

```
>> Log at: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\GA_log_20251114_013311.txt
Loaded 10 TRSV modifier profiles from Excel.
--- Step 1: Reading variable configuration from Excel ---
Cargadas 22 variables paramétricas (Valores asumidos en MILÍMETROS).
Cargadas 4 variables de catálogo.
Loaded 166 frames to read D/C ratio.
Loaded 122 joints for Skew check.
Loaded 80 joints for Horizontal check.
Loaded 2 joints for Angular check (IM19, IM20).
Cargando configuración de Fatiga S11...
    ... Leída hoja de parámetros de Fatiga (FatigueParams).
    ... Leídas 8 listas de frames para Chequeo de Fatiga S11.
--- Master lists built. Total variables: 26 ---
--- Step 2: Attaching to an ALREADY OPEN SAP2000 API instance ---
;Conexión exitosa! Adjuntado a la instancia abierta y modelo
desbloqueado.
--- Step 3: Running initial frame assignment (NewSections) ---
    Asignando prefijo VER... a sección Propiedad "HE450B"
    Asignando prefijo LG... a sección Propiedad "HE450M"
    Asignando prefijo TRS... a sección Propiedad "HE240B"
    Asignando prefijo TRSV... a sección Propiedad "HE240B-A"
    Asignando prefijo R-TR-B... a sección Propiedad "HE360B"
    Asignando prefijo DGA... a sección Propiedad "DGA"
    Asignando prefijo DGB... a sección Propiedad "DGB"
    Asignando prefijo BRT... a sección Propiedad "TC"
    Asignando prefijo BRB... a sección Propiedad "BC"
    Asignando prefijo TRB... a sección Propiedad "TRB"
    Asignando prefijo TRBM... a sección Propiedad "TRBM"
    Asignando prefijo CTB... a sección Propiedad "CTB"
    Asignando prefijo CTT... a sección Propiedad "CTT"
    Asignando prefijo ST-CT-B... a sección Propiedad "ST-CT-B"
    Asignación inicial completada. 454 asignaciones exitosas.
--- Step 4: Starting Genetic Algorithm (GA) ---
>> No previous checkpoint found. Starting from scratch.
```

```
Single objective optimization:
26 Variable(s)
26 Integer variable(s)
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```
Options:
CreationFcn:      @gacreationuniformint
CrossoverFcn:     @crossoverlaplace
SelectionFcn:     @selectiontournament
MutationFcn:      @mutationpower
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=====
--- STARTING GA ITERATION No. 1 ---
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>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 650.0 mm
    BC_tf: 16.0 mm
    BC_tw: 38.0 mm
    TC_h: 700.0 mm
```

TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 20.0 mm
DGB_bf: 600.0 mm
DGB_tf: 32.0 mm
DGB_tw: 30.0 mm
TRB_h: 550.0 mm
TRB_bf: 500.0 mm
TRB_tf: 38.0 mm
TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE340B
LG: HE600M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2615.12 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4024 mm

F60 Dynamic check (L=43.0 m): |U3|=9.40 mm -> X=5.79

L.Inf (2.54) < X (5.79) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3051

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3051) = 9509322.5$ mm

Horizontal check result (R > 6000000.0 mm ?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008728 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9031 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=115.3109,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.8508,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=116.4489,
Limit=118.5185 -> OK
-> Sheet: FramesRSTForFatigue . S11_final=87.8209,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=149.5589,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=186.7240,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=7.7086, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.3299, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2615.12 kN, MaxRatio=3.303, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=4.010e+10
Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 4; [0.7-0.9]: 37;
[0.4-0.7]: 49; [0.1-0.4]: 49; [<=0.1]: 4;

--- STARTING GA ITERATION No. 2 ---

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 40.0 mm
TC_h: 700.0 mm
TC_tf: 20.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 32.0 mm
DGB_tw: 22.0 mm

TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 140.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 15.0 mm
VER: HE600B
TRS: HE280B
LG: HE500M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2641.30 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0897 mm

F60 Dynamic check (L=43.0 m): |U3|=9.09 mm -> X=5.89

L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.9967
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.9967) = 11007698.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007692 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5778 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=92.1011, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=29.0320,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=175.5522,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=147.7705,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=160.0437,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=177.6824,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.8747,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.9612,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2641.30 kN, MaxRatio=120025.562, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.805e+19

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 4; [0.7-0.9]: 17; [0.4-0.7]: 71; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 3 ---

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 12.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 32.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 10.0 mm
CTB_h: 150.0 mm

CTB_tf: 17.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE300B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2040.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9356 mm

F60 Dynamic check (L=43.0 m): |U3|=10.94 mm -> X=5.37

L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.3185
mm

Horizontal check: $R = (43000.0)^2 / (8 * 31.3185) = 7379819.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00017723 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4349 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=229.8045,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=55.4373,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=158.1991,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=138.3419,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=316.6366,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=376.5373,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.7527,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.2097, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2040.24 kN, MaxRatio=100417.523, F60_Dinamico=OK, SkewV=4,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=2.057e+19

Ratio counts by range: [>1.0]: 58; [0.9-1.0]: 7; [0.7-0.9]: 18;
 [0.4-0.7]: 52; [0.1-0.4]: 31; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 4 ---
=====

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>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 350.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 14.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 16.0 mm
CTB_h: 110.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE400B
LG: HE400M
R_TR_B: HE340B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2396.30 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7638 mm

F60 Dynamic check (L=43.0 m): |U3|=9.76 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9427

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.9427) = 10074027.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010988 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2522 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.0647,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.9489,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=199.9220,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=169.4185,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=305.2922,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=312.8628,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)


```
-> Sheet: FramesEBTForFatigue . S11_final=10.6769,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.0396, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2396.30 kN, MaxRatio=145233.865, F60_Dinamico=OK, SkewV=129,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.054e+19

Ratio counts by range: [>1.0]: 41; [0.9-1.0]: 8; [0.7-0.9]: 16;
[0.4-0.7]: 84; [0.1-0.4]: 17; [<=0.1]: 0;

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=====
--- STARTING GA ITERATION No. 5 ---
=====
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>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 18.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 34.0 mm
DGA_tw: 18.0 mm
DGB_bf: 600.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 600.0 mm
TRB_tf: 22.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE200B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2656.30 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.9652 mm

F60 Dynamic check (L=43.0 m): |U3|=8.97 mm -> X=5.93

L.Inf (2.54) < X (5.93) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 131

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0798

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.0798) = 9598297.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008705 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.4622 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=93.2038, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.3196,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.6339,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.3272,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=147.9388,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=184.0046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.2357,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.8988,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2656.30 kN, MaxRatio=1.226, F60_Dinamico=Check, dynamic
analysis required, SkewV=131, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.031e+10
Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 9; [0.7-0.9]: 27; [0.4-
0.7]: 61; [0.1-0.4]: 61; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 6 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 40.0 mm
TC_h: 700.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 19.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE360B
LG: HE400M
R_TR_B: HE360B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2551.68 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.5380 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.54 mm -> X=5.75
```

```
L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 127

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.6801
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.6801) = 9760314.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010795 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0282 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=92.8994, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=40.1379,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=201.2891,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=164.8393,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=275.9564,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=285.6856,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.5526,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.0446,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2551.68 kN, MaxRatio=3.048, F60_Dinamico=Check, dynamic
analysis required, SkewV=127, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.959e+10
Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 0; [0.7-0.9]: 12;
[0.4-0.7]: 86; [0.1-0.4]: 34; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 7 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 32.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 18.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 10.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE220B
LG: HE340M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2203.07 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0105 mm
F60 Dynamic check (L=43.0 m): |U3|=11.01 mm -> X=5.35
L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 232

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7923
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.7923) = 8027320.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008260 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5095 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=91.5280, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.2812,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.4980,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=117.0768,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=119.3519,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=148.0272,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=16.0333,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.6372,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2203.07 kN, MaxRatio=2.567, F60_Dinamico=OK, SkewV=232,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
failures) -> Cost=1.059e+10
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 8; [0.7-0.9]: 26;
[0.4-0.7]: 72; [0.1-0.4]: 31; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 8 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm

```

DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 100.0 mm
CTT_tf: 17.0 mm
CTB_h: 110.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE320B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2503.32 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7227 mm

F60 Dynamic check (L=43.0 m): |U3|=9.72 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.0654
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.0654) = 10474524.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008755 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2146 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=108.6928,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.4933,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=151.7399,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=121.9828,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=161.6263,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=186.3268,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8005,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.3250, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2503.32 kN, MaxRatio=145776.320, F60_Dinamico=Check, dynamic
analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.320e+19
Ratio counts by range: [>1.0]: 47; [0.9-1.0]: 3; [0.7-0.9]: 18;
[0.4-0.7]: 52; [0.1-0.4]: 46; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 9 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 24.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 12.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 34.0 mm
DGB_tw: 22.0 mm
TRB_h: 550.0 mm
TRB_bf: 700.0 mm

TRB_tf: 32.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE320B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2607.83 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7622 mm

F60 Dynamic check (L=43.0 m): |U3|=9.76 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.8856
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.8856) = 11066242.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005879 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2530 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=74.5052, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.7503,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.1577,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=146.4606,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=110.5307,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=140.6503,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.4745,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7472,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2607.83 kN, MaxRatio=1.823, F60_Dinamico=OK, SkewV=50,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.175e+09

```

```

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 2; [0.7-0.9]: 18;
[0.4-0.7]: 74; [0.1-0.4]: 43; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 10 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 10.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 18.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 18.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE360B

```

TRS: HE320B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2236.26 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9776 mm

F60 Dynamic check (L=43.0 m): |U3|=9.98 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 68

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.6962
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.6962) = 8345018.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013841 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4753 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=174.2782,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=43.8164,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=189.3657,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=183.3488,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=241.1408,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=294.4440,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.2992,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.4450, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2236.26 kN, MaxRatio=99126.543, F60_Dinamico=OK, SkewV=68,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.197e+19

```

```

    Ratio counts by range: [>1.0]: 52; [0.9-1.0]: 14; [0.7-0.9]: 5;
[0.4-0.7]: 46; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 11 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 16.0 mm
    BC_tw: 28.0 mm
    TC_h: 600.0 mm
    TC_tf: 38.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 600.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 38.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 100.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 13.0 mm
    VER: HE400B
    TRS: HE260B
    LG: HE340M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2381.21 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.0981 mm
F60 Dynamic check (L=43.0 m): |U3|=9.10 mm -> X=5.88
L.Inf (2.54) < X (5.88) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 225

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.8504
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.8504) = 8011145.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010805 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5961 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=114.7299,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=31.9639,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=216.3147,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.3790,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=175.7233,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=217.8755,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.8010,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.0606,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2381.21 kN, MaxRatio=166390.813, F60_Dinamico=Check, dynamic analysis required, SkewV=225, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=6.593e+19

Ratio counts by range: [>1.0]: 57; [0.9-1.0]: 7; [0.7-0.9]: 23; [0.4-0.7]: 26; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 12 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 12.0 mm
DGB_bf: 550.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 900.0 mm
TRB_bf: 700.0 mm
TRB_tf: 36.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 140.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 13.0 mm
VER: HE600B
TRS: HE320B
LG: HE320M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 3000.66 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.4989 mm

F60 Dynamic check (L=43.0 m): |U3|=8.50 mm -> X=6.09

L.Inf (2.54) < X (6.09) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 273

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.3143 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 16.3143) = 14167059.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00004561 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 15.9886 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=63.8059, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=17.5639,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=165.5210,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=104.5268,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=66.2220, Limit=92.5926
 -> OK
 -> Sheet: FramesEBBForFatigue . S11_final=82.5616, Limit=92.5926
 -> OK
 -> Sheet: FramesEBTForFatigue . S11_final=10.6307,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=8.9958, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (1 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=3000.66 kN, MaxRatio=104736.331, F60_Dinamico=Check, dynamic analysis required, SkewV=273, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (1 failures) -> Cost=3.292e+19

Ratio counts by range: [>1.0]: 17; [$0.9-1.0$]: 7; [$0.7-0.9$]: 15;
[$0.4-0.7$]: 42; [$0.1-0.4$]: 85; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 13 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 28.0 mm
TC_h: 800.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 34.0 mm
DGA_tw: 16.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 26.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 38.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 19.0 mm
CTB_h: 130.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE340B
LG: HE360M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2542.35 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6013 mm

F60 Dynamic check (L=43.0 m): |U3|=9.60 mm -> X=5.73

L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71


```

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 182

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1692
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.1692) = 10425518.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007825 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0961 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.6901,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.0616,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=157.9664,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=108.2168,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=145.3527,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=182.1567,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.6396,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.8278, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2542.35 kN, MaxRatio=116902.711, F60_Dinamico=Check, dynamic
analysis required, SkewV=182, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.474e+19
Ratio counts by range: [>1.0]: 51; [0.9-1.0]: 5; [0.7-0.9]: 39;
[0.4-0.7]: 26; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 14 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 800.0 mm

```

BC_tf: 36.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 40.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 26.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 28.0 mm
TRB_tw: 18.0 mm
CTT_h: 130.0 mm
CTT_tf: 13.0 mm
CTB_h: 140.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE200B
LG: HE340M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2269.64 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2504 mm

F60 Dynamic check (L=43.0 m): |U3|=9.25 mm -> X=5.84

L.Inf (2.54) < X (5.84) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 218

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.6261 mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.6261) = 7801389.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011688 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7510 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=89.1870, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=33.0689,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=194.4992,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=129.9436,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=173.0924,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=212.1093,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=16.1557,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=17.1973,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2269.64 kN, MaxRatio=114948.098, F60_Dinamico=Check, dynamic analysis required, SkewV=218, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.999e+19

Ratio counts by range: [>1.0): 40; [$0.9-1.0$): 10; [$0.7-0.9$): 36; [$0.4-0.7$): 38; [$0.1-0.4$): 42; [≤ 0.1): 0;

===
--- STARTING GA ITERATION No. 15 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 24.0 mm

BC_tw: 38.0 mm

TC_h: 550.0 mm

TC_tf: 22.0 mm

TC_tw: 38.0 mm

DGA_bf: 450.0 mm

DGA_tf: 28.0 mm

DGA_tw: 14.0 mm

DGB_bf: 400.0 mm
DGB_tf: 34.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE200B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2336.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4583 mm

F60 Dynamic check (L=43.0 m): |U3|=9.46 mm -> X=5.77

L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.1890
mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.1890) = 7655928.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012871 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9569 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=97.9955, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.4045,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=162.8379,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=144.7667,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=209.8387,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=241.8916,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=20.7915,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=22.6718,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2336.94 kN, MaxRatio=2.461, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.866e+10
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 1; [0.7-0.9]: 22;
[0.4-0.7]: 81; [0.1-0.4]: 38; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 16 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 40.0 mm
BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 600.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 350.0 mm
DGB_tf: 32.0 mm
DGB_tw: 30.0 mm
TRB_h: 800.0 mm
TRB_bf: 650.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm

CTT_tf: 13.0 mm
CTB_h: 140.0 mm
CTB_tf: 20.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE400B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2513.56 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7244 mm

F60 Dynamic check (L=43.0 m): |U3|=9.72 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.4436
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.4436) = 10298024.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007740 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2224 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=105.0134,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue . S11_final=29.4522,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=142.1321,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=119.3222,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=103.8928,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=127.3505,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=7.6113, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.3129, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2513.56 kN, MaxRatio=103929.817, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.715e+19

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 3; [0.7-0.9]: 7; [0.4-0.7]: 88; [0.1-0.4]: 44; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 17 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 10.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 14.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 16.0 mm
CTB_h: 120.0 mm
CTB_tf: 13.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE300B
LG: HE500M

```

R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2183.26 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7811 mm

F60 Dynamic check (L=43.0 m): |U3|=10.78 mm -> X=5.41

L.Inf (2.54) < X (5.41) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.0686
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.0686) = 10019042.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007447 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2651 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=141.0773,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.4189,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=177.5577,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=267.0887,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=152.1991,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)


```
-> Sheet: FramesEBBForFatigue . S11_final=194.4785,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.7590,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.4158,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2183.26 kN, MaxRatio=138645.655, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.197e+19

Ratio counts by range: [>1.0]: 59; [0.9-1.0]: 11; [0.7-0.9]: 13;
[0.4-0.7]: 54; [0.1-0.4]: 29; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 18 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 26.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 30.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 26.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 20.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 130.0 mm
CTB_tf: 20.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE240B
LG: HE320M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2106.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5335 mm

F60 Dynamic check (L=43.0 m): |U3|=10.53 mm -> X=5.47

L.Inf (2.54) < X (5.47) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 267

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.8409
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 28.8409) = 8013790.4$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00013205 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.0294 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=161.8942,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=48.9017,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=221.1690,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=157.2341,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=264.4847,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=328.1308,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=15.5516,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=14.1106,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2106.58 kN, MaxRatio=115503.334, F60_Dinamico=OK, SkewV=267,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.810e+19

Ratio counts by range: [>1.0]: 49; [0.9-1.0]: 11; [0.7-0.9]: 14;
[0.4-0.7]: 64; [0.1-0.4]: 28; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 19 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 12.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 34.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 34.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 26.0 mm
CTT_h: 100.0 mm
CTT_tf: 15.0 mm
CTB_h: 100.0 mm
CTB_tf: 12.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE300M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2248.66 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6637 mm

F60 Dynamic check (L=43.0 m): |U3|=9.66 mm -> X=5.71

L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 307

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.0290 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 30.0290) = 7696722.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008839 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.1625 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=117.4251,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=27.5792,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=196.4613,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=151.1092,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=150.0983,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=187.7488,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=13.3456,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.1069,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2248.66 kN, MaxRatio=168977.862, F60_Dinamico=Check, dynamic analysis required, SkewV=307, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=6.421e+19
 Ratio counts by range: [>1.0]: 70; [0.9-1.0]: 8; [0.7-0.9]: 44; [0.4-0.7]: 9; [0.1-0.4]: 35; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 20 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 550.0 mm
BC_tf: 38.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 38.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE220B
LG: HE450M
R_TR_B: HE240B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2544.13 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.0338 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.03 mm -> X=5.91
```

```
L.Inf (2.54) < X (5.91) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2476
mm
Horizontal check: $R = (43000.0)^2 / (8 * 27.2476) = 8482399.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012089 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.5313 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=117.5873,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=48.3120,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=185.6321,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=215.0720,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=310.9297,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=373.0581,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.2194,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.0064,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2544.13 kN, MaxRatio=2.658, F60_Dinamico=Check, dynamic
analysis required, SkewV=50, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.383e+10
Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 3; [0.7-0.9]: 15;
[0.4-0.7]: 84; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 21 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 10.0 mm
BC_tw: 38.0 mm
TC_h: 650.0 mm

TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 550.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE240B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2238.93 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5661 mm

F60 Dynamic check (L=43.0 m): |U3|=10.57 mm -> X=5.46

L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 181

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.5940

mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.5940) = 7809857.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010927 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0564 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=133.1226,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=55.8920,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=219.3093,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=163.6843,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=446.0883,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=527.9327,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.3865,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=18.8892,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2238.93 kN, MaxRatio=2.119, F60_Dinamico=OK, SkewV=181,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.967e+09
Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 14; [0.7-0.9]: 10;
[0.4-0.7]: 69; [0.1-0.4]: 20; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 22 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 26.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 32.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm

TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE260B
LG: HE600M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2449.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7661 mm

F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1813

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.1813) = 9178425.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009347 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2653 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=121.6975,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.9953,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=123.8225,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=99.9056,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=139.8333,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=173.2417,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.3292,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.2739,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2449.79 kN, MaxRatio=1.398, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.851e+08

```

```

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 6; [0.7-0.9]: 31;
[0.4-0.7]: 53; [0.1-0.4]: 53; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 23 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 36.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 10.0 mm
TRB_h: 600.0 mm
TRB_bf: 500.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 120.0 mm
CTB_tf: 11.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm

```

VER: HE550B
TRS: HE260B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2579.51 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4628 mm

F60 Dynamic check (L=43.0 m): |U3|=9.46 mm -> X=5.77

L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.5696
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.5696) = 10240553.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007142 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9543 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=79.1709, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=32.5411,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=141.6978,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRSTForFatigue . S11_final=104.3949,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=139.9645,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesEBBForFatigue . S11_final=173.7147,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBTForFatigue . S11_final=16.6895,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=15.1598,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2579.51 kN, MaxRatio=143491.707, F60_Dinamico=Check, dynamic analysis required, SkewV=2, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=5.311e+19

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 11; [0.7-0.9]: 20; [0.4-0.7]: 54; [0.1-0.4]: 37; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 24 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 36.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 450.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE220B
LG: HE360M
R_TR_B: HE240B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2656.11 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.0595 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.06 mm -> X=5.90
    L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required
    Starting Skew check for 16 combinations...
        Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
        Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
        Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
        Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
        Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
        Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
        Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
        Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
        Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
        Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
        Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
        Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
        Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
        Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
        Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
        Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
    Skew check completed. Total violations (> 0.8 mm): 195

    Starting Horizontal U2 check for 24 combinations...
    Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.2346
mm
    Horizontal check:  $R = (43000.0)^2 / (8 * 25.2346) = 9159054.1$  mm
    Horizontal check result ( $R > 6000000.0$  mm?): OK

    Starting Angular (Rotation) check for 24 combinations...
    Angular check completed. Max Theta (abs): 0.00010126 rad (Limit:
0.002000). Estado: OK

    Starting Vertical (F60) check for 288 combinations...
    Vertical (F60) check completed. Max U3 (abs): 16.5579 mm (Limit:
71.6667 mm). Estado: OK

    Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
        -> Sheet: FramesWBTForFatigue . S11_final=93.6553, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
        -> Sheet: FramesRBTForFatigue . S11_final=28.2161,
Limit=118.5185 -> OK
        -> Sheet: FramesWSTForFatigue . S11_final=206.1722,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
        -> Sheet: FramesRSTForFatigue . S11_final=212.9228,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
        -> Sheet: FramesIBBForFatigue . S11_final=157.6259,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
        -> Sheet: FramesEBBForFatigue . S11_final=188.4413,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
        -> Sheet: FramesEBTForFatigue . S11_final=14.4086,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=11.8948,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2656.11 kN, MaxRatio=1.583, F60_Dinamico=Check, dynamic
analysis required, SkewV=195, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.278e+10
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 12; [0.7-0.9]: 14;
[0.4-0.7]: 72; [0.1-0.4]: 51; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 25 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 10.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 600.0 mm
DGB_tf: 34.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE600B
TRS: HE260B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2809.19 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.1814 mm
F60 Dynamic check (L=43.0 m): |U3|=9.18 mm -> X=5.86
L.Inf (2.54) < X (5.86) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.0332
mm
Horizontal check: $R = (43000.0)^2 / (8 * 20.0332) = 11537086.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007572 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.6723 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=152.9103,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.3023,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=149.7763,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=128.5018,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=152.0640,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=184.6591,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.1805,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.2861,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2809.19 kN, MaxRatio=3.081, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.062e+10
Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 9; [0.7-0.9]: 9; [0.4-
0.7]: 17; [0.1-0.4]: 77; [<=0.1]: 8;
>> Snapshot iter 25 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_025_20251114_013311.mat
```

```
=====
--- STARTING GA ITERATION No. 26 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 550.0 mm
BC_tf: 20.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 20.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 20.0 mm
DGB_bf: 600.0 mm
DGB_tf: 18.0 mm
DGB_tw: 26.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 17.0 mm
CTB_h: 140.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE240B
LG: HE550M
R_TR_B: HE320B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2120.58 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.6825 mm
F60 Dynamic check (L=43.0 m): |U3|=10.68 mm -> X=5.43
L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```


Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 32.1497
mm
Horizontal check: $R = (43000.0)^2 / (8 * 32.1497) = 7189024.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008784 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.1831 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.7406,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.3474,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=133.1326,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=108.8433,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=125.7669,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=157.7429,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=17.2812,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.9613,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2120.58 kN, MaxRatio=119191.629, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.013e+19
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 4; [0.7-0.9]: 35;
[0.4-0.7]: 51; [0.1-0.4]: 41; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 27 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 350.0 mm
DGB_tf: 38.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 14.0 mm
CTB_h: 140.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE360B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2411.48 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6870 mm

F60 Dynamic check (L=43.0 m): |U3|=9.69 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

```

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 64

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0151
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.0151) = 9624154.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007610 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1865 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=89.5221, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=26.0544,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=163.4521,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=265.5614,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=110.8694,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=137.0084,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=7.9246, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.1205, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2411.48 kN, MaxRatio=109794.792, F60_Dinamico=Check, dynamic
analysis required, SkewV=64, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.907e+19
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 9; [0.7-0.9]: 13;
[0.4-0.7]: 76; [0.1-0.4]: 41; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 28 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 18.0 mm

```

TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 38.0 mm
DGA_tw: 22.0 mm
DGB_bf: 350.0 mm
DGB_tf: 40.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 22.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 14.0 mm
CTB_h: 130.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE200B
LG: HE600M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2595.34 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6953 mm

F60 Dynamic check (L=43.0 m): |U3|=8.70 mm -> X=6.02

L.Inf (2.54) < X (6.02) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.1006

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.1006) = 9589995.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009636 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.1910 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=85.7961, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.5794,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=153.3878,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=177.2116,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=165.3496,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=179.3043,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=16.6535,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.2783,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2595.34 kN, MaxRatio=124373.914, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.015e+19
Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 2; [0.7-0.9]: 16;
[0.4-0.7]: 74; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 29 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 12.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 26.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm

TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE400B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2410.02 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4208 mm

F60 Dynamic check (L=43.0 m): |U3|=10.42 mm -> X=5.50

L.Inf (2.54) < X (5.50) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.2233

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.2233) = 10890130.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007153 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9186 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=94.6346, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.3476,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=146.6776,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.5169,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=100.5198,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=122.9386,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.3399, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.5505, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2410.02 kN, MaxRatio=6.552, F60_Dinamico=OK, SkewV=8,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=7.459e+10

Ratio counts by range: [>1.0]: 50; [0.9-1.0]: 11; [0.7-0.9]: 15;
 [0.4-0.7]: 39; [0.1-0.4]: 51; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 30 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 40.0 mm
DGA_tw: 24.0 mm
DGB_bf: 350.0 mm
DGB_tf: 36.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 120.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm

```

VER: HE340B
TRS: HE260B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2281.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0288 mm

F60 Dynamic check (L=43.0 m): |U3|=9.03 mm -> X=5.91

L.Inf (2.54) < X (5.91) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.7540
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.7540) = 7767853.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013509 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5288 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=98.8616, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.3627,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=167.8533,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)


```

    -> Sheet: FramesRSTForFatigue . S11_final=131.6351,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=201.2501,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=244.3097,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=12.9041,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.7544, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2281.94 kN, MaxRatio=145543.021, F60_Dinamico=Check, dynamic analysis required, SkewV=50, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.834e+19

Ratio counts by range: [>1.0]: 48; [0.9-1.0]: 7; [0.7-0.9]: 19; [0.4-0.7]: 70; [0.1-0.4]: 22; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 31 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 12.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 30.0 mm
DGB_tw: 30.0 mm
TRB_h: 900.0 mm
TRB_bf: 600.0 mm
TRB_tf: 26.0 mm
TRB_tw: 28.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 100.0 mm
CTB_tf: 20.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE220B
LG: HE450M
R_TR_B: HE240B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2541.92 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.0923 mm
F60 Dynamic check (L=43.0 m): |U3|=9.09 mm -> X=5.89
L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 72

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.3421
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.3421) = 9901621.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007556 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5887 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=104.2726,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=23.7265,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=180.1416,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.2967,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=121.5860,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=149.2283,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=14.9659,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.2676,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2541.92 kN, MaxRatio=150973.596, F60_Dinamico=Check, dynamic
analysis required, SkewV=72, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.794e+19

Ratio counts by range: [>1.0]: 48; [0.9-1.0]: 6; [0.7-0.9]: 20;
[0.4-0.7]: 55; [0.1-0.4]: 37; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 32 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 24.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 40.0 mm
DGA_tw: 30.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 900.0 mm
TRB_bf: 650.0 mm
TRB_tf: 14.0 mm
TRB_tw: 18.0 mm
CTT_h: 110.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE260B
LG: HE450M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2293.41 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9046 mm
F60 Dynamic check (L=43.0 m): |U3|=9.90 mm -> X=5.64
L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 85

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.5566
mm
Horizontal check: $R = (43000.0)^2 / (8 * 20.5566) = 11243323.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012326 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3993 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=110.0003,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.2540,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=227.2146,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=196.7875,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.8553,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=222.1402,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.3673,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.9136,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2293.41 kN, MaxRatio=3.111, F60_Dinamico=OK, SkewV=85,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.228e+10

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 5; [0.7-0.9]: 21;
[0.4-0.7]: 58; [0.1-0.4]: 50; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 33 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 10.0 mm
TRB_h: 900.0 mm
TRB_bf: 600.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE340B
LG: HE300M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2515.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6969 mm

F60 Dynamic check (L=43.0 m): |U3|=9.70 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 310

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.5296
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 18.5296) = 12473305.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006255 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1922 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=76.3629, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=20.6129,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=188.2171,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=123.7844,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBFForFatigue . S11_final=95.9251, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBFForFatigue . S11_final=119.1460,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.4559, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.9145, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2515.58 kN, MaxRatio=2.248, F60_Dinamico=Check, dynamic
analysis required, SkewV=310, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.697e+10
Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 3; [0.7-0.9]: 10;
[0.4-0.7]: 58; [0.1-0.4]: 72; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 34 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 34.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 22.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 19.0 mm
CTB_h: 150.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 15.0 mm
VER: HE500B
TRS: HE360B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2310.58 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0091 mm
F60 Dynamic check (L=43.0 m): |U3|=10.01 mm -> X=5.61
L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 204

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.2278
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.2278) = 10887837.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010977 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4976 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=146.9970,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.2086,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=243.7263,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=230.6014,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=210.1651,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=228.7335,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8654,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8343, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2310.58 kN, MaxRatio=99080.245, F60_Dinamico=OK, SkewV=204,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.268e+19
Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 9; [0.7-0.9]: 20;
[0.4-0.7]: 31; [0.1-0.4]: 67; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 35 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm

```


DGA_tf: 26.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 34.0 mm
DGB_tw: 26.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 20.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE300B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2350.96 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4365 mm

F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.0821
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.0821) = 8861456.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010057 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9364 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=85.9295, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=28.1567,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=170.8020,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=143.9170,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=139.6920,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=170.1383,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=9.9348, Limit=118.5185
-> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.5395,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2350.96 kN, MaxRatio=95057.412, F60_Dinamico=Check, dynamic analysis required, SkewV=69, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.124e+19

Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 4; [0.7-0.9]: 19; [0.4-0.7]: 66; [0.1-0.4]: 47; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 36 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 26.0 mm

BC_tw: 36.0 mm

TC_h: 550.0 mm

TC_tf: 36.0 mm

TC_tw: 34.0 mm

DGA_bf: 450.0 mm

DGA_tf: 32.0 mm

DGA_tw: 12.0 mm

DGB_bf: 550.0 mm

DGB_tf: 34.0 mm

DGB_tw: 20.0 mm

TRB_h: 750.0 mm

TRB_bf: 500.0 mm

TRB_tf: 32.0 mm

TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 15.0 mm
CTB_h: 130.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE320B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2490.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0904 mm

F60 Dynamic check (L=43.0 m): |U3|=9.09 mm -> X=5.89

L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.5332
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.5332) = 9420909.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009868 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5896 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=91.7057, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.7617,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=173.8820,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=132.5295,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=143.9175,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=176.6199,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.2699, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.5058, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2490.49 kN, MaxRatio=121049.288, F60_Dinamico=Check, dynamic analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.649e+19

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 3; [0.7-0.9]: 11; [0.4-0.7]: 78; [0.1-0.4]: 43; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 37 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 34.0 mm
DGB_tw: 26.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 130.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE360B

```

TRS: HE400B
LG: HE360M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2458.99 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1045 mm

F60 Dynamic check (L=43.0 m): |U3|=9.10 mm -> X=5.88

L.Inf (2.54) < X (5.88) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 187

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2660
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.2660) = 8476686.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014175 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6024 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=116.4738,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=49.5964,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=202.1449,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=159.9954,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=260.5308,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=323.5201,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.2148, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.6886, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2458.99 kN, MaxRatio=124896.431, F60_Dinamico=Check, dynamic
analysis required, SkewV=187, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.836e+19
    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 7; [0.7-0.9]: 32;
[0.4-0.7]: 74; [0.1-0.4]: 32; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 38 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 14.0 mm
    BC_tw: 26.0 mm
    TC_h: 700.0 mm
    TC_tf: 30.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 350.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 18.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 15.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 10.0 mm
    VER: HE340B
    TRS: HE220B
    LG: HE600M
    R_TR_B: HE320B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2033.25 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -11.3132 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.31 mm -> X=5.28
 L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.4209
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 31.4209) = 7355770.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00016753 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.8128 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=175.1314,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=46.4591,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=147.9858,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=121.9639,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=271.3391,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=328.2936,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=18.1721,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=18.1383,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2033.25 kN, MaxRatio=93102.066, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.762e+19
    Ratio counts by range: [>1.0]: 51; [0.9-1.0]: 10; [0.7-0.9]: 23;
[0.4-0.7]: 44; [0.1-0.4]: 38; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 39 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 550.0 mm
    BC_tf: 34.0 mm
    BC_tw: 40.0 mm
    TC_h: 500.0 mm
    TC_tf: 18.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 600.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 28.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 700.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 17.0 mm
    CTB_h: 120.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE240B
    LG: HE500M
    R_TR_B: HE320B
-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2423.74 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.5636 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.56 mm -> X=5.74
    L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```


Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 28

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.8845 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.8845) = 8929082.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007836 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.0580 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=94.4252, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=33.2040,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=152.1862,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=117.4400,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=121.8038,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=152.9445,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=17.1634,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=17.1250,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2423.74 kN, MaxRatio=138092.834, F60_Dinamico=Check, dynamic analysis required, SkewV=28, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.622e+19

Ratio counts by range: [>1.0]: 38; [$0.9-1.0$]: 3; [$0.7-0.9$]: 2; [$0.4-0.7$]: 87; [$0.1-0.4$]: 36; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 40 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 20.0 mm
TC_tw: 40.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 24.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 26.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE550B
TRS: HE200B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2298.11 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8194 mm
F60 Dynamic check (L=43.0 m): |U3|=9.82 mm -> X=5.66
L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9737
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.9737) = 8568546.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008003 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3102 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=121.7952,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=43.7291,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=154.6600,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=213.4372,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=191.5925,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=252.3036,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=18.8866,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.4088,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2298.11 kN, MaxRatio=2.090, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.396e+09
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 2; [0.7-0.9]: 13;
[0.4-0.7]: 78; [0.1-0.4]: 44; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 41 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 18.0 mm

```

BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 34.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 12.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE220B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2249.60 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5770 mm

F60 Dynamic check (L=43.0 m): |U3|=10.58 mm -> X=5.46

L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 202

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.2572

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.2572) = 8802363.6$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009452 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0771 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=113.0973,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.0853,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=185.9289,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=156.1557,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=143.4825,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=175.4896,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.6851,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.1798,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2249.60 kN, MaxRatio=1.971, F60_Dinamico=OK, SkewV=202,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=6.780e+09

Ratio counts by range: [>1.0]: 31; [$0.9-1.0$]: 4; [$0.7-0.9$]: 33;
[$0.4-0.7$]: 47; [$0.1-0.4$]: 51; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 42 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 12.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm

DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 34.0 mm
TRB_tw: 26.0 mm
CTT_h: 100.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE320B
LG: HE400M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2243.28 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1977 mm

F60 Dynamic check (L=43.0 m): |U3|=10.20 mm -> X=5.56

L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 122

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.5065

mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.5065) = 11270793.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010134 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6904 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

- > Sheet: FramesWBTForFatigue . S11_final=94.3133, Limit=92.5926
- > NOT OK! (Cumulative failures: 1)
- > Sheet: FramesRBTForFatigue . S11_final=35.7068, Limit=118.5185 -> OK
- > Sheet: FramesWSTForFatigue . S11_final=163.7084, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
- > Sheet: FramesRSTForFatigue . S11_final=119.5078, Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
- > Sheet: FramesIBBForFatigue . S11_final=185.0843, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
- > Sheet: FramesEBBForFatigue . S11_final=226.2253, Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
- > Sheet: FramesEBTForFatigue . S11_final=9.8422, Limit=118.5185
- > OK
- > Sheet: FramesIBTForFatigue . S11_final=9.3794, Limit=118.5185
- > OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2243.28 kN, MaxRatio=101161.368, F60_Dinamico=OK, SkewV=122, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.296e+19

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 6; [0.7-0.9]: 22; [0.4-0.7]: 72; [0.1-0.4]: 37; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 43 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 800.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 350.0 mm
DGB_tf: 30.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 32.0 mm
TRB_tw: 30.0 mm
CTT_h: 170.0 mm
CTT_tf: 16.0 mm
CTB_h: 150.0 mm

CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE340B
LG: HE500M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2393.39 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0949 mm

F60 Dynamic check (L=43.0 m): |U3|=10.09 mm -> X=5.59

L.Inf (2.54) < X (5.59) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 26

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.9112
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.9112) = 9277965.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010378 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5952 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=96.0249, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.6986,
Limit=118.5185 -> OK


```

    -> Sheet: FramesWSTForFatigue . S11_final=142.2587,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=105.7848,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=154.9716,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=192.5032,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=8.9662, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.9170, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2393.39 kN, MaxRatio=96170.825, F60_Dinamico=OK, SkewV=26,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=2.214e+19

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 11; [0.7-0.9]: 46;
 [0.4-0.7]: 46; [0.1-0.4]: 43; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 44 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 500.0 mm
BC_tf: 12.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 36.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 12.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 150.0 mm
CTB_tf: 20.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 15.0 mm
VER: HE500B
TRS: HE340B
LG: HE600M
R_TR_B: HE340B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2283.67 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5545 mm

F60 Dynamic check (L=43.0 m): |U3|=10.55 mm -> X=5.46

L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.9206

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.9206) = 9274461.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011790 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0421 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=189.5046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=51.7359,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=144.5145,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=114.0403,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=342.9351,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=461.9647,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```
-> Sheet: FramesEBTForFatigue . S11_final=13.4843,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1261,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2283.67 kN, MaxRatio=97076.855, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.152e+19

Ratio counts by range: [>1.0]: 42; [0.9-1.0]: 11; [0.7-0.9]: 25;
[0.4-0.7]: 52; [0.1-0.4]: 36; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 45 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE320B
LG: HE500M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2150.61 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1224 mm
F60 Dynamic check (L=43.0 m): |U3|=10.12 mm -> X=5.58
L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7016
mm
Horizontal check: $R = (43000.0)^2 / (8 * 28.7016) = 8052679.8$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011763 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6222 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=104.7705,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.7540,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=192.4455,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=339.4891,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=181.8095,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=220.6302,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.1999, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.7539, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2150.61 kN, MaxRatio=2.260, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.954e+09

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 20;
[0.4-0.7]: 71; [0.1-0.4]: 34; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 46 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 12.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 10.0 mm
CTB_h: 130.0 mm
CTB_tf: 16.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE200B
LG: HE320M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2112.95 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.5105 mm
F60 Dynamic check (L=43.0 m): |U3|=10.51 mm -> X=5.48
L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 262

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.7173
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 29.7173) = 7777453.3$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00014634 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.0091 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=166.5031,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=40.7080,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=226.9731,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=178.7192,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=279.2800,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=338.9601,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=15.9848,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.2925,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2112.95 kN, MaxRatio=125075.072, F60_Dinamico=OK, SkewV=262,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.305e+19
 Ratio counts by range: [>1.0]: 64; [0.9-1.0]: 11; [0.7-0.9]: 5;
 [0.4-0.7]: 44; [0.1-0.4]: 42; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 47 ---
 =====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 12.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 32.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 600.0 mm
TRB_bf: 350.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 19.0 mm
CTB_h: 110.0 mm
CTB_tf: 11.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE360B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1963.82 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.3485 mm
F60 Dynamic check (L=43.0 m): |U3|=11.35 mm -> X=5.27
L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 32.8894
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 32.8894) = 7027348.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013646 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.8454 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=195.2804,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=52.7976,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=163.7716,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.9815,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=227.3612,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=281.9390,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.8940,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.3903, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1963.82 kN, MaxRatio=160264.599, F60_Dinamico=OK, SkewV=52,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.044e+19
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 13; [0.7-0.9]: 18;
[0.4-0.7]: 57; [0.1-0.4]: 18; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 48 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm

```


DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 40.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE340B
LG: HE320M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2416.22 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9961 mm

F60 Dynamic check (L=43.0 m): |U3|=11.00 mm -> X=5.35

L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 270

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 15.9013

mm

Horizontal check: $R = (43000.0)^2 / (8 * 15.9013) = 14535015.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006040 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4817 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=97.1857, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=23.2328,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=169.0449,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=147.3256,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=101.8034,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=127.6870,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4184,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.2466, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2416.22 kN, MaxRatio=2.095, F60_Dinamico=OK, SkewV=270,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.542e+09
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 2; [0.7-0.9]: 27;
[0.4-0.7]: 63; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 49 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 22.0 mm
BC_tw: 36.0 mm
TC_h: 750.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 40.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 38.0 mm
DGB_tw: 12.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 18.0 mm
CTT_h: 170.0 mm

CTT_tf: 12.0 mm
CTB_h: 150.0 mm
CTB_tf: 20.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 14.0 mm
VER: HE400B
TRS: HE260B
LG: HE400M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2465.76 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7355 mm

F60 Dynamic check (L=43.0 m): |U3|=9.74 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 131

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3229
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3229) = 9502343.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009045 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2322 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=127.6029,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue . S11_final=32.4548,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=179.2182,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=211.8100,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=133.2533,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=166.6968,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.8990,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.2187,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2465.76 kN, MaxRatio=97092.345, F60_Dinamico=Check, dynamic analysis required, SkewV=131, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.324e+19

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 9; [0.7-0.9]: 37; [0.4-0.7]: 39; [0.1-0.4]: 50; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 50 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 8.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 18.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 14.0 mm
TRB_h: 850.0 mm
TRB_bf: 350.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 110.0 mm
CTT_tf: 16.0 mm
CTB_h: 120.0 mm
CTB_tf: 10.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE280B
LG: HE500M

```

R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2131.63 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9092 mm

F60 Dynamic check (L=43.0 m): |U3|=10.91 mm -> X=5.37

L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.2186
mm

Horizontal check: $R = (43000.0)^2 / (8 * 31.2186) = 7403443.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00016171 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4072 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=189.5685,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=37.6024,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=178.2523,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=160.8342,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=299.0989,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```

    -> Sheet: FramesEBBForFatigue . S11_final=351.8433,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.9096,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.0272,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2131.63 kN, MaxRatio=148651.708, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.710e+19

```

```

    Ratio counts by range: [>1.0]: 84; [0.9-1.0]: 2; [0.7-0.9]: 2; [0.4-
0.7]: 52; [0.1-0.4]: 26; [<=0.1]: 0;

```

```

>> Snapshot iter 50 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_050_20251114_013311.mat

```

Generation	Func-count	Best Penalty	Mean Penalty	Stall Generations
------------	------------	-----------------	-----------------	----------------------

```

=====

```

```

--- STARTING GA ITERATION No. 51 ---

```

```

=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 34.0 mm
    BC_tw: 26.0 mm
    TC_h: 600.0 mm
    TC_tf: 32.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 32.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 32.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 17.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 13.0 mm
    VER: HE360B
    TRS: HE260B
    LG: HE600M
    R_TR_B: HE340B

```

```

-----
Running analysis...

```

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2449.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7661 mm

F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1813 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.1813) = 9178425.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009347 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2653 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=121.6975,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.9953,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=123.8225,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=99.9056,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=139.8333,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=173.2417,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=14.3292,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.2739,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2449.79 kN, MaxRatio=1.398, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.851e+08

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 6; [0.7-0.9]: 31;
[0.4-0.7]: 53; [0.1-0.4]: 53; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 52 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 8.0 mm
BC_tw: 26.0 mm
TC_h: 500.0 mm
TC_tf: 12.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 10.0 mm
DGB_bf: 350.0 mm
DGB_tf: 14.0 mm
DGB_tw: 10.0 mm
TRB_h: 550.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 18.0 mm
CTT_h: 100.0 mm
CTT_tf: 10.0 mm
CTB_h: 100.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE200B
LG: HE300M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1329.91 kN
U3 displacement at F60 (COMB01-PER-LOAD): -15.4314 mm
F60 Dynamic check (L=43.0 m): |U3|=15.43 mm -> X=4.52
L.Inf (2.54) < X (4.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 312

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 47.5851
mm
Horizontal check: $R = (43000.0)^2 / (8 * 47.5851) = 4857091.6$ mm
Horizontal check result ($R > 6000000.0$ mm?): NOT OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00023982 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 22.9296 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=319.0966,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=83.0072,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=277.8087,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=345.7300,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=517.0108,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=652.2781,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=22.5822,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.3555,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=1329.91 kN, MaxRatio=187769.193, F60_Dinamico=OK, SkewV=312,
HorizCheck=NOT OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK
(5 failures) -> Cost=4.689e+19

Ratio counts by range: [>1.0]: 126; [0.9-1.0]: 3; [0.7-0.9]: 7;
[0.4-0.7]: 26; [0.1-0.4]: 4; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 53 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 14.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 18.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 26.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 18.0 mm
CTB_h: 140.0 mm
CTB_tf: 13.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE550B
TRS: HE320B
LG: HE320M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2170.27 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.3396 mm
F60 Dynamic check (L=43.0 m): |U3|=11.34 mm -> X=5.27
L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 273

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.6345
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.6345) = 10211176.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006612 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.8217 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=157.9277,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=34.6963,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=201.3789,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=266.0489,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=145.8643,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=187.0147,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=14.4089,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.0288,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2170.27 kN, MaxRatio=120262.331, F60_Dinamico=OK, SkewV=273,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.139e+19
 Ratio counts by range: [>1.0]: 45; [0.9-1.0]: 12; [0.7-0.9]: 24;
 [0.4-0.7]: 50; [0.1-0.4]: 35; [<=0.1]: 0;

--- STARTING GA ITERATION No. 54 ---

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 12.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE340B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2175.48 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.7864 mm
F60 Dynamic check (L=43.0 m): |U3|=10.79 mm -> X=5.40
L.Inf (2.54) < X (5.40) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 211

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9447
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.9447) = 8908364.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012552 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.2773 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=163.3228,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=52.3985,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=209.9646,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=170.3200,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=396.7260,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=423.0861,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.6482,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8512, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2175.48 kN, MaxRatio=102579.472, F60_Dinamico=OK, SkewV=211,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.289e+19
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 17; [0.7-0.9]: 29;
[0.4-0.7]: 65; [0.1-0.4]: 28; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 55 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 38.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm

```

DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 22.0 mm
TRB_h: 550.0 mm
TRB_bf: 450.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 10.0 mm
VER: HE450B
TRS: HE220B
LG: HE340M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2471.56 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1620 mm

F60 Dynamic check (L=43.0 m): |U3|=9.16 mm -> X=5.86

L.Inf (2.54) < X (5.86) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 222

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.3692
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.3692) = 8764955.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008598 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6582 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=127.9696,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=41.7747,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=177.6238,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=116.7738,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=182.8256,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=227.9013,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=15.0023,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.4541,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2471.56 kN, MaxRatio=1.710, F60_Dinamico=Check, dynamic analysis required, SkewV=222, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.155e+10

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 2; [0.7-0.9]: 15; [0.4-0.7]: 64; [0.1-0.4]: 61; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 56 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm

BC_tf: 34.0 mm

BC_tw: 30.0 mm

TC_h: 550.0 mm

TC_tf: 36.0 mm

TC_tw: 34.0 mm

DGA_bf: 500.0 mm

DGA_tf: 26.0 mm

DGA_tw: 22.0 mm

DGB_bf: 500.0 mm

DGB_tf: 30.0 mm

DGB_tw: 22.0 mm

TRB_h: 700.0 mm

TRB_bf: 600.0 mm

TRB_tf: 32.0 mm

TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 13.0 mm
CTB_h: 120.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE300B
LG: HE450M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2558.76 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.9648 mm

F60 Dynamic check (L=43.0 m): |U3|=8.96 mm -> X=5.93

L.Inf (2.54) < X (5.93) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 54

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.6879
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.6879) = 9757084.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006803 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.4579 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...


```

    -> Sheet: FramesWBTForFatigue . S11_final=105.5304,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=29.3101,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=172.5417,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=337.3703,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=113.0703,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=141.7247,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.2710,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.6629, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2558.76 kN, MaxRatio=147370.788, F60_Dinamico=Check, dynamic
analysis required, SkewV=54, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.557e+19
    Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 1; [0.7-0.9]: 12;
[0.4-0.7]: 54; [0.1-0.4]: 53; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 57 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 34.0 mm
    BC_tw: 30.0 mm
    TC_h: 550.0 mm
    TC_tf: 36.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 36.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 130.0 mm
    CTB_tf: 11.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 11.0 mm
    VER: HE450B

```

TRS: HE240B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2410.15 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4849 mm

F60 Dynamic check (L=43.0 m): |U3|=9.48 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 132

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.8262
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.8262) = 8615641.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009268 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9804 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=111.8350,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=29.6717,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=193.1998,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=170.3575,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=138.5684,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=167.7404,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=15.7213,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=13.4706,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2410.15 kN, MaxRatio=133243.737, F60_Dinamico=Check, dynamic
analysis required, SkewV=132, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.279e+19
    Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 11; [0.7-0.9]: 16;
[0.4-0.7]: 44; [0.1-0.4]: 63; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 58 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 36.0 mm
    BC_tw: 38.0 mm
    TC_h: 600.0 mm
    TC_tf: 26.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 600.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 24.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 26.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 19.0 mm
    CTB_h: 140.0 mm
    CTB_tf: 17.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 14.0 mm
    VER: HE450B
    TRS: HE360B
    LG: HE320M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2439.48 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.7806 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.78 mm -> X=5.68
 L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 266

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.2013
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 21.2013) = 10901459.6$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007627 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.2728 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=97.0312, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.5811,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=186.9958,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=211.7894,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=139.0506,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=175.6780,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=9.8610, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=8.7211, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2439.48 kN, MaxRatio=108845.427, F60_Dinamico=OK, SkewV=266,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.890e+19
    Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 2; [0.7-0.9]: 7; [0.4-
0.7]: 85; [0.1-0.4]: 43; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 59 ---
=====

```

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

```

BC_h: 600.0 mm
BC_tf: 12.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE240B
LG: HE500M
R_TR_B: HE240B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

```

    Total Weight (Sum |FZ_dead|): 2291.38 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.5914 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.59 mm -> X=5.45
    L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.7620 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.7620) = 8971532.2$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008660 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.0908 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=116.1110,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=30.6072,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=162.6593,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=211.9962,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=130.0001,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=160.7126,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.9057,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.2877,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2291.38 kN, MaxRatio=1.481, F60_Dinamico=OK, SkewV=22,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=1.149e+09
 Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 5; [0.7-0.9]: 25;
 [0.4-0.7]: 68; [0.1-0.4]: 50; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 60 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 12.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 22.0 mm
DGB_bf: 350.0 mm
DGB_tf: 30.0 mm
DGB_tw: 14.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE600B
TRS: HE320B
LG: HE320M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2275.60 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2058 mm
F60 Dynamic check (L=43.0 m): |U3|=10.21 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 259

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7302
mm
Horizontal check: $R = (43000.0)^2 / (8 * 21.7302) = 10636121.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009289 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6911 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=129.4749,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.6198,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=236.5651,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=217.5342,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=422.4154,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=434.0956,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.2285,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.1490,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2275.60 kN, MaxRatio=98487.263, F60_Dinamico=OK, SkewV=259,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.207e+19
Ratio counts by range: [>1.0]: 42; [0.9-1.0]: 3; [0.7-0.9]: 28;
[0.4-0.7]: 40; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 61 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 800.0 mm

TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 36.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 18.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 140.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE360B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2699.08 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0745 mm

F60 Dynamic check (L=43.0 m): |U3|=9.07 mm -> X=5.89

L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.8133

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.8133) = 10595621.1$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009102 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5652 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=116.8723,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.8135,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=172.9740,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=165.9765,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=169.0598,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=210.7046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.4854,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.1070,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2699.08 kN, MaxRatio=107506.101, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.119e+19

Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 7; [0.7-0.9]: 42; [0.4-0.7]: 47; [0.1-0.4]: 43; [<=0.1]: 1;

===
--- STARTING GA ITERATION No. 62 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm

BC_tf: 16.0 mm

BC_tw: 30.0 mm

TC_h: 750.0 mm

TC_tf: 34.0 mm

TC_tw: 36.0 mm

DGA_bf: 550.0 mm

DGA_tf: 34.0 mm

DGA_tw: 26.0 mm

DGB_bf: 550.0 mm

DGB_tf: 34.0 mm

DGB_tw: 16.0 mm

TRB_h: 650.0 mm
TRB_bf: 650.0 mm
TRB_tf: 20.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 120.0 mm
CTB_tf: 13.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE240B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2373.78 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3840 mm

F60 Dynamic check (L=43.0 m): |U3|=9.38 mm -> X=5.79

L.Inf (2.54) < X (5.79) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.4220
mm

Horizontal check: $R = (43000.0)^2 / (8 * 33.4220) = 6915360.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012202 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8839 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

- > Sheet: FramesWBTForFatigue . S11_final=139.5458, Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
- > Sheet: FramesRBTForFatigue . S11_final=40.2044, Limit=118.5185 -> OK
- > Sheet: FramesWSTForFatigue . S11_final=169.9703, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
- > Sheet: FramesRSTForFatigue . S11_final=213.4880, Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
- > Sheet: FramesIBBForFatigue . S11_final=190.4372, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
- > Sheet: FramesEBBForFatigue . S11_final=232.8130, Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
- > Sheet: FramesEBTForFatigue . S11_final=15.7242, Limit=118.5185 -> OK
- > Sheet: FramesIBTForFatigue . S11_final=13.1884, Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2373.78 kN, MaxRatio=141154.086, F60_Dinamico=Check, dynamic analysis required, SkewV=24, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.730e+19
Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 6; [0.7-0.9]: 31; [0.4-0.7]: 41; [0.1-0.4]: 35; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 63 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

- BC_h: 600.0 mm
- BC_tf: 18.0 mm
- BC_tw: 28.0 mm
- TC_h: 550.0 mm
- TC_tf: 34.0 mm
- TC_tw: 38.0 mm
- DGA_bf: 450.0 mm
- DGA_tf: 36.0 mm
- DGA_tw: 18.0 mm
- DGB_bf: 450.0 mm
- DGB_tf: 24.0 mm
- DGB_tw: 16.0 mm
- TRB_h: 900.0 mm
- TRB_bf: 700.0 mm
- TRB_tf: 36.0 mm
- TRB_tw: 20.0 mm
- CTT_h: 120.0 mm
- CTT_tf: 16.0 mm
- CTB_h: 160.0 mm

CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE340B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2450.44 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0315 mm

F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.60

L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.1707 mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.1707) = 11458460.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006400 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5244 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=110.4250,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=23.4455,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=157.6127,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=130.3720,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=90.7901, Limit=92.5926
-> OK
    -> Sheet: FramesEBBForFatigue . S11_final=111.0207,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=10.7675,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.3620, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2450.44 kN, MaxRatio=3.949, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.161e+10

```

```

    Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 4; [0.7-0.9]: 17;
[0.4-0.7]: 37; [0.1-0.4]: 77; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 64 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 18.0 mm
    BC_tw: 30.0 mm
    TC_h: 750.0 mm
    TC_tf: 32.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 30.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 150.0 mm
    CTB_tf: 15.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 14.0 mm
    VER: HE500B
    TRS: HE220B
    LG: HE360M
    R_TR_B: HE240B

```

```

Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2437.56 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.5060 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.76
    L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 196

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.5018
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.5018) = 9432967.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008581 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0008 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=119.1901,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.4129,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.6883,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=211.1222,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=155.5454,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=193.4329,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```

```
-> Sheet: FramesEBTForFatigue . S11_final=15.4996,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.8806,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2437.56 kN, MaxRatio=102468.731, F60_Dinamico=Check, dynamic analysis required, SkewV=196, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.559e+19

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 5; [0.7-0.9]: 25; [0.4-0.7]: 55; [0.1-0.4]: 54; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 65 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 38.0 mm
DGB_tw: 26.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 140.0 mm
CTB_tf: 19.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE240B
LG: HE400M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2591.25 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3076 mm

F60 Dynamic check (L=43.0 m): |U3|=9.31 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.4040
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.4040) = 9470786.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008246 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8064 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=97.5709, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.6746,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=176.3249,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.1809,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=116.4137,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=143.5627,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.3382,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.0828,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2591.25 kN, MaxRatio=107752.690, F60_Dinamico=Check, dynamic
analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.009e+19
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 5; [0.7-0.9]: 17;
[0.4-0.7]: 67; [0.1-0.4]: 50; [<=0.1]: 8;
```

```
=====
--- STARTING GA ITERATION No. 66 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 28.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 22.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 19.0 mm
CTB_h: 130.0 mm
CTB_tf: 11.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE400B
LG: HE320M
R_TR_B: HE340B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2508.95 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.2888 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.29 mm -> X=5.82
```

```
L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 272

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.6067
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.6067) = 9025961.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010110 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.7798 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=105.9456,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=40.5966,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=204.8600,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=147.3182,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=200.2086,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=246.6827,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.6537,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2226,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2508.95 kN, MaxRatio=133632.428, F60_Dinamico=Check, dynamic
analysis required, SkewV=272, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.480e+19
Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 5; [0.7-0.9]: 15;
[0.4-0.7]: 80; [0.1-0.4]: 34; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 67 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 10.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 130.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE220B
LG: HE320M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2211.81 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3779 mm
F60 Dynamic check (L=43.0 m): |U3|=10.38 mm -> X=5.51
L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 257

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.7743
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.7743) = 8321535.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015267 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8760 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=113.8331,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.7889,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=242.1547,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=197.6181,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=311.1153,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=319.9135,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.2093,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.7213,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2211.81 kN, MaxRatio=123201.790, F60_Dinamico=OK, SkewV=257,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.357e+19
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 4; [0.7-0.9]: 26;
[0.4-0.7]: 70; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 68 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 36.0 mm
BC_tw: 36.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm

```

DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 16.0 mm
TRB_h: 550.0 mm
TRB_bf: 500.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE240B
LG: HE340M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2332.61 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4568 mm

F60 Dynamic check (L=43.0 m): |U3|=9.46 mm -> X=5.77

L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 230

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.8877
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.8877) = 7733102.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013823 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9561 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=113.8959,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=51.0281,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=216.1954,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=270.4891,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=266.4902,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=333.6813,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.1941,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.3798,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2332.61 kN, MaxRatio=104695.112, F60_Dinamico=Check, dynamic
analysis required, SkewV=230, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.557e+19
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 8; [0.7-0.9]: 27;
[0.4-0.7]: 83; [0.1-0.4]: 33; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 69 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 38.0 mm
BC_tw: 38.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 10.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm

TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 14.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE360B
LG: HE450M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2555.17 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4814 mm

F60 Dynamic check (L=43.0 m): |U3|=9.48 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 63

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7510
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.7510) = 10625959.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011274 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9718 mm (Limit:
71.6667 mm). Estado: OK


```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=86.3574, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=40.8752,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.8023,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=149.4581,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=332.1748,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=373.9503,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.5527,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.9341, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2555.17 kN, MaxRatio=104791.989, F60_Dinamico=Check, dynamic analysis required, SkewV=63, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.806e+19

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 6; [0.7-0.9]: 17; [0.4-0.7]: 84; [0.1-0.4]: 39; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 70 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 12.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 34.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 26.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm

```

VER: HE500B
TRS: HE240B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2431.88 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4197 mm

F60 Dynamic check (L=43.0 m): |U3|=9.42 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 54

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.9134
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.9134) = 10547220.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009643 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9137 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=129.7498,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=36.3114,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=180.0311,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=269.1024,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=204.5757,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=257.5929,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.4294,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=13.8517,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2431.88 kN, MaxRatio=4.064, F60_Dinamico=Check, dynamic
analysis required, SkewV=54, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.858e+10
    Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 6; [0.7-0.9]: 22;
[0.4-0.7]: 52; [0.1-0.4]: 54; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 71 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 16.0 mm
    BC_tw: 30.0 mm
    TC_h: 600.0 mm
    TC_tf: 36.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 36.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 900.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 30.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 11.0 mm
    VER: HE500B
    TRS: HE240B
    LG: HE360M
    R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2542.94 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.2833 mm
F60 Dynamic check (L=43.0 m): |U3|=9.28 mm -> X=5.83
L.Inf (2.54) < X (5.83) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 198

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.6394
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.6394) = 10208988.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008345 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7792 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=112.7516,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=24.6447,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=202.4146,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=183.0845,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=135.2919,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=165.0249,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.9131,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.8241,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2542.94 kN, MaxRatio=2.457, F60_Dinamico=Check, dynamic
analysis required, SkewV=198, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.599e+10
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 3; [0.7-0.9]: 26;
[0.4-0.7]: 41; [0.1-0.4]: 67; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 72 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 600.0 mm
DGB_tf: 24.0 mm
DGB_tw: 26.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE280B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2468.34 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.5327 mm
F60 Dynamic check (L=43.0 m): |U3|=9.53 mm -> X=5.75
L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.2400
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.2400) = 9534868.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008770 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0334 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=105.1148,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.2334,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=148.8258,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.9937,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=126.5047,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=153.5488,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.1994, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.1572, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2468.34 kN, MaxRatio=3.136, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.627e+10
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 5; [0.7-0.9]: 18; [0.4-0.7]: 64; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 73 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 500.0 mm
TC_tf: 12.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 26.0 mm
DGB_tw: 24.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE320B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2147.03 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0270 mm
F60 Dynamic check (L=43.0 m): |U3|=11.03 mm -> X=5.35
L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 28

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.3006
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.3006) = 8166778.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008342 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5265 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.2187,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.4076,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=148.4179,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=210.5095,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=116.7455,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=145.9355,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.2536,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6137,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2147.03 kN, MaxRatio=2.430, F60_Dinamico=OK, SkewV=28,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.101e+09
Ratio counts by range: [>1.0]: 63; [0.9-1.0]: 9; [0.7-0.9]: 17;
[0.4-0.7]: 34; [0.1-0.4]: 43; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 74 ---
=====

```


>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 140.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE300B
LG: HE400M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2439.52 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3486 mm

F60 Dynamic check (L=43.0 m): |U3|=9.35 mm -> X=5.81

L.Inf (2.54) < X (5.81) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.1924
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.1924) = 9553612.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009429 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8456 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.0282, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.9059,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=182.7674,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.2314,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=140.5190,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=173.5276,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.1793,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.1099,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2439.52 kN, MaxRatio=112403.627, F60_Dinamico=Check, dynamic
analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.082e+19
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 5; [0.7-0.9]: 14;
[0.4-0.7]: 73; [0.1-0.4]: 44; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 75 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 30.0 mm
BC_tw: 26.0 mm
TC_h: 700.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm

```

DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 36.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE220B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2265.23 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6878 mm

F60 Dynamic check (L=43.0 m): |U3|=10.69 mm -> X=5.43

L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 30

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.3200

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.3200) = 8161201.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008072 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1887 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=104.5223,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=28.9346,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=143.0431,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=211.8957,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=112.0017,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=140.3103,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.5373,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=16.2418,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2265.23 kN, MaxRatio=2.943, F60_Dinamico=OK, SkewV=30,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.348e+09

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 16; [0.7-0.9]: 22;
[0.4-0.7]: 54; [0.1-0.4]: 47; [<=0.1]: 0;

>> Snapshot iter 75 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_075_20251114_013311.mat

===
--- STARTING GA ITERATION No. 76 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 10.0 mm

BC_tw: 28.0 mm

TC_h: 700.0 mm

TC_tf: 36.0 mm

TC_tw: 38.0 mm

DGA_bf: 350.0 mm

DGA_tf: 20.0 mm

DGA_tw: 12.0 mm

DGB_bf: 400.0 mm

DGB_tf: 20.0 mm

DGB_tw: 26.0 mm

TRB_h: 550.0 mm

TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE220B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2293.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7733 mm

F60 Dynamic check (L=43.0 m): |U3|=10.77 mm -> X=5.41

L.Inf (2.54) < X (5.41) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 187

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.6835

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.6835) = 8661735.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007468 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2664 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=138.3156,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.5338,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=175.4104,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=149.0208,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=175.6384,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=227.2547,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.2306,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.8929,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2293.38 kN, MaxRatio=2.096, F60_Dinamico=OK, SkewV=187,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.160e+09

```

```

Ratio counts by range: [>1.0]: 48; [0.9-1.0]: 14; [0.7-0.9]: 12;
[0.4-0.7]: 44; [0.1-0.4]: 48; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 77 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 10.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 36.0 mm
DGB_tw: 22.0 mm
TRB_h: 900.0 mm
TRB_bf: 500.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm

```

VER: HE500B
TRS: HE280B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2665.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1999 mm

F60 Dynamic check (L=43.0 m): |U3|=9.20 mm -> X=5.85

L.Inf (2.54) < X (5.85) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.5134
mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.5134) = 11844425.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007849 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6955 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=119.1159,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=23.0697,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=157.7614,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=135.3044,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=125.5561,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=152.2608,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=11.8088,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.6437, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2665.38 kN, MaxRatio=4.049, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.178e+10
    Ratio counts by range: [>1.0]: 42; [0.9-1.0]: 8; [0.7-0.9]: 16;
[0.4-0.7]: 38; [0.1-0.4]: 62; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 78 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 14.0 mm
    BC_tw: 38.0 mm
    TC_h: 650.0 mm
    TC_tf: 32.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 600.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 10.0 mm
    VER: HE340B
    TRS: HE300B
    LG: HE550M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.


```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2206.19 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.6468 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.65 mm -> X=5.71
    L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required
    Starting Skew check for 16 combinations...
        Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
        Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
        Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
        Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
        Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
        Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
        Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
        Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
        Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
        Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
        Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
        Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
        Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
        Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
        Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
        Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
    Skew check completed. Total violations (> 0.8 mm): 8

    Starting Horizontal U2 check for 24 combinations...
    Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.1381
mm
    Horizontal check:  $R = (43000.0)^2 / (8 * 27.1381) = 8516620.0$  mm
    Horizontal check result ( $R > 6000000.0$  mm?): OK

    Starting Angular (Rotation) check for 24 combinations...
    Angular check completed. Max Theta (abs): 0.00017164 rad (Limit:
0.002000). Estado: OK

    Starting Vertical (F60) check for 288 combinations...
    Vertical (F60) check completed. Max U3 (abs): 17.1465 mm (Limit:
71.6667 mm). Estado: OK

    Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
        -> Sheet: FramesWBTFForFatigue . S11_final=135.5919,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
        -> Sheet: FramesRBTForFatigue . S11_final=42.6278,
Limit=118.5185 -> OK
        -> Sheet: FramesWSTForFatigue . S11_final=179.7725,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
        -> Sheet: FramesRSTForFatigue . S11_final=214.7665,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
        -> Sheet: FramesIBBForFatigue . S11_final=309.4468,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
        -> Sheet: FramesEBBForFatigue . S11_final=353.3123,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
        -> Sheet: FramesEBTForFatigue . S11_final=9.4864, Limit=118.5185
-> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=7.4205, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2206.19 kN, MaxRatio=2.088, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.496e+10
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 14; [0.7-0.9]: 21; [0.4-0.7]: 57; [0.1-0.4]: 39; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 79 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 18.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 12.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 20.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE340B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2427.91 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7248 mm
F60 Dynamic check (L=43.0 m): |U3|=9.72 mm -> X=5.69
L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.7092
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.7092) = 11160522.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008803 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2188 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=111.0434,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.8188,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=141.4984,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.3937,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=137.5024,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=171.0407,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.5740,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.9780, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2427.91 kN, MaxRatio=1.925, F60_Dinamico=Check, dynamic analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.648e+10
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 7; [0.7-0.9]: 20; [0.4-0.7]: 31; [0.1-0.4]: 82; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 80 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 14.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 130.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE400B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2221.39 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9404 mm
F60 Dynamic check (L=43.0 m): |U3|=9.94 mm -> X=5.63
L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 131

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.5016
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.5016) = 8109188.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015685 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4361 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.4908,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=47.8054,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=195.4883,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=167.9843,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=267.8432,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=331.4934,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.5119, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2585, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2221.39 kN, MaxRatio=134418.022, F60_Dinamico=OK, SkewV=131,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.014e+19
Ratio counts by range: [>1.0]: 45; [0.9-1.0]: 6; [0.7-0.9]: 49;
[0.4-0.7]: 40; [0.1-0.4]: 26; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 81 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 750.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 150.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE240B
LG: HE320M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2090.81 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.5829 mm
F60 Dynamic check (L=43.0 m): |U3|=10.58 mm -> X=5.46
L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 268

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.3648
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.3648) = 7870810.8$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011815 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0814 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.4927,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.9063,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=226.0379,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=170.8819,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=192.2497,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=240.8208,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.7581,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1502,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2090.81 kN, MaxRatio=2.547, F60_Dinamico=OK, SkewV=268,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.071e+10
Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 12; [0.7-0.9]: 17;
[0.4-0.7]: 71; [0.1-0.4]: 27; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 82 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm

DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 26.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 20.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 130.0 mm
CTB_tf: 11.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE600B
TRS: HE320B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2601.47 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2864 mm

F60 Dynamic check (L=43.0 m): |U3|=9.29 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.2196
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.2196) = 11430725.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007836 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7721 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=72.4854, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=25.5399,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=170.4639,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=161.6067,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=184.4977,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=179.4438,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.3048,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.3926,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2601.47 kN, MaxRatio=130602.663, F60_Dinamico=Check, dynamic analysis required, SkewV=24, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.437e+19

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 12; [0.7-0.9]: 11; [0.4-0.7]: 75; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 83 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 12.0 mm

BC_tw: 30.0 mm

TC_h: 650.0 mm

TC_tf: 34.0 mm

TC_tw: 34.0 mm

DGA_bf: 350.0 mm

DGA_tf: 26.0 mm

DGA_tw: 24.0 mm

DGB_bf: 400.0 mm

DGB_tf: 18.0 mm

DGB_tw: 26.0 mm

TRB_h: 800.0 mm

TRB_bf: 400.0 mm

TRB_tf: 22.0 mm

TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 19.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE550B
TRS: HE240B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2376.69 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7497 mm

F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 200

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.0462

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.0462) = 10483676.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009779 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2413 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=113.8019,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=29.4862,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=224.1713,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=166.4433,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=224.3474,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=241.4970,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.6395,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.9418,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2376.69 kN, MaxRatio=94160.478, F60_Dinamico=OK, SkewV=200,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=2.107e+19

```

```

    Ratio counts by range: [>1.0]: 51; [0.9-1.0]: 4; [0.7-0.9]: 17;
    [0.4-0.7]: 39; [0.1-0.4]: 55; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 84 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 14.0 mm
    BC_tw: 36.0 mm
    TC_h: 600.0 mm
    TC_tf: 34.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 600.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 28.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 900.0 mm
    TRB_bf: 600.0 mm
    TRB_tf: 34.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 110.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 15.0 mm
    VER: HE500B

```

TRS: HE400B
LG: HE450M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2722.83 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8748 mm

F60 Dynamic check (L=43.0 m): |U3|=8.87 mm -> X=5.96

L.Inf (2.54) < X (5.96) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 72

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.4722
mm

Horizontal check: $R = (43000.0)^2 / (8 * 17.4722) = 13228153.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006667 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3676 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=81.5435, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=20.8324,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=170.7613,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=126.0272,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesIBBForFatigue . S11_final=98.2318, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=122.1332,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=9.3747, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.2919, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2722.83 kN, MaxRatio=2.834, F60_Dinamico=Check, dynamic
analysis required, SkewV=72, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.845e+10
    Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 3; [0.7-0.9]: 12;
[0.4-0.7]: 55; [0.1-0.4]: 72; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 85 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 18.0 mm
    BC_tw: 38.0 mm
    TC_h: 550.0 mm
    TC_tf: 36.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 350.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 34.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 13.0 mm
    VER: HE300B
    TRS: HE340B
    LG: HE360M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2191.94 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -11.3034 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.30 mm -> X=5.28
 L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 195

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.6238
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.6238) = 9019945.7$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007363 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.8039 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=74.2032, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=26.9060,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=177.0529,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=121.0161,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=105.4357,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=129.6445,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=8.2584, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.0476, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2191.94 kN, MaxRatio=1.578, F60_Dinamico=OK, SkewV=195,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=5.093e+09
    Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 5; [0.7-0.9]: 22;
[0.4-0.7]: 79; [0.1-0.4]: 41; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 86 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 750.0 mm
    BC_tf: 20.0 mm
    BC_tw: 28.0 mm
    TC_h: 650.0 mm
    TC_tf: 12.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 30.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 32.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 14.0 mm
    VER: HE450B
    TRS: HE320B
    LG: HE340M
    R_TR_B: HE340B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2468.35 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.5779 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.58 mm -> X=5.74
    L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 237

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.0788 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 20.0788) = 11510923.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007945 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.0716 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=95.5155, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=29.5564,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=176.8037,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=117.1826,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=137.2130,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=173.1167,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=9.9648, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.1421, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2468.35 kN, MaxRatio=2.952, F60_Dinamico=Check, dynamic analysis required, SkewV=237, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.004e+10

Ratio counts by range: [>1.0]: 30; [$0.9-1.0$]: 6; [$0.7-0.9$]: 37;
[$0.4-0.7$]: 38; [$0.1-0.4$]: 55; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 87 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm
TRB_tf: 40.0 mm
TRB_tw: 26.0 mm
CTT_h: 130.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE340B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2363.96 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2042 mm
F60 Dynamic check (L=43.0 m): |U3|=10.20 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 233

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7197
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.7197) = 10172891.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009986 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.7009 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=105.7830,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.2033,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=168.3464,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=113.6648,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=168.7162,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=204.9367,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.5930, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.0857, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2363.96 kN, MaxRatio=95854.561, F60_Dinamico=OK, SkewV=233,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.172e+19
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 4; [0.7-0.9]: 31;
[0.4-0.7]: 56; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 88 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 24.0 mm

```

BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 600.0 mm
TRB_bf: 750.0 mm
TRB_tf: 20.0 mm
TRB_tw: 28.0 mm
CTT_h: 110.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE300B
LG: HE400M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2354.27 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9148 mm

F60 Dynamic check (L=43.0 m): |U3|=9.91 mm -> X=5.64

L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 121

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.3269

mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.3269) = 11370416.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008192 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4094 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=80.3968, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=32.7300, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=172.1162, Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=130.9042, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=148.7674, Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=190.6143, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.1366, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.6954, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2354.27 kN, MaxRatio=3.867, F60_Dinamico=OK, SkewV=121, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.229e+10
Ratio counts by range: [>1.0]: 18; [$0.9-1.0$]: 5; [$0.7-0.9$]: 16; [$0.4-0.7$]: 71; [$0.1-0.4$]: 56; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 89 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 500.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 26.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 32.0 mm

DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 26.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE280B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2455.83 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3180 mm

F60 Dynamic check (L=43.0 m): |U3|=9.32 mm -> X=5.81

L.Inf (2.54) < X (5.81) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 216

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.6989
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.6989) = 11166044.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008400 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8134 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTForFatigue . S11_final=80.8858, Limit=92.5926
-> OK
  -> Sheet: FramesRBTForFatigue . S11_final=23.5868,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=201.4441,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRSTForFatigue . S11_final=156.1529,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesIBBForFatigue . S11_final=125.1183,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesEBBForFatigue . S11_final=152.7567,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBTForFatigue . S11_final=11.9249,
Limit=118.5185 -> OK
  -> Sheet: FramesIBTForFatigue . S11_final=11.2788,
Limit=118.5185 -> OK
```

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2455.83 kN, MaxRatio=3.328, F60_Dinamico=Check, dynamic analysis required, SkewV=216, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.327e+10

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 8; [0.7-0.9]: 8; [0.4-0.7]: 68; [0.1-0.4]: 61; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 90 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 16.0 mm
BC_tw: 36.0 mm
TC_h: 800.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 20.0 mm
DGB_bf: 350.0 mm
DGB_tf: 28.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 40.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm

CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE600B
TRS: HE340B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2770.36 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3109 mm

F60 Dynamic check (L=43.0 m): |U3|=9.31 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 180

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 14.4817

mm

Horizontal check: $R = (43000.0)^2 / (8 * 14.4817) = 15959791.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005803 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8001 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=74.0104, Limit=92.5926

-> OK

-> Sheet: FramesRBTForFatigue . S11_final=21.5242,

Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=157.5379,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=122.2676,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=100.0799,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=125.5597,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=9.1915, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.2754, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2770.36 kN, MaxRatio=1.978, F60_Dinamico=Check, dynamic analysis required, SkewV=180, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.545e+10
 Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 6; [0.7-0.9]: 12; [0.4-0.7]: 75; [0.1-0.4]: 59; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 91 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 500.0 mm
BC_tf: 10.0 mm
BC_tw: 40.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 38.0 mm
DGB_tw: 10.0 mm
TRB_h: 550.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 28.0 mm
CTT_h: 100.0 mm
CTT_tf: 10.0 mm
CTB_h: 110.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE200B
LG: HE550M
R_TR_B: HE400B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2360.32 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.8767 mm

F60 Dynamic check (L=43.0 m): |U3|=10.88 mm -> X=5.38

L.Inf (2.54) < X (5.38) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 35.1490 mm

Horizontal check: $R = (43000.0)^2 / (8 * 35.1490) = 6575585.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010949 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3696 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=174.8632,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=61.3754,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=151.4960,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=107.9179,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=392.9417,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=488.4075,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```
-> Sheet: FramesEBTForFatigue . S11_final=20.8979,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=21.7443,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2360.32 kN, MaxRatio=169944.345, F60_Dinamico=OK, SkewV=2,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=6.817e+19

Ratio counts by range: [>1.0]: 70; [0.9-1.0]: 13; [0.7-0.9]: 8;
[0.4-0.7]: 48; [0.1-0.4]: 27; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 92 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 34.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 450.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE200B
LG: HE360M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2672.34 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0479 mm

F60 Dynamic check (L=43.0 m): |U3|=9.05 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 196

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.5738

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.5738) = 8697477.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010133 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5464 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=102.3220,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=29.1217,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=206.5286,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.7075,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=157.9582,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=188.7079,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.7954,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.3831,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2672.34 kN, MaxRatio=1.592, F60_Dinamico=Check, dynamic
analysis required, SkewV=196, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.303e+10
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 8; [0.7-0.9]: 20;
[0.4-0.7]: 64; [0.1-0.4]: 56; [<=0.1]: 1;
```

```
=====
--- STARTING GA ITERATION No. 93 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 16.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE320B
LG: HE500M
R_TR_B: HE200B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2128.86 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0596 mm
F60 Dynamic check (L=43.0 m): |U3|=10.06 mm -> X=5.60
L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.5003
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.5003) = 8404444.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011643 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5596 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=97.3174, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.7628,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.7383,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=339.0748,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=179.7050,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=219.1422,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.6979, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.2115, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2128.86 kN, MaxRatio=2.137, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.283e+09
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 9; [0.7-0.9]: 16;
[0.4-0.7]: 70; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 94 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 32.0 mm
BC_tw: 40.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 19.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE320B
LG: HE400M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2522.57 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7299 mm

F60 Dynamic check (L=43.0 m): |U3|=9.73 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.7789
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.7789) = 9327493.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010059 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2199 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.8799,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=42.8193,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=199.2330,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=157.7847,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=239.7272,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=281.3161,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.7028,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.5303,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2522.57 kN, MaxRatio=29946.083, F60_Dinamico=Check, dynamic
analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.262e+18
Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 0; [0.7-0.9]: 11;
[0.4-0.7]: 89; [0.1-0.4]: 32; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 95 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 800.0 mm
BC_tf: 34.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm

```

DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 28.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 900.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE360B
LG: HE550M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2239.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7605 mm

F60 Dynamic check (L=43.0 m): |U3|=9.76 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.2828

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.2828) = 8171914.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011349 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2614 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=84.2781, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=29.2740,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=185.3657,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=339.0017,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=168.2046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=198.3819,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=7.5957, Limit=118.5185
-> OK

-> Sheet: FramesIBTForFatigue . S11_final=7.1362, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2239.94 kN, MaxRatio=2.261, F60_Dinamico=OK, SkewV=10,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.878e+09

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 8; [0.7-0.9]: 33;
[0.4-0.7]: 38; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 96 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 36.0 mm

BC_tw: 28.0 mm

TC_h: 500.0 mm

TC_tf: 30.0 mm

TC_tw: 38.0 mm

DGA_bf: 600.0 mm

DGA_tf: 26.0 mm

DGA_tw: 16.0 mm

DGB_bf: 400.0 mm

DGB_tf: 32.0 mm

DGB_tw: 28.0 mm

TRB_h: 800.0 mm

TRB_bf: 550.0 mm

TRB_tf: 28.0 mm

TRB_tw: 28.0 mm
CTT_h: 110.0 mm
CTT_tf: 20.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE320B
LG: HE400M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2289.30 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5669 mm

F60 Dynamic check (L=43.0 m): |U3|=9.57 mm -> X=5.74

L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.7464
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7464) = 8641341.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009970 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0673 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=88.5807, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.2604,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.0476,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=143.7977,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=139.8262,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=171.7462,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.9003, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.0623,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2289.30 kN, MaxRatio=93745.461, F60_Dinamico=Check, dynamic analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.012e+19

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 9; [0.7-0.9]: 21; [0.4-0.7]: 58; [0.1-0.4]: 46; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 97 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 500.0 mm
BC_tf: 8.0 mm
BC_tw: 26.0 mm
TC_h: 800.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 10.0 mm
DGB_bf: 400.0 mm
DGB_tf: 40.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 350.0 mm
TRB_tf: 38.0 mm
TRB_tw: 18.0 mm
CTT_h: 180.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE600B

```

TRS: HE200B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2605.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.1417 mm

F60 Dynamic check (L=43.0 m): |U3|=11.14 mm -> X=5.32

L.Inf (2.54) < X (5.32) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.6946
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.6946) = 7783409.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006700 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.6310 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=228.9166,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=40.9506,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=137.5332,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=267.3073,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=177.7535,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=234.4442,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=21.9123,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=18.8907,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2605.09 kN, MaxRatio=3.734, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.960e+10

```

```

    Ratio counts by range: [>1.0]: 50; [0.9-1.0]: 2; [0.7-0.9]: 5; [0.4-
0.7]: 58; [0.1-0.4]: 51; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 98 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 500.0 mm
    BC_tf: 10.0 mm
    BC_tw: 34.0 mm
    TC_h: 700.0 mm
    TC_tf: 16.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 26.0 mm
    DGB_tw: 12.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 150.0 mm
    CTB_tf: 20.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 15.0 mm
    VER: HE500B
    TRS: HE360B
    LG: HE600M
    R_TR_B: HE340B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2249.85 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -10.7311 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.73 mm -> X=5.42
 L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3338
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.3338) = 9123177.1$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00011441 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.2178 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=198.9445,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=55.3020,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=137.0186,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=104.1956,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=345.2942,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=405.4576,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=13.5107,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.0191,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2249.85 kN, MaxRatio=21.649, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=9.594e+11
    Ratio counts by range: [>1.0]: 55; [0.9-1.0]: 11; [0.7-0.9]: 15;
[0.4-0.7]: 51; [0.1-0.4]: 34; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 99 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 550.0 mm
    BC_tf: 40.0 mm
    BC_tw: 30.0 mm
    TC_h: 800.0 mm
    TC_tf: 30.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 22.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 38.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 100.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 14.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B
    TRS: HE220B
    LG: HE400M
    R_TR_B: HE240B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2491.23 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.2811 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.28 mm -> X=5.83
    L.Inf (2.54) < X (5.83) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 120

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.3801 mm
Horizontal check: $R = (43000.0)^2 / (8 * 27.3801) = 8441356.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012516 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.7782 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.6398,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=50.3162,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=198.9370,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=215.3765,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=378.1527,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=438.6408,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.2513,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.2327,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2491.23 kN, MaxRatio=3.272, F60_Dinamico=Check, dynamic analysis required, SkewV=120, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.088e+10

Ratio counts by range: [>1.0]: 21; [$0.9-1.0$]: 5; [$0.7-0.9$]: 17;
[$0.4-0.7$]: 82; [$0.1-0.4$]: 41; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 100 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 38.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 18.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE240B
LG: HE600M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2505.49 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9277 mm
F60 Dynamic check (L=43.0 m): |U3|=9.93 mm -> X=5.63
L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3261
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.3261) = 9125968.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008520 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4247 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=113.3305,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.2650,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=135.7714,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=101.8056,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=163.5065,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=204.9578,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=15.9501,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.3562,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2505.49 kN, MaxRatio=1.701, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.330e+09
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 13; [0.7-0.9]: 19;
[0.4-0.7]: 56; [0.1-0.4]: 47; [<=0.1]: 0;
>> Snapshot iter 100 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_100_20251114_013311.mat
>> Checkpoint saved (Gen=1, FunEval=100): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
1 100 4.851e+08 1.531e+19 0

```

=====

--- STARTING GA ITERATION No. 101 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 8.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 30.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 36.0 mm
TRB_tw: 18.0 mm
CTT_h: 140.0 mm
CTT_tf: 18.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE320B
LG: HE320M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2482.22 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.8499 mm
F60 Dynamic check (L=43.0 m): |U3|=10.85 mm -> X=5.39
L.Inf (2.54) < X (5.39) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 268

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.3777
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.3777) = 10328385.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00005274 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.3366 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=163.9595,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.7587,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=175.8742,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=209.9144,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=110.8125,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=143.2391,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.4464,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.9553, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2482.22 kN, MaxRatio=94275.969, F60_Dinamico=OK, SkewV=268,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.206e+19
Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 11; [0.7-0.9]: 9;
[0.4-0.7]: 23; [0.1-0.4]: 77; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 102 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm

```

DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 28.0 mm
DGB_bf: 550.0 mm
DGB_tf: 30.0 mm
DGB_tw: 20.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 100.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE400B
LG: HE500M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2481.39 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4296 mm

F60 Dynamic check (L=43.0 m): |U3|=9.43 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0437
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0437) = 9228866.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010498 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9214 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=117.0473,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.2530,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=165.4247,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=130.3310,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=214.5995,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=258.9614,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.3813,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.0328, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2481.39 kN, MaxRatio=158043.652, F60_Dinamico=Check, dynamic
analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=6.198e+19
Ratio counts by range: [>1.0]: 40; [0.9-1.0]: 3; [0.7-0.9]: 23;
[0.4-0.7]: 75; [0.1-0.4]: 25; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 103 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 38.0 mm
DGB_tw: 14.0 mm
TRB_h: 650.0 mm
TRB_bf: 550.0 mm

TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 20.0 mm
CTB_h: 130.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE340B
LG: HE300M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2446.10 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4349 mm

F60 Dynamic check (L=43.0 m): |U3|=9.43 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 307

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7500
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.7500) = 10159361.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008522 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9276 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=110.2764,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.5485,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=205.2311,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=210.9661,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=152.4735,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=189.4675,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.0497,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.3969,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2446.10 kN, MaxRatio=116924.090, F60_Dinamico=Check, dynamic analysis required, SkewV=307, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.344e+19

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 8; [0.7-0.9]: 11; [0.4-0.7]: 74; [0.1-0.4]: 46; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 104 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 36.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 500.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm

```


VER: HE450B
TRS: HE360B
LG: HE340M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2549.68 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3137 mm

F60 Dynamic check (L=43.0 m): |U3|=9.31 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 229

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.8132
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.8132) = 11104720.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008221 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8078 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=113.2912,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.2108,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=181.8760,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=175.2516,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=128.0344,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=157.2334,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=9.3402, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.2991, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2549.68 kN, MaxRatio=67578.845, F60_Dinamico=Check, dynamic analysis required, SkewV=229, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=1.164e+19

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 1; [0.7-0.9]: 14; [0.4-0.7]: 69; [0.1-0.4]: 51; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 105 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 40.0 mm
BC_tw: 40.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 30.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE200B
LG: HE300M
R_TR_B: HE340B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2536.89 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -8.9418 mm
    F60 Dynamic check (L=43.0 m): |U3|=8.94 mm -> X=5.94
    L.Inf (2.54) < X (5.94) < L.Sup (5.69) -> Check: a dynamic analysis
is required
    Starting Skew check for 16 combinations...
        Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
        Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
        Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
        Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
        Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
        Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
        Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
        Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
        Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
        Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
        Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
        Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
        Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
        Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
        Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
        Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
    Skew check completed. Total violations (> 0.8 mm): 299

    Starting Horizontal U2 check for 24 combinations...
    Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.6737
mm
    Horizontal check:  $R = (43000.0)^2 / (8 * 24.6737) = 9367271.5$  mm
    Horizontal check result (R > 6000000.0 mm?): OK

    Starting Angular (Rotation) check for 24 combinations...
    Angular check completed. Max Theta (abs): 0.00010723 rad (Limit:
0.002000). Estado: OK

    Starting Vertical (F60) check for 288 combinations...
    Vertical (F60) check completed. Max U3 (abs): 16.4397 mm (Limit:
71.6667 mm). Estado: OK

    Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
        -> Sheet: FramesWBTFForFatigue . S11_final=96.3264, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
        -> Sheet: FramesRBTForFatigue . S11_final=36.7504,
Limit=118.5185 -> OK
        -> Sheet: FramesWSTForFatigue . S11_final=226.7891,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
        -> Sheet: FramesRSTForFatigue . S11_final=164.3861,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
        -> Sheet: FramesIBBForFatigue . S11_final=192.0739,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
        -> Sheet: FramesEBBForFatigue . S11_final=234.3475,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
        -> Sheet: FramesEBTForFatigue . S11_final=14.1910,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=14.1007,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2536.89 kN, MaxRatio=2.219, F60_Dinamico=Check, dynamic
analysis required, SkewV=299, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.685e+10

Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 2; [0.7-0.9]: 5; [0.4-
0.7]: 85; [0.1-0.4]: 56; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 106 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 8.0 mm
BC_tw: 40.0 mm
TC_h: 750.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 22.0 mm
DGB_tw: 12.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 40.0 mm
TRB_tw: 18.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 150.0 mm
CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE300B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2260.68 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.2506 mm
F60 Dynamic check (L=43.0 m): |U3|=11.25 mm -> X=5.29
L.Inf (2.54) < X (5.29) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.4996
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.4996) = 9063867.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010448 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.7491 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=157.8710,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.1532,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=139.0791,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=265.5496,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=170.8581,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=215.4136,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.4265,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.7830,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2260.68 kN, MaxRatio=96094.568, F60_Dinamico=OK, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.088e+19

Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 11; [0.7-0.9]: 13; [0.4-0.7]: 54; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 107 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 10.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 34.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE280B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2064.02 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.4197 mm
F60 Dynamic check (L=43.0 m): |U3|=11.42 mm -> X=5.25
L.Inf (2.54) < X (5.25) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 75

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.2036
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.2036) = 9170299.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00010763 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.9184 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=122.9494,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=33.8811,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=198.5422,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=185.3256,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=165.2046,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=197.5726,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=10.3436,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=8.4368, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2064.02 kN, MaxRatio=5.186, F60_Dinamico=OK, SkewV=75,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.782e+10
 Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 5; [0.7-0.9]: 29;
 [0.4-0.7]: 55; [0.1-0.4]: 43; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 108 ---
 =====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 14.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 28.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE240B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2254.18 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0299 mm
F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.60
L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.5280
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.5280) = 8712484.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009912 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5277 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=148.1120,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.8165,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=155.5174,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=176.5145,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=159.1083,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=192.2480,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.6356,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7263,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2254.18 kN, MaxRatio=3.054, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.807e+09
Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 12; [0.7-0.9]: 18;
[0.4-0.7]: 52; [0.1-0.4]: 48; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 109 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm

DGA_tw: 12.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 12.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 16.0 mm
TRB_tw: 18.0 mm
CTT_h: 110.0 mm
CTT_tf: 10.0 mm
CTB_h: 110.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE220B
LG: HE360M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1776.97 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.6372 mm

F60 Dynamic check (L=43.0 m): |U3|=11.64 mm -> X=5.20

L.Inf (2.54) < X (5.20) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 198

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 35.7238

mm

Horizontal check: $R = (43000.0)^2 / (8 * 35.7238) = 6469782.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013631 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.1368 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=126.5858,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=42.2405,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=238.6818,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=340.4329,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=208.6380,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=252.8651,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.5393,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.9655,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1776.97 kN, MaxRatio=162029.868, F60_Dinamico=OK, SkewV=198,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.665e+19
Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 14; [0.7-0.9]: 46;
[0.4-0.7]: 35; [0.1-0.4]: 18; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 110 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 40.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm

CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE260B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2425.40 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9836 mm

F60 Dynamic check (L=43.0 m): |U3|=10.98 mm -> X=5.36

L.Inf (2.54) < X (5.36) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.8407
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.8407) = 11090065.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005877 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4780 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=102.0703,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue . S11_final=27.1890,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=142.6505,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=264.9641,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=94.5414, Limit=92.5926
-> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=120.7025,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.3059,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.5726,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2425.40 kN, MaxRatio=65628.709, F60_Dinamico=OK, SkewV=52,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=1.045e+19

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 6; [0.7-0.9]: 12;
 [0.4-0.7]: 56; [0.1-0.4]: 67; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 111 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 20.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE600M

```

R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2154.27 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4356 mm

F60 Dynamic check (L=43.0 m): |U3|=10.44 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7566

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.7566) = 8037278.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013212 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9364 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=132.0884,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=38.5429,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=148.3693,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=127.5703,

Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=209.6705,

Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```
-> Sheet: FramesEBBForFatigue . S11_final=243.4461,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.3204,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.2899,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2154.27 kN, MaxRatio=1.466, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.750e+08
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 8; [0.7-0.9]: 40;
[0.4-0.7]: 50; [0.1-0.4]: 49; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 112 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 14.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE220B
LG: HE360M
R_TR_B: HE260B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2327.33 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.5347 mm
F60 Dynamic check (L=43.0 m): |U3|=9.53 mm -> X=5.75
```

L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 197

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.0523 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.0523) = 8543632.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011542 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0284 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.9421,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=40.8123,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=219.6494,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.4115,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=314.4897,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=318.4361,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=17.0545,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=16.0309,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)


```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2327.33 kN, MaxRatio=1.984, F60_Dinamico=Check, dynamic
analysis required, SkewV=197, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.023e+10
    Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 7; [0.7-0.9]: 9; [0.4-
0.7]: 90; [0.1-0.4]: 33; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 113 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 750.0 mm
TRB_bf: 500.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 19.0 mm
CTB_h: 110.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE550B
TRS: HE360B
LG: HE550M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2635.16 kN
```

```
    U3 displacement at F60 (COMB01-PER-LOAD): -8.9473 mm
```

```
    F60 Dynamic check (L=43.0 m): |U3|=8.95 mm -> X=5.93
```

```
    L.Inf (2.54) < X (5.93) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.2792 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.2792) = 10374037.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006667 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.4328 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=89.1457, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=27.2452, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=146.1676, Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=175.3022, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=112.5324, Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=140.1536, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=14.2446, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.3515, Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2635.16 kN, MaxRatio=155606.483, F60_Dinamico=Check, dynamic analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=6.381e+19
 Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 10; [0.7-0.9]: 14; [0.4-0.7]: 75; [0.1-0.4]: 35; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 114 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 24.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 12.0 mm
DGB_bf: 550.0 mm
DGB_tf: 28.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 100.0 mm
CTT_tf: 20.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE400B
LG: HE600M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2494.11 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0526 mm
F60 Dynamic check (L=43.0 m): |U3|=10.05 mm -> X=5.60
L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.8546
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.8546) = 10575587.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008402 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5507 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=114.6437,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.9620,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=139.0635,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=176.1922,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=116.1950,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=139.0003,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.6702, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.1763, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2494.11 kN, MaxRatio=12.321, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.198e+11
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 8; [0.7-0.9]: 36;
[0.4-0.7]: 32; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 115 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 38.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm

```

TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 24.0 mm
TRB_h: 550.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 170.0 mm
CTT_tf: 12.0 mm
CTB_h: 110.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE320B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2619.84 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.7969 mm

F60 Dynamic check (L=43.0 m): |U3|=8.80 mm -> X=5.98

L.Inf (2.54) < X (5.98) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 228

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.6662

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.6662) = 9370099.6$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008356 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.2897 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=90.0690, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=42.1039,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=194.8128,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=144.0276,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=184.4582,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=236.9502,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=11.6253,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.6744,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2619.84 kN, MaxRatio=150827.529, F60_Dinamico=Check, dynamic analysis required, SkewV=228, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=5.960e+19

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 6; [0.7-0.9]: 14; [0.4-0.7]: 63; [0.1-0.4]: 54; [<=0.1]: 0;

===
--- STARTING GA ITERATION No. 116 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 14.0 mm

BC_tw: 32.0 mm

TC_h: 800.0 mm

TC_tf: 32.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 38.0 mm

DGA_tw: 20.0 mm

DGB_bf: 450.0 mm

DGB_tf: 26.0 mm

DGB_tw: 26.0 mm

TRB_h: 900.0 mm
TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 130.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE240B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2286.70 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9249 mm

F60 Dynamic check (L=43.0 m): |U3|=9.92 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 73

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.6613
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.6613) = 8064017.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009982 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4262 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=123.5069,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.7274,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=185.2837,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=171.7997,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=154.0352,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=185.8173,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8157,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.4418, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2286.70 kN, MaxRatio=117973.731, F60_Dinamico=OK, SkewV=73,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.183e+19

Ratio counts by range: [>1.0]: 41; [0.9-1.0]: 17; [0.7-0.9]: 35;
 [0.4-0.7]: 30; [0.1-0.4]: 43; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 117 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 32.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 12.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 36.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 14.0 mm
CTB_h: 130.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm

```


STCTB_tf: 10.0 mm
VER: HE340B
TRS: HE300B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2246.78 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2647 mm

F60 Dynamic check (L=43.0 m): |U3|=10.26 mm -> X=5.54

L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2011 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.2011) = 8496899.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008936 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7640 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=110.0588,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.7566,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=146.3067,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=116.0818,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=129.1825,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=160.1321,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=10.3787,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.8216, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2246.78 kN, MaxRatio=128338.729, F60_Dinamico=OK, SkewV=22,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
    failures) -> Cost=3.701e+19

```

```

    Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 10; [0.7-0.9]: 46;
    [0.4-0.7]: 32; [0.1-0.4]: 39; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 118 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 20.0 mm
    BC_tw: 32.0 mm
    TC_h: 650.0 mm
    TC_tf: 24.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 38.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 19.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 10.0 mm
    VER: HE400B
    TRS: HE220B
    LG: HE550M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2412.63 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.6330 mm
F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72
L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.8071
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.8071) = 9708221.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008035 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1321 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.3706,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=25.4294,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=138.0379,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=112.0833,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=113.2227,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=140.7864,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.5912,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.9001,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2412.63 kN, MaxRatio=2.221, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.801e+10
Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 3; [0.7-0.9]: 15;
[0.4-0.7]: 65; [0.1-0.4]: 55; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 119 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 40.0 mm
TC_tw: 40.0 mm
DGA_bf: 600.0 mm
DGA_tf: 20.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 26.0 mm
DGB_tw: 26.0 mm
TRB_h: 650.0 mm
TRB_bf: 600.0 mm
TRB_tf: 30.0 mm
TRB_tw: 28.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE260B
LG: HE500M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2417.49 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7715 mm
F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68
L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0092
mm
Horizontal check: $R = (43000.0)^2 / (8 * 25.0092) = 9241594.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009183 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2711 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=107.2672,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.9354,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=146.7803,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=107.2710,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=137.6656,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=173.7781,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.6890,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5223,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2417.49 kN, MaxRatio=4.384, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.831e+10

Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 2; [0.7-0.9]: 25;
[0.4-0.7]: 78; [0.1-0.4]: 44; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 120 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 150.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE280B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2290.57 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1287 mm
F60 Dynamic check (L=43.0 m): |U3|=10.13 mm -> X=5.58
L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 76

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1121
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.1121) = 10452428.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013179 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6231 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.2486, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.7113,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=192.5851,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=171.8118,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=279.1639,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=276.4436,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.7271,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2343,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2290.57 kN, MaxRatio=99708.051, F60_Dinamico=OK, SkewV=76,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.277e+19
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 1; [0.7-0.9]: 16;
[0.4-0.7]: 77; [0.1-0.4]: 51; [<=0.1]: 0;

```

```

-----
--- STARTING GA ITERATION No. 121 ---
-----

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 32.0 mm
DGB_tw: 20.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 26.0 mm
CTT_h: 100.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 16.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE280B
LG: HE360M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2523.64 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1271 mm

F60 Dynamic check (L=43.0 m): |U3|=9.13 mm -> X=5.88

L.Inf (2.54) < X (5.88) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 193


```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.6826
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.6826) = 11742577.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008790 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.6214 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=88.2529, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.7729,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=215.3380,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=164.9680,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=136.8817,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=165.3877,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.4003,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1265, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2523.64 kN, MaxRatio=100096.024, F60_Dinamico=Check, dynamic
analysis required, SkewV=193, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.528e+19
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 0; [0.7-0.9]: 11;
[0.4-0.7]: 55; [0.1-0.4]: 73; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 122 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm

```

DGA_tf: 28.0 mm
DGA_tw: 26.0 mm
DGB_bf: 600.0 mm
DGB_tf: 26.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE280B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2566.83 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8309 mm

F60 Dynamic check (L=43.0 m): |U3|=8.83 mm -> X=5.97

L.Inf (2.54) < X (5.97) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.2872
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.2872) = 9516332.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009925 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3296 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=100.9671,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.4453,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=149.3458,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.4735,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=144.1760,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=171.8250,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.4231,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2571, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2566.83 kN, MaxRatio=2.676, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.321e+10
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 5; [0.7-0.9]: 10; [0.4-0.7]: 78; [0.1-0.4]: 49; [<=0.1]: 0;

===
--- STARTING GA ITERATION No. 123 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 650.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 18.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 18.0 mm
```

TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE280B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2195.97 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.3247 mm

F60 Dynamic check (L=43.0 m): |U3|=10.32 mm -> X=5.52

L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 54

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3183
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3183) = 9504143.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010475 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8209 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=101.0048,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=38.7449,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=173.7852,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=157.6895,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=174.7943,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=222.3870,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=11.4242,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.5136, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2195.97 kN, MaxRatio=3.449, F60_Dinamico=OK, SkewV=54,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.447e+10

```

```

    Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 6; [0.7-0.9]: 10;
[0.4-0.7]: 90; [0.1-0.4]: 34; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 124 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 32.0 mm
    BC_tw: 26.0 mm
    TC_h: 550.0 mm
    TC_tf: 36.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 30.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 18.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 15.0 mm
    VER: HE550B

```

TRS: HE220B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2627.50 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.9672 mm

F60 Dynamic check (L=43.0 m): |U3|=8.97 mm -> X=5.93

L.Inf (2.54) < X (5.93) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3391
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.3391) = 9121288.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010067 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.4612 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=96.5587, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=43.0368,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=137.0533,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=148.8688,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=326.4160,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=362.6453,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.9499,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.7078,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2627.50 kN, MaxRatio=1.343, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.672e+10
Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 7; [0.7-0.9]: 30;
[0.4-0.7]: 39; [0.1-0.4]: 76; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 125 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 650.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 12.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 14.0 mm
VER: HE600B
TRS: HE200B
LG: HE400M
R_TR_B: HE340B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2761.57 kN
```

U3 displacement at F60 (COMB01-PER-LOAD): -9.8577 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65
 L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 129

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.5510
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 18.5510) = 12458902.3$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00005505 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.3476 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=71.9804, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=19.6744,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=165.0863,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=118.0518,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=83.5505, Limit=92.5926
 -> OK
 -> Sheet: FramesEBBForFatigue . S11_final=103.0538,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesEBTForFatigue . S11_final=14.6860,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=14.2699,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (2 failures)


```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2761.57 kN, MaxRatio=1.675, F60_Dinamico=OK, SkewV=129,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (2
failures) -> Cost=4.877e+09
    Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 3; [0.7-0.9]: 17;
[0.4-0.7]: 68; [0.1-0.4]: 66; [<=0.1]: 0;
>> Snapshot iter 125 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_125_20251114_013311.mat

```

```

=====
--- STARTING GA ITERATION No. 126 ---
=====

```

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

```

    BC_h: 650.0 mm
    BC_tf: 34.0 mm
    BC_tw: 38.0 mm
    TC_h: 650.0 mm
    TC_tf: 30.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 34.0 mm
    DGA_tw: 26.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 24.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 30.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 12.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 15.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B
    TRS: HE240B
    LG: HE360M
    R_TR_B: HE320B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

```

    Total Weight (Sum |FZ_dead|): 2502.90 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.2079 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.21 mm -> X=5.85
    L.Inf (2.54) < X (5.85) < L.Sup (5.69) -> Check: a dynamic analysis

```

```

is required

```

```

Starting Skew check for 16 combinations...

```

```

    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

```

    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

```

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 196

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.0808
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.0808) = 10467260.9$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010859 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.7050 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=83.3221, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=28.3720,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=205.7123,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=165.5704,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=189.8576,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=203.3086,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.1915,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.7299,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2502.90 kN, MaxRatio=1.786, F60_Dinamico=Check, dynamic analysis required, SkewV=196, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.158e+10
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 2; [0.7-0.9]: 8; [0.4-0.7]: 81; [0.1-0.4]: 54; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 127 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 10.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE300B
TRS: HE360B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2116.39 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.2178 mm
F60 Dynamic check (L=43.0 m): |U3|=11.22 mm -> X=5.30
L.Inf (2.54) < X (5.30) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 182

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9145
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.9145) = 8587385.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007915 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.7174 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=85.2153, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=32.3192,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=165.4453,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=113.5164,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=115.2179,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=141.7292,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=8.5315, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.6601, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2116.39 kN, MaxRatio=1.738, F60_Dinamico=OK, SkewV=182,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
failures) -> Cost=5.068e+09
Ratio counts by range: [>1.0]: 54; [0.9-1.0]: 12; [0.7-0.9]: 16;
[0.4-0.7]: 42; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 128 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 26.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 18.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE320B
LG: HE360M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2157.48 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9678 mm
F60 Dynamic check (L=43.0 m): |U3|=10.97 mm -> X=5.36
L.Inf (2.54) < X (5.36) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 193

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.8098
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.8098) = 8954946.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012368 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4675 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.9660,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.6432,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=227.4313,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=179.2828,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=185.0175,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=224.4805,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.3393, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.5652, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2157.48 kN, MaxRatio=2.393, F60_Dinamico=OK, SkewV=193,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.457e+09
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 5; [0.7-0.9]: 36;
[0.4-0.7]: 57; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 129 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 36.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 26.0 mm

```

DGA_tw: 26.0 mm
DGB_bf: 600.0 mm
DGB_tf: 24.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 16.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE260B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2462.70 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3577 mm

F60 Dynamic check (L=43.0 m): |U3|=9.36 mm -> X=5.80

L.Inf (2.54) < X (5.80) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0475
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0475) = 9227470.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010443 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8580 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=105.8884,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.2699,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=145.5705,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=116.1777,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=149.1513,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=184.1885,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=11.8713,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.7263,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2462.70 kN, MaxRatio=2.908, F60_Dinamico=Check, dynamic analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.423e+10

Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 3; [0.7-0.9]: 25; [0.4-0.7]: 59; [0.1-0.4]: 51; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 130 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 22.0 mm

BC_tw: 36.0 mm

TC_h: 800.0 mm

TC_tf: 22.0 mm

TC_tw: 38.0 mm

DGA_bf: 450.0 mm

DGA_tf: 32.0 mm

DGA_tw: 22.0 mm

DGB_bf: 500.0 mm

DGB_tf: 30.0 mm

DGB_tw: 18.0 mm

TRB_h: 750.0 mm

TRB_bf: 550.0 mm

TRB_tf: 34.0 mm

TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE320B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2556.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4433 mm

F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 182

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.8387
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.8387) = 10119868.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008683 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9426 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=89.5730, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=28.0717,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=173.1868,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=123.3779,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=127.7207,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=158.3825,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.1146, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1560, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2556.49 kN, MaxRatio=1.292, F60_Dinamico=Check, dynamic
analysis required, SkewV=182, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.054e+10
Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 8; [0.7-0.9]: 41;
[0.4-0.7]: 50; [0.1-0.4]: 55; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 131 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 12.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE340B

```

TRS: HE320B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2142.67 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9177 mm

F60 Dynamic check (L=43.0 m): |U3|=10.92 mm -> X=5.37

L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 182

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8681
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8681) = 9294020.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012594 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4153 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=123.5758,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=38.9843,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=178.0350,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=149.3416,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=206.2960,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=251.1266,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.2482,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.2321,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2142.67 kN, MaxRatio=2.325, F60_Dinamico=OK, SkewV=182,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.771e+09

```

```

    Ratio counts by range: [>1.0]: 68; [0.9-1.0]: 15; [0.7-0.9]: 20;
[0.4-0.7]: 18; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 132 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 38.0 mm
    BC_tw: 34.0 mm
    TC_h: 750.0 mm
    TC_tf: 38.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 14.0 mm
    DGB_bf: 600.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 26.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 32.0 mm
    TRB_tw: 30.0 mm
    CTT_h: 170.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 10.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 12.0 mm
    VER: HE400B
    TRS: HE220B
    LG: HE450M
    R_TR_B: HE320B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2531.45 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.6262 mm
F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72
L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 56

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.9685
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.9685) = 8263752.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011690 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1255 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=86.6070, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=34.9571,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=156.4778,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=118.9028,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=191.8341,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=225.9783,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=15.6326,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.2407,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2531.45 kN, MaxRatio=1.971, F60_Dinamico=Check, dynamic analysis required, SkewV=56, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.922e+10
Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 5; [0.7-0.9]: 19; [0.4-0.7]: 88; [0.1-0.4]: 40; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 133 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 12.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 36.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 24.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE260B
LG: HE360M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2485.77 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5782 mm

F60 Dynamic check (L=43.0 m): |U3|=9.58 mm -> X=5.74

L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 180

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9429
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.9429) = 8908979.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009300 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0774 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=98.4719, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.5582,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=178.9840,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=124.4916,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=156.7868,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=197.7336,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.8791,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.4339,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2485.77 kN, MaxRatio=99636.515, F60_Dinamico=Check, dynamic
analysis required, SkewV=180, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.468e+19

Ratio counts by range: [>1.0]: 34; [$0.9-1.0$]: 8; [$0.7-0.9$]: 23;
[$0.4-0.7$]: 56; [$0.1-0.4$]: 45; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 134 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 16.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 12.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE320B
LG: HE340M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2571.31 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2902 mm

F60 Dynamic check (L=43.0 m): |U3|=9.29 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71


```

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 225

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.9430
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.9430) = 11035888.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006223 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.7827 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=79.6648, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=21.5752,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=183.0220,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=124.0921,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=99.4832, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=123.7437,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.4280,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.9105,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2571.31 kN, MaxRatio=1.864, F60_Dinamico=Check, dynamic
analysis required, SkewV=225, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.352e+10
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 5; [0.7-0.9]: 20;
[0.4-0.7]: 53; [0.1-0.4]: 67; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 135 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm

```

BC_tf: 16.0 mm
BC_tw: 36.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 18.0 mm
DGA_tw: 22.0 mm
DGB_bf: 600.0 mm
DGB_tf: 18.0 mm
DGB_tw: 10.0 mm
TRB_h: 600.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE220B
LG: HE550M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2457.29 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4791 mm

F60 Dynamic check (L=43.0 m): |U3|=9.48 mm -> X=5.77

L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1247 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.1247) = 9199110.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010100 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9734 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=97.6008, Limit=92.5926

-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=45.0867,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=159.0339,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=268.0411,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=340.3103,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=469.6973,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=14.3360,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=15.0981,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2457.29 kN, MaxRatio=2.467, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.018e+10

Ratio counts by range: [>1.0]: 26; [$0.9-1.0$]: 7; [$0.7-0.9$]: 14; [$0.4-0.7$]: 72; [$0.1-0.4$]: 47; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 136 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 18.0 mm

BC_tw: 36.0 mm

TC_h: 600.0 mm

TC_tf: 12.0 mm

TC_tw: 36.0 mm

DGA_bf: 600.0 mm

DGA_tf: 30.0 mm

DGA_tw: 20.0 mm

DGB_bf: 450.0 mm
DGB_tf: 28.0 mm
DGB_tw: 14.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE340B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2435.13 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8386 mm

F60 Dynamic check (L=43.0 m): |U3|=9.84 mm -> X=5.66

L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.7172

mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.7172) = 11156177.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009611 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3331 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=100.8279,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.8172,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=141.4581,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=123.6912,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=138.6798,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=169.0393,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.1093,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.7797,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2435.13 kN, MaxRatio=1.646, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.332e+09
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 7; [0.7-0.9]: 48;
[0.4-0.7]: 31; [0.1-0.4]: 59; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 137 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 30.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 20.0 mm
TRB_tw: 22.0 mm
CTT_h: 180.0 mm
CTT_tf: 17.0 mm

CTB_h: 150.0 mm
CTB_tf: 13.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE300B
TRS: HE320B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2165.47 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.3374 mm

F60 Dynamic check (L=43.0 m): |U3|=10.34 mm -> X=5.52

L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 133

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.9896
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.9896) = 8257542.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012921 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8374 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=90.2044, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=33.3572,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=205.7616,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=191.4990,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=187.4540,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=223.0047,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=10.7290,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=13.2101,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2165.47 kN, MaxRatio=106737.007, F60_Dinamico=OK, SkewV=133,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=2.467e+19

Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 10; [0.7-0.9]: 32;
 [0.4-0.7]: 73; [0.1-0.4]: 39; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 138 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 32.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 20.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 800.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE340B
LG: HE340M
R_TR_B: HE340B
-----

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2543.57 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8578 mm

F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65

L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 221

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.1526

mm

Horizontal check: $R = (43000.0)^2 / (8 * 17.1526) = 13474647.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007971 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3486 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=69.5611, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=23.8027,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=186.1872,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=134.0988,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=125.1325,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=151.2990,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)


```
-> Sheet: FramesEBTForFatigue . S11_final=9.8311, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1140, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2543.57 kN, MaxRatio=1.732, F60_Dinamico=OK, SkewV=221,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=7.086e+09

Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 3; [0.7-0.9]: 16;
[0.4-0.7]: 80; [0.1-0.4]: 51; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 139 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 18.0 mm
TRB_h: 900.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 110.0 mm
CTB_tf: 13.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE340B
LG: HE400M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2424.44 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7555 mm
F60 Dynamic check (L=43.0 m): |U3|=9.76 mm -> X=5.68
L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 148

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0096
mm
Horizontal check: $R = (43000.0)^2 / (8 * 21.0096) = 11000929.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007862 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2469 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=75.7697, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=22.7334,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=219.2553,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=175.8039,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=121.8568,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=148.4863,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.8325,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.8809, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2424.44 kN, MaxRatio=149553.414, F60_Dinamico=OK, SkewV=148, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=5.422e+19

Ratio counts by range: [>1.0]: 38; [$0.9-1.0$]: 3; [$0.7-0.9$]: 19; [$0.4-0.7$]: 75; [$0.1-0.4$]: 31; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 140 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 38.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 40.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 30.0 mm
DGB_tw: 24.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 26.0 mm
TRB_tw: 28.0 mm
CTT_h: 130.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 10.0 mm
VER: HE450B
TRS: HE200B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2493.70 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0637 mm

F60 Dynamic check (L=43.0 m): |U3|=9.06 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 180

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.8472
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.8472) = 8299760.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009443 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.5605 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=134.3489,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=44.4329,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=181.0294,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.0231,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=213.5496,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=262.5845,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.4898,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.9892,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2493.70 kN, MaxRatio=2.006, F60_Dinamico=Check, dynamic
analysis required, SkewV=180, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.207e+10
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 4; [0.7-0.9]: 20;
[0.4-0.7]: 50; [0.1-0.4]: 68; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 141 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 12.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE240B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2176.04 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.2163 mm
F60 Dynamic check (L=43.0 m): |U3|=11.22 mm -> X=5.30
L.Inf (2.54) < X (5.30) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.0955
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.0955) = 8530013.0$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008936 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.7161 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=128.0835,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.0714,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.1340,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=211.9169,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=134.5080,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=165.8185,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.8961,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.3316,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2176.04 kN, MaxRatio=1.683, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.602e+09
Ratio counts by range: [>1.0]: 19; [$0.9-1.0$]: 11; [$0.7-0.9$]: 27;
[$0.4-0.7$]: 61; [$0.1-0.4$]: 48; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 142 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 36.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 36.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm

DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 30.0 mm
DGB_tw: 12.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 30.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 130.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE320B
LG: HE320M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2452.83 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2592 mm

F60 Dynamic check (L=43.0 m): |U3|=10.26 mm -> X=5.54

L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 276

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0255

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0255) = 10992597.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006834 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7538 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=96.6011, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.8299,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.2166,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=264.8439,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=102.3958,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=126.3899,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4067,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.8163, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2452.83 kN, MaxRatio=125276.204, F60_Dinamico=OK, SkewV=276, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.849e+19

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 4; [0.7-0.9]: 15; [0.4-0.7]: 70; [0.1-0.4]: 45; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 143 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 40.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 600.0 mm
DGB_tf: 34.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 26.0 mm

TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE200B
LG: HE360M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2748.12 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8584 mm

F60 Dynamic check (L=43.0 m): |U3|=8.86 mm -> X=5.96

L.Inf (2.54) < X (5.96) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 194

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.7204
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.7204) = 8337713.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010878 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3571 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=101.6278,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=30.4454,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=209.6983,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=213.1790,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=195.5274,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=208.0214,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=16.4809,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.0971,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2748.12 kN, MaxRatio=1.867, F60_Dinamico=Check, dynamic
analysis required, SkewV=194, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.501e+10
    Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 4; [0.7-0.9]: 24;
[0.4-0.7]: 69; [0.1-0.4]: 47; [<=0.1]: 8;

```

```

=====
--- STARTING GA ITERATION No. 144 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 10.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 26.0 mm
TRB_h: 550.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 14.0 mm
VER: HE450B

```

TRS: HE220B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2173.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.8883 mm

F60 Dynamic check (L=43.0 m): |U3|=11.89 mm -> X=5.15

L.Inf (2.54) < X (5.15) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 185

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.8934
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.8934) = 8286024.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007972 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.3825 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=151.6977,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=38.8581,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=175.2193,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=149.0408,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=171.6524,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=221.2856,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=17.6317,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.1536,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2173.38 kN, MaxRatio=32647.220, F60_Dinamico=OK, SkewV=185,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.316e+18

```

```

    Ratio counts by range: [>1.0]: 54; [0.9-1.0]: 10; [0.7-0.9]: 13;
[0.4-0.7]: 45; [0.1-0.4]: 44; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 145 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 30.0 mm
    BC_tw: 26.0 mm
    TC_h: 650.0 mm
    TC_tf: 28.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 700.0 mm
    TRB_tf: 36.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 10.0 mm
    VER: HE300B
    TRS: HE200B
    LG: HE550M
    R_TR_B: HE280B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2242.83 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -10.7505 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.75 mm -> X=5.41
 L.Inf (2.54) < X (5.41) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.7408
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 29.7408) = 7771313.6$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007756 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.2524 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=93.1141, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=27.8704,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=131.2684,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=147.9824,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=104.3753,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=130.4400,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.5321,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=17.9723,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2242.83 kN, MaxRatio=2.111, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.881e+09
    Ratio counts by range: [>1.0]: 37; [0.9-1.0]: 12; [0.7-0.9]: 23;
[0.4-0.7]: 43; [0.1-0.4]: 51; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 146 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 700.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 18.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 150.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE220B
LG: HE320M
R_TR_B: HE400B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2063.96 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.5534 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.55 mm -> X=5.46
    L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 259

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.5848
mm
Horizontal check: $R = (43000.0)^2 / (8 * 30.5848) = 7556864.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012670 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0522 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=102.8504,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=41.2052,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=226.7140,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=165.0356,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=208.3967,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=261.4582,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.1528,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.7471,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2063.96 kN, MaxRatio=2.537, F60_Dinamico=OK, SkewV=259,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.032e+10
Ratio counts by range: [>1.0]: 43; [0.9-1.0]: 10; [0.7-0.9]: 13;
[0.4-0.7]: 75; [0.1-0.4]: 25; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 147 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 8.0 mm
BC_tw: 40.0 mm
TC_h: 500.0 mm
TC_tf: 38.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 28.0 mm
DGB_bf: 350.0 mm
DGB_tf: 40.0 mm
DGB_tw: 30.0 mm
TRB_h: 900.0 mm
TRB_bf: 750.0 mm
TRB_tf: 40.0 mm
TRB_tw: 18.0 mm
CTT_h: 170.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE300B
TRS: HE400B
LG: HE320M
R_TR_B: HE360B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2502.76 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.7160 mm
F60 Dynamic check (L=43.0 m): |U3|=10.72 mm -> X=5.42
L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```


Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 269

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0693
mm
Horizontal check: $R = (43000.0)^2 / (8 * 24.0693) = 9602477.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00005665 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.2163 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=66.1448, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=23.6562,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=160.8824,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=94.7908,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=77.4644, Limit=92.5926
-> OK
-> Sheet: FramesEBBForFatigue . S11_final=94.1072, Limit=92.5926
-> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBTForFatigue . S11_final=8.7132, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6383,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (2 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2502.76 kN, MaxRatio=24834.816, F60_Dinamico=OK, SkewV=269,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (2
failures) -> Cost=1.543e+18
Ratio counts by range: [>1.0]: 13; [0.9-1.0]: 8; [0.7-0.9]: 19;
[0.4-0.7]: 71; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 148 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 800.0 mm
BC_tf: 16.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm

TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE320B
LG: HE550M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2096.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9366 mm

F60 Dynamic check (L=43.0 m): |U3|=9.94 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.1253

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.1253) = 8520640.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012682 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4367 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.6005, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.3757,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.8608,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=339.1129,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=198.7884,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=241.0984,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.4867, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.5931, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2096.79 kN, MaxRatio=2.742, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.636e+09
Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 2; [0.7-0.9]: 18;
[0.4-0.7]: 66; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 149 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 36.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 30.0 mm
TRB_h: 900.0 mm

TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 100.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE360B
LG: HE550M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2236.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8416 mm

F60 Dynamic check (L=43.0 m): |U3|=9.84 mm -> X=5.66

L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.5817

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.5817) = 8379646.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011315 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3425 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=82.8040, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.1372,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=184.8902,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=338.9795,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=166.8088,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=196.7655,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=7.3108, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.7982, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2236.38 kN, MaxRatio=2.854, F60_Dinamico=OK, SkewV=10,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=8.001e+09

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 6; [0.7-0.9]: 33;
 [0.4-0.7]: 42; [0.1-0.4]: 41; [<=0.1]: 0;

>> Checkpoint saved (Gen=2, FunEval=149): D:\000.Robinson
 Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
 2 149 4.851e+08 1.187e+19 1

```

=====
--- STARTING GA ITERATION No. 150 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 18.0 mm
BC_tw: 28.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 600.0 mm
DGB_tf: 16.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm

```

CTB_tf: 15.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 15.0 mm
VER: HE360B
TRS: HE220B
LG: HE340M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2163.50 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9601 mm

F60 Dynamic check (L=43.0 m): |U3|=10.96 mm -> X=5.36

L.Inf (2.54) < X (5.36) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 223

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.1921 mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.1921) = 7917387.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009502 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4597 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=145.7251,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=31.1050,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=202.1303,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=211.3807,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=145.3355,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=180.5234,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=15.7002,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=13.9443,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2163.50 kN, MaxRatio=102804.206, F60_Dinamico=OK, SkewV=223,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=2.286e+19

```

```

    Ratio counts by range: [>1.0]: 37; [0.9-1.0]: 17; [0.7-0.9]: 29;
    [0.4-0.7]: 37; [0.1-0.4]: 46; [<=0.1]: 0;

```

```

>> Snapshot iter 150 saved: D:\000.Robinson Mercado\001.Model
    3D\05.MatLAB\Logs\snapshot_iter_150_20251114_013311.mat

```

```

=====
--- STARTING GA ITERATION No. 151 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 32.0 mm
    BC_tw: 34.0 mm
    TC_h: 750.0 mm
    TC_tf: 32.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 34.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 24.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 170.0 mm
    CTT_tf: 19.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 10.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B
    TRS: HE220B
    LG: HE400M

```

R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2341.60 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6170 mm

F60 Dynamic check (L=43.0 m): |U3|=9.62 mm -> X=5.72

L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 132

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.4923
mm

Horizontal check: $R = (43000.0)^2 / (8 * 31.4923) = 7339103.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009629 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1181 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=87.6425, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=29.6372,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=202.8195,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=339.9755,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=135.6766,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)


```
-> Sheet: FramesEBBForFatigue . S11_final=165.0535,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=18.0387,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.9805,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2341.60 kN, MaxRatio=2.153, F60_Dinamico=Check, dynamic
analysis required, SkewV=132, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.971e+10
Ratio counts by range: [>1.0]: 11; [0.9-1.0]: 1; [0.7-0.9]: 39;
[0.4-0.7]: 70; [0.1-0.4]: 45; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 152 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 28.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 32.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE300B
LG: HE600M
R_TR_B: HE260B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2351.31 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3949 mm
F60 Dynamic check (L=43.0 m): |U3|=10.39 mm -> X=5.51
```

L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.7506
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 24.7506) = 9338155.9$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007369 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.8949 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=86.9851, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=26.0095,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=140.2313,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=175.2516,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=101.8744,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=125.9421,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=10.3545,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.4501,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

 Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2351.31 kN, MaxRatio=1.330, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.501e+08

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 8; [0.7-0.9]: 20;
[0.4-0.7]: 69; [0.1-0.4]: 49; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 153 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 34.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 350.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE320B
LG: HE360M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2269.22 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7716 mm
F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68
L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 196

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.3892
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.3892) = 8758311.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013796 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2712 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=122.6445,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.9528,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=204.1363,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=213.5878,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=220.8759,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=265.1685,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.9607, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.7513, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2269.22 kN, MaxRatio=1.442, F60_Dinamico=OK, SkewV=196,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.004e+09
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 13; [0.7-0.9]: 33;
[0.4-0.7]: 48; [0.1-0.4]: 48; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 154 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 22.0 mm
BC_tw: 28.0 mm
TC_h: 500.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 38.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm
DGB_tw: 26.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 20.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 11.0 mm
CTB_h: 150.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE260B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2199.46 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6259 mm

F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72

L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

```

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8563
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.8563) = 9298435.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012641 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1255 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=112.6657,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.6503,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=162.3633,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=145.0222,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=194.6557,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=225.7465,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8880,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.6415, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2199.46 kN, MaxRatio=102745.268, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.322e+19
Ratio counts by range: [>1.0]: 43; [0.9-1.0]: 4; [0.7-0.9]: 22;
[0.4-0.7]: 47; [0.1-0.4]: 50; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 155 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 32.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm

```

TC_tw: 40.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 20.0 mm
TRB_tw: 26.0 mm
CTT_h: 100.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE400B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2352.42 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8214 mm

F60 Dynamic check (L=43.0 m): |U3|=9.82 mm -> X=5.66

L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7003

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.7003) = 10181571.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011572 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3194 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.8629,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.9922,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=167.3665,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=159.7363,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=174.8440,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=200.8425,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.2628, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=5.8681, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2352.42 kN, MaxRatio=90871.715, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.943e+19
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 1; [0.7-0.9]: 22;
[0.4-0.7]: 61; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 156 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 18.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 600.0 mm
DGA_tf: 34.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 36.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm

TRB_tf: 40.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE360B
LG: HE320M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2745.48 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8933 mm

F60 Dynamic check (L=43.0 m): |U3|=8.89 mm -> X=5.95

L.Inf (2.54) < X (5.95) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 272

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.4265
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.4265) = 11314933.0$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006792 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3888 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=93.3967, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.9483,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.1340,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=100.8516,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=107.2698,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=133.9833,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.5226, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.4949, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2745.48 kN, MaxRatio=1.747, F60_Dinamico=Check, dynamic
analysis required, SkewV=272, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.656e+10
Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 7; [0.7-0.9]: 12;
[0.4-0.7]: 68; [0.1-0.4]: 61; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 157 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 18.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 40.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
TRB_tf: 38.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 20.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm

```

VER: HE360B
TRS: HE320B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2452.12 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5137 mm

F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.75

L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 187

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.9032
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.9032) = 9669214.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009614 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0130 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=130.6742,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.1594,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=173.7968,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=128.0207,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=146.5126,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=181.6832,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.5055, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=6.9350, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2452.12 kN, MaxRatio=2.552, F60_Dinamico=Check, dynamic
analysis required, SkewV=187, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.514e+10
    Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 3; [0.7-0.9]: 24;
[0.4-0.7]: 61; [0.1-0.4]: 55; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 158 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 28.0 mm
    BC_tw: 26.0 mm
    TC_h: 650.0 mm
    TC_tf: 34.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 22.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 30.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 16.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 14.0 mm
    VER: HE550B
    TRS: HE220B
    LG: HE600M
    R_TR_B: HE340B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2565.44 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.1641 mm
F60 Dynamic check (L=43.0 m): |U3|=9.16 mm -> X=5.86
L.Inf (2.54) < X (5.86) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.5934
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.5934) = 10703480.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008276 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6573 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=124.9849,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.0903,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=143.1059,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=118.1603,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=159.8094,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=195.0035,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.4129,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.1802,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2565.44 kN, MaxRatio=2.606, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.238e+10
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 3; [0.7-0.9]: 21;
[0.4-0.7]: 27; [0.1-0.4]: 85; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 159 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 600.0 mm
DGB_tf: 22.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 12.0 mm
CTB_h: 150.0 mm
CTB_tf: 15.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2381.37 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.4617 mm
F60 Dynamic check (L=43.0 m): |U3|=9.46 mm -> X=5.77
L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.5342
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.5342) = 9051568.2$  mm
Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011377 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9613 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=119.4921,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.6118,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.4674,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=114.6424,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=168.7415,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=207.3374,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.5052,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.2987, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2381.37 kN, MaxRatio=104745.071, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.613e+19
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 4; [0.7-0.9]: 26; [0.4-0.7]: 56; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 160 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 150.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE260B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2159.13 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3161 mm
F60 Dynamic check (L=43.0 m): |U3|=10.32 mm -> X=5.53
L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71


```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 68

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.2934
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.2934) = 8790245.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00014025 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8113 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=122.8518,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=41.7622,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=179.2503,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=213.4779,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=274.5475,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=302.0453,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.4436,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.3944,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2159.13 kN, MaxRatio=107317.439, F60_Dinamico=OK, SkewV=68,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.487e+19
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 4; [0.7-0.9]: 35;
[0.4-0.7]: 63; [0.1-0.4]: 34; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 161 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 22.0 mm
BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 12.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE360B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2342.26 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2754 mm
F60 Dynamic check (L=43.0 m): |U3|=10.28 mm -> X=5.54
L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 196

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.6895
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.6895) = 10656088.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009200 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.7720 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=97.4573, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.2044,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=179.5273,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=140.7067,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=136.7980,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=166.6874,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.1951,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.2318,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2342.26 kN, MaxRatio=1.898, F60_Dinamico=OK, SkewV=196,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.599e+09
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 15; [0.7-0.9]: 33;
[0.4-0.7]: 38; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 162 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 32.0 mm
TC_h: 500.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm

```

DGA_tw: 30.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE340B
LG: HE450M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2334.05 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9030 mm

F60 Dynamic check (L=43.0 m): |U3|=9.90 mm -> X=5.64

L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1402

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.1402) = 9193449.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007486 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4007 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.0921,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.5176,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.1568,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=109.0960,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=108.5402,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=135.4052,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.9618, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.0455, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2334.05 kN, MaxRatio=1.966, F60_Dinamico=OK, SkewV=52,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.483e+09
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 2; [0.7-0.9]: 22;
[0.4-0.7]: 65; [0.1-0.4]: 47; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 163 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 650.0 mm
TC_tf: 20.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 32.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm

CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE340B
TRS: HE400B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2440.99 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7499 mm

F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.4908

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.4908) = 9437202.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008188 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2493 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=90.5474, Limit=92.5926

-> OK

```

    -> Sheet: FramesRBTForFatigue . S11_final=34.3823,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=129.9689,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=109.4097,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=117.3695,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesEBBForFatigue . S11_final=145.7346,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBTForFatigue . S11_final=7.5037, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.2522, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2440.99 kN, MaxRatio=94880.970, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
 failures) -> Cost=2.197e+19

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 7; [0.7-0.9]: 34;
 [0.4-0.7]: 57; [0.1-0.4]: 45; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 164 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 18.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE260B
LG: HE450M

```

R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2326.87 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4716 mm

F60 Dynamic check (L=43.0 m): |U3|=10.47 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.7776

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.7776) = 9720285.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008325 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9655 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=120.0865,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=26.7958,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=178.4185,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=162.7361,

Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=133.2945,

Limit=92.5926 -> NOT OK! (Cumulative failures: 4)


```
-> Sheet: FramesEBBForFatigue . S11_final=164.4123,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.2066,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.5012,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2326.87 kN, MaxRatio=2.081, F60_Dinamico=OK, SkewV=69,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.442e+09

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 15; [0.7-0.9]: 26;
[0.4-0.7]: 30; [0.1-0.4]: 63; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 165 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 36.0 mm
DGB_tw: 24.0 mm
TRB_h: 600.0 mm
TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 26.0 mm
CTT_h: 130.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE300B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2504.84 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.6126 mm
F60 Dynamic check (L=43.0 m): |U3|=9.61 mm -> X=5.73

L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8763 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8763) = 9290983.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009786 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1104 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=104.8407,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=36.7995,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=156.3852,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=118.3943,

Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=159.3190,

Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=197.7555,

Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=10.6624,

Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=8.4049, Limit=118.5185

-> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2504.84 kN, MaxRatio=2.096, F60_Dinamico=Check, dynamic
analysis required, SkewV=52, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.946e+10
    Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 5; [0.7-0.9]: 12;
[0.4-0.7]: 76; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 166 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 600.0 mm
    BC_tf: 34.0 mm
    BC_tw: 32.0 mm
    TC_h: 600.0 mm
    TC_tf: 24.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 600.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 140.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE260B
    LG: HE600M
    R_TR_B: HE320B
-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2413.21 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.4082 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.41 mm -> X=5.79
    L.Inf (2.54) < X (5.79) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
    Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0952
mm
Horizontal check: $R = (43000.0)^2 / (8 * 25.0952) = 9209922.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011458 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9019 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=104.9440,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.1405,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=144.7809,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=119.6577,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.6061,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=228.7722,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.5971,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.3060,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2413.21 kN, MaxRatio=119126.698, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.425e+19
Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 5; [0.7-0.9]: 18;
[0.4-0.7]: 84; [0.1-0.4]: 36; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 167 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 18.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 18.0 mm
TRB_tw: 26.0 mm
CTT_h: 130.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE400B
LG: HE360M
R_TR_B: HE280B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2422.30 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.3145 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.31 mm -> X=5.82
```

```
L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 193

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.3284
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.3284) = 11957790.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008750 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8085 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=87.8806, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=27.1963,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=214.1363,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=190.8016,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=136.6165,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=168.8526,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.8026, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.8764, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2422.30 kN, MaxRatio=4.357, F60_Dinamico=Check, dynamic
analysis required, SkewV=193, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=5.629e+10
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 2; [0.7-0.9]: 16;
[0.4-0.7]: 64; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 168 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 34.0 mm
BC_tw: 34.0 mm

```

TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 38.0 mm
DGB_tw: 26.0 mm
TRB_h: 800.0 mm
TRB_bf: 700.0 mm
TRB_tf: 32.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE340B
TRS: HE240B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2646.92 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3759 mm

F60 Dynamic check (L=43.0 m): |U3|=9.38 mm -> X=5.80

L.Inf (2.54) < X (5.80) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1758

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.1758) = 8829705.0$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008074 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8763 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=101.8052,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.9066,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=148.5540,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.5183,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=107.8268,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=131.0025,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.5755,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.7824,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2646.92 kN, MaxRatio=1.478, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.742e+10

Ratio counts by range: [>1.0]: 16; [$0.9-1.0$]: 9; [$0.7-0.9$]: 8; [$0.4-0.7$]: 78; [$0.1-0.4$]: 48; [≤ 0.1]: 7;

=====
--- STARTING GA ITERATION No. 169 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm

DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 34.0 mm
TRB_tw: 30.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE300B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2242.52 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.2979 mm

F60 Dynamic check (L=43.0 m): |U3|=11.30 mm -> X=5.28

L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 228

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3329

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3329) = 9498465.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007442 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.7962 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

- > Sheet: FramesWBTForFatigue . S11_final=115.9406,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
- > Sheet: FramesRBTForFatigue . S11_final=31.5026,
Limit=118.5185 -> OK
- > Sheet: FramesWSTForFatigue . S11_final=166.2546,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
- > Sheet: FramesRSTForFatigue . S11_final=106.0836,
Limit=118.5185 -> OK
- > Sheet: FramesIBBForFatigue . S11_final=114.3860,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
- > Sheet: FramesEBBForFatigue . S11_final=143.2247,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
- > Sheet: FramesEBTForFatigue . S11_final=9.7467, Limit=118.5185
-> OK
- > Sheet: FramesIBTForFatigue . S11_final=7.6819, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2242.52 kN, MaxRatio=93907.687, F60_Dinamico=OK, SkewV=228,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.978e+19

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 2; [0.7-0.9]: 17;
[0.4-0.7]: 71; [0.1-0.4]: 43; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 170 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 26.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 600.0 mm
TRB_tf: 38.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm

CTB_tf: 20.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE360B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2425.62 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1104 mm

F60 Dynamic check (L=43.0 m): |U3|=10.11 mm -> X=5.58

L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 229

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.5576
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.5576) = 10246011.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007586 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6082 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=95.1224, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=28.8681,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=159.7722,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=108.7315,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=117.5808,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=146.7987,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=9.3798, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.2118,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2425.62 kN, MaxRatio=1.343, F60_Dinamico=OK, SkewV=229,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=5.938e+09

```

```

    Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 17; [0.7-0.9]: 42;
[0.4-0.7]: 28; [0.1-0.4]: 55; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 171 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 28.0 mm
    BC_tw: 28.0 mm
    TC_h: 800.0 mm
    TC_tf: 36.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 18.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 700.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 110.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 150.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 14.0 mm
    VER: HE500B
    TRS: HE360B
    LG: HE340M
    R_TR_B: HE200B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2489.27 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8073 mm

F60 Dynamic check (L=43.0 m): |U3|=9.81 mm -> X=5.67

L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 236

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0637

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0637) = 10972679.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009548 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2986 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=102.2012,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.1026,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=254.7992,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=342.9350,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=156.6727,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=188.0439,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=10.6523,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.9447, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2489.27 kN, MaxRatio=2.309, F60_Dinamico=OK, SkewV=236,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.026e+10

Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 5; [0.7-0.9]: 19;
[0.4-0.7]: 55; [0.1-0.4]: 57; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 172 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 12.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 18.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE240B
LG: HE400M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2272.16 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.4371 mm
F60 Dynamic check (L=43.0 m): |U3|=10.44 mm -> X=5.49
L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 136

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1075
mm
Horizontal check: $R = (43000.0)^2 / (8 * 25.1075) = 9205428.0$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008676 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.9324 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=118.0030,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.3354,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=199.9077,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=266.3502,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=139.0029,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=170.6742,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.5102,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.9586,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2272.16 kN, MaxRatio=1.770, F60_Dinamico=OK, SkewV=136,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.549e+09

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 8; [0.7-0.9]: 35;
[0.4-0.7]: 51; [0.1-0.4]: 48; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 173 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 12.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 40.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 17.0 mm
CTB_h: 120.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE400B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2469.05 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8423 mm
F60 Dynamic check (L=43.0 m): |U3|=9.84 mm -> X=5.66
L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71


```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 64

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9436
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.9436) = 8578101.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011931 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3419 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=104.3385,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.5531,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=160.1450,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=128.2508,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=176.1492,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=215.3638,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.0018, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.1972, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2469.05 kN, MaxRatio=133816.751, F60_Dinamico=OK, SkewV=64,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.421e+19
Ratio counts by range: [>1.0]: 73; [0.9-1.0]: 14; [0.7-0.9]: 26;
[0.4-0.7]: 16; [0.1-0.4]: 30; [<=0.1]: 7;

```

```

=====
--- STARTING GA ITERATION No. 174 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 600.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE220B
LG: HE600M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2573.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3198 mm

F60 Dynamic check (L=43.0 m): |U3|=9.32 mm -> X=5.81

L.Inf (2.54) < X (5.81) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.5477
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.5477) = 9046807.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008886 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8155 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=107.7851,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.6813,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=131.3283,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=100.1776,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=182.7183,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=227.6019,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=17.1183,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.0181,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2573.94 kN, MaxRatio=1.540, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.659e+10
Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 12; [0.7-0.9]: 21;
[0.4-0.7]: 47; [0.1-0.4]: 76; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 175 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 36.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm

```

DGA_tf: 28.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 30.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE260B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2546.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2329 mm

F60 Dynamic check (L=43.0 m): |U3|=9.23 mm -> X=5.84

L.Inf (2.54) < X (5.84) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 183

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.9282
mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.9282) = 11597886.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007877 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7261 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=83.8038, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=30.0043,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=178.6432,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=130.2666,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=147.3345,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=183.4314,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.7932,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.2288,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2546.58 kN, MaxRatio=1.438, F60_Dinamico=Check, dynamic analysis required, SkewV=183, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.072e+10

Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 3; [0.7-0.9]: 37; [0.4-0.7]: 53; [0.1-0.4]: 54; [<=0.1]: 0;

>> Snapshot iter 175 saved: D:\000.Robinson Mercado\001.Model 3D\05.MatLAB\Logs\snapshot_iter_175_20251114_013311.mat

===
--- STARTING GA ITERATION No. 176 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 22.0 mm

BC_tw: 32.0 mm

TC_h: 750.0 mm

TC_tf: 26.0 mm

TC_tw: 36.0 mm

DGA_bf: 350.0 mm

DGA_tf: 22.0 mm

DGA_tw: 18.0 mm

DGB_bf: 400.0 mm

DGB_tf: 18.0 mm

DGB_tw: 22.0 mm

TRB_h: 750.0 mm

TRB_bf: 650.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE550B
TRS: HE340B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2499.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4756 mm

F60 Dynamic check (L=43.0 m): |U3|=10.48 mm -> X=5.48

L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 191

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.5928

mm

Horizontal check: $R = (43000.0)^2 / (8 * 17.5928) = 13137485.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006756 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9621 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=89.2745, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.9057,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=199.2862,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=135.9372,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=116.1351,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=145.1980,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.7911,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1272, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2499.49 kN, MaxRatio=2.414, F60_Dinamico=OK, SkewV=191,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=9.872e+09

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 5; [0.7-0.9]: 9; [0.4-
 0.7]: 78; [0.1-0.4]: 47; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 177 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 40.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 16.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm

```

VER: HE500B
TRS: HE300B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2502.12 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3731 mm

F60 Dynamic check (L=43.0 m): |U3|=9.37 mm -> X=5.80

L.Inf (2.54) < X (5.80) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.9804
mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.9804) = 11567603.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011039 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8663 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=104.9137,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.8657,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=185.0745,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)


```

    -> Sheet: FramesRSTForFatigue . S11_final=192.6259,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=193.6351,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=227.0784,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.5762,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.0416, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2502.12 kN, MaxRatio=2.380, F60_Dinamico=Check, dynamic
analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.046e+10
    Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 8; [0.7-0.9]: 10;
[0.4-0.7]: 65; [0.1-0.4]: 60; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 178 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 22.0 mm
    BC_tw: 30.0 mm
    TC_h: 750.0 mm
    TC_tf: 34.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 350.0 mm
    DGA_tf: 30.0 mm
    DGA_tw: 10.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 24.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 36.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 14.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 10.0 mm
    VER: HE550B
    TRS: HE340B
    LG: HE300M
    R_TR_B: HE260B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
  Total Weight (Sum |FZ_dead|): 2522.92 kN
  U3 displacement at F60 (COMB01-PER-LOAD): -9.9678 mm
  F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62
  L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
  Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
  Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
  Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
  Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
  Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
  Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
  Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
  Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
  Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
  Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
  Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
  Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
  Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
  Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
  Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
  Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 308

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.4740
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.4740) = 11288731.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006337 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4556 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
  -> Sheet: FramesWBTFForFatigue . S11_final=100.9382,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRBTForFatigue . S11_final=33.4624,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=177.4041,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesRSTForFatigue . S11_final=174.5009,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesIBBForFatigue . S11_final=145.9896,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBBForFatigue . S11_final=186.2490,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
  -> Sheet: FramesEBTForFatigue . S11_final=11.4690,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=10.0760,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2522.92 kN, MaxRatio=5.509, F60_Dinamico=OK, SkewV=308,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.920e+10

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 13; [0.7-0.9]: 18;
[0.4-0.7]: 59; [0.1-0.4]: 56; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 179 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 120.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE240B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2350.55 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3123 mm
F60 Dynamic check (L=43.0 m): |U3|=10.31 mm -> X=5.53
L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.5358
mm
Horizontal check: $R = (43000.0)^2 / (8 * 25.5358) = 9051003.6$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008953 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8007 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=130.7730,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=42.1141,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=169.3438,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=177.2943,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=241.3175,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=298.2738,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=16.1019,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.9046,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2350.55 kN, MaxRatio=133699.685, F60_Dinamico=OK, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.202e+19

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 6; [0.7-0.9]: 29; [0.4-0.7]: 71; [0.1-0.4]: 33; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 180 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 34.0 mm
BC_tw: 38.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 28.0 mm
CTT_h: 100.0 mm
CTT_tf: 18.0 mm
CTB_h: 120.0 mm
CTB_tf: 14.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE300B
TRS: HE300B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2346.49 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0859 mm
F60 Dynamic check (L=43.0 m): |U3|=10.09 mm -> X=5.59
L.Inf (2.54) < X (5.59) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.4447
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.4447) = 8125405.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011434 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5870 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=81.7713, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.5977,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=167.4338,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=176.8850,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=163.1876,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=193.4372,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.6097, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.7095, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2346.49 kN, MaxRatio=134826.459, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.265e+19
Ratio counts by range: [>1.0]: 42; [0.9-1.0]: 3; [0.7-0.9]: 10;
[0.4-0.7]: 78; [0.1-0.4]: 33; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 181 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 30.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 28.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 38.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 20.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE360B
LG: HE600M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2555.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5907 mm

F60 Dynamic check (L=43.0 m): |U3|=9.59 mm -> X=5.73

L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.0340
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.0340) = 10489475.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008120 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0892 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=96.2044, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.5396,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=133.7378,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=110.5782,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=110.1957,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=133.2625,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.4869, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.5141, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2555.09 kN, MaxRatio=1.677, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.682e+10
Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 10; [0.7-0.9]: 12;
[0.4-0.7]: 71; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 182 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 30.0 mm
BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 14.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm

```


DGA_tf: 24.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE360M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2146.04 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5580 mm

F60 Dynamic check (L=43.0 m): |U3|=10.56 mm -> X=5.46

L.Inf (2.54) < X (5.46) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 189

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1695

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.1695) = 8831861.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011837 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0586 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=99.4261, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.5614,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=180.0167,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=176.1559,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=174.2389,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=211.2996,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=10.3962,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.9075,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2146.04 kN, MaxRatio=2.723, F60_Dinamico=OK, SkewV=189,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.053e+10

Ratio counts by range: [>1.0]: 57; [0.9-1.0]: 3; [0.7-0.9]: 16;
[0.4-0.7]: 39; [0.1-0.4]: 51; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 183 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm

BC_tf: 34.0 mm

BC_tw: 34.0 mm

TC_h: 700.0 mm

TC_tf: 38.0 mm

TC_tw: 38.0 mm

DGA_bf: 400.0 mm

DGA_tf: 28.0 mm

DGA_tw: 22.0 mm

DGB_bf: 550.0 mm

DGB_tf: 22.0 mm

DGB_tw: 18.0 mm

TRB_h: 850.0 mm

TRB_bf: 600.0 mm

TRB_tf: 36.0 mm

TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE200B
LG: HE360M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2643.66 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3754 mm

F60 Dynamic check (L=43.0 m): |U3|=9.38 mm -> X=5.80

L.Inf (2.54) < X (5.80) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 184

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0586
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.0586) = 9606748.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005890 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8711 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=93.1710, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=22.9235,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=169.7242,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=264.6475,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=88.7824, Limit=92.5926
-> OK
    -> Sheet: FramesEBBForFatigue . S11_final=110.2039,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=16.0100,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.8177,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2643.66 kN, MaxRatio=1.811, F60_Dinamico=Check, dynamic
analysis required, SkewV=184, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.315e+10
    Ratio counts by range: [>1.0]: 13; [0.9-1.0]: 4; [0.7-0.9]: 15;
[0.4-0.7]: 66; [0.1-0.4]: 68; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 184 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 28.0 mm
    BC_tw: 28.0 mm
    TC_h: 700.0 mm
    TC_tf: 26.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 10.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 11.0 mm
    VER: HE400B

```

TRS: HE220B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2310.34 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0947 mm

F60 Dynamic check (L=43.0 m): |U3|=9.09 mm -> X=5.89

L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 70

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.0523
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.0523) = 8239062.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011850 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5933 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=89.6612, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=31.2860,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=192.8295,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=179.2557,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```
-> Sheet: FramesIBBForFatigue . S11_final=176.7887,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=214.4960,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=15.7523,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.3674,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2310.34 kN, MaxRatio=2.294, F60_Dinamico=Check, dynamic
analysis required, SkewV=70, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.868e+10
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 8; [0.7-0.9]: 31;
[0.4-0.7]: 52; [0.1-0.4]: 40; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 185 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 550.0 mm
BC_tf: 10.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 14.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 20.0 mm
TRB_tw: 18.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE300B
LG: HE500M
R_TR_B: HE280B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2059.98 kN
```

U3 displacement at F60 (COMB01-PER-LOAD): -10.3319 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.33 mm -> X=5.52
 L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 24

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7457
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 28.7457) = 8040341.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00013797 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.8294 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=178.3271,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=40.0558,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=187.1005,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=200.2503,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=235.5771,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=277.0146,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.6731,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.1660, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2059.98 kN, MaxRatio=2.072, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.964e+09
    Ratio counts by range: [>1.0]: 54; [0.9-1.0]: 12; [0.7-0.9]: 0;
[0.4-0.7]: 58; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 186 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 750.0 mm
    BC_tf: 30.0 mm
    BC_tw: 32.0 mm
    TC_h: 650.0 mm
    TC_tf: 22.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 36.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 14.0 mm
    VER: HE500B
    TRS: HE200B
    LG: HE360M
    R_TR_B: HE400B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2626.95 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.2408 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.24 mm -> X=5.84
    L.Inf (2.54) < X (5.84) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```


Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 188

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.9431 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 19.9431) = 11589196.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006852 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.7378 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=71.1307, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=20.7694,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=171.6486,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=109.6386,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=101.1080,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesEBBForFatigue . S11_final=124.6731,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBTForFatigue . S11_final=12.9709,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.6930,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2626.95 kN, MaxRatio=2.312, F60_Dinamico=Check, dynamic analysis required, SkewV=188, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=3.581e+10

Ratio counts by range: [>1.0]: 20; [$0.9-1.0$]: 3; [$0.7-0.9$]: 12;
[$0.4-0.7$]: 75; [$0.1-0.4$]: 56; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 187 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE300B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1970.56 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.3430 mm
F60 Dynamic check (L=43.0 m): |U3|=11.34 mm -> X=5.27
L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 183

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.0821
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.0821) = 7947322.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00017774 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.8426 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=156.1416,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=55.2127,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=207.8908,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=173.6095,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=320.4020,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=395.7425,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.6344, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8811, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1970.56 kN, MaxRatio=1.592, F60_Dinamico=OK, SkewV=183,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.396e+09
Ratio counts by range: [>1.0]: 43; [0.9-1.0]: 12; [0.7-0.9]: 20;
[0.4-0.7]: 52; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 188 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 30.0 mm

```

BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 600.0 mm
DGB_tf: 18.0 mm
DGB_tw: 10.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE260B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2223.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0009 mm

F60 Dynamic check (L=43.0 m): |U3|=10.00 mm -> X=5.61

L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 76

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.5711

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.5711) = 10239861.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011405 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4981 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=120.8373,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.8950,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=186.0668,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=177.0902,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=175.1741,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=201.7717,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.6707,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.4276, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2223.79 kN, MaxRatio=3.246, F60_Dinamico=OK, SkewV=76,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=1.302e+10
Ratio counts by range: [>1.0]: 26; [$0.9-1.0$]: 4; [$0.7-0.9$]: 18;
[$0.4-0.7$]: 63; [$0.1-0.4$]: 55; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 189 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 8.0 mm
BC_tw: 26.0 mm
TC_h: 700.0 mm
TC_tf: 40.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 10.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm

DGB_tw: 26.0 mm
TRB_h: 550.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE200B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2262.52 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.5159 mm

F60 Dynamic check (L=43.0 m): |U3|=11.52 mm -> X=5.23

L.Inf (2.54) < X (5.23) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 232

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.5380

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.5380) = 8709211.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006787 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.0087 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=144.1888,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.3535,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=172.6144,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=148.5864,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=160.8624,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=209.0802,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=17.5275,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.4689,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2262.52 kN, MaxRatio=33621.187, F60_Dinamico=OK, SkewV=232,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.557e+18
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 8; [0.7-0.9]: 6; [0.4-
0.7]: 22; [0.1-0.4]: 70; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 190 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 38.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 30.0 mm
DGB_bf: 550.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 900.0 mm
TRB_bf: 350.0 mm
TRB_tf: 18.0 mm
TRB_tw: 30.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm

CTB_tf: 13.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE200B
LG: HE340M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2308.28 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8708 mm

F60 Dynamic check (L=43.0 m): |U3|=9.87 mm -> X=5.65

L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 228

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.9035
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.9035) = 8283013.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014292 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3712 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=88.4299, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=30.1878,
Limit=118.5185 -> OK


```

    -> Sheet: FramesWSTForFatigue . S11_final=221.5878,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=170.5421,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=316.9917,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=343.0832,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=18.1201,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=20.0696,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2308.28 kN, MaxRatio=1.348, F60_Dinamico=OK, SkewV=228,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=5.634e+09

```

```

    Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 11; [0.7-0.9]: 25;
[0.4-0.7]: 83; [0.1-0.4]: 39; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 191 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 800.0 mm
    BC_tf: 8.0 mm
    BC_tw: 40.0 mm
    TC_h: 500.0 mm
    TC_tf: 14.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 14.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 700.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 120.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 15.0 mm
    VER: HE300B
    TRS: HE260B
    LG: HE320M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2029.10 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.0103 mm

F60 Dynamic check (L=43.0 m): |U3|=11.01 mm -> X=5.35

L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 267

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.8000

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.8000) = 8313848.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011358 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.5101 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=87.0197, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=40.3305,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=206.0477,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=146.7156,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=179.6735,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=222.3532,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```
-> Sheet: FramesEBTForFatigue . S11_final=11.9788,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.6196,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2029.10 kN, MaxRatio=129562.808, F60_Dinamico=OK, SkewV=267,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.406e+19

Ratio counts by range: [>1.0]: 68; [0.9-1.0]: 8; [0.7-0.9]: 34;
[0.4-0.7]: 23; [0.1-0.4]: 33; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 192 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 32.0 mm
BC_tw: 26.0 mm
TC_h: 550.0 mm
TC_tf: 38.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 14.0 mm
DGB_bf: 600.0 mm
DGB_tf: 28.0 mm
DGB_tw: 24.0 mm
TRB_h: 600.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 15.0 mm
VER: HE600B
TRS: HE200B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2684.20 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1743 mm

F60 Dynamic check (L=43.0 m): |U3|=9.17 mm -> X=5.86

L.Inf (2.54) < X (5.86) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.7891
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7891) = 8627583.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009966 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6667 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=99.8924, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.3891,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=137.8239,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=149.3808,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=446.6859,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=514.6041,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=18.0479,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.1492,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2684.20 kN, MaxRatio=1.300, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.722e+10
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 5; [0.7-0.9]: 28;
[0.4-0.7]: 44; [0.1-0.4]: 72; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 193 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 800.0 mm
BC_tf: 16.0 mm
BC_tw: 30.0 mm
TC_h: 500.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE320B
LG: HE550M
R_TR_B: HE200B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2053.90 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9918 mm
F60 Dynamic check (L=43.0 m): |U3|=9.99 mm -> X=5.62
L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.5062
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.5062) = 8107872.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012779 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4926 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.0418, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.1086,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=177.3107,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=338.9080,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=198.4143,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=241.5419,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.0128, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.7468, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2053.90 kN, MaxRatio=2.769, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.696e+09
Ratio counts by range: [>1.0]: 45; [0.9-1.0]: 4; [0.7-0.9]: 15;
[0.4-0.7]: 67; [0.1-0.4]: 35; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 194 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 36.0 mm
BC_tw: 28.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 30.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE340B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2557.55 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2006 mm

F60 Dynamic check (L=43.0 m): |U3|=9.20 mm -> X=5.85

L.Inf (2.54) < X (5.85) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.4474
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.4474) = 11303383.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009439 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.6926 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=109.7319,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.4361,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=172.3236,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=213.6741,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=162.5504,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=200.5800,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4719,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1343, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2557.55 kN, MaxRatio=3.809, F60_Dinamico=Check, dynamic
analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.639e+10
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 3; [0.7-0.9]: 13;
[0.4-0.7]: 73; [0.1-0.4]: 46; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 195 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm

```


DGA_bf: 500.0 mm
DGA_tf: 18.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 550.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE200B
LG: HE320M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2035.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6689 mm

F60 Dynamic check (L=43.0 m): |U3|=10.67 mm -> X=5.43

L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 266

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 32.2789

mm

Horizontal check: $R = (43000.0)^2 / (8 * 32.2789) = 7160249.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013031 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1688 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=98.3876, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=43.8868,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=218.0867,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=159.0432,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=224.2346,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=284.0541,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.6322,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.7191,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2035.49 kN, MaxRatio=2.238, F60_Dinamico=OK, SkewV=266,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.636e+09

Ratio counts by range: [>1.0]: 40; [0.9-1.0]: 12; [0.7-0.9]: 16;
[0.4-0.7]: 74; [0.1-0.4]: 24; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 196 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 32.0 mm

BC_tw: 34.0 mm

TC_h: 600.0 mm

TC_tf: 18.0 mm

TC_tw: 38.0 mm

DGA_bf: 400.0 mm

DGA_tf: 22.0 mm

DGA_tw: 16.0 mm

DGB_bf: 400.0 mm

DGB_tf: 20.0 mm

DGB_tw: 28.0 mm

TRB_h: 850.0 mm

TRB_bf: 450.0 mm

TRB_tf: 34.0 mm

TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE360B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2596.59 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7516 mm

F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 219

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.2726 mm

Horizontal check: $R = (43000.0)^2 / (8 * 16.2726) = 14203320.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007286 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2386 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=66.3675, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=22.4470,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.8649,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=143.8840,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=116.6198,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=140.3534,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.3544,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.5672, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2596.59 kN, MaxRatio=1.961, F60_Dinamico=OK, SkewV=219,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=8.188e+09

Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 5; [0.7-0.9]: 14;
 [0.4-0.7]: 78; [0.1-0.4]: 52; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 197 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 20.0 mm
BC_tw: 40.0 mm
TC_h: 550.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 20.0 mm
TRB_h: 800.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE450B

```

TRS: HE280B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2154.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6152 mm

F60 Dynamic check (L=43.0 m): |U3|=10.62 mm -> X=5.45

L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 135

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.2495
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.2495) = 10387884.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014986 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1085 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=114.7350,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.5560,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=217.2263,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=214.6066,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=392.5288,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=402.5310,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.9105,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.9495,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2154.79 kN, MaxRatio=3.005, F60_Dinamico=OK, SkewV=135,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.168e+10

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 2; [0.7-0.9]: 16;
[0.4-0.7]: 75; [0.1-0.4]: 53; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 198 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE300B
LG: HE600M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2115.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8437 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.84 mm -> X=5.66
 L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.7159
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.7159) = 8339086.6$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00012735 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.3441 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=104.0098,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.5022,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=172.4473,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=338.6347,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=204.7194,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=243.3240,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=9.1898, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=7.0029, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2115.94 kN, MaxRatio=2.675, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.042e+09
    Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 2; [0.7-0.9]: 16;
[0.4-0.7]: 65; [0.1-0.4]: 37; [<=0.1]: 0;
>> Checkpoint saved (Gen=3, FunEval=198): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
      3              198          3.501e+08          7.16e+18          0

```

```

=====
--- STARTING GA ITERATION No. 199 ---
=====

```

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

```

BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE340B
TRS: HE280B
LG: HE550M
R_TR_B: HE300B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

```

    Total Weight (Sum |FZ_dead|): 1931.09 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -11.0249 mm
    F60 Dynamic check (L=43.0 m): |U3|=11.02 mm -> X=5.35
    L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

```

    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

```


Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.6006
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.6006) = 7808127.8$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00019403 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5234 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=200.2471,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=48.7019,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=179.1151,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=178.5067,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=381.2166,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=450.9014,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.5985,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.0501, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=1931.09 kN, MaxRatio=3.345, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.087e+10

Ratio counts by range: [>1.0]: 49; [0.9-1.0]: 11; [0.7-0.9]: 7;
[0.4-0.7]: 63; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 200 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 38.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 16.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE300B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2379.59 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4389 mm

F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 80

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7719 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 21.7719) = 10615741.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00010783 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.9279 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=130.4891,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.6930,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=210.7902,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=213.3559,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=276.0369,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=259.6302,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.2850,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.3576,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2379.59 kN, MaxRatio=1.758, F60_Dinamico=Check, dynamic analysis required, SkewV=80, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.719e+10
 Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 2; [0.7-0.9]: 22; [0.4-0.7]: 40; [0.1-0.4]: 76; [<=0.1]: 0;
 >> Snapshot iter 200 saved: D:\000.Robinson Mercado\001.Model 3D\05.MatLAB\Logs\snapshot_iter_200_20251114_013311.mat

```
=====
--- STARTING GA ITERATION No. 201 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 500.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 500.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE320B
LG: HE400M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2381.08 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.3364 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.34 mm -> X=5.81
```

```
L.Inf (2.54) < X (5.81) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 138

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0967
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.0967) = 10955519.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012227 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8277 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=131.1713,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.7952,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=218.2106,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=217.9718,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=299.3996,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=284.4739,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.7734,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1472, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2381.08 kN, MaxRatio=1.931, F60_Dinamico=Check, dynamic
analysis required, SkewV=138, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.928e+10
Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 1; [0.7-0.9]: 24;
[0.4-0.7]: 36; [0.1-0.4]: 82; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 202 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 30.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm

```

TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 36.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 32.0 mm
TRB_tw: 18.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 110.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE240B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2507.67 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4681 mm

F60 Dynamic check (L=43.0 m): |U3|=9.47 mm -> X=5.77

L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0451

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0451) = 9228352.5$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009561 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9613 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=112.9593,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=31.2122,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=154.0819,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=136.7989,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=174.5048,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=199.4148,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.6102,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.0558,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2507.67 kN, MaxRatio=148291.776, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.514e+19

Ratio counts by range: [>1.0]: 37; [0.9-1.0]: 6; [0.7-0.9]: 10; [0.4-0.7]: 71; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 203 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm

BC_tf: 14.0 mm

BC_tw: 32.0 mm

TC_h: 550.0 mm

TC_tf: 36.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 34.0 mm

DGA_tw: 28.0 mm

DGB_bf: 400.0 mm

DGB_tf: 22.0 mm

DGB_tw: 14.0 mm

TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 20.0 mm
TRB_tw: 18.0 mm
CTT_h: 140.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE300B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2031.16 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4639 mm

F60 Dynamic check (L=43.0 m): |U3|=10.46 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 75

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.7547

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7547) = 8638660.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013595 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9594 mm (Limit: 71.6667 mm). Estado: OK


```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=166.3162,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=44.2958,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=202.3540,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=268.6011,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=247.8470,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=299.5253,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.9308,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.0412, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2031.16 kN, MaxRatio=1.952, F60_Dinamico=OK, SkewV=75,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.466e+09

Ratio counts by range: [>1.0]: 38; [0.9-1.0]: 11; [0.7-0.9]: 17;
 [0.4-0.7]: 47; [0.1-0.4]: 53; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 204 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 36.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 26.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm

```

STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE300B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2385.06 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7019 mm

F60 Dynamic check (L=43.0 m): |U3|=9.70 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 76

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.4234
mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.4234) = 8428006.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011043 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2004 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=128.5660,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.8501,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=193.5054,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=192.3445,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=166.0293,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=195.5135,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=11.0266,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.4791, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2385.06 kN, MaxRatio=1.894, F60_Dinamico=Check, dynamic
analysis required, SkewV=76, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.769e+10
    Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 9; [0.7-0.9]: 25;
[0.4-0.7]: 64; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 205 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 14.0 mm
    BC_tw: 32.0 mm
    TC_h: 750.0 mm
    TC_tf: 30.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 22.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 26.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE280B
    LG: HE500M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2386.39 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.6746 mm
F60 Dynamic check (L=43.0 m): |U3|=9.67 mm -> X=5.71
L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.7610
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.7610) = 9334250.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010639 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1694 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=132.8330,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.7448,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=189.0522,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=181.9284,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=174.2681,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=204.7672,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.9172,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.3455,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2386.39 kN, MaxRatio=1.603, F60_Dinamico=Check, dynamic
analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.537e+10
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 4; [0.7-0.9]: 32;
[0.4-0.7]: 52; [0.1-0.4]: 49; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 206 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 36.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 18.0 mm
TRB_h: 550.0 mm
TRB_bf: 350.0 mm
TRB_tf: 40.0 mm
TRB_tw: 18.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE280B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2208.10 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9273 mm
F60 Dynamic check (L=43.0 m): |U3|=9.93 mm -> X=5.63
L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 191

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.0510
mm
Horizontal check: $R = (43000.0)^2 / (8 * 28.0510) = 8239456.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011260 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4267 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=156.4184,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=45.9780,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=164.7185,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=123.5622,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=206.9442,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=254.4532,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.3174,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.1182,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2208.10 kN, MaxRatio=1.690, F60_Dinamico=OK, SkewV=191,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.378e+09

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 16; [0.7-0.9]: 17;
[0.4-0.7]: 58; [0.1-0.4]: 44; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 207 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 40.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 22.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE400B
LG: HE320M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2167.05 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.1412 mm
F60 Dynamic check (L=43.0 m): |U3|=11.14 mm -> X=5.32
L.Inf (2.54) < X (5.32) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 273

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.4070
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.4070) = 10314837.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011665 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.6382 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=126.0890,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.5995,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=204.7902,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=170.9752,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.2089,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=230.8198,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.0037, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.0568, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2167.05 kN, MaxRatio=1.469, F60_Dinamico=OK, SkewV=273,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.500e+09
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 7; [0.7-0.9]: 22;
[0.4-0.7]: 71; [0.1-0.4]: 47; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 208 ---
=====

```


>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 500.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 34.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 20.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE340B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2133.11 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0748 mm
F60 Dynamic check (L=43.0 m): |U3|=10.07 mm -> X=5.59
L.Inf (2.54) < X (5.59) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 235

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.6538
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.6538) = 8066112.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011144 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5741 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=111.4358,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.7894,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=243.1649,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=224.7492,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=160.3431,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=190.8419,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.5167, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2742, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2133.11 kN, MaxRatio=2.375, F60_Dinamico=OK, SkewV=235,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.153e+09
Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 2; [0.7-0.9]: 27;
[0.4-0.7]: 60; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 209 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 38.0 mm

```

DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 30.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 20.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE240B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2516.84 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1344 mm

F60 Dynamic check (L=43.0 m): |U3|=9.13 mm -> X=5.87

L.Inf (2.54) < X (5.87) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.1337
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.1337) = 9990846.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011100 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6285 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=113.3738,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=37.4874,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=156.3715,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=150.2432,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=283.6321,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=360.5996,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.8962,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.0564,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2516.84 kN, MaxRatio=1.563, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.629e+10

Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 9; [0.7-0.9]: 18; [0.4-0.7]: 67; [0.1-0.4]: 50; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 210 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm

BC_tf: 28.0 mm

BC_tw: 32.0 mm

TC_h: 700.0 mm

TC_tf: 30.0 mm

TC_tw: 36.0 mm

DGA_bf: 500.0 mm

DGA_tf: 36.0 mm

DGA_tw: 28.0 mm

DGB_bf: 500.0 mm

DGB_tf: 20.0 mm

DGB_tw: 16.0 mm

TRB_h: 750.0 mm

TRB_bf: 650.0 mm

TRB_tf: 38.0 mm

TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE320B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2446.06 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7879 mm

F60 Dynamic check (L=43.0 m): |U3|=9.79 mm -> X=5.67

L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7591 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.7591) = 10155257.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007073 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2850 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=99.5132, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.1789,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=138.2102,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.4017,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=97.9717, Limit=92.5926
-> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=122.4735,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.9198, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.3842, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2446.06 kN, MaxRatio=3.292, F60_Dinamico=OK, SkewV=24,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=1.356e+10

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 4; [0.7-0.9]: 10;
 [0.4-0.7]: 79; [0.1-0.4]: 46; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 211 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 17.0 mm
CTB_h: 120.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 15.0 mm
VER: HE450B

```

TRS: HE220B
LG: HE320M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2365.78 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4329 mm

F60 Dynamic check (L=43.0 m): |U3|=9.43 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 251

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.7279
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7279) = 8647347.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013046 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9303 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=105.3128,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.6351,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=254.1683,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=256.6884,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=274.7153,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=287.3862,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=15.1597,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.1200,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2365.78 kN, MaxRatio=134188.001, F60_Dinamico=Check, dynamic
analysis required, SkewV=251, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.260e+19

```

```

    Ratio counts by range: [>1.0]: 37; [0.9-1.0]: 6; [0.7-0.9]: 9; [0.4-
0.7]: 66; [0.1-0.4]: 48; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 212 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 32.0 mm
    BC_tw: 34.0 mm
    TC_h: 550.0 mm
    TC_tf: 28.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 26.0 mm
    DGB_tw: 24.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 17.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 14.0 mm
    VER: HE450B
    TRS: HE360B
    LG: HE340M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2357.37 kN

```


U3 displacement at F60 (COMB01-PER-LOAD): -9.6288 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72
 L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
 is required
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 213

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7446
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 21.7446) = 10629062.9$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00012705 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.1208 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=105.6183,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=44.0838,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=222.8578,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=175.2205,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=304.1412,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=318.2119,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=9.8031, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.6687, Limit=118.5185
 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2357.37 kN, MaxRatio=1.669, F60_Dinamico=Check, dynamic analysis required, SkewV=213, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.977e+10
Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 7; [0.7-0.9]: 12; [0.4-0.7]: 86; [0.1-0.4]: 47; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 213 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE360B
LG: HE450M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2407.73 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9217 mm
F60 Dynamic check (L=43.0 m): |U3|=9.92 mm -> X=5.64
L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 73

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2266
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.2266) = 9950856.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009832 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4195 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=104.8734,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.9560,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.6762,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=144.4955,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=135.4388,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=160.7703,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.0642, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2441, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2407.73 kN, MaxRatio=3.077, F60_Dinamico=OK, SkewV=73,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.226e+10

```

Ratio counts by range: [>1.0]: 18; [$0.9-1.0$]: 7; [$0.7-0.9$]: 31;
[$0.4-0.7$]: 59; [$0.1-0.4$]: 51; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 214 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 36.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 28.0 mm
DGB_bf: 550.0 mm
DGB_tf: 34.0 mm
DGB_tw: 30.0 mm
TRB_h: 800.0 mm
TRB_bf: 600.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE220B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2878.63 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.4706 mm

F60 Dynamic check (L=43.0 m): |U3|=8.47 mm -> X=6.10

L.Inf (2.54) < X (6.10) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

```

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.2797
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.2797) = 10861270.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008535 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 15.9644 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=86.1169, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=26.0443,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.5651,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=166.4151,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=139.8545,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=167.6698,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.8550,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.8300,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2878.63 kN, MaxRatio=1.304, F60_Dinamico=Check, dynamic
analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.974e+10
Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 5; [0.7-0.9]: 16;
[0.4-0.7]: 77; [0.1-0.4]: 54; [<=0.1]: 4;

=====
--- STARTING GA ITERATION No. 215 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm

```

BC_tf: 38.0 mm
BC_tw: 34.0 mm
TC_h: 800.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 38.0 mm
DGA_tw: 16.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 900.0 mm
TRB_bf: 700.0 mm
TRB_tf: 38.0 mm
TRB_tw: 28.0 mm
CTT_h: 170.0 mm
CTT_tf: 19.0 mm
CTB_h: 130.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE600B
TRS: HE280B
LG: HE320M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2922.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0067 mm

F60 Dynamic check (L=43.0 m): |U3|=9.01 mm -> X=5.91

L.Inf (2.54) < X (5.91) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 268

Starting Horizontal U2 check for 24 combinations...

```

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.2008
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.2008) = 12037249.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00003993 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.4942 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=72.4492, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=18.9179,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=159.6591,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=121.9384,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=63.8008, Limit=92.5926
-> OK
-> Sheet: FramesEBBForFatigue . S11_final=79.4325, Limit=92.5926
-> OK
-> Sheet: FramesEBTForFatigue . S11_final=14.5300,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.9020,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (2 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2922.24 kN, MaxRatio=127675.880, F60_Dinamico=Check, dynamic
analysis required, SkewV=268, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (2 failures) -> Cost=4.764e+19
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 0; [0.7-0.9]: 30;
[0.4-0.7]: 70; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 216 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 20.0 mm

```

DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE300B
LG: HE320M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2247.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7297 mm

F60 Dynamic check (L=43.0 m): |U3|=9.73 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 273

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.6855
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.6855) = 9362797.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009310 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2282 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=114.8621,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.2309,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=190.3423,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=138.3741,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=158.7661,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=199.0685,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.8116, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.6882, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2247.79 kN, MaxRatio=1.916, F60_Dinamico=Check, dynamic
analysis required, SkewV=273, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.061e+10
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 5; [0.7-0.9]: 26;
[0.4-0.7]: 42; [0.1-0.4]: 62; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 217 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 38.0 mm
TC_h: 700.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 22.0 mm
DGB_tw: 10.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm

CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE260B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2188.20 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.8987 mm

F60 Dynamic check (L=43.0 m): |U3|=10.90 mm -> X=5.38

L.Inf (2.54) < X (5.38) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 56

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.4208 mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.4208) = 8747832.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012021 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3980 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=139.4774,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue . S11_final=38.9960,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=161.7705,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=149.4577,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=196.0813,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=245.4939,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.2288,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.8094,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2188.20 kN, MaxRatio=65453.285, F60_Dinamico=OK, SkewV=56,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=9.374e+18

```

```

    Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 15; [0.7-0.9]: 30;
    [0.4-0.7]: 56; [0.1-0.4]: 38; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 218 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 24.0 mm
    BC_tw: 40.0 mm
    TC_h: 650.0 mm
    TC_tf: 28.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 12.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 17.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 11.0 mm
    VER: HE450B
    TRS: HE300B
    LG: HE500M

```

R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2445.03 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6703 mm

F60 Dynamic check (L=43.0 m): |U3|=9.67 mm -> X=5.71

L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.3690
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.3690) = 11346917.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011090 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1652 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=94.6706, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.0205,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=161.8698,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=136.0889,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=183.3129,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```

    -> Sheet: FramesEBBForFatigue . S11_final=215.8903,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.1796,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.0816, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2445.03 kN, MaxRatio=1.578, F60_Dinamico=Check, dynamic
analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.588e+10
    Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 7; [0.7-0.9]: 14;
[0.4-0.7]: 80; [0.1-0.4]: 53; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 219 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 28.0 mm
    BC_tw: 34.0 mm
    TC_h: 800.0 mm
    TC_tf: 20.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 28.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 180.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 10.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 12.0 mm
    VER: HE340B
    TRS: HE300B
    LG: HE320M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2249.76 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.3779 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.38 mm -> X=5.51

```

```

    L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 258

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.0153
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.0153) = 8249961.7$  mm
Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012043 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8765 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=95.2712, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.9000,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=250.5094,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=195.3447,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=172.0106,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=209.4499,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.4903,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.0259,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

```

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2249.76 kN, MaxRatio=2.127, F60_Dinamico=OK, SkewV=258,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.772e+09

Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 7; [0.7-0.9]: 37;
[0.4-0.7]: 65; [0.1-0.4]: 38; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 220 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 30.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
CTB_tf: 13.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE300B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2459.80 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6850 mm

F60 Dynamic check (L=43.0 m): |U3|=9.69 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 223

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.6503 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.6503) = 9772596.2$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008085 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.1824 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=92.7949, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=25.6261,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=203.2476,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=150.4409,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=115.8614,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=141.7516,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.0268,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.7554, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2459.80 kN, MaxRatio=107608.321, F60_Dinamico=Check, dynamic analysis required, SkewV=223, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.848e+19
 Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 11; [0.7-0.9]: 12; [0.4-0.7]: 69; [0.1-0.4]: 45; [<=0.1]: 0;


```
=====
--- STARTING GA ITERATION No. 221 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 650.0 mm
BC_tf: 34.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 28.0 mm
DGA_tw: 26.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE260B
LG: HE450M
R_TR_B: HE300B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2316.87 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9086 mm
F60 Dynamic check (L=43.0 m): |U3|=9.91 mm -> X=5.64
L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
```

```

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 75

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.4987
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.4987) = 8722115.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013580 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4074 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.0965,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.1486,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=193.7661,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=179.2699,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=202.2896,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=235.7682,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.6971,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6290,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2316.87 kN, MaxRatio=2.009, F60_Dinamico=OK, SkewV=75,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.211e+09
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 2; [0.7-0.9]: 24;
[0.4-0.7]: 82; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 222 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 40.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 34.0 mm

```

TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 350.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE340B
LG: HE450M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2524.35 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7370 mm

F60 Dynamic check (L=43.0 m): |U3|=9.74 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 72

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.8302

mm

Horizontal check: $R = (43000.0)^2 / (8 * 18.8302) = 12274194.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008111 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2315 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=81.0708, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.9125,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=187.0809,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=338.7430,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=113.6878,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=137.7977,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.0754, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.2197, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2524.35 kN, MaxRatio=2.991, F60_Dinamico=Check, dynamic
analysis required, SkewV=72, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.717e+10
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 7; [0.7-0.9]: 13;
[0.4-0.7]: 72; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 223 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 10.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 38.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 36.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm

TRB_bf: 750.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE300B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2513.05 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6336 mm

F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72

L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0453
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0453) = 9228261.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007400 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1322 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=93.7556, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.6407,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=135.4162,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=113.8715,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=103.0921,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=128.6079,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.9741,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.4632,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2513.05 kN, MaxRatio=1.328, F60_Dinamico=Check, dynamic
analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.560e+10
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 8; [0.7-0.9]: 29;
[0.4-0.7]: 59; [0.1-0.4]: 53; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 224 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 12.0 mm
BC_tw: 28.0 mm
TC_h: 800.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 20.0 mm
CTB_h: 150.0 mm
CTB_tf: 20.0 mm
STCTB_h: 120.0 mm

```

STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE260B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2305.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0444 mm

F60 Dynamic check (L=43.0 m): |U3|=10.04 mm -> X=5.60

L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 193

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8729 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8729) = 9292245.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012601 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5410 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=130.6527,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.0600,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=232.9183,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=196.8300,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=210.3459,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=258.3334,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=16.2756,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=16.1079,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2305.09 kN, MaxRatio=96189.241, F60_Dinamico=OK, SkewV=193,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.133e+19

```

```

    Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 10; [0.7-0.9]: 28;
[0.4-0.7]: 52; [0.1-0.4]: 46; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 225 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 14.0 mm
    BC_tw: 32.0 mm
    TC_h: 700.0 mm
    TC_tf: 34.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 350.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 24.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 30.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 900.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 130.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 12.0 mm
    VER: HE600B
    TRS: HE240B
    LG: HE400M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.


```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2588.45 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.3092 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.31 mm -> X=5.82
    L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required
    Starting Skew check for 16 combinations...
        Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
        Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
        Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
        Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
        Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
        Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
        Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
        Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
        Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
        Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
        Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
        Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
        Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
        Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
        Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
        Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
    Skew check completed. Total violations (> 0.8 mm): 132

    Starting Horizontal U2 check for 24 combinations...
    Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.6610
mm
    Horizontal check:  $R = (43000.0)^2 / (8 * 22.6610) = 10199248.6$  mm
    Horizontal check result ( $R > 6000000.0$  mm?): OK

    Starting Angular (Rotation) check for 24 combinations...
    Angular check completed. Max Theta (abs): 0.00007314 rad (Limit:
0.002000). Estado: OK

    Starting Vertical (F60) check for 288 combinations...
    Vertical (F60) check completed. Max U3 (abs): 16.8000 mm (Limit:
71.6667 mm). Estado: OK

    Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
        -> Sheet: FramesWBTFForFatigue . S11_final=98.9051, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
        -> Sheet: FramesRBTForFatigue . S11_final=23.6271,
Limit=118.5185 -> OK
        -> Sheet: FramesWSTForFatigue . S11_final=200.9077,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
        -> Sheet: FramesRSTForFatigue . S11_final=212.9868,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
        -> Sheet: FramesIBBForFatigue . S11_final=136.4062,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
        -> Sheet: FramesEBBForFatigue . S11_final=165.6233,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
        -> Sheet: FramesEBTForFatigue . S11_final=15.4454,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=12.0858,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2588.45 kN, MaxRatio=129412.012, F60_Dinamico=Check, dynamic
analysis required, SkewV=132, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.335e+19

Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 11; [0.7-0.9]: 25;
[0.4-0.7]: 35; [0.1-0.4]: 60; [<=0.1]: 0;

>> Snapshot iter 225 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_225_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 226 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE220B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2010.65 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2951 mm

F60 Dynamic check (L=43.0 m): |U3|=10.30 mm -> X=5.53

L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.0655
mm
Horizontal check: $R = (43000.0)^2 / (8 * 29.0655) = 7951869.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00017967 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.7952 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=142.4630,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=43.4519,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=186.8140,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=168.8643,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=301.2792,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=348.2394,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.4491,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.0164,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2010.65 kN, MaxRatio=2.674, F60_Dinamico=OK, SkewV=69,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.124e+09

Ratio counts by range: [>1.0]: 47; [0.9-1.0]: 5; [0.7-0.9]: 26;
[0.4-0.7]: 45; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 227 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 30.0 mm
TRB_h: 550.0 mm
TRB_bf: 700.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm
CTB_h: 130.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE340B
TRS: HE340B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2366.70 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9710 mm
F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62
L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 112

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.6688
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.6688) = 8353271.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009317 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4701 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=94.8274, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.2751,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.4712,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.2705,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=145.3810,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=183.3851,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.4752, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.7574, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2366.70 kN, MaxRatio=127175.368, F60_Dinamico=OK, SkewV=112,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.828e+19
Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 6; [0.7-0.9]: 36;
[0.4-0.7]: 58; [0.1-0.4]: 38; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 228 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 600.0 mm
TRB_bf: 350.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 15.0 mm
VER: HE320B
TRS: HE200B
LG: HE320M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2089.08 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0666 mm
F60 Dynamic check (L=43.0 m): |U3|=11.07 mm -> X=5.34
L.Inf (2.54) < X (5.34) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 273

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.4159
mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.4159) = 7598826.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00017734 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5675 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=126.6956,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=49.5582,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=227.4313,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=192.7651,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=332.2592,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=402.1997,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.1693,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.3247,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2089.08 kN, MaxRatio=1.418, F60_Dinamico=OK, SkewV=273,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.173e+09
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 11; [0.7-0.9]: 32;
[0.4-0.7]: 63; [0.1-0.4]: 35; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 229 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 32.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 28.0 mm

DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 110.0 mm
CTB_tf: 17.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE280B
LG: HE340M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2259.08 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1419 mm

F60 Dynamic check (L=43.0 m): |U3|=10.14 mm -> X=5.57

L.Inf (2.54) < X (5.57) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 223

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9160

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.9160) = 8918227.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009670 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6400 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=90.3630, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=31.3883,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=187.9721,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=121.1348,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=141.9256,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=174.5752,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.2070,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1527,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2259.08 kN, MaxRatio=141477.167, F60_Dinamico=OK, SkewV=223,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.522e+19
Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 18; [0.7-0.9]: 26;
[0.4-0.7]: 45; [0.1-0.4]: 31; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 230 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm

CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE360B
TRS: HE220B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2204.89 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6446 mm

F60 Dynamic check (L=43.0 m): |U3|=9.64 mm -> X=5.72

L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 72

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.9619
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.9619) = 7980306.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012064 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1441 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=90.1790, Limit=92.5926
-> OK

```

    -> Sheet: FramesRBTForFatigue . S11_final=32.7026,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=178.5436,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=212.1450,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=175.2437,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=212.2948,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=15.0450,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=13.2231,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2204.89 kN, MaxRatio=2.378, F60_Dinamico=Check, dynamic
analysis required, SkewV=72, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.791e+10
    Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 5; [0.7-0.9]: 22;
[0.4-0.7]: 72; [0.1-0.4]: 37; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 231 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 34.0 mm
    BC_tw: 34.0 mm
    TC_h: 700.0 mm
    TC_tf: 24.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 30.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 18.0 mm
    CTB_h: 120.0 mm
    CTB_tf: 17.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 13.0 mm
    VER: HE500B
    TRS: HE320B
    LG: HE550M

```

R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2748.47 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6243 mm

F60 Dynamic check (L=43.0 m): |U3|=8.62 mm -> X=6.04

L.Inf (2.54) < X (6.04) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.8888
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.8888) = 11064542.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008664 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.1167 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=75.7926, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=27.2467,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=150.6924,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=127.7198,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=137.7737,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesEBBForFatigue . S11_final=168.6270,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.5576,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2343,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2748.47 kN, MaxRatio=129189.752, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.587e+19
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 4; [0.7-0.9]: 19;
[0.4-0.7]: 75; [0.1-0.4]: 42; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 232 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 700.0 mm
BC_tf: 40.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 32.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 16.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE600B
TRS: HE340B
LG: HE400M
R_TR_B: HE360B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2823.26 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.2716 mm
F60 Dynamic check (L=43.0 m): |U3|=9.27 mm -> X=5.83
```

L.Inf (2.54) < X (5.83) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 126

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 15.3373

mm

Horizontal check: $R = (43000.0)^2 / (8 * 15.3373) = 15069505.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005530 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7586 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=64.1585, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=22.9819,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=164.3554,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=113.1637,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=91.6403, Limit=92.5926
-> OK
-> Sheet: FramesEBBForFatigue . S11_final=114.4897,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBTForFatigue . S11_final=9.6256, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.2827, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (2 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2823.26 kN, MaxRatio=3.241, F60_Dinamico=Check, dynamic
analysis required, SkewV=126, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (2 failures) -> Cost=4.602e+10
    Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 3; [0.7-0.9]: 12;
[0.4-0.7]: 71; [0.1-0.4]: 58; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 233 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 700.0 mm
BC_tf: 40.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE550B
TRS: HE320B
LG: HE300M
R_TR_B: HE400B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2570.86 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.0324 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.60
    L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 307

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.2121
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 17.2121) = 13428024.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007420 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.5196 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTForFatigue . S11_final=66.3951, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=26.1029,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=190.7894,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=117.2801,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=141.9282,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesEBBForFatigue . S11_final=164.3308,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBTForFatigue . S11_final=10.8339,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.7345,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2570.86 kN, MaxRatio=2.120, F60_Dinamico=OK, SkewV=307,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
 failures) -> Cost=1.119e+10
 Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 7; [0.7-0.9]: 7; [0.4-
 0.7]: 79; [0.1-0.4]: 55; [<=0.1]: 0;


```
=====
--- STARTING GA ITERATION No. 234 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 22.0 mm
BC_tw: 26.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 500.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE360B
LG: HE450M
R_TR_B: HE220B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2338.55 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.5512 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.55 mm -> X=5.74
```

```
L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 66

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.6669
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.6669) = 10667174.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010515 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0479 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=107.9547,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.7121,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.3637,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=266.6704,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=169.7022,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=211.3578,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.5640, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.9179, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2338.55 kN, MaxRatio=1.967, F60_Dinamico=Check, dynamic
analysis required, SkewV=66, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.723e+10
Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 6; [0.7-0.9]: 20;
[0.4-0.7]: 39; [0.1-0.4]: 62; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 235 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 38.0 mm
TC_h: 650.0 mm

```

TC_tf: 32.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 26.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE280B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2428.40 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9721 mm

F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 181

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.8313

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.8313) = 10586878.3$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008488 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4649 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=82.0561, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=38.8443,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=178.3697,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=131.3036,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=192.4485,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=244.7390,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.8068,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6014,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2428.40 kN, MaxRatio=2.076, F60_Dinamico=OK, SkewV=181,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=7.303e+09
Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 3; [0.7-0.9]: 24;
[0.4-0.7]: 78; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 236 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 36.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 550.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 900.0 mm

TRB_bf: 350.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 19.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE360B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2273.39 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4431 mm

F60 Dynamic check (L=43.0 m): |U3|=10.44 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 201

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7622

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.7622) = 10620482.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014741 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9398 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=90.1573, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=32.1087,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=226.4734,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=170.7357,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=320.4467,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=342.3655,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.2684, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5897,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2273.39 kN, MaxRatio=2.127, F60_Dinamico=OK, SkewV=201,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=7.550e+09

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 7; [0.7-0.9]: 41;
 [0.4-0.7]: 49; [0.1-0.4]: 45; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 237 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 800.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 26.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 22.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm

```

VER: HE300B
TRS: HE220B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2192.86 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4529 mm

F60 Dynamic check (L=43.0 m): |U3|=10.45 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 135

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.6324
mm

Horizontal check: $R = (43000.0)^2 / (8 * 31.6324) = 7306601.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009380 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9542 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=71.6120, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=26.5518,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=209.9897,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=174.7059,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```
-> Sheet: FramesIBBForFatigue . S11_final=126.1226,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=150.6445,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=17.8788,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=20.3537,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2192.86 kN, MaxRatio=2.380, F60_Dinamico=OK, SkewV=135,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=7.226e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 19; [0.7-0.9]: 34;
[0.4-0.7]: 55; [0.1-0.4]: 35; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 238 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 36.0 mm
BC_tw: 26.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 18.0 mm
DGB_bf: 600.0 mm
DGB_tf: 32.0 mm
DGB_tw: 22.0 mm
TRB_h: 550.0 mm
TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE280B
LG: HE600M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2495.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7950 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.79 mm -> X=5.67
 L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1353
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 26.1353) = 8843402.5$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00009915 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.2944 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=124.7658,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=41.2667,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=126.1241,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=100.1220,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=169.5793,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=208.3891,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=11.9483,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.5642,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2495.58 kN, MaxRatio=1.563, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=8.900e+08
    Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 16; [0.7-0.9]: 26;
[0.4-0.7]: 61; [0.1-0.4]: 40; [<=0.1]: 3;
```

```
=====
--- STARTING GA ITERATION No. 239 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 550.0 mm
BC_tf: 34.0 mm
BC_tw: 38.0 mm
TC_h: 800.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 36.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 180.0 mm
CTT_tf: 20.0 mm
CTB_h: 130.0 mm
CTB_tf: 10.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE220B
LG: HE500M
R_TR_B: HE200B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2222.05 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.3190 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.32 mm -> X=5.53
    L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.8680
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 33.8680) = 6824283.2$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00011075 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.8193 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=101.9783,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=33.6148,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=195.5529,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=340.8776,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=153.7019,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=181.9358,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=21.7919,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=24.3004,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2222.05 kN, MaxRatio=3.555, F60_Dinamico=OK, SkewV=22,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=1.510e+10
 Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 13; [0.7-0.9]: 26;
 [0.4-0.7]: 62; [0.1-0.4]: 33; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 240 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 800.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 15.0 mm
CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE550B
TRS: HE340B
LG: HE320M
R_TR_B: HE340B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2618.56 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.6758 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.68 mm -> X=5.71
```

```
L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 264

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.7874
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 16.7874) = 13767725.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007117 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1635 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=62.1049, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=21.8942,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=191.3209,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=136.7018,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=115.3253,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=139.1721,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.1552,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.7210,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2618.56 kN, MaxRatio=97691.740, F60_Dinamico=Check, dynamic
analysis required, SkewV=264, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.499e+19
Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 2; [0.7-0.9]: 16;
[0.4-0.7]: 75; [0.1-0.4]: 51; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 241 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm

```

TC_h: 750.0 mm
TC_tf: 24.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 30.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 30.0 mm
TRB_h: 700.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 10.0 mm
VER: HE450B
TRS: HE200B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2386.04 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8968 mm

F60 Dynamic check (L=43.0 m): |U3|=8.90 mm -> X=5.95

L.Inf (2.54) < X (5.95) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.4958

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.4958) = 8405833.5 \text{ mm}$
Horizontal check result ($R > 6000000.0 \text{ mm}$): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010793 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.3945 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=88.5826, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=31.8436,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.8191,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=173.3189,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=178.1427,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=221.6447,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=17.2664,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.0524,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2386.04 kN, MaxRatio=2.208, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.791e+10
Ratio counts by range: [>1.0]: 35; [$0.9-1.0$]: 8; [$0.7-0.9$]: 36; [$0.4-0.7$]: 51; [$0.1-0.4$]: 36; [≤ 0.1]: 0;

===
--- STARTING GA ITERATION No. 242 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 36.0 mm
BC_tw: 26.0 mm
TC_h: 700.0 mm
TC_tf: 20.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 16.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm

DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE260B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2514.47 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5995 mm

F60 Dynamic check (L=43.0 m): |U3|=9.60 mm -> X=5.73

L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 181

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.5553
mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.5553) = 11819075.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007407 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0916 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

- > Sheet: FramesWBTForFatigue . S11_final=92.7553, Limit=92.5926
- > NOT OK! (Cumulative failures: 1)
- > Sheet: FramesRBTForFatigue . S11_final=29.4156, Limit=118.5185 -> OK
- > Sheet: FramesWSTForFatigue . S11_final=175.6768, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
- > Sheet: FramesRSTForFatigue . S11_final=126.5764, Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
- > Sheet: FramesIBBForFatigue . S11_final=135.1742, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
- > Sheet: FramesEBBForFatigue . S11_final=169.0642, Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
- > Sheet: FramesEBTForFatigue . S11_final=14.0216, Limit=118.5185 -> OK
- > Sheet: FramesIBTForFatigue . S11_final=13.3970, Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2514.47 kN, MaxRatio=1.468, F60_Dinamico=Check, dynamic analysis required, SkewV=181, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.037e+10

Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 9; [0.7-0.9]: 40; [0.4-0.7]: 43; [0.1-0.4]: 55; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 243 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 32.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 32.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm

CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE360B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2556.64 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7106 mm

F60 Dynamic check (L=43.0 m): |U3|=9.71 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 224

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.4195

mm

Horizontal check: $R = (43000.0)^2 / (8 * 16.4195) = 14076280.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008180 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1971 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=69.2412, Limit=92.5926

-> OK

-> Sheet: FramesRBTForFatigue . S11_final=24.1332,

Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=201.1030,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=152.3300,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=156.8605,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=163.3687,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=10.2742,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.7059, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2556.64 kN, MaxRatio=1.367, F60_Dinamico=Check, dynamic
analysis required, SkewV=224, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.174e+10
    Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 1; [0.7-0.9]: 24;
[0.4-0.7]: 73; [0.1-0.4]: 54; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 244 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 20.0 mm
    BC_tw: 40.0 mm
    TC_h: 550.0 mm
    TC_tf: 30.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 14.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 180.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 17.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 10.0 mm
    VER: HE500B
    TRS: HE280B
    LG: HE360M
    R_TR_B: HE280B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2189.33 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6170 mm

F60 Dynamic check (L=43.0 m): |U3|=10.62 mm -> X=5.45

L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 202

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.6840 mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.6840) = 10658791.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013903 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1070 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=116.3730,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=40.7453,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=239.1329,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=232.5794,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=451.6266,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=483.4646,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=12.3440,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7799,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2189.33 kN, MaxRatio=1.488, F60_Dinamico=OK, SkewV=202,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.053e+09

Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 10; [0.7-0.9]: 16;
[0.4-0.7]: 67; [0.1-0.4]: 63; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 245 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 10.0 mm
DGB_bf: 550.0 mm
DGB_tf: 22.0 mm
DGB_tw: 30.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 36.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE200B
LG: HE360M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2782.38 kN
U3 displacement at F60 (COMB01-PER-LOAD): -8.8461 mm
F60 Dynamic check (L=43.0 m): |U3|=8.85 mm -> X=5.97

L.Inf (2.54) < X (5.97) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 189

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.4908

mm

Horizontal check: $R = (43000.0)^2 / (8 * 18.4908) = 12499443.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006466 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3421 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=64.5749, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=20.8755,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=171.4993,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=110.3538,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=97.7100, Limit=92.5926
-> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=120.2475,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=12.2622,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1475,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2782.38 kN, MaxRatio=2.343, F60_Dinamico=Check, dynamic
analysis required, SkewV=189, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=3.819e+10
Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 2; [0.7-0.9]: 9; [0.4-
0.7]: 73; [0.1-0.4]: 62; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 246 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 800.0 mm
BC_tf: 8.0 mm
BC_tw: 26.0 mm
TC_h: 500.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 350.0 mm
DGB_tf: 40.0 mm
DGB_tw: 12.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 100.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE220B
LG: HE600M
R_TR_B: HE200B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2056.34 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7990 mm
F60 Dynamic check (L=43.0 m): |U3|=9.80 mm -> X=5.67
L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 32.2968
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 32.2968) = 7156277.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012254 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3004 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=117.5181,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.7325,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.9084,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=338.6554,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=201.5753,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=238.5810,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.3076,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.1629,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2056.34 kN, MaxRatio=6.376, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.954e+10
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 6; [0.7-0.9]: 6; [0.4-
0.7]: 54; [0.1-0.4]: 40; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 247 ---

```


=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE300B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1981.58 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.5298 mm
F60 Dynamic check (L=43.0 m): |U3|=11.53 mm -> X=5.23
L.Inf (2.54) < X (5.23) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 187

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.7416
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.7416) = 7771101.9$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00017858 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.0291 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=165.3554,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=56.5233,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=209.1532,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=174.8385,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=319.3360,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=394.2940,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4088,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1610,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1981.58 kN, MaxRatio=1.736, F60_Dinamico=OK, SkewV=187,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.877e+09
Ratio counts by range: [>1.0]: 38; [$0.9-1.0$]: 10; [$0.7-0.9$]: 33;
[$0.4-0.7$]: 43; [$0.1-0.4$]: 42; [≤ 0.1]: 0;
>> Checkpoint saved (Gen=4, FunEval=247): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
4 247 3.501e+08 8.045e+18 1

=====
--- STARTING GA ITERATION No. 248 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 24.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm

TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 26.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE300B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2434.21 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8569 mm

F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65

L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.4416

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.4416) = 10779304.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009011 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3478 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=133.1543,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.0153,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=153.2603,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=121.1583,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=184.9883,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=225.8347,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.9508,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.6571,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2434.21 kN, MaxRatio=1.444, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.136e+09
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 4; [0.7-0.9]: 27;
[0.4-0.7]: 54; [0.1-0.4]: 64; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 249 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 24.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm

TRB_bf: 650.0 mm
TRB_tf: 16.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 11.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE300B
LG: HE600M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2035.57 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.1388 mm

F60 Dynamic check (L=43.0 m): |U3|=11.14 mm -> X=5.32

L.Inf (2.54) < X (5.32) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.8702

mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.8702) = 7487005.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014162 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.6382 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=151.7750,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.3724,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=143.0713,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=111.3011,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=209.2058,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=260.8342,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.5989,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.5619, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2035.57 kN, MaxRatio=2.805, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=6.711e+09

Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 18; [0.7-0.9]: 35;
 [0.4-0.7]: 32; [0.1-0.4]: 35; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 250 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm

```

VER: HE360B
TRS: HE280B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2071.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.0826 mm

F60 Dynamic check (L=43.0 m): |U3|=11.08 mm -> X=5.33

L.Inf (2.54) < X (5.33) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 26

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.6916
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.6916) = 8996128.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011106 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.5795 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=124.1561,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.4404,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=192.7750,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=174.4981,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=162.7163,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=190.4001,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=12.1546,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.1560,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2071.38 kN, MaxRatio=1.933, F60_Dinamico=OK, SkewV=26,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.446e+09

```

```

    Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 10; [0.7-0.9]: 41;
[0.4-0.7]: 42; [0.1-0.4]: 40; [<=0.1]: 0;

```

```

>> Snapshot iter 250 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_250_20251114_013311.mat

```

```

=====
--- STARTING GA ITERATION No. 251 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 30.0 mm
    BC_tw: 34.0 mm
    TC_h: 750.0 mm
    TC_tf: 30.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 10.0 mm
    DGB_bf: 600.0 mm
    DGB_tf: 22.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 19.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 20.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B
    TRS: HE220B
    LG: HE360M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2481.52 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.3799 mm
F60 Dynamic check (L=43.0 m): |U3|=9.38 mm -> X=5.80
L.Inf (2.54) < X (5.80) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 190

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.0866
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.0866) = 8859921.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012207 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.8766 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=117.9926,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.0689,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=200.9623,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=213.5589,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=309.5059,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=316.3497,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.5872,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=15.1181,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2481.52 kN, MaxRatio=1.505, F60_Dinamico=Check, dynamic
analysis required, SkewV=190, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.029e+10

Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 11; [0.7-0.9]: 11;
[0.4-0.7]: 82; [0.1-0.4]: 44; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 252 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 34.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE300B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2331.12 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1964 mm
F60 Dynamic check (L=43.0 m): |U3|=10.20 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.7705
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.7705) = 9723184.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008163 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6952 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=114.5571,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.4860,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=142.8512,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.0421,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=118.0145,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=146.1681,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.7099, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.0792, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2331.12 kN, MaxRatio=2.950, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.167e+09

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 2; [0.7-0.9]: 26;
[0.4-0.7]: 58; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 253 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 22.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 34.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 10.0 mm
TRB_h: 700.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE300B
LG: HE400M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2267.93 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8837 mm
F60 Dynamic check (L=43.0 m): |U3|=9.88 mm -> X=5.65
L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 128

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3701 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.3701) = 9110126.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008872 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.3794 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=120.4834,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=32.6317,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=174.0092,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=211.4497,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=138.8355,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=174.5757,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.0620,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.6812,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2267.93 kN, MaxRatio=1.669, F60_Dinamico=OK, SkewV=128,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.031e+09
 Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 8; [0.7-0.9]: 21;
 [0.4-0.7]: 57; [0.1-0.4]: 51; [<=0.1]: 0;

--- STARTING GA ITERATION No. 254 ---

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 26.0 mm
TC_h: 550.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 22.0 mm
DGA_tw: 20.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE360B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2250.16 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3524 mm
F60 Dynamic check (L=43.0 m): |U3|=10.35 mm -> X=5.52
L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 62

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7318
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 21.7318) = 10635351.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009376 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8473 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=127.4211,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.8748,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=157.0889,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=130.0730,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=140.2918,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=171.5476,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.8931, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.3416, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2250.16 kN, MaxRatio=2.290, F60_Dinamico=OK, SkewV=62,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.251e+09
Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 7; [0.7-0.9]: 24;
[0.4-0.7]: 53; [0.1-0.4]: 54; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 255 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 38.0 mm

```

DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE240B
LG: HE600M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2115.80 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.8152 mm

F60 Dynamic check (L=43.0 m): |U3|=10.82 mm -> X=5.40

L.Inf (2.54) < X (5.40) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.4816

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.4816) = 8114890.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012899 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.3149 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=135.4311,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.6472,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=148.5351,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=134.1762,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.0186,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=217.0826,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.2486,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.8696,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2115.80 kN, MaxRatio=2.387, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.176e+09
Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 7; [0.7-0.9]: 34;
[0.4-0.7]: 52; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 256 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 10.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm

CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE320B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2395.08 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4493 mm

F60 Dynamic check (L=43.0 m): |U3|=10.45 mm -> X=5.49

L.Inf (2.54) < X (5.49) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.5982

mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.5982) = 11793186.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011335 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9404 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=95.3814, Limit=92.5926

-> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue    . S11_final=30.6569,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue    . S11_final=164.2014,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue    . S11_final=177.7728,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue    . S11_final=187.2944,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue    . S11_final=206.3188,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue    . S11_final=10.9154,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue    . S11_final=10.9447,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2395.08 kN, MaxRatio=1.851, F60_Dinamico=OK, SkewV=8,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=2.044e+09

```

```

    Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 11; [0.7-0.9]: 26;
    [0.4-0.7]: 57; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 257 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 36.0 mm
    BC_tw: 26.0 mm
    TC_h: 650.0 mm
    TC_tf: 28.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 600.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 18.0 mm
    CTB_h: 150.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 14.0 mm
    VER: HE300B
    TRS: HE400B
    LG: HE360M

```

R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2101.46 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.1979 mm

F60 Dynamic check (L=43.0 m): |U3|=11.20 mm -> X=5.30

L.Inf (2.54) < X (5.30) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 195

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.6004
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.6004) = 8688773.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012653 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.6976 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=121.7047,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=36.9788,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=225.2547,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=179.7082,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=181.2373,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```

-> Sheet: FramesEBBForFatigue . S11_final=217.1340,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.8016, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1575, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2101.46 kN, MaxRatio=97401.065, F60_Dinamico=OK, SkewV=195,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.994e+19

```

```

Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 13; [0.7-0.9]: 34;
[0.4-0.7]: 53; [0.1-0.4]: 38; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 258 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 38.0 mm
DGA_tw: 20.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 20.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE260B
LG: HE450M
R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

Total Weight (Sum |FZ_dead|): 2095.54 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1037 mm
F60 Dynamic check (L=43.0 m): |U3|=10.10 mm -> X=5.58

```

L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 52

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.6470
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 31.6470) = 7303225.7$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00016807 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.6035 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=178.5661,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=53.2989,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=181.4014,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=179.2256,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=316.5054,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=380.1942,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=13.9644,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.9105,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...

Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2095.54 kN, MaxRatio=1.881, F60_Dinamico=OK, SkewV=52,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.822e+09
Ratio counts by range: [>1.0]: 54; [0.9-1.0]: 5; [0.7-0.9]: 13;
[0.4-0.7]: 63; [0.1-0.4]: 31; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 259 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 12.0 mm
DGB_bf: 600.0 mm
DGB_tf: 22.0 mm
DGB_tw: 14.0 mm
TRB_h: 600.0 mm
TRB_bf: 600.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 17.0 mm
CTB_h: 150.0 mm
CTB_tf: 19.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE320B
LG: HE360M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2161.50 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2820 mm
F60 Dynamic check (L=43.0 m): |U3|=10.28 mm -> X=5.54
L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 182

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.8339
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.8339) = 8613180.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012760 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.7799 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=135.3262,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=45.1609,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=207.9030,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=185.9690,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=226.4309,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=286.6508,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.6879, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1349, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2161.50 kN, MaxRatio=96896.127, F60_Dinamico=OK, SkewV=182,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.029e+19
Ratio counts by range: [>1.0]: 52; [0.9-1.0]: 26; [0.7-0.9]: 24;
[0.4-0.7]: 24; [0.1-0.4]: 40; [<=0.1]: 0;

=====

```


--- STARTING GA ITERATION No. 260 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 36.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE260B
LG: HE500M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2297.51 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.5206 mm
F60 Dynamic check (L=43.0 m): |U3|=10.52 mm -> X=5.47
L.Inf (2.54) < X (5.47) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7391
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.7391) = 8042192.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013716 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0208 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=123.2804,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.3099,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=168.0181,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=141.8297,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=204.0711,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=240.3987,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.1832,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.3913,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2297.51 kN, MaxRatio=94078.704, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.033e+19
Ratio counts by range: [>1.0]: 56; [0.9-1.0]: 12; [0.7-0.9]: 37;
[0.4-0.7]: 15; [0.1-0.4]: 46; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 261 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 40.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 34.0 mm

```

DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 18.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE280B
LG: HE360M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2302.42 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2399 mm

F60 Dynamic check (L=43.0 m): |U3|=10.24 mm -> X=5.55

L.Inf (2.54) < X (5.55) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 191

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.3762

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.3762) = 10812249.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009880 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7334 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=97.3199, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.8816,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=187.8314,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=141.4057,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=158.9535,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=192.5537,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=12.6906,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.8010,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2302.42 kN, MaxRatio=2.413, F60_Dinamico=OK, SkewV=191,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.107e+09

Ratio counts by range: [>1.0]: 11; [0.9-1.0]: 3; [0.7-0.9]: 14;
[0.4-0.7]: 95; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 262 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 24.0 mm

BC_tw: 32.0 mm

TC_h: 600.0 mm

TC_tf: 32.0 mm

TC_tw: 38.0 mm

DGA_bf: 400.0 mm

DGA_tf: 22.0 mm

DGA_tw: 18.0 mm

DGB_bf: 400.0 mm

DGB_tf: 32.0 mm

DGB_tw: 16.0 mm

TRB_h: 900.0 mm

TRB_bf: 450.0 mm

TRB_tf: 20.0 mm

TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 15.0 mm
CTB_h: 130.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE300B
LG: HE300M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2152.53 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2871 mm

F60 Dynamic check (L=43.0 m): |U3|=10.29 mm -> X=5.53

L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 278

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.6582
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.6582) = 8669933.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012862 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7865 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=118.3205,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=32.4126,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=267.8207,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=215.3434,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=198.7265,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=236.5237,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.1016,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.0617, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2152.53 kN, MaxRatio=124724.861, F60_Dinamico=OK, SkewV=278,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.348e+19

Ratio counts by range: [>1.0]: 41; [0.9-1.0]: 4; [0.7-0.9]: 33;
 [0.4-0.7]: 50; [0.1-0.4]: 38; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 263 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE300B

```

TRS: HE320B
LG: HE500M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2290.72 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1494 mm

F60 Dynamic check (L=43.0 m): |U3|=10.15 mm -> X=5.57

L.Inf (2.54) < X (5.57) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.6693
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.6693) = 8666345.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009823 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6500 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=105.4081,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.1084,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=162.0415,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=134.9307,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=139.5924,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=169.5172,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.7960, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.6193, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2290.72 kN, MaxRatio=1.480, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.192e+09

```

```

    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 6; [0.7-0.9]: 33;
[0.4-0.7]: 51; [0.1-0.4]: 55; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 264 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 26.0 mm
    BC_tw: 26.0 mm
    TC_h: 750.0 mm
    TC_tf: 20.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 12.0 mm
    TRB_h: 550.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 180.0 mm
    CTT_tf: 17.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 14.0 mm
    VER: HE360B
    TRS: HE340B
    LG: HE320M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2097.50 kN

```


U3 displacement at F60 (COMB01-PER-LOAD): -11.2649 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.26 mm -> X=5.29
 L.Inf (2.54) < X (5.29) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 269

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9438
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 26.9438) = 8578047.6$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00012370 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.7607 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=133.7244,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=50.8597,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=205.6372,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=160.6068,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=252.9149,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=317.5241,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.0455,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.2590,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2097.50 kN, MaxRatio=1.713, F60_Dinamico=OK, SkewV=269,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.814e+09
    Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 5; [0.7-0.9]: 36;
[0.4-0.7]: 69; [0.1-0.4]: 28; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 265 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 650.0 mm
    BC_tf: 32.0 mm
    BC_tw: 32.0 mm
    TC_h: 650.0 mm
    TC_tf: 36.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 26.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 36.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 14.0 mm
    VER: HE340B
    TRS: HE360B
    LG: HE450M
    R_TR_B: HE240B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2404.84 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -8.9023 mm
    F60 Dynamic check (L=43.0 m): |U3|=8.90 mm -> X=5.95
    L.Inf (2.54) < X (5.95) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 73

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2228
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.2228) = 8490112.7$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00013413 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.4015 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=103.0935,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=39.4901,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=187.6860,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=213.1557,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=203.1992,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=244.8302,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=8.2295, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=7.1745, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2404.84 kN, MaxRatio=1.810, F60_Dinamico=Check, dynamic
 analysis required, SkewV=73, HorizCheck=OK, AngularCheck=OK,
 VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.750e+10

Ratio counts by range: [>1.0]: 28; [$0.9-1.0$]: 5; [$0.7-0.9$]: 19;
[$0.4-0.7$]: 73; [$0.1-0.4$]: 41; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 266 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 10.0 mm
VER: HE340B
TRS: HE300B
LG: HE550M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2264.74 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3440 mm
F60 Dynamic check (L=43.0 m): |U3|=10.34 mm -> X=5.52
L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1809
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.1809) = 8828007.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009444 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8429 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.4380, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.0978,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=155.7594,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=128.8356,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=132.1309,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=156.9259,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4722,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.5577, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2264.74 kN, MaxRatio=2.148, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.278e+09
Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 11; [0.7-0.9]: 45;
[0.4-0.7]: 36; [0.1-0.4]: 42; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 267 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 8.0 mm

```

BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 36.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE600B
TRS: HE400B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2570.89 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9479 mm

F60 Dynamic check (L=43.0 m): |U3|=9.95 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 60

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 14.8893

mm

Horizontal check: $R = (43000.0)^2 / (8 * 14.8893) = 15522845.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00005317 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4332 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=106.6899,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=24.0288,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=158.7506,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=264.8122,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=99.8652, Limit=92.5926
-> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=129.3436,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.0444,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.1036, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2570.89 kN, MaxRatio=4.190, F60_Dinamico=OK, SkewV=60,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.783e+10

Ratio counts by range: [>1.0]: 38; [$0.9-1.0$]: 6; [$0.7-0.9$]: 20;
[$0.4-0.7$]: 40; [$0.1-0.4$]: 62; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 268 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 26.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm

DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 100.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE360B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2201.72 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7006 mm

F60 Dynamic check (L=43.0 m): |U3|=9.70 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 64

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.7542
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.7542) = 7767803.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012016 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1960 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTForFatigue . S11_final=149.4862,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.0216,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=182.8851,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=267.2503,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=205.1407,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=254.4406,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.1157,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1225, Limit=118.5185
-> OK
```

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2201.72 kN, MaxRatio=169890.551, F60_Dinamico=Check, dynamic analysis required, SkewV=64, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=6.355e+19
Ratio counts by range: [>1.0]: 70; [0.9-1.0]: 6; [0.7-0.9]: 16; [0.4-0.7]: 34; [0.1-0.4]: 40; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 269 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 22.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 22.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 750.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 19.0 mm
CTB_h: 150.0 mm

CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE340B
LG: HE550M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2259.68 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2470 mm

F60 Dynamic check (L=43.0 m): |U3|=10.25 mm -> X=5.54

L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.4140 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.4140) = 9466909.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007975 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7460 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=92.5755, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=32.9150,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=142.4307,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=210.6472,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=117.5820,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=146.8545,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=9.7549, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.4023,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2259.68 kN, MaxRatio=95888.709, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=2.078e+19

Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 11; [0.7-0.9]: 18;
 [0.4-0.7]: 67; [0.1-0.4]: 43; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 270 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 16.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE300B
LG: HE400M
R_TR_B: HE240B

```

```

Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2552.18 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.0144 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.01 mm -> X=5.91
    L.Inf (2.54) < X (5.91) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 138

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.2663
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.2663) = 11996342.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010017 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.5046 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=87.6557, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=27.7027,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=206.6869,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=213.5046,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=206.7005,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=216.1316,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```

```
-> Sheet: FramesEBTForFatigue . S11_final=12.1413,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6538,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2552.18 kN, MaxRatio=1.539, F60_Dinamico=Check, dynamic analysis required, SkewV=138, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.989e+10
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 9; [0.7-0.9]: 16; [0.4-0.7]: 68; [0.1-0.4]: 58; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 271 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 30.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 34.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 15.0 mm
VER: HE550B
TRS: HE360B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2731.02 kN
U3 displacement at F60 (COMB01-PER-LOAD): -8.4333 mm
F60 Dynamic check (L=43.0 m): |U3|=8.43 mm -> X=6.11

L.Inf (2.54) < X (6.11) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.6828 mm

Horizontal check: $R = (43000.0)^2 / (8 * 18.6828) = 12371018.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006270 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 15.9248 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=79.2171, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.6938,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=153.5628,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=147.6976,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=127.9686,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=162.8486,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.4558,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2988, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2731.02 kN, MaxRatio=70663.010, F60_Dinamico=Check, dynamic
analysis required, SkewV=52, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=1.364e+19
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 1; [0.7-0.9]: 10;
[0.4-0.7]: 59; [0.1-0.4]: 70; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 272 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 700.0 mm
BC_tf: 28.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 700.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 20.0 mm
CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE320B
LG: HE550M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2309.97 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0160 mm
F60 Dynamic check (L=43.0 m): |U3|=11.02 mm -> X=5.35
L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.6267
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.6267) = 11205160.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007898 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5095 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=79.3413, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.7480,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.6938,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=176.3521,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=106.8046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=131.3084,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.8589,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.1898,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2309.97 kN, MaxRatio=97887.306, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.213e+19
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 3; [0.7-0.9]: 36;
[0.4-0.7]: 62; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 273 ---

```


=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 32.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 350.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE300B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2474.54 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4101 mm

F60 Dynamic check (L=43.0 m): |U3|=9.41 mm -> X=5.79

L.Inf (2.54) < X (5.79) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 223

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.6350
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.6350) = 11771057.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011737 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.8999 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=73.4029, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=35.3041,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=230.7560,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=216.4697,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=454.4984,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=512.6788,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.0723,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2452,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2474.54 kN, MaxRatio=1.355, F60_Dinamico=Check, dynamic
analysis required, SkewV=223, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.067e+10
Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 2; [0.7-0.9]: 15; [0.4-
0.7]: 66; [0.1-0.4]: 75; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 274 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 34.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 36.0 mm
TC_tw: 40.0 mm

```

DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 20.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE220B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2149.28 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.3430 mm

F60 Dynamic check (L=43.0 m): |U3|=11.34 mm -> X=5.27

L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 202

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.9670

mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.9670) = 7712646.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00015674 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.8438 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=103.5005,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.8038,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=233.6937,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=206.0172,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=251.8601,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=278.3637,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=14.9482,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.5754,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2149.28 kN, MaxRatio=31218.267, F60_Dinamico=OK, SkewV=202,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.095e+18

Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 9; [0.7-0.9]: 32;
[0.4-0.7]: 71; [0.1-0.4]: 35; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 275 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 36.0 mm

BC_tw: 32.0 mm

TC_h: 650.0 mm

TC_tf: 36.0 mm

TC_tw: 38.0 mm

DGA_bf: 500.0 mm

DGA_tf: 22.0 mm

DGA_tw: 24.0 mm

DGB_bf: 600.0 mm

DGB_tf: 20.0 mm

DGB_tw: 20.0 mm

TRB_h: 750.0 mm

TRB_bf: 350.0 mm

TRB_tf: 36.0 mm

TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 18.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE360B
TRS: HE280B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2446.98 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5054 mm

F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.2365
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.2365) = 9536238.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012116 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0045 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=95.7602, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=31.4471,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=142.1664,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=124.2361,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=168.3227,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=201.3433,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=11.6087,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.4870,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2446.98 kN, MaxRatio=1.921, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.686e+10
    Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 6; [0.7-0.9]: 20;
[0.4-0.7]: 79; [0.1-0.4]: 51; [<=0.1]: 0;
>> Snapshot iter 275 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_275_20251114_013311.mat

```

```

=====
--- STARTING GA ITERATION No. 276 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 36.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 600.0 mm
DGB_tf: 22.0 mm
DGB_tw: 28.0 mm
TRB_h: 550.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 150.0 mm

```

STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE280B
LG: HE450M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2696.08 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.8576 mm

F60 Dynamic check (L=43.0 m): |U3|=8.86 mm -> X=5.96

L.Inf (2.54) < X (5.96) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.8706 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.8706) = 10105748.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008116 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.3526 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=78.6423, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=37.1435,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=157.1709,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRSTForFatigue . S11_final=114.2908,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue . S11_final=164.2747,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesEBBForFatigue . S11_final=206.4106,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBTForFatigue . S11_final=12.0995,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.3324,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2696.08 kN, MaxRatio=1.483, F60_Dinamico=Check, dynamic
analysis required, SkewV=50, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=2.902e+10
    Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 5; [0.7-0.9]: 17;
[0.4-0.7]: 65; [0.1-0.4]: 63; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 277 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 14.0 mm
    BC_tw: 36.0 mm
    TC_h: 550.0 mm
    TC_tf: 36.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 14.0 mm
    DGB_bf: 350.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 15.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE300B
    LG: HE300M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.


```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
  Total Weight (Sum |FZ_dead|): 2332.51 kN
  U3 displacement at F60 (COMB01-PER-LOAD): -10.7760 mm
  F60 Dynamic check (L=43.0 m): |U3|=10.78 mm -> X=5.41
  L.Inf (2.54) < X (5.41) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
  Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
  Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
  Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
  Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
  Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
  Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
  Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
  Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
  Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
  Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
  Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
  Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
  Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
  Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
  Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
  Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 307

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.0644
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.0644) = 12123363.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006991 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.2697 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
  -> Sheet: FramesWBTForFatigue . S11_final=83.3625, Limit=92.5926
-> OK
  -> Sheet: FramesRBTForFatigue . S11_final=23.9649,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=204.2276,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRSTForFatigue . S11_final=153.4028,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesIBBForFatigue . S11_final=110.3252,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesEBBForFatigue . S11_final=136.9510,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBTForFatigue . S11_final=10.5827,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=8.9090, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2332.51 kN, MaxRatio=1.501, F60_Dinamico=OK, SkewV=307,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=7.840e+09

Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 7; [0.7-0.9]: 17;
[0.4-0.7]: 63; [0.1-0.4]: 63; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 278 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 18.0 mm
BC_tw: 26.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 18.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE280B
LG: HE500M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1988.18 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.8024 mm
F60 Dynamic check (L=43.0 m): |U3|=10.80 mm -> X=5.40
L.Inf (2.54) < X (5.40) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 26

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.0479
mm
Horizontal check: $R = (43000.0)^2 / (8 * 28.0479) = 8240370.9$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012405 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.3016 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=116.2256,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.8162,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=190.0972,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=160.7779,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=187.1853,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=219.5701,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.7860,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2124,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=1988.18 kN, MaxRatio=1.896, F60_Dinamico=OK, SkewV=26,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.212e+09

Ratio counts by range: [>1.0]: 50; [0.9-1.0]: 6; [0.7-0.9]: 35;
[0.4-0.7]: 36; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 279 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 14.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE280B
LG: HE360M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2599.74 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6653 mm

F60 Dynamic check (L=43.0 m): |U3|=8.67 mm -> X=6.03

L.Inf (2.54) < X (6.03) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 193

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.8040
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.8040) = 11109622.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008613 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.1581 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=83.0118, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.0053,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=208.6994,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=266.8832,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=175.5253,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=207.9933,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.0957,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.9351,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2599.74 kN, MaxRatio=1.827, F60_Dinamico=Check, dynamic
analysis required, SkewV=193, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.290e+10
Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 9; [0.7-0.9]: 14;
[0.4-0.7]: 65; [0.1-0.4]: 68; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 280 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE320B
LG: HE500M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2177.38 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3506 mm
F60 Dynamic check (L=43.0 m): |U3|=10.35 mm -> X=5.52
L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.7591
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.7591) = 8972572.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00014203 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8504 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=108.2977,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=40.9317,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=162.1923,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=126.0536,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=221.4077,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=260.9455,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.4138, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.1731, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2177.38 kN, MaxRatio=1.913, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.401e+09
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 8; [0.7-0.9]: 25;
[0.4-0.7]: 65; [0.1-0.4]: 37; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 281 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm

```

DGA_tf: 24.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 32.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE280B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2631.21 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6554 mm

F60 Dynamic check (L=43.0 m): |U3|=8.66 mm -> X=6.03

L.Inf (2.54) < X (6.03) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2989
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.2989) = 9919982.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009037 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.1487 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=81.9229, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=38.0298,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=193.4104,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=162.1820,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=285.1373,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=293.5016,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=12.3483,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.0730,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2631.21 kN, MaxRatio=1.569, F60_Dinamico=Check, dynamic analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.066e+10

Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 2; [0.7-0.9]: 20; [0.4-0.7]: 77; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 282 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 28.0 mm

BC_tw: 28.0 mm

TC_h: 800.0 mm

TC_tf: 22.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 28.0 mm

DGA_tw: 14.0 mm

DGB_bf: 350.0 mm

DGB_tf: 18.0 mm

DGB_tw: 30.0 mm

TRB_h: 800.0 mm

TRB_bf: 550.0 mm

TRB_tf: 16.0 mm

TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE360B
LG: HE450M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2434.80 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7498 mm

F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 70

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.2761 mm

Horizontal check: $R = (43000.0)^2 / (8 * 18.2761) = 12646265.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010660 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2414 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=84.9476, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.1065,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=197.7500,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=170.4432,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=183.3578,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=219.7605,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.4911, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.2929, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2434.80 kN, MaxRatio=3.621, F60_Dinamico=OK, SkewV=70,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=1.853e+10

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 6; [0.7-0.9]: 33;
 [0.4-0.7]: 54; [0.1-0.4]: 48; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 283 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE340B

```

TRS: HE300B
LG: HE340M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2266.51 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9289 mm

F60 Dynamic check (L=43.0 m): |U3|=9.93 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 228

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2595
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.2595) = 9936785.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00015262 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4289 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=105.5420,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=36.0700,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=229.7815,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=177.2392,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=249.9859,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=286.2760,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=7.9758, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=6.7505, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2266.51 kN, MaxRatio=3.038, F60_Dinamico=OK, SkewV=228,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.469e+10

```

```

    Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 5; [0.7-0.9]: 38;
[0.4-0.7]: 50; [0.1-0.4]: 47; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 284 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 800.0 mm
    BC_tf: 16.0 mm
    BC_tw: 30.0 mm
    TC_h: 600.0 mm
    TC_tf: 32.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 38.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 10.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE260B
    LG: HE300M
    R_TR_B: HE280B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2246.81 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.8556 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65
 L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 302

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0622
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 24.0622) = 9605307.1$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00009303 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.3503 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=110.0922,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=39.1524,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=211.1667,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=164.8110,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=204.0965,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=259.1533,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=14.3582,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.3996,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2246.81 kN, MaxRatio=1.939, F60_Dinamico=OK, SkewV=302,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.880e+09
    Ratio counts by range: [>1.0]: 40; [0.9-1.0]: 6; [0.7-0.9]: 22;
[0.4-0.7]: 36; [0.1-0.4]: 62; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 285 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 800.0 mm
    BC_tf: 26.0 mm
    BC_tw: 34.0 mm
    TC_h: 650.0 mm
    TC_tf: 28.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 28.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 40.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 110.0 mm
    CTB_tf: 19.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 14.0 mm
    VER: HE550B
    TRS: HE200B
    LG: HE360M
    R_TR_B: HE220B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2719.16 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.1435 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.14 mm -> X=5.87
    L.Inf (2.54) < X (5.87) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 194

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.6896 mm
Horizontal check: $R = (43000.0)^2 / (8 * 21.6896) = 10656049.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00004890 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.6386 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=65.0319, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.6643,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=149.1131,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=263.7290,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=97.0969, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=124.0650,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.7659,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.7481,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2719.16 kN, MaxRatio=137803.267, F60_Dinamico=Check, dynamic
analysis required, SkewV=194, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=5.164e+19

Ratio counts by range: [>1.0]: 29; [$0.9-1.0$]: 14; [$0.7-0.9$]: 11;
[$0.4-0.7$]: 51; [$0.1-0.4$]: 61; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 286 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 34.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 30.0 mm
DGB_bf: 550.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 700.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE240B
LG: HE340M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2494.26 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7464 mm
F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.69
L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 224

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.4847
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.4847) = 11861863.2$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009157 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2395 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=66.1232, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.5178,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=235.1649,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=188.0178,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=134.6148,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=162.3106,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=13.6086,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.8018,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2494.26 kN, MaxRatio=1.659, F60_Dinamico=OK, SkewV=224,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=6.769e+09
Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 11; [0.7-0.9]: 22;
[0.4-0.7]: 70; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 287 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 22.0 mm

```

BC_tw: 40.0 mm
TC_h: 600.0 mm
TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 350.0 mm
TRB_tf: 26.0 mm
TRB_tw: 18.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE300B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2400.01 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7172 mm

F60 Dynamic check (L=43.0 m): |U3|=9.72 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0611 mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0611) = 10974037.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012609 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2118 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=100.5375,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.1083,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=169.6290,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=145.0707,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=251.7940,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=278.4511,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=10.4088,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=9.4748, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2400.01 kN, MaxRatio=1.365, F60_Dinamico=Check, dynamic analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.497e+10

Ratio counts by range: [>1.0]: 12; [$0.9-1.0$]: 5; [$0.7-0.9$]: 18; [$0.4-0.7$]: 62; [$0.1-0.4$]: 69; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 288 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm

BC_tf: 12.0 mm

BC_tw: 34.0 mm

TC_h: 750.0 mm

TC_tf: 30.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 32.0 mm

DGA_tw: 20.0 mm

DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 24.0 mm
TRB_tw: 18.0 mm
CTT_h: 140.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE300B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2382.32 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8052 mm

F60 Dynamic check (L=43.0 m): |U3|=9.81 mm -> X=5.67

L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.9280

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.9280) = 9659168.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010067 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2992 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=133.6489,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.2234,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=173.6410,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=171.8009,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=166.9070,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=195.8319,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.8405,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2392,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2382.32 kN, MaxRatio=1.650, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.317e+09
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 25;
[0.4-0.7]: 49; [0.1-0.4]: 51; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 289 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 34.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm
TRB_tw: 26.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm

CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE600B
TRS: HE360B
LG: HE320M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2676.44 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6960 mm

F60 Dynamic check (L=43.0 m): |U3|=9.70 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 267

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 15.4924
mm

Horizontal check: $R = (43000.0)^2 / (8 * 15.4924) = 14918651.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006722 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1807 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=56.1391, Limit=92.5926
-> OK

```

    -> Sheet: FramesRBTForFatigue . S11_final=22.2791,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=184.3787,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=139.9249,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=136.0843,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=148.6543,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=11.0453,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.1953,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2676.44 kN, MaxRatio=97566.496, F60_Dinamico=Check, dynamic
analysis required, SkewV=267, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.548e+19
    Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 1; [0.7-0.9]: 10;
[0.4-0.7]: 68; [0.1-0.4]: 63; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 290 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 20.0 mm
    BC_tw: 40.0 mm
    TC_h: 550.0 mm
    TC_tf: 30.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 18.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 14.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 180.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 140.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B
    TRS: HE300B
    LG: HE360M

```


R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2142.43 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9903 mm

F60 Dynamic check (L=43.0 m): |U3|=10.99 mm -> X=5.35

L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 204

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0665
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0665) = 10971193.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00015317 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4826 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=123.0513,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.1157,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=237.8673,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=234.7600,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=430.2307,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```
-> Sheet: FramesEBBForFatigue . S11_final=461.8443,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.9061,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.9698, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2142.43 kN, MaxRatio=1.351, F60_Dinamico=OK, SkewV=204,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.741e+09

Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 3; [0.7-0.9]: 22;
[0.4-0.7]: 69; [0.1-0.4]: 58; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 291 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 20.0 mm
TC_tw: 40.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 350.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE360B
TRS: HE220B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2218.27 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9646 mm
F60 Dynamic check (L=43.0 m): |U3|=9.96 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 70

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.4918
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 28.4918) = 8111981.9$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00012195 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.4639 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=89.0263, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=33.0703,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=182.1975,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=212.3368,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=176.5731,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=212.6752,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=15.2632,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.8698,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

 Running design...

Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2218.27 kN, MaxRatio=2.127, F60_Dinamico=OK, SkewV=70,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.459e+09
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 3; [0.7-0.9]: 26;
[0.4-0.7]: 68; [0.1-0.4]: 36; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 292 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 26.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE300B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1853.02 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.7069 mm
F60 Dynamic check (L=43.0 m): |U3|=11.71 mm -> X=5.19
L.Inf (2.54) < X (5.19) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.8537
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.8537) = 7741925.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00019995 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.2060 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=216.8119,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=50.4509,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=171.8617,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=181.9024,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=382.7367,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=453.0037,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.1405,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.1744, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1853.02 kN, MaxRatio=3.346, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.029e+10
Ratio counts by range: [>1.0]: 58; [0.9-1.0]: 4; [0.7-0.9]: 6; [0.4-
0.7]: 64; [0.1-0.4]: 34; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 293 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE300B
LG: HE300M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2226.14 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.6615 mm
F60 Dynamic check (L=43.0 m): |U3|=10.66 mm -> X=5.44
L.Inf (2.54) < X (5.44) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 286

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9017
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.9017) = 8591468.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011612 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.1588 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.8598,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.0780,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=264.8874,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=193.8700,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=167.3879,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=203.9429,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.7239,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.0913,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2226.14 kN, MaxRatio=1.918, F60_Dinamico=OK, SkewV=286,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.355e+09
Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 8; [0.7-0.9]: 40;
[0.4-0.7]: 65; [0.1-0.4]: 37; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 294 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm

```

DGA_bf: 400.0 mm
DGA_tf: 32.0 mm
DGA_tw: 28.0 mm
DGB_bf: 600.0 mm
DGB_tf: 36.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE600B
TRS: HE200B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2982.47 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.4797 mm

F60 Dynamic check (L=43.0 m): |U3|=8.48 mm -> X=6.10

L.Inf (2.54) < X (6.10) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.3655

mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.3655) = 11348872.8$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008236 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 15.9724 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=84.6674, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.6990,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=179.1507,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=176.9739,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=154.3089,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=168.4149,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=15.2929,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=16.0393,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2982.47 kN, MaxRatio=1.317, F60_Dinamico=Check, dynamic
analysis required, SkewV=24, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.096e+10
Ratio counts by range: [>1.0]: 11; [0.9-1.0]: 3; [0.7-0.9]: 18;
[0.4-0.7]: 65; [0.1-0.4]: 61; [<=0.1]: 8;

=====
--- STARTING GA ITERATION No. 295 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 40.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm

TRB_tf: 38.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 13.0 mm
VER: HE600B
TRS: HE340B
LG: HE300M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2613.30 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2202 mm

F60 Dynamic check (L=43.0 m): |U3|=10.22 mm -> X=5.55

L.Inf (2.54) < X (5.55) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 305

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.3677

mm

Horizontal check: $R = (43000.0)^2 / (8 * 16.3677) = 14120839.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006730 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7032 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=63.9730, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=28.3036,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=184.5439,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=110.4657,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=179.2142,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=201.2761,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=10.6684,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.0137,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2613.30 kN, MaxRatio=3.846, F60_Dinamico=OK, SkewV=305,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
 failures) -> Cost=2.922e+10

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 7; [0.7-0.9]: 4; [0.4-
 0.7]: 79; [0.1-0.4]: 55; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 296 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 800.0 mm
BC_tf: 32.0 mm
BC_tw: 40.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 10.0 mm
DGB_bf: 500.0 mm
DGB_tf: 14.0 mm
DGB_tw: 26.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 18.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE550B

```

TRS: HE240B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2628.60 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2953 mm

F60 Dynamic check (L=43.0 m): |U3|=9.30 mm -> X=5.82

L.Inf (2.54) < X (5.82) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.6566
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.6566) = 11188891.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007411 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7893 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=62.5262, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=33.5993,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=153.4593,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=176.3899,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesIBBForFatigue . S11_final=160.9936,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=203.6290,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=12.1695,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.8387,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2628.60 kN, MaxRatio=1.415, F60_Dinamico=Check, dynamic
analysis required, SkewV=50, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.816e+10
    Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 0; [0.7-0.9]: 12;
[0.4-0.7]: 63; [0.1-0.4]: 77; [<=0.1]: 0;
>> Checkpoint saved (Gen=5, FunEval=296): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
    5          296          3.501e+08          5.867e+18          2

```

```

=====
--- STARTING GA ITERATION No. 297 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 18.0 mm
    BC_tw: 34.0 mm
    TC_h: 600.0 mm
    TC_tf: 36.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 38.0 mm
    DGA_tw: 22.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 16.0 mm
    TRB_tw: 30.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B
    TRS: HE240B
    LG: HE400M
    R_TR_B: HE220B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2292.95 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6728 mm

F60 Dynamic check (L=43.0 m): |U3|=9.67 mm -> X=5.71

L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 119

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.4038 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.4038) = 9098051.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010586 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1690 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=105.5573,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.1439,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=186.6195,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=268.5930,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=236.1439,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=299.2613,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=13.1895,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1980,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2292.95 kN, MaxRatio=1.554, F60_Dinamico=Check, dynamic analysis required, SkewV=119, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.648e+10
Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 9; [0.7-0.9]: 25; [0.4-0.7]: 44; [0.1-0.4]: 68; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 298 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 20.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 32.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 550.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 170.0 mm
CTT_tf: 18.0 mm
CTB_h: 130.0 mm
CTB_tf: 11.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE340B
TRS: HE320B
LG: HE550M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2098.76 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9124 mm
F60 Dynamic check (L=43.0 m): |U3|=10.91 mm -> X=5.37
L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.3591
mm
Horizontal check: $R = (43000.0)^2 / (8 * 31.3591) = 7370277.0$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010881 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4098 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=136.9285,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=48.8619,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=145.2741,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=104.1051,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=187.5074,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=233.3881,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=13.4159,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.2221,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2098.76 kN, MaxRatio=136574.805, F60_Dinamico=OK, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.915e+19

Ratio counts by range: [>1.0]: 31; [$0.9-1.0$]: 7; [$0.7-0.9$]: 39; [$0.4-0.7$]: 71; [$0.1-0.4$]: 18; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 299 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 36.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 32.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 20.0 mm
CTB_h: 150.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE320B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2687.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.9291 mm

F60 Dynamic check (L=43.0 m): |U3|=8.93 mm -> X=5.94

L.Inf (2.54) < X (5.94) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 199

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.9397
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.9397) = 11591221.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011048 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.4206 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=78.5698, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=28.3352,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=228.7931,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=202.4476,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=206.5437,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=214.2835,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.4445,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.4638,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2687.09 kN, MaxRatio=97640.867, F60_Dinamico=Check, dynamic
analysis required, SkewV=199, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.562e+19
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 5; [0.7-0.9]: 18;
[0.4-0.7]: 70; [0.1-0.4]: 44; [<=0.1]: 3;

=====
--- STARTING GA ITERATION No. 300 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 40.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 20.0 mm
DGB_bf: 550.0 mm
DGB_tf: 40.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 150.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE300B
LG: HE340M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 3037.75 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.2999 mm

F60 Dynamic check (L=43.0 m): |U3|=8.30 mm -> X=6.16

L.Inf (2.54) < X (6.16) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 224

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.2370
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 18.2370) = 12673421.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007341 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 15.7949 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=61.2108, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.0778,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=169.8992,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=114.3560,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=146.1000,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=160.6405,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=9.8546, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.7656, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=3037.75 kN, MaxRatio=98582.927, F60_Dinamico=Check, dynamic
analysis required, SkewV=224, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=2.952e+19
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 1; [0.7-0.9]: 9; [0.4-
0.7]: 49; [0.1-0.4]: 74; [<=0.1]: 8;
>> Snapshot iter 300 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_300_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 301 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm

```

TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 38.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 17.0 mm
CTB_h: 140.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE300B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2311.46 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0287 mm

F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.61

L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 133

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.7467

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7467) = 8641262.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007737 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5278 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=101.7776,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.0446,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.0591,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=118.8924,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=110.6045,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=137.2793,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.4795,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7157,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2311.46 kN, MaxRatio=117562.880, F60_Dinamico=OK, SkewV=133,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.195e+19
Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 6; [0.7-0.9]: 25;
[0.4-0.7]: 59; [0.1-0.4]: 40; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 302 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 800.0 mm

TRB_bf: 750.0 mm
TRB_tf: 26.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE300B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2351.37 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5021 mm

F60 Dynamic check (L=43.0 m): |U3|=9.50 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0627
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0627) = 9221875.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008206 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0005 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=83.2511, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=26.8759,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=175.2067,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=211.1137,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=114.1847,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=138.7463,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.7758,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2270,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2351.37 kN, MaxRatio=1.789, F60_Dinamico=Check, dynamic
analysis required, SkewV=69, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.669e+10
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 4; [0.7-0.9]: 16;
[0.4-0.7]: 74; [0.1-0.4]: 46; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 303 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 20.0 mm
DGB_bf: 500.0 mm
DGB_tf: 38.0 mm
DGB_tw: 20.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 30.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 140.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm

```


STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE280B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2587.11 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5788 mm

F60 Dynamic check (L=43.0 m): |U3|=9.58 mm -> X=5.74

L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9671 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.9671) = 10063323.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009317 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0712 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=124.4935,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=27.9113,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=174.9710,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=147.4607,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=178.1054,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=182.3229,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.3056,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.3949,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2587.11 kN, MaxRatio=112534.108, F60_Dinamico=Check, dynamic analysis required, SkewV=24, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.276e+19

Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 2; [0.7-0.9]: 31; [0.4-0.7]: 63; [0.1-0.4]: 47; [<=0.1]: 1;

```

=====
--- STARTING GA ITERATION No. 304 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 22.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 750.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE320B
LG: HE550M
R_TR_B: HE320B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
  Total Weight (Sum |FZ_dead|): 2282.48 kN
  U3 displacement at F60 (COMB01-PER-LOAD): -10.9296 mm
  F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37
  L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
  Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
  Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
  Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
  Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
  Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
  Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
  Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
  Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
  Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
  Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
  Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
  Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
  Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
  Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
  Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
  Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.3084
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.3084) = 10360463.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008643 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4276 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
  -> Sheet: FramesWBTFForFatigue . S11_final=87.8219, Limit=92.5926
-> OK
  -> Sheet: FramesRBTForFatigue . S11_final=29.3996,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=144.5300,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRSTForFatigue . S11_final=123.3485,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesIBBForFatigue . S11_final=118.6200,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesEBBForFatigue . S11_final=147.4381,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBTForFatigue . S11_final=9.0132, Limit=118.5185
-> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=7.9019, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2282.48 kN, MaxRatio=2.374, F60_Dinamico=OK, SkewV=4,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.493e+09

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 9; [0.7-0.9]: 22;
[0.4-0.7]: 71; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 305 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE240B
LG: HE320M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2214.44 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0785 mm
F60 Dynamic check (L=43.0 m): |U3|=10.08 mm -> X=5.59
L.Inf (2.54) < X (5.59) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 270

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.0373
mm
Horizontal check: $R = (43000.0)^2 / (8 * 30.0373) = 7694608.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012793 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5795 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=104.5046,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.9134,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=191.7538,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=127.5897,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=201.0015,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=243.4393,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.4396,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1783,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2214.44 kN, MaxRatio=1.888, F60_Dinamico=OK, SkewV=270,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.834e+09

Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 14; [0.7-0.9]: 42;
[0.4-0.7]: 58; [0.1-0.4]: 34; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 306 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 500.0 mm
TRB_tf: 22.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE340B
LG: HE400M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2169.94 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0471 mm
F60 Dynamic check (L=43.0 m): |U3|=10.05 mm -> X=5.60
L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 121

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.5875
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.5875) = 8377878.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013620 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5468 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=99.9356, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=43.1284,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=184.3894,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=177.8927,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=219.2228,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=272.5176,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.4372, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.2224, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2169.94 kN, MaxRatio=1.682, F60_Dinamico=OK, SkewV=121,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.744e+09
Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 14; [0.7-0.9]: 27;
[0.4-0.7]: 69; [0.1-0.4]: 28; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 307 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 18.0 mm
DGA_tw: 26.0 mm
DGB_bf: 350.0 mm
DGB_tf: 16.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE340B
LG: HE360M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2176.11 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.2837 mm
F60 Dynamic check (L=43.0 m): |U3|=11.28 mm -> X=5.28
L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 182


```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7567
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.7567) = 10156336.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009711 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.7836 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=87.4044, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=34.1976,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.4520,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=339.0933,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=150.6045,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=187.4953,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=7.0327, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.6788, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2176.11 kN, MaxRatio=2.020, F60_Dinamico=OK, SkewV=182,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=6.313e+09
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 4; [0.7-0.9]: 22;
[0.4-0.7]: 70; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 308 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm

```

DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 30.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 16.0 mm
TRB_tw: 18.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE280B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2694.28 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6662 mm

F60 Dynamic check (L=43.0 m): |U3|=8.67 mm -> X=6.03

L.Inf (2.54) < X (6.03) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 68

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.9183
mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.9183) = 11048912.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010142 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.1596 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=85.5055, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=36.0089,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=189.1776,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=191.1404,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=284.5161,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=295.8644,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=11.4346,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.9674,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2694.28 kN, MaxRatio=1.629, F60_Dinamico=Check, dynamic analysis required, SkewV=68, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.995e+10

Ratio counts by range: [>1.0]: 13; [0.9-1.0]: 7; [0.7-0.9]: 16; [0.4-0.7]: 78; [0.1-0.4]: 52; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 309 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm

BC_tf: 30.0 mm

BC_tw: 34.0 mm

TC_h: 750.0 mm

TC_tf: 14.0 mm

TC_tw: 36.0 mm

DGA_bf: 400.0 mm

DGA_tf: 38.0 mm

DGA_tw: 30.0 mm

DGB_bf: 500.0 mm

DGB_tf: 18.0 mm

DGB_tw: 22.0 mm

TRB_h: 850.0 mm

TRB_bf: 550.0 mm

TRB_tf: 18.0 mm

TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 18.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE340B
LG: HE550M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2117.16 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9727 mm

F60 Dynamic check (L=43.0 m): |U3|=10.97 mm -> X=5.36

L.Inf (2.54) < X (5.36) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2372 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.2372) = 8485632.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013273 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4726 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=140.7144,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=38.9669,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=197.5201,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=341.8844,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=205.8330,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=237.1233,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.6436, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.1681, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2117.16 kN, MaxRatio=4.213, F60_Dinamico=OK, SkewV=10,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.217e+10

```

```

    Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 3; [0.7-0.9]: 26;
[0.4-0.7]: 32; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 310 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 18.0 mm
    BC_tw: 32.0 mm
    TC_h: 700.0 mm
    TC_tf: 32.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 100.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 15.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 11.0 mm
    VER: HE360B

```

TRS: HE220B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2267.32 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8266 mm

F60 Dynamic check (L=43.0 m): |U3|=9.83 mm -> X=5.66

L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.6079
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.6079) = 8686327.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011080 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3267 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=104.8417,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.9037,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=166.5141,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=176.7570,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=168.7886,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=205.1130,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.4302,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.0537,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2267.32 kN, MaxRatio=3.246, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.205e+10
```

```
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 4; [0.7-0.9]: 21;
[0.4-0.7]: 68; [0.1-0.4]: 43; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 311 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 650.0 mm
BC_tf: 28.0 mm
BC_tw: 34.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 550.0 mm
DGB_tf: 28.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 500.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE300B
LG: HE400M
R_TR_B: HE320B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2437.35 kN
```

U3 displacement at F60 (COMB01-PER-LOAD): -9.4353 mm
F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78
L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.4183
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.4183) = 9869425.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009851 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9325 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=97.3458, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.2088,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.8880,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=139.4130,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=148.0991,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=181.3194,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.4425,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1056, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2437.35 kN, MaxRatio=1.494, F60_Dinamico=Check, dynamic analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.823e+10
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 7; [0.7-0.9]: 15; [0.4-0.7]: 80; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 312 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 32.0 mm
BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
TRB_tf: 38.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE340B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2732.29 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7284 mm
F60 Dynamic check (L=43.0 m): |U3|=9.73 mm -> X=5.69
L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.8550
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 16.8550) = 13712572.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007063 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.2171 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=91.2796, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=26.0786,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=134.3423,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=148.5450,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=115.0262,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=140.8220,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=9.8365, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=8.2034, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2732.29 kN, MaxRatio=1.421, F60_Dinamico=Check, dynamic
 analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK,
 VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.803e+10

Ratio counts by range: [>1.0]: 8; [$0.9-1.0$]: 8; [$0.7-0.9$]: 19; [$0.4-0.7$]: 71; [$0.1-0.4$]: 60; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 313 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 32.0 mm
DGA_tw: 30.0 mm
DGB_bf: 600.0 mm
DGB_tf: 30.0 mm
DGB_tw: 16.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE220B
LG: HE360M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2606.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.5362 mm

F60 Dynamic check (L=43.0 m): |U3|=8.54 mm -> X=6.08

L.Inf (2.54) < X (6.08) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

```

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 174

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.1465
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 27.1465) = 8513986.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010929 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.0317 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=94.2677, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.6124,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=206.2209,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=157.5797,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=335.9320,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=378.5228,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=18.0524,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=18.2074,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2606.94 kN, MaxRatio=1.467, F60_Dinamico=Check, dynamic
analysis required, SkewV=174, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.130e+10
Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 5; [0.7-0.9]: 18;
[0.4-0.7]: 89; [0.1-0.4]: 40; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 314 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm

```

BC_tf: 18.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 26.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 24.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE300B
LG: HE600M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2405.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0397 mm

F60 Dynamic check (L=43.0 m): |U3|=9.04 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

```

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.9079
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.9079) = 7995218.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010959 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.5400 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=96.9817, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.0586,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.0952,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.5177,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=158.8467,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=198.1020,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.6644,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.9236, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2405.24 kN, MaxRatio=2.566, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.007e+10
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 24;
[0.4-0.7]: 63; [0.1-0.4]: 38; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 315 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 22.0 mm
BC_tw: 40.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 28.0 mm
DGA_tw: 28.0 mm

```

DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE300B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2322.05 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6632 mm

F60 Dynamic check (L=43.0 m): |U3|=9.66 mm -> X=5.71

L.Inf (2.54) < X (5.71) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.8348
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.8348) = 8946279.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009837 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1616 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.1473,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.0564,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=176.3134,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=150.6274,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=144.1512,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=175.5945,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.6934,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8871, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2322.05 kN, MaxRatio=2.004, F60_Dinamico=Check, dynamic
analysis required, SkewV=69, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.728e+10
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 3; [0.7-0.9]: 10;
[0.4-0.7]: 83; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 316 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 38.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm

CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE260B
LG: HE400M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2606.39 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0646 mm

F60 Dynamic check (L=43.0 m): |U3|=9.06 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 125

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0335
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0335) = 10988440.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007951 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5561 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=78.5160, Limit=92.5926
-> OK

```

    -> Sheet: FramesRBTForFatigue . S11_final=29.8808,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=175.8819,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=131.0835,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=190.2113,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=199.2880,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=14.7605,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.0288,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2606.39 kN, MaxRatio=1.837, F60_Dinamico=Check, dynamic
analysis required, SkewV=125, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.125e+10
    Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 6; [0.7-0.9]: 22;
[0.4-0.7]: 55; [0.1-0.4]: 56; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 317 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 800.0 mm
    BC_tf: 24.0 mm
    BC_tw: 32.0 mm
    TC_h: 600.0 mm
    TC_tf: 28.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 350.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 26.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 24.0 mm
    DGB_tw: 12.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 17.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 10.0 mm
    VER: HE600B
    TRS: HE300B
    LG: HE450M

```

R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2603.01 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2224 mm

F60 Dynamic check (L=43.0 m): |U3|=9.22 mm -> X=5.84

L.Inf (2.54) < X (5.84) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 59

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.4016
mm

Horizontal check: $R = (43000.0)^2 / (8 * 17.4016) = 13281821.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006962 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7093 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=72.2407, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=28.0665,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=164.3444,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=150.2777,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=146.4358,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesEBBForFatigue . S11_final=186.0413,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.3620,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2299,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```
Peso=2603.01 kN, MaxRatio=1.436, F60_Dinamico=Check, dynamic
analysis required, SkewV=59, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.816e+10
Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 7; [0.7-0.9]: 20;
[0.4-0.7]: 57; [0.1-0.4]: 70; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 318 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```
BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 26.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 500.0 mm
TRB_tf: 34.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 16.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE320B
LG: HE550M
R_TR_B: HE300B
```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```
Total Weight (Sum |FZ_dead|): 2579.16 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.4453 mm
F60 Dynamic check (L=43.0 m): |U3|=9.45 mm -> X=5.78
```

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9211

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.9211) = 10083510.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008529 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9399 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=94.0247, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=25.2622,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=152.5006,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=135.9242,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=121.9459,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=145.8869,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8662,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.7071, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2579.16 kN, MaxRatio=2.291, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.042e+10
    Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 7; [0.7-0.9]: 20;
[0.4-0.7]: 67; [0.1-0.4]: 44; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 319 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 700.0 mm
BC_tf: 28.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 32.0 mm
TRB_tw: 18.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE320B
LG: HE500M
R_TR_B: HE300B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2304.64 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.8639 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65
    L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3159
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.3159) = 9129650.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012495 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3628 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.5705,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.3624,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=157.1699,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=138.9590,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=176.2526,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=213.0116,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.9259, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5670,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2304.64 kN, MaxRatio=94646.059, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.064e+19
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 7; [0.7-0.9]: 30;
[0.4-0.7]: 73; [0.1-0.4]: 41; [<=0.1]: 0;

```

```
=====
--- STARTING GA ITERATION No. 320 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 24.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 34.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 550.0 mm
TRB_tf: 38.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE550B
TRS: HE320B
LG: HE340M
R_TR_B: HE240B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2675.91 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -8.6780 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=8.68 mm -> X=6.03
```

```
L.Inf (2.54) < X (6.03) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```


Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 233

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.5664
mm
Horizontal check: $R = (43000.0)^2 / (8 * 20.5664) = 11237982.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00005512 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.1702 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=80.8281, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=28.9487,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=160.9742,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=208.8228,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=117.8959,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=150.7612,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.5269,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8702, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2675.91 kN, MaxRatio=1.966, F60_Dinamico=Check, dynamic
analysis required, SkewV=233, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.560e+10
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 4; [0.7-0.9]: 11;
[0.4-0.7]: 79; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 321 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm

TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 14.0 mm
TRB_h: 600.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE280B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2199.42 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4957 mm

F60 Dynamic check (L=43.0 m): |U3|=10.50 mm -> X=5.48

L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 50

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9519

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.9519) = 10069955.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009515 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.9885 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=111.8992,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.2350,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=169.4398,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=177.2163,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=184.1953,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=232.9244,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.2052,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.5335,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2199.42 kN, MaxRatio=1.563, F60_Dinamico=OK, SkewV=50,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.907e+09
Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 12; [0.7-0.9]: 27;
[0.4-0.7]: 72; [0.1-0.4]: 38; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 322 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 26.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm

TRB_bf: 600.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE280B
LG: HE500M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1947.89 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.6576 mm

F60 Dynamic check (L=43.0 m): |U3|=11.66 mm -> X=5.20

L.Inf (2.54) < X (5.20) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.2369
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.2369) = 7905251.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011691 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.1561 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=154.3642,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.6339,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.3970,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=170.1500,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=177.1498,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=208.8027,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.0604,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2026,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=1947.89 kN, MaxRatio=1.844, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.952e+09

```

```

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 7; [0.7-0.9]: 59;
[0.4-0.7]: 28; [0.1-0.4]: 39; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 323 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 38.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 550.0 mm
DGB_tf: 22.0 mm
DGB_tw: 18.0 mm
TRB_h: 750.0 mm
TRB_bf: 350.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 16.0 mm
CTB_h: 110.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm

```

VER: HE450B
TRS: HE280B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2573.98 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0401 mm

F60 Dynamic check (L=43.0 m): |U3|=9.04 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.3455
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.3455) = 9900210.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011260 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5360 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=72.5471, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=30.4609,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=158.2647,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

```
-> Sheet: FramesRSTForFatigue . S11_final=149.3095,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=228.1189,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=257.2112,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.5938,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.5378,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2573.98 kN, MaxRatio=139109.058, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.981e+19

Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 7; [0.7-0.9]: 11; [0.4-0.7]: 65; [0.1-0.4]: 55; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 324 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 750.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 10.0 mm
CTB_h: 140.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE600B
TRS: HE340B
LG: HE450M
R_TR_B: HE340B

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2428.46 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.8062 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.81 mm -> X=5.67
    L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
    Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
    Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
    Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
    Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
    Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
    Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
    Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
    Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
    Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
    Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
    Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
    Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 63

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.2846
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 17.2846) = 13371764.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006362 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2899 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=91.6079, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.8900,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.9909,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=138.4378,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=115.6180,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=145.8619,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.6469,
Limit=118.5185 -> OK

```


-> Sheet: FramesIBTForFatigue . S11_final=10.6092,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2428.46 kN, MaxRatio=112428.155, F60_Dinamico=OK, SkewV=63,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.070e+19

Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 4; [0.7-0.9]: 10;
[0.4-0.7]: 77; [0.1-0.4]: 39; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 325 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 22.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE600M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1961.66 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.8618 mm
F60 Dynamic check (L=43.0 m): |U3|=11.86 mm -> X=5.15
L.Inf (2.54) < X (5.15) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7087
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.7087) = 8050709.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00014924 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.3621 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=135.1634,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.0844,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.9504,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=185.2192,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=240.5297,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=264.7864,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.6382,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.6312, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=1961.66 kN, MaxRatio=2.222, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.027e+09

Ratio counts by range: [>1.0]: 52; [0.9-1.0]: 15; [0.7-0.9]: 43;
[0.4-0.7]: 22; [0.1-0.4]: 34; [<=0.1]: 0;

>> Snapshot iter 325 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_325_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 326 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 38.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 26.0 mm
CTT_h: 100.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE260B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2071.24 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3542 mm
F60 Dynamic check (L=43.0 m): |U3|=10.35 mm -> X=5.52
L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 217

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9896
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.9896) = 8563472.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015786 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8535 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=135.7542,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=42.0249,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=225.7415,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=201.9112,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=258.9417,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=303.2658,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.2086,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.2660, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2071.24 kN, MaxRatio=8.418, F60_Dinamico=OK, SkewV=217,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.186e+11
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 7; [0.7-0.9]: 41;
[0.4-0.7]: 51; [0.1-0.4]: 34; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 327 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 26.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 850.0 mm
TRB_bf: 650.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE300B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2278.84 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8068 mm
F60 Dynamic check (L=43.0 m): |U3|=9.81 mm -> X=5.67
L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 67

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.4417
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.4417) = 9084497.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007569 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3058 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=74.1060, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.3358,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=165.9934,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=264.9652,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=106.9230,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=132.0278,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.2253,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1151,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2278.84 kN, MaxRatio=1.841, F60_Dinamico=OK, SkewV=67,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.231e+09
Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 8; [0.7-0.9]: 34;
[0.4-0.7]: 55; [0.1-0.4]: 47; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 328 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm

```

DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 850.0 mm
TRB_bf: 350.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE320M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1958.78 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.7002 mm

F60 Dynamic check (L=43.0 m): |U3|=11.70 mm -> X=5.19

L.Inf (2.54) < X (5.19) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 267

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.7164

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.7164) = 9351084.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013590 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.1974 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=151.8818,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=36.1768,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=234.0520,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=195.8106,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=235.4982,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=262.7688,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.4665,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=10.6504,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=1958.78 kN, MaxRatio=1.850, F60_Dinamico=OK, SkewV=267,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.744e+09

Ratio counts by range: [>1.0]: 32; [0.9-1.0]: 13; [0.7-0.9]: 35;
[0.4-0.7]: 41; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 329 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 32.0 mm

BC_tw: 38.0 mm

TC_h: 700.0 mm

TC_tf: 18.0 mm

TC_tw: 40.0 mm

DGA_bf: 600.0 mm

DGA_tf: 26.0 mm

DGA_tw: 22.0 mm

DGB_bf: 400.0 mm

DGB_tf: 34.0 mm

DGB_tw: 22.0 mm

TRB_h: 700.0 mm

TRB_bf: 550.0 mm

TRB_tf: 36.0 mm

TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 10.0 mm
VER: HE550B
TRS: HE220B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2870.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.5117 mm

F60 Dynamic check (L=43.0 m): |U3|=8.51 mm -> X=6.08

L.Inf (2.54) < X (6.08) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.8027
mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.8027) = 11671382.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006524 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.0066 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=64.7986, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=23.8457,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=133.9782,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=106.7939,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=103.3813,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=128.8790,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=13.8159,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.6693,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2870.09 kN, MaxRatio=1.273, F60_Dinamico=Check, dynamic analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=2.912e+10

Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 6; [0.7-0.9]: 10; [0.4-0.7]: 77; [0.1-0.4]: 65; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 330 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 18.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 28.0 mm
CTT_h: 170.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE320B

```

TRS: HE280B
LG: HE360M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2158.88 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4092 mm

F60 Dynamic check (L=43.0 m): |U3|=10.41 mm -> X=5.50

L.Inf (2.54) < X (5.50) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 190

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9787

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.9787) = 8896706.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011919 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9096 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=113.7725,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.5558,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=188.4434,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=157.5190,

Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=192.9247,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=238.5342,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.3696,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5796,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2158.88 kN, MaxRatio=1.453, F60_Dinamico=OK, SkewV=190,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.652e+09

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 8; [0.7-0.9]: 36;
[0.4-0.7]: 52; [0.1-0.4]: 45; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 331 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 600.0 mm
DGB_tf: 28.0 mm
DGB_tw: 16.0 mm
TRB_h: 600.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE220B
LG: HE300M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2488.75 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4660 mm
F60 Dynamic check (L=43.0 m): |U3|=9.47 mm -> X=5.77
L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 300

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.7103
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.7103) = 9353368.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008263 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9621 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=108.0791,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.5319,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=208.6757,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=266.3486,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=156.7809,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=198.3730,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=16.0008,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=16.0843,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2488.75 kN, MaxRatio=1.823, F60_Dinamico=Check, dynamic analysis required, SkewV=300, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.416e+10
Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 7; [0.7-0.9]: 29; [0.4-0.7]: 59; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 332 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 8.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 38.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 150.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE320B
LG: HE400M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2356.58 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3055 mm
F60 Dynamic check (L=43.0 m): |U3|=10.31 mm -> X=5.53
L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.5416 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 20.5416) = 11251530.5$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007633 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.7954 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=103.6692,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=29.3609,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=192.7404,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=157.5006,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=139.4756,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=177.0710,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.5798,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.0072, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2356.58 kN, MaxRatio=103337.767, F60_Dinamico=OK, SkewV=129,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.516e+19

Ratio counts by range: [>1.0]: 41; [$0.9-1.0$]: 7; [$0.7-0.9$]: 25;
[$0.4-0.7$]: 23; [$0.1-0.4$]: 70; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 333 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 32.0 mm
BC_tw: 28.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE260B
LG: HE600M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2205.45 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1781 mm
F60 Dynamic check (L=43.0 m): |U3|=10.18 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71


```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.7750
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.7750) = 8967012.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013188 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6787 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=101.7994,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.4241,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=139.5296,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=114.1081,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=182.7129,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=219.0895,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.9824,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.3686,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2205.45 kN, MaxRatio=66672.066, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=9.803e+18
Ratio counts by range: [>1.0]: 43; [0.9-1.0]: 14; [0.7-0.9]: 29;
[0.4-0.7]: 41; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 334 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 30.0 mm

```

BC_tw: 38.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 18.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE300B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2635.33 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4271 mm

F60 Dynamic check (L=43.0 m): |U3|=9.43 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

```

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.7738
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.7738) = 11688428.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009532 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9207 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=83.8793, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=31.6177,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=161.4439,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=176.4017,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=182.1281,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=208.0156,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.5009,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.6527, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2635.33 kN, MaxRatio=1.377, F60_Dinamico=Check, dynamic
analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.736e+10
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 4; [0.7-0.9]: 16;
[0.4-0.7]: 51; [0.1-0.4]: 80; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 335 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 24.0 mm

```

DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 14.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE300B
LG: HE550M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2084.41 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.4837 mm

F60 Dynamic check (L=43.0 m): |U3|=11.48 mm -> X=5.24

L.Inf (2.54) < X (5.24) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.3566

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.3566) = 8769164.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010571 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.9842 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=136.9289,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.6108,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.7168,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=123.7057,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=165.5279,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=201.7942,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.1082, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.9954, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2084.41 kN, MaxRatio=3.154, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.939e+09
Ratio counts by range: [>1.0]: 72; [0.9-1.0]: 12; [0.7-0.9]: 16;
[0.4-0.7]: 16; [0.1-0.4]: 50; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 336 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 10.0 mm
BC_tw: 26.0 mm
TC_h: 800.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 600.0 mm
DGB_tf: 14.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm

CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 15.0 mm
VER: HE300B
TRS: HE220B
LG: HE600M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1947.99 kN

U3 displacement at F60 (COMB01-PER-LOAD): -12.2931 mm

F60 Dynamic check (L=43.0 m): |U3|=12.29 mm -> X=5.06

L.Inf (2.54) < X (5.06) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 34.2438 mm

Horizontal check: $R = (43000.0)^2 / (8 * 34.2438) = 6749398.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012260 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.7944 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=239.4341,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=49.0412,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=131.8276,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=213.2435,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=216.5632,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=278.3020,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=15.6863,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.6280,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=1947.99 kN, MaxRatio=2.888, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.040e+09

```

```

    Ratio counts by range: [>1.0]: 90; [0.9-1.0]: 0; [0.7-0.9]: 7; [0.4-
0.7]: 28; [0.1-0.4]: 41; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 337 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 16.0 mm
    BC_tw: 40.0 mm
    TC_h: 600.0 mm
    TC_tf: 34.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 18.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 12.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 19.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 11.0 mm
    VER: HE500B
    TRS: HE260B
    LG: HE500M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2407.11 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0317 mm

F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.60

L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.0807

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.0807) = 10963798.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011506 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5241 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.6681,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=41.2073,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=175.2338,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=143.1683,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=319.3867,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=393.5486,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)


```
-> Sheet: FramesEBTForFatigue . S11_final=13.8128,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.9915,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2407.11 kN, MaxRatio=1.304, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.248e+08

Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 11; [0.7-0.9]: 18;
[0.4-0.7]: 48; [0.1-0.4]: 79; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 338 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 32.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 40.0 mm
DGA_bf: 550.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 38.0 mm
DGB_tw: 30.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 18.0 mm
CTT_h: 130.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE340B
LG: HE500M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2406.67 kN
U3 displacement at F60 (COMB01-PER-LOAD): -8.7962 mm
F60 Dynamic check (L=43.0 m): |U3|=8.80 mm -> X=5.98

L.Inf (2.54) < X (5.98) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.2564
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.2564) = 8179575.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014196 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.2952 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=108.7899,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=43.4712,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=188.7457,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=268.5532,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=234.6650,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=274.3993,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.0149, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.8119, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

```
>> RESULTADOS FINALES ITERACIÓN:
Peso=2406.67 kN, MaxRatio=1.832, F60_Dinamico=Check, dynamic
analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.638e+10
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 5; [0.7-0.9]: 22;
[0.4-0.7]: 74; [0.1-0.4]: 35; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 339 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 650.0 mm
BC_tf: 16.0 mm
BC_tw: 28.0 mm
TC_h: 700.0 mm
TC_tf: 14.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 34.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 12.0 mm
TRB_h: 850.0 mm
TRB_bf: 650.0 mm
TRB_tf: 30.0 mm
TRB_tw: 18.0 mm
CTT_h: 170.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE220B
LG: HE340M
R_TR_B: HE360B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2049.98 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.1337 mm
F60 Dynamic check (L=43.0 m): |U3|=11.13 mm -> X=5.32
L.Inf (2.54) < X (5.32) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 220

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.8859
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.8859) = 7733570.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008130 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.6333 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=108.8852,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.4984,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=209.9168,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=150.0651,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=118.2131,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=144.5566,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.2231,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.0006,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2049.98 kN, MaxRatio=2.021, F60_Dinamico=OK, SkewV=220,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.748e+09
Ratio counts by range: [>1.0]: 54; [0.9-1.0]: 20; [0.7-0.9]: 20;
[0.4-0.7]: 31; [0.1-0.4]: 41; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 340 ---

```

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 30.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 22.0 mm
TRB_h: 600.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 11.0 mm
CTB_h: 130.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE300B
LG: HE600M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2034.99 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.2839 mm
F60 Dynamic check (L=43.0 m): |U3|=11.28 mm -> X=5.28
L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.7443
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 33.7443) = 6849303.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015111 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.7841 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=160.2698,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=53.4117,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=138.1355,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=98.0879,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=237.0407,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=295.6722,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.5362,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.6265, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2034.99 kN, MaxRatio=137125.374, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.826e+19
Ratio counts by range: [>1.0]: 65; [0.9-1.0]: 20; [0.7-0.9]: 30;
[0.4-0.7]: 24; [0.1-0.4]: 27; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 341 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 32.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm

```

DGA_tf: 26.0 mm
DGA_tw: 26.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 30.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE600B
TRS: HE280B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2728.86 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6319 mm

F60 Dynamic check (L=43.0 m): |U3|=8.63 mm -> X=6.04

L.Inf (2.54) < X (6.04) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 74

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.8788
mm

Horizontal check: $R = (43000.0)^2 / (8 * 18.8788) = 12242569.6$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009738 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.1230 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=71.8104, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=26.7574,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=195.4013,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=268.6736,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=310.9111,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=325.5252,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=12.1078,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.0317,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2728.86 kN, MaxRatio=1.985, F60_Dinamico=Check, dynamic analysis required, SkewV=74, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.206e+10

Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 3; [0.7-0.9]: 10; [0.4-0.7]: 59; [0.1-0.4]: 68; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 342 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 24.0 mm

BC_tw: 32.0 mm

TC_h: 600.0 mm

TC_tf: 40.0 mm

TC_tw: 38.0 mm

DGA_bf: 350.0 mm

DGA_tf: 30.0 mm

DGA_tw: 28.0 mm

DGB_bf: 500.0 mm

DGB_tf: 18.0 mm

DGB_tw: 28.0 mm

TRB_h: 800.0 mm

TRB_bf: 750.0 mm

TRB_tf: 34.0 mm

TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE300B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2467.14 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0285 mm

F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.61

L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.5392

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.5392) = 9818742.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006968 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5279 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=82.6177, Limit=92.5926
-> OK
    -> Sheet: FramesRBTForFatigue . S11_final=24.5868,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=134.5743,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=147.5912,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=94.6609, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=117.8174,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=10.6623,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.8425,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2467.14 kN, MaxRatio=1.172, F60_Dinamico=OK, SkewV=0,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
    failures) -> Cost=1.717e+08

```

```

    Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 7; [0.7-0.9]: 21;
    [0.4-0.7]: 74; [0.1-0.4]: 51; [<=0.1]: 1;

```

```

=====
--- STARTING GA ITERATION No. 343 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 10.0 mm
    BC_tw: 26.0 mm
    TC_h: 550.0 mm
    TC_tf: 40.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 350.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 14.0 mm
    DGB_tw: 28.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 110.0 mm
    CTT_tf: 20.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 11.0 mm
    VER: HE300B

```

TRS: HE220B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1804.76 kN

U3 displacement at F60 (COMB01-PER-LOAD): -12.4779 mm

F60 Dynamic check (L=43.0 m): |U3|=12.48 mm -> X=5.02

L.Inf (2.54) < X (5.02) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 35.1322
mm

Horizontal check: $R = (43000.0)^2 / (8 * 35.1322) = 6578713.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011255 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.9788 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=173.2177,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=46.0809,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=152.0336,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=265.2699,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=189.8082,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=245.4976,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=18.2222,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.3160,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=1804.76 kN, MaxRatio=2.437, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.815e+09

Ratio counts by range: [>1.0]: 59; [0.9-1.0]: 4; [0.7-0.9]: 12;
[0.4-0.7]: 58; [0.1-0.4]: 33; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 344 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 800.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 600.0 mm
DGB_tf: 22.0 mm
DGB_tw: 30.0 mm
TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 20.0 mm
CTB_h: 170.0 mm
CTB_tf: 20.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 10.0 mm
VER: HE450B
TRS: HE220B
LG: HE360M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2510.78 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6066 mm
F60 Dynamic check (L=43.0 m): |U3|=9.61 mm -> X=5.73
L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 190

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.8441
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.8441) = 8943038.3$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012589 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1032 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=115.6586,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.9371,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=209.8632,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=268.1370,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=339.5657,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=347.5457,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.6606,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=15.2691,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2510.78 kN, MaxRatio=1.386, F60_Dinamico=Check, dynamic analysis required, SkewV=190, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.038e+10
Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 6; [0.7-0.9]: 19; [0.4-0.7]: 78; [0.1-0.4]: 48; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 345 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 32.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 38.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE240B
LG: HE600M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2159.40 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.8032 mm
F60 Dynamic check (L=43.0 m): |U3|=10.80 mm -> X=5.40
L.Inf (2.54) < X (5.40) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.4169 mm
Horizontal check: $R = (43000.0)^2 / (8 * 27.4169) = 8430025.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012688 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.3021 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=123.8243,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.5499,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=154.3780,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=146.1391,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=192.3730,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=215.0347,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.4507,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2692,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2159.40 kN, MaxRatio=3.016, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=8.883e+09

Ratio counts by range: [>1.0]: 33; [$0.9-1.0$]: 3; [$0.7-0.9$]: 44;
 [$0.4-0.7$]: 51; [$0.1-0.4$]: 35; [≤ 0.1]: 0;
 >> Checkpoint saved (Gen=6, FunEval=345): D:\000.Robinson
 Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
 6 345 1.717e+08 6.668e+18 0

=====
 --- STARTING GA ITERATION No. 346 ---
 =====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
 BC_tf: 24.0 mm
 BC_tw: 32.0 mm
 TC_h: 700.0 mm
 TC_tf: 28.0 mm
 TC_tw: 36.0 mm
 DGA_bf: 500.0 mm
 DGA_tf: 28.0 mm
 DGA_tw: 20.0 mm
 DGB_bf: 400.0 mm
 DGB_tf: 16.0 mm
 DGB_tw: 22.0 mm
 TRB_h: 700.0 mm
 TRB_bf: 500.0 mm
 TRB_tf: 24.0 mm
 TRB_tw: 30.0 mm
 CTT_h: 130.0 mm
 CTT_tf: 17.0 mm
 CTB_h: 160.0 mm
 CTB_tf: 17.0 mm
 STCTB_h: 120.0 mm
 STCTB_tf: 11.0 mm
 VER: HE400B
 TRS: HE280B
 LG: HE400M
 R_TR_B: HE240B

 Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2235.89 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.4820 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.48 mm -> X=5.48
 L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71


```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 127

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2337
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.2337) = 9947842.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010577 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.9783 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=108.5307,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.9673,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.8808,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.0889,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=172.0374,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=212.5679,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.0399,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2321,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2235.89 kN, MaxRatio=2.563, F60_Dinamico=OK, SkewV=127,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.411e+09
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 4; [0.7-0.9]: 25;
[0.4-0.7]: 67; [0.1-0.4]: 41; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 347 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 40.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 600.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 100.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE340B
LG: HE340M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1929.87 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.6326 mm
F60 Dynamic check (L=43.0 m): |U3|=11.63 mm -> X=5.20
L.Inf (2.54) < X (5.20) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 235

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.9586
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.9586) = 7714821.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013374 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.1328 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=146.9608,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=50.5499,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=209.7534,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=267.0195,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=225.5427,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=282.9431,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.5675, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=5.4220, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1929.87 kN, MaxRatio=5.249, F60_Dinamico=OK, SkewV=235,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.947e+10
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 17; [0.7-0.9]: 35;
[0.4-0.7]: 54; [0.1-0.4]: 25; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 348 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 30.0 mm

```

DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 550.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE240B
LG: HE500M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2390.92 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2486 mm

F60 Dynamic check (L=43.0 m): |U3|=9.25 mm -> X=5.84

L.Inf (2.54) < X (5.84) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 26

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3916
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.3916) = 9102436.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009226 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7471 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=115.0007,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.0106,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=148.3126,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=115.4127,
Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=160.7931,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=202.1335,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.8927,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.6521,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2390.92 kN, MaxRatio=2.251, F60_Dinamico=Check, dynamic analysis required, SkewV=26, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.837e+10

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 4; [0.7-0.9]: 15; [0.4-0.7]: 56; [0.1-0.4]: 71; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 349 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 24.0 mm

BC_tw: 28.0 mm

TC_h: 700.0 mm

TC_tf: 28.0 mm

TC_tw: 40.0 mm

DGA_bf: 500.0 mm

DGA_tf: 18.0 mm

DGA_tw: 16.0 mm

DGB_bf: 500.0 mm

DGB_tf: 22.0 mm

DGB_tw: 14.0 mm

TRB_h: 650.0 mm

TRB_bf: 650.0 mm

TRB_tf: 20.0 mm

TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE260B
LG: HE400M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2304.10 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1725 mm

F60 Dynamic check (L=43.0 m): |U3|=10.17 mm -> X=5.57

L.Inf (2.54) < X (5.57) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1042
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.1042) = 9206644.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009192 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6657 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue . S11_final=107.4788,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=34.5700,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=184.6516,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=175.7983,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=164.4457,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=208.1817,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=17.2685,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=15.0417,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2304.10 kN, MaxRatio=2.030, F60_Dinamico=OK, SkewV=129,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.533e+09

```

```

    Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 9; [0.7-0.9]: 31;
[0.4-0.7]: 64; [0.1-0.4]: 44; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 350 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 26.0 mm
    BC_tw: 30.0 mm
    TC_h: 650.0 mm
    TC_tf: 30.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 10.0 mm
    VER: HE450B

```

TRS: HE320B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2333.44 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7717 mm

F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68

L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 62

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7291
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.7291) = 10636678.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008933 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2650 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=93.1401, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.1414,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=175.0223,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.5837,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)


```

    -> Sheet: FramesIBBForFatigue . S11_final=152.8044,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=194.2277,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.8810,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.3093, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2333.44 kN, MaxRatio=1.922, F60_Dinamico=OK, SkewV=62,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.546e+09

```

```

    Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 6; [0.7-0.9]: 18;
[0.4-0.7]: 70; [0.1-0.4]: 47; [<=0.1]: 0;

```

```

>> Snapshot iter 350 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_350_20251114_013311.mat

```

```

=====
--- STARTING GA ITERATION No. 351 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 26.0 mm
    BC_tw: 26.0 mm
    TC_h: 550.0 mm
    TC_tf: 18.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 28.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 30.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 17.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 19.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 10.0 mm
    VER: HE340B
    TRS: HE280B
    LG: HE450M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
  Total Weight (Sum |FZ_dead|): 2198.96 kN
  U3 displacement at F60 (COMB01-PER-LOAD): -10.8550 mm
  F60 Dynamic check (L=43.0 m): |U3|=10.86 mm -> X=5.39
  L.Inf (2.54) < X (5.39) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
  Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
  Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
  Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
  Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
  Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
  Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
  Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
  Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
  Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
  Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
  Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
  Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
  Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
  Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
  Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
  Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 71

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.0766
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.0766) = 8863294.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010080 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.3529 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
  -> Sheet: FramesWBTFForFatigue . S11_final=139.9102,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRBTForFatigue . S11_final=31.0522,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=181.6330,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesRSTForFatigue . S11_final=156.2241,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesIBBForFatigue . S11_final=145.3266,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBBForFatigue . S11_final=176.5084,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
  -> Sheet: FramesEBTForFatigue . S11_final=13.4704,
Limit=118.5185 -> OK

```

```
-> Sheet: FramesIBTForFatigue . S11_final=15.2588,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2198.96 kN, MaxRatio=2.408, F60_Dinamico=OK, SkewV=71,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.030e+09
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 6; [0.7-0.9]: 44;
[0.4-0.7]: 28; [0.1-0.4]: 53; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 352 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 36.0 mm
DGB_tw: 20.0 mm
TRB_h: 800.0 mm
TRB_bf: 600.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE280B
LG: HE320M
R_TR_B: HE300B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2257.16 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1764 mm
F60 Dynamic check (L=43.0 m): |U3|=10.18 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 265

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.3850
mm
Horizontal check: $R = (43000.0)^2 / (8 * 31.3850) = 7364196.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010076 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6761 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=127.5597,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.5511,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=218.5602,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=172.6280,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=150.8986,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=186.1052,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.8582,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.8671,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2257.16 kN, MaxRatio=2.480, F60_Dinamico=OK, SkewV=265,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.104e+10

Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 10; [0.7-0.9]: 25;
[0.4-0.7]: 64; [0.1-0.4]: 41; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 353 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 12.0 mm
TRB_h: 550.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE260B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2274.54 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2200 mm
F60 Dynamic check (L=43.0 m): |U3|=10.22 mm -> X=5.55
L.Inf (2.54) < X (5.55) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 50

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1901 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.1901) = 10415661.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008261 rad (Limit: 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.7099 mm (Limit: 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=107.8870,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=39.7793,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=163.6184,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=125.1773,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=180.5524,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=231.2782,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.5132,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=15.8170,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2274.54 kN, MaxRatio=1.845, F60_Dinamico=OK, SkewV=50,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.875e+09
 Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 5; [0.7-0.9]: 22;
 [0.4-0.7]: 75; [0.1-0.4]: 38; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 354 ---
 =====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 18.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE300B
LG: HE340M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1956.05 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0480 mm
F60 Dynamic check (L=43.0 m): |U3|=11.05 mm -> X=5.34
L.Inf (2.54) < X (5.34) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 215

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.9625
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 28.9625) = 7980142.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00016090 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5471 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=143.4962,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=47.0903,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=226.5968,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=197.6619,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=255.0506,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=308.4480,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.7393, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.6026, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1956.05 kN, MaxRatio=2.271, F60_Dinamico=OK, SkewV=215,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.461e+09
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 12; [0.7-0.9]: 51;
[0.4-0.7]: 45; [0.1-0.4]: 28; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 355 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 800.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 32.0 mm

```


DGA_tw: 28.0 mm
DGB_bf: 350.0 mm
DGB_tf: 30.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE340B
TRS: HE300B
LG: HE600M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2487.22 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9254 mm

F60 Dynamic check (L=43.0 m): |U3|=9.93 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.4490

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.4490) = 10295579.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007455 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4257 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=84.0026, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.3410,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=128.9521,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=122.6382,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBFForFatigue . S11_final=100.3964,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBFForFatigue . S11_final=125.8202,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.5532, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.7891, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2487.22 kN, MaxRatio=1.711, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.358e+09
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 9; [0.7-0.9]: 43;
[0.4-0.7]: 28; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 356 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 10.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 20.0 mm
DGA_tw: 24.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 18.0 mm
CTT_h: 100.0 mm

CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE220B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1759.91 kN

U3 displacement at F60 (COMB01-PER-LOAD): -13.4275 mm

F60 Dynamic check (L=43.0 m): |U3|=13.43 mm -> X=4.84

L.Inf (2.54) < X (4.84) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 32.1146 mm

Horizontal check: $R = (43000.0)^2 / (8 * 32.1146) = 7196885.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011709 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 20.9280 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=206.0129,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

```

    -> Sheet: FramesRBTForFatigue . S11_final=46.5242,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=127.6678,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=148.4125,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=193.3922,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=249.0409,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=16.2287,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=15.0215,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=1759.91 kN, MaxRatio=95307.466, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=1.599e+19

Ratio counts by range: [>1.0]: 67; [0.9-1.0]: 15; [0.7-0.9]: 22;
 [0.4-0.7]: 22; [0.1-0.4]: 40; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 357 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 36.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 18.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 22.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE320B
LG: HE400M

```

R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2261.51 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.3911 mm

F60 Dynamic check (L=43.0 m): |U3|=10.39 mm -> X=5.51

L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 125

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1023

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.1023) = 10457069.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012329 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8871 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=87.4383, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=37.7133,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=186.5526,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=154.0023,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=206.4603,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesEBBForFatigue . S11_final=253.3684,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=9.3927, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.5641, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2261.51 kN, MaxRatio=4.187, F60_Dinamico=OK, SkewV=125,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=2.589e+10
    Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 5; [0.7-0.9]: 25;
[0.4-0.7]: 78; [0.1-0.4]: 36; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 358 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 34.0 mm
    BC_tw: 32.0 mm
    TC_h: 800.0 mm
    TC_tf: 40.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 24.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 26.0 mm
    DGB_tw: 16.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 30.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 12.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 130.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B
    TRS: HE260B
    LG: HE340M
    R_TR_B: HE320B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2350.85 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.6336 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.63 mm -> X=5.72

```

L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 229

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.6694 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.6694) = 8353103.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011807 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1345 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=100.4335,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=37.0341,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=183.6558,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=130.9430,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=180.4440,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=220.4938,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.5798,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=9.9765, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2350.85 kN, MaxRatio=1.503, F60_Dinamico=Check, dynamic
analysis required, SkewV=229, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.960e+10
    Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 8; [0.7-0.9]: 43;
[0.4-0.7]: 51; [0.1-0.4]: 44; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 359 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 38.0 mm
DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 900.0 mm
TRB_bf: 700.0 mm
TRB_tf: 32.0 mm
TRB_tw: 22.0 mm
CTT_h: 180.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE360B
LG: HE500M
R_TR_B: HE340B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2496.65 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.9968 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.00 mm -> X=5.61
    L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```



```

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.2846
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 20.2846) = 11394124.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00006919 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4927 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-ITH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=74.0107, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=22.2019,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=164.6900,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=130.3640,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=93.7484, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=113.8991,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.5794, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.5816, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2496.65 kN, MaxRatio=1.593, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.528e+09
Ratio counts by range: [>1.0]: 10; [0.9-1.0]: 5; [0.7-0.9]: 27;
[0.4-0.7]: 76; [0.1-0.4]: 48; [<=0.1]: 0;

```

```
=====
--- STARTING GA ITERATION No. 360 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 26.0 mm
TC_h: 800.0 mm
TC_tf: 22.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 38.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 350.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE340M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2178.87 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.5772 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.58 mm -> X=5.74
```

```
L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 227

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.4758
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.4758) = 7841187.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00017070 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0785 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=131.7383,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=41.6011,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=225.9528,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.2408,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=273.4700,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=325.1392,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.3276, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.8334, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2178.87 kN, MaxRatio=2.059, F60_Dinamico=Check, dynamic
analysis required, SkewV=227, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.929e+10
Ratio counts by range: [>1.0]: 62; [0.9-1.0]: 21; [0.7-0.9]: 14;
[0.4-0.7]: 26; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 361 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 10.0 mm
BC_tw: 26.0 mm
TC_h: 500.0 mm

```

TC_tf: 30.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 550.0 mm
DGB_tf: 14.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE220B
LG: HE600M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1828.00 kN

U3 displacement at F60 (COMB01-PER-LOAD): -12.5800 mm

F60 Dynamic check (L=43.0 m): |U3|=12.58 mm -> X=5.00

L.Inf (2.54) < X (5.00) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 35.4313

mm

Horizontal check: $R = (43000.0)^2 / (8 * 35.4313) = 6523181.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011283 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 20.0806 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=225.6582,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.9152,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=131.8078,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.5930,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=195.8394,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=252.2986,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=19.4047,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.7963,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1828.00 kN, MaxRatio=2.795, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.978e+09
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 2; [0.7-0.9]: 12;
[0.4-0.7]: 56; [0.1-0.4]: 36; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 362 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 38.0 mm
DGB_tw: 12.0 mm
TRB_h: 550.0 mm

TRB_bf: 700.0 mm
TRB_tf: 24.0 mm
TRB_tw: 18.0 mm
CTT_h: 140.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 20.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE340B
LG: HE320M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2408.00 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5287 mm

F60 Dynamic check (L=43.0 m): |U3|=9.53 mm -> X=5.75

L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 265

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.9464
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.9464) = 9264877.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009369 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0279 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=103.1281,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=40.0409,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=192.9154,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.5872,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=164.3766,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=207.3416,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=7.9637, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.2227, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2408.00 kN, MaxRatio=1.904, F60_Dinamico=Check, dynamic
analysis required, SkewV=265, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.255e+10
Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 12; [0.7-0.9]: 37;
[0.4-0.7]: 38; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 363 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 700.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 28.0 mm
DGB_bf: 600.0 mm
DGB_tf: 16.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 32.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm

```

STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE260B
LG: HE550M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2433.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1710 mm

F60 Dynamic check (L=43.0 m): |U3|=9.17 mm -> X=5.86

L.Inf (2.54) < X (5.86) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.8868 mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.8868) = 11622002.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009424 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6671 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=97.2417, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.0591,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=137.7082,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)


```

    -> Sheet: FramesRSTForFatigue    . S11_final=110.0239,
Limit=118.5185 -> OK
    -> Sheet: FramesIBBForFatigue    . S11_final=148.3039,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue    . S11_final=181.9256,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue    . S11_final=12.6679,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue    . S11_final=10.9613,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2433.49 kN, MaxRatio=3.662, F60_Dinamico=Check, dynamic
analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.178e+10
    Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 8; [0.7-0.9]: 15;
[0.4-0.7]: 58; [0.1-0.4]: 66; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 364 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 20.0 mm
    BC_tw: 32.0 mm
    TC_h: 700.0 mm
    TC_tf: 38.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 32.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 19.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 13.0 mm
    VER: HE320B
    TRS: HE240B
    LG: HE400M
    R_TR_B: HE340B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):
Total Weight (Sum |FZ_dead|): 2246.04 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.6004 mm
F60 Dynamic check (L=43.0 m): |U3|=9.60 mm -> X=5.73
L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 113

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.2454
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.2454) = 8182744.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012613 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1016 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=134.3296,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.2088,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=170.7666,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=128.2199,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=207.3946,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=255.8985,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.0335,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=9.1331, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2246.04 kN, MaxRatio=1.932, F60_Dinamico=Check, dynamic analysis required, SkewV=113, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.706e+10
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 9; [0.7-0.9]: 30; [0.4-0.7]: 45; [0.1-0.4]: 51; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 365 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 18.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 38.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE320B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2444.92 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.6042 mm
F60 Dynamic check (L=43.0 m): |U3|=9.60 mm -> X=5.73
L.Inf (2.54) < X (5.73) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 72

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.5348
mm
Horizontal check: $R = (43000.0)^2 / (8 * 22.5348) = 10256342.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009154 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0981 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.3363,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.0769,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=184.6159,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.8001,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=144.5045,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=174.6699,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8439,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.2372,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2444.92 kN, MaxRatio=1.563, F60_Dinamico=Check, dynamic analysis required, SkewV=72, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.711e+10
Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 9; [0.7-0.9]: 28; [0.4-0.7]: 56; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 366 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 14.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 32.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 40.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE340B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2133.39 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.8771 mm
F60 Dynamic check (L=43.0 m): |U3|=11.88 mm -> X=5.15
L.Inf (2.54) < X (5.15) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.8966
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.8966) = 8285067.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00010911 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 19.3774 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=155.3915,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=41.8617,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=126.2906,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=147.9383,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=163.7918,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=203.0108,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=9.4588, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.0964,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2133.39 kN, MaxRatio=2.764, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=6.747e+09
 Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 22; [0.7-0.9]: 26;
 [0.4-0.7]: 26; [0.1-0.4]: 39; [<=0.1]: 0;

===
 --- STARTING GA ITERATION No. 367 ---
 ===

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 700.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 18.0 mm
DGB_bf: 400.0 mm
DGB_tf: 36.0 mm
DGB_tw: 24.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 38.0 mm
TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE240B
LG: HE320M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2463.80 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5490 mm

F60 Dynamic check (L=43.0 m): |U3|=9.55 mm -> X=5.74

L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 269

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8630
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.8630) = 9295948.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008825 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0475 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=87.2481, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.4900,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=165.7238,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=106.8937,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=142.1618,
Limit=92.5926 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=174.4296,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=13.8274,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.6425,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (3 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2463.80 kN, MaxRatio=94867.734, F60_Dinamico=Check, dynamic
analysis required, SkewV=269, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (3 failures) -> Cost=2.217e+19
Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 9; [0.7-0.9]: 43;
[0.4-0.7]: 56; [0.1-0.4]: 46; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 368 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm

```


DGA_tf: 32.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE320M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2215.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4948 mm

F60 Dynamic check (L=43.0 m): |U3|=10.49 mm -> X=5.48

L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 263

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0198

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.0198) = 9622261.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011349 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9930 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=124.4739,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.8938,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=196.1880,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=127.8775,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=189.2532,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=231.4782,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.8720,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.8950,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2215.94 kN, MaxRatio=1.284, F60_Dinamico=OK, SkewV=263,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.118e+09

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 14; [0.7-0.9]: 33;
[0.4-0.7]: 39; [0.1-0.4]: 59; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 369 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 26.0 mm

BC_tw: 28.0 mm

TC_h: 750.0 mm

TC_tf: 30.0 mm

TC_tw: 38.0 mm

DGA_bf: 450.0 mm

DGA_tf: 28.0 mm

DGA_tw: 14.0 mm

DGB_bf: 350.0 mm

DGB_tf: 36.0 mm

DGB_tw: 24.0 mm

TRB_h: 650.0 mm

TRB_bf: 500.0 mm

TRB_tf: 22.0 mm

TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 120.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE600B
TRS: HE280B
LG: HE400M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2673.94 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.6758 mm

F60 Dynamic check (L=43.0 m): |U3|=8.68 mm -> X=6.03

L.Inf (2.54) < X (6.03) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 127

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.4093
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.4093) = 10795566.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006962 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.1671 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=82.7006, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=32.2889,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=182.0750,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=212.5937,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=180.3243,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=219.7208,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.6434,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.6979,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2673.94 kN, MaxRatio=132392.175, F60_Dinamico=Check, dynamic
analysis required, SkewV=127, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=4.687e+19
Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 9; [0.7-0.9]: 23;
[0.4-0.7]: 55; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 370 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 800.0 mm
BC_tf: 26.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 28.0 mm
TRB_h: 600.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 30.0 mm
CTT_h: 180.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE450B

```

TRS: HE200B
LG: HE360M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2549.05 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.9950 mm

F60 Dynamic check (L=43.0 m): |U3|=8.99 mm -> X=5.92

L.Inf (2.54) < X (5.92) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 180

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.3014
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.3014) = 8787548.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008849 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.4935 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=87.5885, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=33.0668,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=179.4090,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=210.9881,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesIBBForFatigue . S11_final=178.3891,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=224.6525,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=17.5445,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=18.2177,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2549.05 kN, MaxRatio=1.470, F60_Dinamico=Check, dynamic
analysis required, SkewV=180, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.074e+10
    Ratio counts by range: [>1.0]: 9; [0.9-1.0]: 15; [0.7-0.9]: 20;
[0.4-0.7]: 69; [0.1-0.4]: 53; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 371 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 34.0 mm
    BC_tw: 30.0 mm
    TC_h: 600.0 mm
    TC_tf: 34.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 34.0 mm
    DGB_tw: 28.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 20.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 11.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 15.0 mm
    VER: HE320B
    TRS: HE280B
    LG: HE300M
    R_TR_B: HE220B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2337.83 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.0697 mm
F60 Dynamic check (L=43.0 m): |U3|=9.07 mm -> X=5.89
L.Inf (2.54) < X (5.89) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 302

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.6301
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.6301) = 8072797.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009728 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5705 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=85.4171, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=31.1909,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=227.1571,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=266.0958,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=141.3063,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=171.7295,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=10.0568,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=8.8643, Limit=118.5185
-> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2337.83 kN, MaxRatio=2.311, F60_Dinamico=Check, dynamic analysis required, SkewV=302, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.455e+10
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 1; [0.7-0.9]: 19; [0.4-0.7]: 73; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 372 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 22.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 10.0 mm
CTB_h: 120.0 mm
CTB_tf: 15.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 10.0 mm
VER: HE320B
TRS: HE200B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1905.46 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.3347 mm
F60 Dynamic check (L=43.0 m): |U3|=11.33 mm -> X=5.27
L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.5125
mm
Horizontal check: $R = (43000.0)^2 / (8 * 33.5125) = 6896688.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010821 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.8350 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=175.1823,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.8127,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=161.8059,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.4906,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=161.3648,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=195.9333,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.9237,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=16.5598,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1905.46 kN, MaxRatio=136282.858, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.539e+19

Ratio counts by range: [>1.0]: 55; [$0.9-1.0$]: 11; [$0.7-0.9$]: 45;
[$0.4-0.7$]: 20; [$0.1-0.4$]: 35; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 373 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 38.0 mm
TC_tw: 34.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 32.0 mm
DGB_tw: 26.0 mm
TRB_h: 800.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE500B
TRS: HE340B
LG: HE360M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2601.02 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0422 mm

F60 Dynamic check (L=43.0 m): |U3|=9.04 mm -> X=5.90

L.Inf (2.54) < X (5.90) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

```

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 195

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 18.6362
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 18.6362) = 12401912.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009074 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.5362 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=93.7446, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.9561,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.1416,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.7986,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=181.3541,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=188.7406,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.6405, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.6937, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2601.02 kN, MaxRatio=3.006, F60_Dinamico=Check, dynamic
analysis required, SkewV=195, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.168e+10
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 0; [0.7-0.9]: 10;
[0.4-0.7]: 60; [0.1-0.4]: 77; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 374 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm

```

BC_tf: 30.0 mm
BC_tw: 34.0 mm
TC_h: 800.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 34.0 mm
DGA_tw: 20.0 mm
DGB_bf: 350.0 mm
DGB_tf: 26.0 mm
DGB_tw: 18.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE450M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2404.74 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8002 mm

F60 Dynamic check (L=43.0 m): |U3|=9.80 mm -> X=5.67

L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 64

Starting Horizontal U2 check for 24 combinations...

```

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.8099
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.8099) = 10132643.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011325 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3001 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=91.2030, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.8705,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=178.9339,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=339.0781,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=172.3034,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=208.4101,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=9.8099, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.1004, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2404.74 kN, MaxRatio=1.215, F60_Dinamico=OK, SkewV=64,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.746e+09
Ratio counts by range: [>1.0]: 6; [0.9-1.0]: 10; [0.7-0.9]: 29;
[0.4-0.7]: 68; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 375 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 500.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 26.0 mm
DGA_tw: 26.0 mm

```

DGB_bf: 600.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 26.0 mm
TRB_tw: 24.0 mm
CTT_h: 120.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE400B
LG: HE340M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2288.02 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7370 mm

F60 Dynamic check (L=43.0 m): |U3|=9.74 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 235

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.5256
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.5256) = 10737232.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009150 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2361 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=82.9197, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.6455,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=189.3754,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=265.5985,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBFForFatigue . S11_final=138.3624,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBFForFatigue . S11_final=171.6026,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=6.5397, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=6.2530, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2288.02 kN, MaxRatio=2.897, F60_Dinamico=Check, dynamic
analysis required, SkewV=235, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.659e+10
Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 3; [0.7-0.9]: 18;
[0.4-0.7]: 68; [0.1-0.4]: 55; [<=0.1]: 0;
>> Snapshot iter 375 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_375_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 376 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 20.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 36.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 36.0 mm

TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE280B
LG: HE500M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2059.88 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.2253 mm

F60 Dynamic check (L=43.0 m): |U3|=11.23 mm -> X=5.30

L.Inf (2.54) < X (5.30) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.0982 mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.0982) = 8225611.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010312 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.7248 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...


```

    -> Sheet: FramesWBTForFatigue . S11_final=138.8746,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=33.2536,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=164.1729,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=266.2098,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=154.4587,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=188.1193,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=12.1413,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.2012,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2059.88 kN, MaxRatio=1.662, F60_Dinamico=OK, SkewV=24,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=1.500e+09

```

```

    Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 10; [0.7-0.9]: 60;
    [0.4-0.7]: 32; [0.1-0.4]: 40; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 377 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 750.0 mm
    BC_tf: 18.0 mm
    BC_tw: 32.0 mm
    TC_h: 600.0 mm
    TC_tf: 34.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 650.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 150.0 mm
    STCTB_tf: 14.0 mm
    VER: HE450B

```

TRS: HE240B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2271.20 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9708 mm

F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.1084
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.1084) = 9586919.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011819 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4664 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=101.0846,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=34.6551,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=174.9288,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=175.6676,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=210.3375,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=257.4665,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.4160,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.5637,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2271.20 kN, MaxRatio=1.427, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.027e+09

```

```

    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 7; [0.7-0.9]: 28;
[0.4-0.7]: 41; [0.1-0.4]: 69; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 378 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 20.0 mm
    BC_tw: 32.0 mm
    TC_h: 600.0 mm
    TC_tf: 34.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 38.0 mm
    DGA_tw: 26.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 18.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 40.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 15.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 10.0 mm
    VER: HE400B
    TRS: HE220B
    LG: HE360M
    R_TR_B: HE240B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2316.32 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -9.5131 mm
F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.75
L.Inf (2.54) < X (5.75) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 195

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.5893
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.5893) = 8692397.8$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007494 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0120 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=97.6572, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.2040,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=156.2703,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=208.4719,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=121.1561,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=151.4414,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.4201,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.4182,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2316.32 kN, MaxRatio=1.838, F60_Dinamico=Check, dynamic analysis required, SkewV=195, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.942e+10
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 6; [0.7-0.9]: 16; [0.4-0.7]: 69; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 379 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 800.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 26.0 mm
DGA_tw: 30.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 500.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE500B
TRS: HE300B
LG: HE550M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2543.93 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.3917 mm

F60 Dynamic check (L=43.0 m): |U3|=9.39 mm -> X=5.79

L.Inf (2.54) < X (5.79) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.3343 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 19.3343) = 11954163.5$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008380 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.8833 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=84.0046, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=25.5157,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=150.6591,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=212.4962,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=133.6032,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=166.8312,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=12.1349,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.7343,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2543.93 kN, MaxRatio=1.722, F60_Dinamico=Check, dynamic analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.707e+10

Ratio counts by range: [>1.0]: 20; [$0.9-1.0$]: 6; [$0.7-0.9$]: 34;
[$0.4-0.7$]: 54; [$0.1-0.4$]: 52; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 380 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE300B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2006.53 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.6916 mm
F60 Dynamic check (L=43.0 m): |U3|=11.69 mm -> X=5.19
L.Inf (2.54) < X (5.19) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.5322
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.5322) = 9421284.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015376 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.1884 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=141.2210,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=43.2546,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=171.5292,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=157.2420,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=260.9064,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=300.0018,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.1576,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.5922, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2006.53 kN, MaxRatio=1.601, F60_Dinamico=OK, SkewV=22,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.267e+09
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 17; [0.7-0.9]: 31;
[0.4-0.7]: 62; [0.1-0.4]: 31; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 381 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 750.0 mm
BC_tf: 38.0 mm

```


BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 30.0 mm
TC_tw: 34.0 mm
DGA_bf: 600.0 mm
DGA_tf: 18.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 150.0 mm
CTB_tf: 19.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE340B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2344.99 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6001 mm

F60 Dynamic check (L=43.0 m): |U3|=10.60 mm -> X=5.45

L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.8211

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.8211) = 10127695.6$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010895 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0996 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=87.0543, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=34.6101, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=141.0464, Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=176.6606, Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=155.1877, Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=189.1280, Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=8.1566, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.1359, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2344.99 kN, MaxRatio=68389.991, F60_Dinamico=OK, SkewV=4, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=1.097e+19

Ratio counts by range: [>1.0]: 28; [$0.9-1.0$]: 10; [$0.7-0.9$]: 29; [$0.4-0.7$]: 62; [$0.1-0.4$]: 37; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 382 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm

DGB_tw: 12.0 mm
TRB_h: 800.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE280B
LG: HE340M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2290.25 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5385 mm

F60 Dynamic check (L=43.0 m): |U3|=10.54 mm -> X=5.47

L.Inf (2.54) < X (5.47) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 234

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.9604

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.9604) = 9646121.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008800 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0380 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTForFatigue . S11_final=87.7802, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=27.4648,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=183.9312,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=175.3210,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=130.1541,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=161.2249,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.0091,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7734,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2290.25 kN, MaxRatio=1.863, F60_Dinamico=OK, SkewV=234,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=7.155e+09

Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 7; [0.7-0.9]: 24;
[0.4-0.7]: 72; [0.1-0.4]: 46; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 383 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 18.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm
TRB_tf: 38.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm

CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE260B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2177.32 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0386 mm

F60 Dynamic check (L=43.0 m): |U3|=10.04 mm -> X=5.60

L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8315 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8315) = 9307718.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012213 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5384 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=139.1216,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.4827,
Limit=118.5185 -> OK

```

-> Sheet: FramesWSTForFatigue . S11_final=151.7923,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=128.9076,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=186.9134,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=228.6369,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.3600,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.4688,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2177.32 kN, MaxRatio=1.540, F60_Dinamico=OK, SkewV=20,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.180e+09

```

```

Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 13; [0.7-0.9]: 16;
[0.4-0.7]: 49; [0.1-0.4]: 57; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 384 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 20.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 40.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 24.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 20.0 mm
TRB_tw: 18.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 150.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE260B
LG: HE600M
R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2048.67 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.1832 mm

F60 Dynamic check (L=43.0 m): |U3|=11.18 mm -> X=5.31

L.Inf (2.54) < X (5.31) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.2197

mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.2197) = 7909896.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010899 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.6834 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=113.6513,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.0116,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=167.4656,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=190.1077,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=158.3300,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=182.8926,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=12.3019,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.3627,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2048.67 kN, MaxRatio=3.207, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.008e+10

Ratio counts by range: [>1.0]: 41; [0.9-1.0]: 17; [0.7-0.9]: 31;
[0.4-0.7]: 46; [0.1-0.4]: 31; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 385 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 34.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE300B
LG: HE600M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2424.56 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1800 mm
F60 Dynamic check (L=43.0 m): |U3|=10.18 mm -> X=5.56
L.Inf (2.54) < X (5.56) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3749
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 24.3749) = 9482096.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006885 rad (Limit:
 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.6799 mm (Limit:
 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=79.7747, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=24.5555,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=135.0797,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=147.7201,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=93.7082, Limit=92.5926
 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=115.3054,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=10.6510,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.4470,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:

Peso=2424.56 kN, MaxRatio=1.201, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.949e+08

Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 4; [0.7-0.9]: 18;
[0.4-0.7]: 77; [0.1-0.4]: 52; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 386 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 12.0 mm
TRB_h: 600.0 mm
TRB_bf: 600.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 180.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 13.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE240B
LG: HE400M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2020.43 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.1306 mm
F60 Dynamic check (L=43.0 m): |U3|=11.13 mm -> X=5.32
L.Inf (2.54) < X (5.32) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 125

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.9484
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.9484) = 8269699.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00011407 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.6285 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=114.6222,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=39.2570,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=194.2958,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=267.8531,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=195.7268,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=247.7205,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.3563,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=17.5462,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2020.43 kN, MaxRatio=1.568, F60_Dinamico=OK, SkewV=125,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.278e+09
 Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 7; [0.7-0.9]: 30;
 [0.4-0.7]: 73; [0.1-0.4]: 33; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 387 ---
 =====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm
BC_tf: 16.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE240B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1859.78 kN
U3 displacement at F60 (COMB01-PER-LOAD): -12.9273 mm
F60 Dynamic check (L=43.0 m): |U3|=12.93 mm -> X=4.94
L.Inf (2.54) < X (4.94) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.1817
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 30.1817) = 7657795.5$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00015991 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 20.4278 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=173.5976,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.4695,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=184.0476,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=269.7331,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=277.5692,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=310.6324,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.5994,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8627, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1859.78 kN, MaxRatio=2.499, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.271e+09
Ratio counts by range: [>1.0]: 59; [0.9-1.0]: 16; [0.7-0.9]: 24;
[0.4-0.7]: 33; [0.1-0.4]: 34; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 388 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 800.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm

```

DGA_tw: 26.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 10.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 10.0 mm
VER: HE600B
TRS: HE300B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2580.11 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4239 mm

F60 Dynamic check (L=43.0 m): |U3|=9.42 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 16.6823
mm

Horizontal check: $R = (43000.0)^2 / (8 * 16.6823) = 13854499.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007328 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9101 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=70.7055, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=26.2539,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=155.3565,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=148.4620,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=138.7018,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=174.6787,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=11.7733,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.5456,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2580.11 kN, MaxRatio=1.437, F60_Dinamico=Check, dynamic analysis required, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.691e+10

Ratio counts by range: [>1.0]: 11; [0.9-1.0]: 11; [0.7-0.9]: 16; [0.4-0.7]: 57; [0.1-0.4]: 71; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 389 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm

BC_tf: 34.0 mm

BC_tw: 30.0 mm

TC_h: 550.0 mm

TC_tf: 38.0 mm

TC_tw: 40.0 mm

DGA_bf: 550.0 mm

DGA_tf: 34.0 mm

DGA_tw: 28.0 mm

DGB_bf: 450.0 mm

DGB_tf: 40.0 mm

DGB_tw: 30.0 mm

TRB_h: 600.0 mm

TRB_bf: 750.0 mm

TRB_tf: 14.0 mm

TRB_tw: 18.0 mm
CTT_h: 130.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE360B
LG: HE550M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2414.53 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.7923 mm

F60 Dynamic check (L=43.0 m): |U3|=8.79 mm -> X=5.99

L.Inf (2.54) < X (5.99) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7604
mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.7604) = 8036231.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013238 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.2918 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...


```

-> Sheet: FramesWBTForFatigue . S11_final=115.8505,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=47.0186,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=172.9978,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=339.4706,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=222.6563,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=263.0133,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.6643, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.6264, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2414.53 kN, MaxRatio=1.868, F60_Dinamico=Check, dynamic
analysis required, SkewV=4, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.618e+10
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 3; [0.7-0.9]: 22;
[0.4-0.7]: 63; [0.1-0.4]: 47; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 390 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 550.0 mm
BC_tf: 36.0 mm
BC_tw: 38.0 mm
TC_h: 800.0 mm
TC_tf: 16.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 28.0 mm
DGB_bf: 350.0 mm
DGB_tf: 16.0 mm
DGB_tw: 30.0 mm
TRB_h: 550.0 mm
TRB_bf: 400.0 mm
TRB_tf: 40.0 mm
TRB_tw: 18.0 mm
CTT_h: 110.0 mm
CTT_tf: 11.0 mm
CTB_h: 120.0 mm
CTB_tf: 18.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE550B

```

TRS: HE240B
LG: HE300M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2474.36 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9591 mm

F60 Dynamic check (L=43.0 m): |U3|=9.96 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 302

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7938

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.7938) = 10605076.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006564 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4505 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=91.7061, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=37.8842,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=182.9843,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=335.4225,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesIBBForFatigue . S11_final=155.3779,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=194.8646,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=13.2000,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.8941,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2474.36 kN, MaxRatio=129414.941, F60_Dinamico=OK, SkewV=302,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.144e+19

```

```

    Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 2; [0.7-0.9]: 11;
[0.4-0.7]: 86; [0.1-0.4]: 28; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 391 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 22.0 mm
    BC_tw: 28.0 mm
    TC_h: 600.0 mm
    TC_tf: 18.0 mm
    TC_tw: 34.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 900.0 mm
    TRB_bf: 350.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 10.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 16.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 11.0 mm
    VER: HE340B
    TRS: HE260B
    LG: HE320M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 1863.22 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -12.3977 mm
 F60 Dynamic check (L=43.0 m): |U3|=12.40 mm -> X=5.04
 L.Inf (2.54) < X (5.04) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 263

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1275
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.1275) = 9198075.4$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00013190 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 19.8956 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=160.0936,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.1568,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=231.3584,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=192.8129,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=224.2291,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=256.7086,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=13.4252,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.3641,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=1863.22 kN, MaxRatio=92353.080, F60_Dinamico=OK, SkewV=263,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.589e+19
    Ratio counts by range: [>1.0]: 42; [0.9-1.0]: 21; [0.7-0.9]: 44;
[0.4-0.7]: 18; [0.1-0.4]: 41; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 392 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 22.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 13.0 mm
VER: HE320B
TRS: HE280B
LG: HE500M
R_TR_B: HE400B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 1982.94 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -11.6967 mm
    F60 Dynamic check (L=43.0 m): |U3|=11.70 mm -> X=5.19
    L.Inf (2.54) < X (5.19) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.6166
mm
Horizontal check: $R = (43000.0)^2 / (8 * 28.6166) = 8076617.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011025 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.1952 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=142.6972,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.3714,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.2516,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=169.1890,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=163.6099,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=193.6873,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.1563,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7617,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1982.94 kN, MaxRatio=1.711, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.578e+09
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 12; [0.7-0.9]: 47;
[0.4-0.7]: 33; [0.1-0.4]: 44; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 393 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 24.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 34.0 mm
DGB_tw: 26.0 mm
TRB_h: 600.0 mm
TRB_bf: 700.0 mm
TRB_tf: 20.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 11.0 mm
CTB_h: 140.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE320B
LG: HE600M
R_TR_B: HE240B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2470.55 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -8.9032 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=8.90 mm -> X=5.95
```

```
L.Inf (2.54) < X (5.95) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.8317
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.8317) = 8613881.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008978 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.4016 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=107.5505,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.8121,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=144.5804,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=211.8252,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=162.8097,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=205.6789,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8092,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.8094, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2470.55 kN, MaxRatio=2.500, F60_Dinamico=Check, dynamic
analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.039e+10
Ratio counts by range: [>1.0]: 39; [0.9-1.0]: 5; [0.7-0.9]: 20;
[0.4-0.7]: 64; [0.1-0.4]: 38; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 394 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 34.0 mm

```


TC_h: 750.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 20.0 mm
TRB_h: 900.0 mm
TRB_bf: 450.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE300B
LG: HE600M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1931.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -12.1822 mm

F60 Dynamic check (L=43.0 m): |U3|=12.18 mm -> X=5.09

L.Inf (2.54) < X (5.09) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.8956

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.8956) = 7998621.1$ mm

```

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00014656 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.6823 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=143.4692,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.3584,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=168.8719,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=190.8043,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=235.7517,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=260.4333,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.2237, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.6937, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1931.24 kN, MaxRatio=2.822, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.507e+09
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 11; [0.7-0.9]: 38;
[0.4-0.7]: 24; [0.1-0.4]: 33; [<=0.1]: 0;
>> Checkpoint saved (Gen=7, FunEval=394): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
7 394 1.717e+08 3.774e+18 1

=====
--- STARTING GA ITERATION No. 395 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 38.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 36.0 mm
DGA_tw: 22.0 mm

```

DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 26.0 mm
TRB_h: 900.0 mm
TRB_bf: 500.0 mm
TRB_tf: 34.0 mm
TRB_tw: 20.0 mm
CTT_h: 110.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE260B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2369.27 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9456 mm

F60 Dynamic check (L=43.0 m): |U3|=9.95 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.2960

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.2960) = 8789372.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009684 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4464 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=136.8016,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.2399,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=162.6822,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=151.4424,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=142.8945,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=171.0942,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.2276,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.3767, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2369.27 kN, MaxRatio=3.101, F60_Dinamico=OK, SkewV=10,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.082e+10
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 13; [0.7-0.9]: 26;
[0.4-0.7]: 51; [0.1-0.4]: 55; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 396 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 24.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 400.0 mm
DGB_tf: 16.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 600.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 180.0 mm
CTT_tf: 18.0 mm

CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE500B
TRS: HE280B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2252.85 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7442 mm

F60 Dynamic check (L=43.0 m): |U3|=10.74 mm -> X=5.42

L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0899
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.0899) = 9594274.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009254 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2313 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=128.8427,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=34.2866,
Limit=118.5185 -> OK

```

    -> Sheet: FramesWSTForFatigue . S11_final=170.4092,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=180.8536,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=170.3790,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=201.6039,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=16.7355,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=16.0860,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2252.85 kN, MaxRatio=2.085, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.946e+09

```

```

    Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 5; [0.7-0.9]: 34;
[0.4-0.7]: 77; [0.1-0.4]: 34; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 397 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 22.0 mm
    BC_tw: 32.0 mm
    TC_h: 600.0 mm
    TC_tf: 16.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 30.0 mm
    DGA_tw: 22.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 20.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 26.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 19.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 100.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B
    TRS: HE240B
    LG: HE450M
    R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2080.42 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7267 mm

F60 Dynamic check (L=43.0 m): |U3|=10.73 mm -> X=5.42

L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 60

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.1528

mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.1528) = 7928054.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012305 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2261 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=146.8400,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=38.8474,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=166.9172,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=176.1367,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=188.1383,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=233.3613,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=17.4920,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=20.9715,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2080.42 kN, MaxRatio=1.577, F60_Dinamico=OK, SkewV=60,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.044e+09

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 22; [0.7-0.9]: 54;
[0.4-0.7]: 17; [0.1-0.4]: 52; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 398 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 550.0 mm
DGB_tf: 30.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 600.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 19.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE280B
LG: HE400M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2312.41 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0777 mm
F60 Dynamic check (L=43.0 m): |U3|=10.08 mm -> X=5.59
L.Inf (2.54) < X (5.59) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 134

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.8502
mm
Horizontal check: $R = (43000.0)^2 / (8 * 26.8502) = 8607945.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010262 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5763 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=114.8223,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.4820,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=195.6739,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=165.2564,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=149.5898,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=182.9636,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.1994,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.9407,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2312.41 kN, MaxRatio=93052.961, F60_Dinamico=OK, SkewV=134,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.002e+19

Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 2; [0.7-0.9]: 8; [0.4-
0.7]: 81; [0.1-0.4]: 49; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 399 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 24.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 350.0 mm
DGB_tf: 28.0 mm
DGB_tw: 30.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 10.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE300B
LG: HE340M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2195.32 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9319 mm
F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37
L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 236

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1092
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.1092) = 8852257.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007900 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4309 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=123.8585,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.7973,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.6220,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=124.0418,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=118.2814,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=147.3502,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.7319, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.3270, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2195.32 kN, MaxRatio=94265.403, F60_Dinamico=OK, SkewV=236,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.951e+19
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 5; [0.7-0.9]: 25;
[0.4-0.7]: 64; [0.1-0.4]: 43; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 400 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 26.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 30.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 22.0 mm
TRB_tw: 30.0 mm
CTT_h: 100.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE550B
TRS: HE240B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2438.65 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5116 mm

F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 62

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.6676
mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.6676) = 10196287.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008316 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.0023 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=118.6452,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.0231,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=168.7308,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=153.2792,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=207.0236,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=222.6123,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.7063,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.3147,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2438.65 kN, MaxRatio=6.227, F60_Dinamico=Check, dynamic
analysis required, SkewV=62, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=9.264e+10
Ratio counts by range: [>1.0]: 25; [$0.9-1.0$]: 3; [$0.7-0.9$]: 15;
[$0.4-0.7$]: 70; [$0.1-0.4$]: 53; [≤ 0.1]: 0;
>> Snapshot iter 400 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_400_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 401 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 16.0 mm

TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 32.0 mm
DGB_tw: 20.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE280B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2193.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.3345 mm

F60 Dynamic check (L=43.0 m): |U3|=10.33 mm -> X=5.52

L.Inf (2.54) < X (5.52) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 28.7762

mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.7762) = 8031805.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011301 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8338 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=137.8959,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.6426,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=157.3116,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=176.8740,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=168.6759,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=196.8599,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.1158,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.9831,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2193.38 kN, MaxRatio=1.630, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.155e+09
Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 15; [0.7-0.9]: 29;
[0.4-0.7]: 22; [0.1-0.4]: 47; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 402 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 14.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm

TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE260B
LG: HE500M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2134.99 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.8356 mm

F60 Dynamic check (L=43.0 m): |U3|=10.84 mm -> X=5.39

L.Inf (2.54) < X (5.39) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.4905

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.4905) = 9839100.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010408 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3306 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...


```

    -> Sheet: FramesWBTForFatigue . S11_final=121.2727,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=30.7094,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=191.4880,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=341.3992,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=156.7442,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=184.2242,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.7146,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.8363,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2134.99 kN, MaxRatio=1.730, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.758e+09

```

```

    Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 6; [0.7-0.9]: 25;
[0.4-0.7]: 70; [0.1-0.4]: 40; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 403 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 32.0 mm
    BC_tw: 32.0 mm
    TC_h: 750.0 mm
    TC_tf: 34.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 16.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 14.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 36.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B

```

TRS: HE360B
LG: HE500M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2152.90 kN

U3 displacement at F60 (COMB01-PER-LOAD): -12.2627 mm

F60 Dynamic check (L=43.0 m): |U3|=12.26 mm -> X=5.07

L.Inf (2.54) < X (5.07) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 26

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8472

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8472) = 9301843.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010961 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.7620 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=130.2887,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.5005,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=144.6585,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=113.7085,

Limit=118.5185 -> OK

```

    -> Sheet: FramesIBBForFatigue . S11_final=157.0121,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=193.0659,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=7.9485, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.7801, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2152.90 kN, MaxRatio=2.197, F60_Dinamico=OK, SkewV=26,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.730e+09

```

```

    Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 9; [0.7-0.9]: 41;
[0.4-0.7]: 58; [0.1-0.4]: 38; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 404 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 40.0 mm
    BC_tw: 30.0 mm
    TC_h: 750.0 mm
    TC_tf: 14.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 30.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 34.0 mm
    DGB_tw: 26.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 18.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 110.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 11.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 11.0 mm
    VER: HE300B
    TRS: HE400B
    LG: HE550M
    R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2189.24 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -10.2735 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.27 mm -> X=5.54
 L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 8

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.8959
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 29.8959) = 7730984.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00018324 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.7739 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=140.5016,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=51.5785,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=172.9211,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=178.2769,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=310.5673,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=352.9806,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=6.3783, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=5.3147, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2189.24 kN, MaxRatio=3.453, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.345e+10
    Ratio counts by range: [>1.0]: 66; [0.9-1.0]: 4; [0.7-0.9]: 29;
[0.4-0.7]: 35; [0.1-0.4]: 32; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 405 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 12.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 32.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE260B
LG: HE600M
R_TR_B: HE220B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 1966.49 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -12.2034 mm
    F60 Dynamic check (L=43.0 m): |U3|=12.20 mm -> X=5.08
    L.Inf (2.54) < X (5.08) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.9180
mm
Horizontal check: $R = (43000.0)^2 / (8 * 31.9180) = 7241216.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012739 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.7039 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=180.4534,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=47.6366,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=138.9462,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=267.5953,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=214.2810,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=269.1438,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.4385,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.7213,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=1966.49 kN, MaxRatio=2.221, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.028e+09
Ratio counts by range: [>1.0]: 60; [0.9-1.0]: 15; [0.7-0.9]: 22;
[0.4-0.7]: 42; [0.1-0.4]: 27; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 406 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 20.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 40.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 10.0 mm
DGB_bf: 600.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 600.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE340B
LG: HE400M
R_TR_B: HE220B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2480.49 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.4529 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.45 mm -> X=5.77
```

```
L.Inf (2.54) < X (5.77) < L.Sup (5.69) -> Check: a dynamic analysis
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 131

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.1448
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.1448) = 9572458.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008312 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.9473 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=115.4321,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.2459,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=187.0929,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=266.5917,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=137.1515,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=173.1801,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.1930,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.0928, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2480.49 kN, MaxRatio=2.093, F60_Dinamico=Check, dynamic
analysis required, SkewV=131, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=3.114e+10
Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 6; [0.7-0.9]: 22;
[0.4-0.7]: 54; [0.1-0.4]: 54; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 407 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 28.0 mm

```


TC_h: 650.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 20.0 mm
DGB_bf: 350.0 mm
DGB_tf: 16.0 mm
DGB_tw: 12.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE260B
LG: HE450M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2191.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.5499 mm

F60 Dynamic check (L=43.0 m): |U3|=11.55 mm -> X=5.22

L.Inf (2.54) < X (5.22) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.7092

mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.7092) = 11160496.7$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008664 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.0396 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=108.3388,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=29.4969,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=180.1103,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=150.4520,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=131.0010,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=162.6116,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.8316,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=15.2159,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2191.09 kN, MaxRatio=1.787, F60_Dinamico=OK, SkewV=69,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.979e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 8; [0.7-0.9]: 27;
[0.4-0.7]: 69; [0.1-0.4]: 39; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 408 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 600.0 mm

BC_tf: 26.0 mm

BC_tw: 32.0 mm

TC_h: 600.0 mm

TC_tf: 24.0 mm

TC_tw: 38.0 mm

DGA_bf: 400.0 mm

DGA_tf: 28.0 mm

DGA_tw: 14.0 mm

DGB_bf: 500.0 mm

DGB_tf: 18.0 mm

DGB_tw: 18.0 mm

TRB_h: 650.0 mm
TRB_bf: 350.0 mm
TRB_tf: 26.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 10.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE280B
LG: HE500M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2001.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7245 mm

F60 Dynamic check (L=43.0 m): |U3|=10.72 mm -> X=5.42

L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.6471
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.6471) = 7795866.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00015457 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2230 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=138.1622,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=46.7758,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=175.5784,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=268.8128,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=253.5328,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=298.1970,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.4102,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1579,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2001.24 kN, MaxRatio=2.153, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.243e+09

```

```

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 7; [0.7-0.9]: 36;
[0.4-0.7]: 66; [0.1-0.4]: 28; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 409 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 700.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 400.0 mm
DGB_tf: 14.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 130.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm

```

STCTB_tf: 10.0 mm
VER: HE300B
TRS: HE320B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1935.57 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.4924 mm

F60 Dynamic check (L=43.0 m): |U3|=11.49 mm -> X=5.24

L.Inf (2.54) < X (5.24) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 217

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.5161 mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.5161) = 7830481.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00018570 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.9925 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=141.2554,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=51.3461,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=227.0090,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=191.0705,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=302.6477,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=361.3381,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.3122, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=7.5278, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=1935.57 kN, MaxRatio=2.167, F60_Dinamico=OK, SkewV=217,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.934e+09

```

```

    Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 21; [0.7-0.9]: 44;
[0.4-0.7]: 47; [0.1-0.4]: 21; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 410 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 28.0 mm
    BC_tw: 30.0 mm
    TC_h: 550.0 mm
    TC_tf: 38.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 32.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 36.0 mm
    DGB_tw: 30.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 750.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 16.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 10.0 mm
    VER: HE340B
    TRS: HE360B
    LG: HE600M
    R_TR_B: HE300B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2516.41 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.1213 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.12 mm -> X=5.88
    L.Inf (2.54) < X (5.88) < L.Sup (5.69) -> Check: a dynamic analysis
is required
    Starting Skew check for 16 combinations...
        Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
        Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
        Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
        Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
        Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
        Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
        Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
        Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
        Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
        Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
        Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
        Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
        Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
        Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
        Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
        Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
    Skew check completed. Total violations (> 0.8 mm): 0

    Starting Horizontal U2 check for 24 combinations...
    Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.2731
mm
    Horizontal check:  $R = (43000.0)^2 / (8 * 25.2731) = 9145102.2$  mm
    Horizontal check result ( $R > 6000000.0$  mm?): OK

    Starting Angular (Rotation) check for 24 combinations...
    Angular check completed. Max Theta (abs): 0.00009656 rad (Limit:
0.002000). Estado: OK

    Starting Vertical (F60) check for 288 combinations...
    Vertical (F60) check completed. Max U3 (abs): 16.6208 mm (Limit:
71.6667 mm). Estado: OK

    Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
        -> Sheet: FramesWBTFForFatigue . S11_final=110.6526,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
        -> Sheet: FramesRBTForFatigue . S11_final=33.5169,
Limit=118.5185 -> OK
        -> Sheet: FramesWSTForFatigue . S11_final=146.3995,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
        -> Sheet: FramesRSTForFatigue . S11_final=127.4919,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
        -> Sheet: FramesIBBForFatigue . S11_final=142.0790,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
        -> Sheet: FramesEBBForFatigue . S11_final=171.4847,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
        -> Sheet: FramesEBTForFatigue . S11_final=8.3174, Limit=118.5185
-> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=8.0111, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2516.41 kN, MaxRatio=1.888, F60_Dinamico=Check, dynamic analysis required, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.727e+10
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 3; [0.7-0.9]: 16; [0.4-0.7]: 67; [0.1-0.4]: 54; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 411 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 10.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 30.0 mm
TRB_h: 900.0 mm
TRB_bf: 450.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 110.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE320B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2142.43 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9189 mm
F60 Dynamic check (L=43.0 m): |U3|=10.92 mm -> X=5.37
L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.5270
mm
Horizontal check: $R = (43000.0)^2 / (8 * 30.5270) = 7571164.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011685 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4188 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=147.3770,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.0126,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=169.3526,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=268.0754,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=191.7020,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=223.4630,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.3117,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.2027,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2142.43 kN, MaxRatio=143601.894, F60_Dinamico=OK, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.418e+19

Ratio counts by range: [>1.0]: 62; [0.9-1.0]: 11; [0.7-0.9]: 26; [0.4-0.7]: 33; [0.1-0.4]: 34; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 412 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 14.0 mm
TRB_h: 650.0 mm
TRB_bf: 650.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE280B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2333.92 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0466 mm
F60 Dynamic check (L=43.0 m): |U3|=10.05 mm -> X=5.60
L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 221

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.1271
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.1271) = 9198241.8$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010825 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5454 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=110.3212,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.7167,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=205.0313,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=172.1916,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=178.0925,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=222.0802,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.6079,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.5553,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2333.92 kN, MaxRatio=1.261, F60_Dinamico=OK, SkewV=221,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.434e+09
Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 3; [0.7-0.9]: 31;
[0.4-0.7]: 69; [0.1-0.4]: 51; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 413 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 32.0 mm
DGA_tw: 28.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 900.0 mm
TRB_bf: 650.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE280B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2377.28 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8871 mm
F60 Dynamic check (L=43.0 m): |U3|=9.89 mm -> X=5.65
L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 26

```

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1722
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.1722) = 10424108.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009230 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3841 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=95.6706, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.0539,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=190.2376,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=164.3834,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=131.8511,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=155.3190,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.4166,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5379,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2377.28 kN, MaxRatio=1.994, F60_Dinamico=OK, SkewV=26,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.087e+09
Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 5; [0.7-0.9]: 12;
[0.4-0.7]: 75; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 414 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 500.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 30.0 mm

```

DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 180.0 mm
CTB_tf: 16.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE280B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2273.64 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.0169 mm

F60 Dynamic check (L=43.0 m): |U3|=10.02 mm -> X=5.61

L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 231

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.4521

mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.4521) = 10773988.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009025 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5099 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=103.0347,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.7725,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=181.4813,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=147.7801,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=152.8756,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=188.2999,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.2638,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.5111,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2273.64 kN, MaxRatio=2.007, F60_Dinamico=OK, SkewV=231,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.674e+09
Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 6; [0.7-0.9]: 11;
[0.4-0.7]: 77; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 415 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 26.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 22.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 26.0 mm
TRB_tw: 30.0 mm
CTT_h: 180.0 mm

CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 20.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE320B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2480.37 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5664 mm

F60 Dynamic check (L=43.0 m): |U3|=9.57 mm -> X=5.74

L.Inf (2.54) < X (5.74) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.8088
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.8088) = 10597804.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008457 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0626 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=92.9808, Limit=92.5926
-> NOT OK! (Cumulative failures: 1)


```

    -> Sheet: FramesRBTForFatigue . S11_final=27.6951,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=172.9742,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=147.6275,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=124.8308,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=155.3185,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.9230,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=11.9508,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2480.37 kN, MaxRatio=1.184, F60_Dinamico=Check, dynamic analysis required, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.821e+10

Ratio counts by range: [>1.0]: 3; [0.9-1.0]: 7; [0.7-0.9]: 18; [0.4-0.7]: 64; [0.1-0.4]: 74; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 416 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 18.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 24.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 10.0 mm
VER: HE340B
TRS: HE320B
LG: HE400M

```

R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2152.76 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.5499 mm

F60 Dynamic check (L=43.0 m): |U3|=11.55 mm -> X=5.22

L.Inf (2.54) < X (5.22) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.8524
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.8524) = 9689782.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009737 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.0477 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=101.2121,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=32.6311,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=189.0649,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=157.4812,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=140.8674,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

```

    -> Sheet: FramesEBBForFatigue . S11_final=174.8834,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=9.8313, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=10.3550,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2152.76 kN, MaxRatio=1.463, F60_Dinamico=OK, SkewV=129,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.345e+09
    Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 6; [0.7-0.9]: 33;
[0.4-0.7]: 66; [0.1-0.4]: 45; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 417 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 12.0 mm
    BC_tw: 30.0 mm
    TC_h: 550.0 mm
    TC_tf: 30.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 36.0 mm
    DGA_tw: 24.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 650.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 22.0 mm
    TRB_tw: 28.0 mm
    CTT_h: 150.0 mm
    CTT_tf: 18.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 12.0 mm
    VER: HE450B
    TRS: HE300B
    LG: HE360M
    R_TR_B: HE280B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2237.66 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.9210 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.92 mm -> X=5.64

```

L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 189

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2776
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.2776) = 9929079.3$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00010904 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.4136 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=138.4674,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=39.8038,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=189.9679,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=165.1455,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=233.5219,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=291.6046,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.4118,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.7917,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

 Running design...

Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2237.66 kN, MaxRatio=1.653, F60_Dinamico=OK, SkewV=189,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.294e+09
Ratio counts by range: [>1.0]: 38; [0.9-1.0]: 8; [0.7-0.9]: 18;
[0.4-0.7]: 32; [0.1-0.4]: 70; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 418 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 26.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE400B
TRS: HE240B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2238.22 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3146 mm
F60 Dynamic check (L=43.0 m): |U3|=10.31 mm -> X=5.53
L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.1768
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 26.1768) = 8829390.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009175 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8110 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=101.8198,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.9619,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=153.9514,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=148.4465,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=136.8623,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=168.2525,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.8673,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=18.8115,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2238.22 kN, MaxRatio=1.666, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.283e+09
Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 8; [0.7-0.9]: 20;
[0.4-0.7]: 67; [0.1-0.4]: 45; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 419 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 500.0 mm
TRB_tf: 14.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE220B
LG: HE340M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2227.82 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9984 mm
F60 Dynamic check (L=43.0 m): |U3|=10.00 mm -> X=5.61
L.Inf (2.54) < X (5.61) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 215

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.8820
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.8820) = 8929945.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00012542 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4945 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=110.3415,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=38.0002,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=222.1636,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=179.8423,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=242.0243,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=297.3320,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.6027,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.3233,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2227.82 kN, MaxRatio=1.368, F60_Dinamico=OK, SkewV=215,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.203e+09
Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 12; [0.7-0.9]: 30;
[0.4-0.7]: 45; [0.1-0.4]: 65; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 420 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm

```


DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 34.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE260B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2281.88 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5414 mm

F60 Dynamic check (L=43.0 m): |U3|=10.54 mm -> X=5.47

L.Inf (2.54) < X (5.47) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 236

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.3073

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.3073) = 9916425.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006808 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0398 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=78.8232, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=25.6405,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=164.2214,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=146.0425,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=95.9222, Limit=92.5926
-> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=117.9634,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=14.9263,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=17.8218,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2281.88 kN, MaxRatio=1.788, F60_Dinamico=OK, SkewV=236,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=6.892e+09

Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 5; [0.7-0.9]: 43;
[0.4-0.7]: 39; [0.1-0.4]: 57; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 421 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm

BC_tf: 24.0 mm

BC_tw: 28.0 mm

TC_h: 500.0 mm

TC_tf: 32.0 mm

TC_tw: 38.0 mm

DGA_bf: 500.0 mm

DGA_tf: 22.0 mm

DGA_tw: 16.0 mm

DGB_bf: 500.0 mm

DGB_tf: 20.0 mm

DGB_tw: 30.0 mm

TRB_h: 800.0 mm

TRB_bf: 350.0 mm

TRB_tf: 22.0 mm

TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE340B
TRS: HE240B
LG: HE400M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2123.25 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1215 mm

F60 Dynamic check (L=43.0 m): |U3|=10.12 mm -> X=5.58

L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 135

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9664
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.9664) = 8900918.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00015930 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6211 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

    -> Sheet: FramesWBTForFatigue      . S11_final=126.9700,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue      . S11_final=35.5334,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue      . S11_final=209.8269,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue      . S11_final=199.1054,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue      . S11_final=270.6705,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue      . S11_final=295.4361,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue      . S11_final=13.3711,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue      . S11_final=14.8718,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2123.25 kN, MaxRatio=1.431, F60_Dinamico=OK, SkewV=135,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.366e+09

```

```

    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 13; [0.7-0.9]: 25;
[0.4-0.7]: 49; [0.1-0.4]: 58; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 422 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 700.0 mm
    BC_tf: 24.0 mm
    BC_tw: 30.0 mm
    TC_h: 700.0 mm
    TC_tf: 36.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 28.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 20.0 mm
    DGB_tw: 26.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 30.0 mm
    CTT_h: 120.0 mm
    CTT_tf: 19.0 mm
    CTB_h: 110.0 mm
    CTB_tf: 14.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 11.0 mm
    VER: HE320B

```

TRS: HE280B
LG: HE450M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2230.09 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9724 mm

F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62

L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 68

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.5827

mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.5827) = 7557386.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012332 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4726 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=119.2803,

Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.2479,

Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=169.3342,

Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.3668,

Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=185.8139,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=226.3165,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.1004,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.0122,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2230.09 kN, MaxRatio=148581.056, F60_Dinamico=OK, SkewV=68,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.923e+19

Ratio counts by range: [>1.0]: 50; [0.9-1.0]: 13; [0.7-0.9]: 25;
[0.4-0.7]: 45; [0.1-0.4]: 33; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 423 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 26.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 14.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 12.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 36.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE320B
LG: HE500M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2488.05 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8691 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.87 mm -> X=5.65
 L.Inf (2.54) < X (5.65) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 24

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.5588
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.5588) = 9810551.2$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006809 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.3676 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=79.5109, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=25.3408,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=136.1424,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=146.9828,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=92.2793, Limit=92.5926
 -> OK
 -> Sheet: FramesEBBForFatigue . S11_final=115.0769,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBTForFatigue . S11_final=10.4560,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.0226,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (3 failures)

```

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2488.05 kN, MaxRatio=1.629, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (3
failures) -> Cost=1.655e+09
    Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 23; [0.7-0.9]: 23;
[0.4-0.7]: 43; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 424 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
    BC_h: 700.0 mm
    BC_tf: 34.0 mm
    BC_tw: 40.0 mm
    TC_h: 500.0 mm
    TC_tf: 38.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 30.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 550.0 mm
    DGB_tf: 38.0 mm
    DGB_tw: 12.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 28.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 16.0 mm
    STCTB_h: 80.0 mm
    STCTB_tf: 14.0 mm
    VER: HE450B
    TRS: HE220B
    LG: HE400M
    R_TR_B: HE280B

-----
Running analysis...
Analysis completed.
>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2754.12 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -8.3186 mm
    F60 Dynamic check (L=43.0 m): |U3|=8.32 mm -> X=6.15
    L.Inf (2.54) < X (6.15) < L.Sup (5.69) -> Check: a dynamic analysis
is required
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```


Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 133

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.0803
mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.0803) = 10013951.5$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009926 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 15.8172 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=73.9588, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.4911,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=193.4292,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=175.9782,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=143.9554,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=170.0618,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.1567,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.2075,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2754.12 kN, MaxRatio=1.160, F60_Dinamico=Check, dynamic
analysis required, SkewV=133, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.139e+10

Ratio counts by range: [>1.0]: 6; [$0.9-1.0$]: 6; [$0.7-0.9$]: 10; [$0.4-0.7$]: 63; [$0.1-0.4$]: 77; [≤ 0.1]: 4;

```
=====
--- STARTING GA ITERATION No. 425 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 700.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 13.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE260B
LG: HE600M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2196.75 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3722 mm
F60 Dynamic check (L=43.0 m): |U3|=10.37 mm -> X=5.51
L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.9122
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.9122) = 9665564.1$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010426 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.8688 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=111.5928,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.0605,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=156.5384,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=213.3956,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=171.4618,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=201.9291,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.2309,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.8760,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2196.75 kN, MaxRatio=1.638, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.005e+09
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 13; [0.7-0.9]: 17;
[0.4-0.7]: 68; [0.1-0.4]: 39; [<=0.1]: 0;
>> Snapshot iter 425 saved: D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\snapshot_iter_425_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 426 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 14.0 mm
VER: HE400B
TRS: HE260B
LG: HE340M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2185.53 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9485 mm

F60 Dynamic check (L=43.0 m): |U3|=9.95 mm -> X=5.63

L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 218

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.0636 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.0636) = 9221557.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012206 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4450 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.9667,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.9717,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=232.6789,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=218.1059,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=205.3083,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=256.4101,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=14.4808,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.6377,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2185.53 kN, MaxRatio=1.529, F60_Dinamico=OK, SkewV=218,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=5.485e+09

Ratio counts by range: [>1.0]: 22; [$0.9-1.0$]: 12; [$0.7-0.9$]: 29;
[$0.4-0.7$]: 62; [$0.1-0.4$]: 41; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 427 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm

BC_tf: 20.0 mm

BC_tw: 34.0 mm

TC_h: 700.0 mm

TC_tf: 28.0 mm

TC_tw: 38.0 mm

DGA_bf: 400.0 mm

DGA_tf: 38.0 mm

DGA_tw: 20.0 mm

DGB_bf: 400.0 mm
DGB_tf: 28.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE600B
TRS: HE300B
LG: HE550M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2750.07 kN

U3 displacement at F60 (COMB01-PER-LOAD): -8.7106 mm

F60 Dynamic check (L=43.0 m): |U3|=8.71 mm -> X=6.01

L.Inf (2.54) < X (6.01) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 17.8766
mm

Horizontal check: $R = (43000.0)^2 / (8 * 17.8766) = 12928912.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007447 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 16.2000 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=82.0908, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=26.8075,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=150.6671,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=212.3145,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=175.4632,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=201.8770,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.2648,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.5210,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2750.07 kN, MaxRatio=1.460, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.841e+10
Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 2; [0.7-0.9]: 18;
[0.4-0.7]: 68; [0.1-0.4]: 66; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 428 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 22.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 14.0 mm
DGB_bf: 350.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 650.0 mm
TRB_tf: 30.0 mm
TRB_tw: 18.0 mm
CTT_h: 140.0 mm

CTT_tf: 18.0 mm
CTB_h: 110.0 mm
CTB_tf: 17.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE260B
LG: HE600M
R_TR_B: HE320B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2272.13 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2529 mm

F60 Dynamic check (L=43.0 m): |U3|=10.25 mm -> X=5.54

L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.4339

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.4339) = 8424784.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008996 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7526 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=85.5438, Limit=92.5926

-> OK


```

    -> Sheet: FramesRBTForFatigue . S11_final=26.6960,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=146.9378,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRSTForFatigue . S11_final=136.5263,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesIBBForFatigue . S11_final=122.8087,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesEBBForFatigue . S11_final=145.3566,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBTForFatigue . S11_final=14.7020,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.6563,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2272.13 kN, MaxRatio=141044.876, F60_Dinamico=OK, SkewV=0,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=4.520e+19

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 15; [0.7-0.9]: 38;
 [0.4-0.7]: 40; [0.1-0.4]: 29; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 429 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 750.0 mm
BC_tf: 28.0 mm
BC_tw: 30.0 mm
TC_h: 800.0 mm
TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 30.0 mm
DGB_bf: 350.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 32.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 170.0 mm
CTB_tf: 20.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE220B
LG: HE400M

```

R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2363.37 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6026 mm

F60 Dynamic check (L=43.0 m): |U3|=10.60 mm -> X=5.45

L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 126

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.6406

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.6406) = 9379839.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007621 rad (Limit:

0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1035 mm (Limit:

71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=76.9735, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=26.0238,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=162.7520,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=123.7366,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=105.8729,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesEBBForFatigue . S11_final=131.1576,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.5462,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1679,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2363.37 kN, MaxRatio=1.423, F60_Dinamico=OK, SkewV=126,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=3.495e+09

Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 12; [0.7-0.9]: 39;
[0.4-0.7]: 53; [0.1-0.4]: 46; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 430 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 750.0 mm
BC_tf: 38.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 600.0 mm
DGA_tf: 20.0 mm
DGA_tw: 16.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 20.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
TRB_tf: 26.0 mm
TRB_tw: 22.0 mm
CTT_h: 100.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE200B
LG: HE340M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2446.86 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.2171 mm
F60 Dynamic check (L=43.0 m): |U3|=9.22 mm -> X=5.85

L.Inf (2.54) < X (5.85) < L.Sup (5.69) -> Check: a dynamic analysis is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 219

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.7682

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.7682) = 10151215.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010204 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7158 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=76.6848, Limit=92.5926
-> OK

-> Sheet: FramesRBTForFatigue . S11_final=27.8237,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=203.4810,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=212.8682,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=162.9173,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=195.6878,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=12.4905,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.0570,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2446.86 kN, MaxRatio=4.902, F60_Dinamico=Check, dynamic
analysis required, SkewV=219, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=6.718e+10
    Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 4; [0.7-0.9]: 9; [0.4-
0.7]: 71; [0.1-0.4]: 58; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 431 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 800.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 14.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 650.0 mm
TRB_tf: 20.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 110.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE260B
LG: HE400M
R_TR_B: HE260B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2318.62 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.6930 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.69 mm -> X=5.43
    L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 130

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.2854
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.2854) = 9925754.7$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00009505 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.1863 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTForFatigue . S11_final=87.9801, Limit=92.5926
 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=28.6249,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=197.6317,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=184.8403,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=153.6467,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=190.8234,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=16.5081,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=14.4923,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2318.62 kN, MaxRatio=142723.151, F60_Dinamico=OK, SkewV=130,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
 failures) -> Cost=4.723e+19
 Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 8; [0.7-0.9]: 25;
 [0.4-0.7]: 66; [0.1-0.4]: 33; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 432 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 800.0 mm
BC_tf: 22.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 16.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE280B
LG: HE550M
R_TR_B: HE220B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2322.42 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.6352 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.64 mm -> X=5.72
```

```
L.Inf (2.54) < X (5.72) < L.Sup (5.69) -> Check: a dynamic analysis
```

```
is required
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.0857
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.0857) = 10011608.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013152 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1312 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=89.2035, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=30.8188,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=179.6609,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=269.0001,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=209.6580,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=244.1013,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=13.6182,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.3638,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2322.42 kN, MaxRatio=1.774, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=2.489e+10
Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 8; [0.7-0.9]: 35;
[0.4-0.7]: 59; [0.1-0.4]: 48; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 433 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 800.0 mm
BC_tf: 26.0 mm
BC_tw: 26.0 mm
TC_h: 650.0 mm

```


TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 12.0 mm
DGB_bf: 400.0 mm
DGB_tf: 20.0 mm
DGB_tw: 26.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE320B
LG: HE450M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2192.49 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5039 mm

F60 Dynamic check (L=43.0 m): |U3|=10.50 mm -> X=5.48

L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 54

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.5120

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.5120) = 9429045.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010825 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.0029 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=106.5447,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=33.9970,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=150.9135,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=147.9515,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=165.4477,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=202.6615,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.6249, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.9565, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2192.49 kN, MaxRatio=3.207, F60_Dinamico=OK, SkewV=54,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.197e+10
Ratio counts by range: [>1.0]: 41; [0.9-1.0]: 7; [0.7-0.9]: 24;
[0.4-0.7]: 54; [0.1-0.4]: 40; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 434 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 24.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm
DGB_tf: 26.0 mm
DGB_tw: 14.0 mm
TRB_h: 850.0 mm

TRB_bf: 650.0 mm
TRB_tf: 20.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE300B
TRS: HE280B
LG: HE550M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1968.31 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.6150 mm

F60 Dynamic check (L=43.0 m): |U3|=11.61 mm -> X=5.21

L.Inf (2.54) < X (5.21) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.1289

mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.1289) = 7934570.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012135 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.1145 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=142.5914,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.2017,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=181.6219,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=163.7177,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=182.1672,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=213.5345,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.4751,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.8588,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=1968.31 kN, MaxRatio=1.690, F60_Dinamico=OK, SkewV=10,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.231e+09

```

```

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 2; [0.7-0.9]: 60;
[0.4-0.7]: 30; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 435 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 12.0 mm
BC_tw: 38.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 34.0 mm
DGA_tw: 30.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 350.0 mm
TRB_tf: 32.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm

```

VER: HE340B
TRS: HE280B
LG: HE300M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2209.24 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2998 mm

F60 Dynamic check (L=43.0 m): |U3|=10.30 mm -> X=5.53

L.Inf (2.54) < X (5.53) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 308

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.6802 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.6802) = 9000119.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012019 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7989 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=145.1231,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.4109,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=199.0962,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=123.3157,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=209.6683,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=256.1745,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.1169,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.6004,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2209.24 kN, MaxRatio=1.476, F60_Dinamico=OK, SkewV=308,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.416e+09

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 13; [0.7-0.9]: 29;
[0.4-0.7]: 44; [0.1-0.4]: 56; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 436 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 12.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 36.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 32.0 mm
DGA_tw: 30.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 24.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE280B
LG: HE320M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2194.88 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6976 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.70 mm -> X=5.43
 L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 267

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.5371
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.5371) = 9819590.7$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00011206 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.1955 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=129.9192,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=32.7578,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=192.1426,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=123.6720,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=190.8683,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=234.4778,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.8970,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.1352,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2194.88 kN, MaxRatio=1.379, F60_Dinamico=OK, SkewV=267,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=6.286e+09
    Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 20; [0.7-0.9]: 29;
[0.4-0.7]: 29; [0.1-0.4]: 69; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 437 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 500.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 36.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 14.0 mm
CTB_h: 160.0 mm
CTB_tf: 10.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE300M
R_TR_B: HE300B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2072.93 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.6018 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.60 mm -> X=5.45
    L.Inf (2.54) < X (5.45) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```


Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 297

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.7904
mm
Horizontal check: $R = (43000.0)^2 / (8 * 33.7904) = 6839960.4$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011765 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.1020 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=155.3037,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.9828,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=245.1036,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=195.9674,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=181.5999,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=223.4963,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.6747,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.0569,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2072.93 kN, MaxRatio=2.569, F60_Dinamico=OK, SkewV=297,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.137e+10
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 25;
[0.4-0.7]: 61; [0.1-0.4]: 39; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 438 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 32.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 550.0 mm
DGB_tf: 22.0 mm
DGB_tw: 26.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 18.0 mm
TRB_tw: 28.0 mm
CTT_h: 120.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE320B
TRS: HE340B
LG: HE320M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2076.35 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0240 mm
F60 Dynamic check (L=43.0 m): |U3|=11.02 mm -> X=5.35
L.Inf (2.54) < X (5.35) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 267

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.1494
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 29.1494) = 7928980.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00013569 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.5231 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=157.9166,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=39.6271,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=226.8256,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=217.9420,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=212.3178,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=255.8144,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=9.2776, Limit=118.5185
-> OK
-> Sheet: FramesIBTForFatigue . S11_final=8.7338, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2076.35 kN, MaxRatio=2.067, F60_Dinamico=OK, SkewV=267,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=8.012e+09
Ratio counts by range: [>1.0]: 38; [0.9-1.0]: 13; [0.7-0.9]: 21;
[0.4-0.7]: 49; [0.1-0.4]: 45; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 439 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 26.0 mm
TC_h: 600.0 mm

```

TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 20.0 mm
DGA_tw: 30.0 mm
DGB_bf: 500.0 mm
DGB_tf: 26.0 mm
DGB_tw: 26.0 mm
TRB_h: 700.0 mm
TRB_bf: 350.0 mm
TRB_tf: 40.0 mm
TRB_tw: 20.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
CTB_tf: 20.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE260B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2322.48 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7373 mm

F60 Dynamic check (L=43.0 m): |U3|=9.74 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 23.1775

mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.1775) = 9971935.3$ mm

Horizontal check result (R > 6000000.0 mm ?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010870 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2350 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=148.6205,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.1683,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=149.5432,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=126.9169,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=175.3736,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=215.7129,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.7373,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.6168,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2322.48 kN, MaxRatio=1.795, F60_Dinamico=Check, dynamic
analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.532e+10

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 11; [0.7-0.9]: 15;
[0.4-0.7]: 47; [0.1-0.4]: 60; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 440 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 28.0 mm

BC_tw: 30.0 mm

TC_h: 550.0 mm

TC_tf: 32.0 mm

TC_tw: 36.0 mm

DGA_bf: 600.0 mm

DGA_tf: 36.0 mm

DGA_tw: 28.0 mm

DGB_bf: 600.0 mm

DGB_tf: 16.0 mm

DGB_tw: 18.0 mm

TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 110.0 mm
CTT_tf: 13.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE260B
LG: HE550M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2355.39 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5055 mm

F60 Dynamic check (L=43.0 m): |U3|=9.51 mm -> X=5.76

L.Inf (2.54) < X (5.76) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.7631
mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.7631) = 10620062.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009982 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0031 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

- > Sheet: FramesWBTForFatigue . S11_final=110.4527,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
- > Sheet: FramesRBTForFatigue . S11_final=33.7031,
Limit=118.5185 -> OK
- > Sheet: FramesWSTForFatigue . S11_final=134.0734,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
- > Sheet: FramesRSTForFatigue . S11_final=102.5924,
Limit=118.5185 -> OK
- > Sheet: FramesIBBForFatigue . S11_final=148.3736,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
- > Sheet: FramesEBBForFatigue . S11_final=181.0822,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
- > Sheet: FramesEBTForFatigue . S11_final=12.6140,
Limit=118.5185 -> OK
- > Sheet: FramesIBTForFatigue . S11_final=10.5108,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2355.39 kN, MaxRatio=3.280, F60_Dinamico=Check, dynamic analysis required, SkewV=2, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4 failures) -> Cost=3.594e+10
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 4; [0.7-0.9]: 16; [0.4-0.7]: 65; [0.1-0.4]: 57; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 441 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

- BC_h: 600.0 mm
- BC_tf: 16.0 mm
- BC_tw: 28.0 mm
- TC_h: 750.0 mm
- TC_tf: 32.0 mm
- TC_tw: 36.0 mm
- DGA_bf: 350.0 mm
- DGA_tf: 22.0 mm
- DGA_tw: 14.0 mm
- DGB_bf: 350.0 mm
- DGB_tf: 14.0 mm
- DGB_tw: 14.0 mm
- TRB_h: 900.0 mm
- TRB_bf: 400.0 mm
- TRB_tf: 20.0 mm
- TRB_tw: 18.0 mm
- CTT_h: 120.0 mm
- CTT_tf: 10.0 mm
- CTB_h: 170.0 mm

CTB_tf: 11.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE300B
TRS: HE240B
LG: HE600M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 1805.33 kN

U3 displacement at F60 (COMB01-PER-LOAD): -13.5195 mm

F60 Dynamic check (L=43.0 m): |U3|=13.52 mm -> X=4.83

L.Inf (2.54) < X (4.83) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 30.8609
mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.8609) = 7489249.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00016375 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 21.0198 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=180.3406,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.3895,
Limit=118.5185 -> OK


```

    -> Sheet: FramesWSTForFatigue . S11_final=199.3919,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=341.4277,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=284.8651,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=319.2204,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=13.0942,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.9880, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=1805.33 kN, MaxRatio=2.482, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.054e+09

```

```

    Ratio counts by range: [>1.0]: 69; [0.9-1.0]: 8; [0.7-0.9]: 16;
[0.4-0.7]: 43; [0.1-0.4]: 30; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 442 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 24.0 mm
    BC_tw: 32.0 mm
    TC_h: 650.0 mm
    TC_tf: 22.0 mm
    TC_tw: 40.0 mm
    DGA_bf: 400.0 mm
    DGA_tf: 38.0 mm
    DGA_tw: 10.0 mm
    DGB_bf: 350.0 mm
    DGB_tf: 18.0 mm
    DGB_tw: 24.0 mm
    TRB_h: 850.0 mm
    TRB_bf: 400.0 mm
    TRB_tf: 38.0 mm
    TRB_tw: 30.0 mm
    CTT_h: 170.0 mm
    CTT_tf: 11.0 mm
    CTB_h: 180.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B
    TRS: HE280B
    LG: HE450M
    R_TR_B: HE200B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2095.29 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.1866 mm

F60 Dynamic check (L=43.0 m): |U3|=11.19 mm -> X=5.31

L.Inf (2.54) < X (5.31) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 64

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.2457

mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.2457) = 8482993.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009668 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.6865 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=127.3412,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=31.4862,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=172.5162,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=337.5764,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=147.3153,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=181.4162,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

```
-> Sheet: FramesEBTForFatigue . S11_final=11.4760,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.3926,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)
```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2095.29 kN, MaxRatio=1.503, F60_Dinamico=OK, SkewV=64,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.977e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 6; [0.7-0.9]: 53;
[0.4-0.7]: 47; [0.1-0.4]: 37; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 443 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 14.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 22.0 mm
CTT_h: 140.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 14.0 mm
VER: HE550B
TRS: HE300B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2281.12 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9321 mm
F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37
L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 6

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 20.1070
mm
Horizontal check: $R = (43000.0)^2 / (8 * 20.1070) = 11494759.2$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008068 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.4193 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=113.8989,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.2380,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=164.1477,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=150.2446,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=206.4120,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=249.8708,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.1242,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.0021,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2281.12 kN, MaxRatio=1.927, F60_Dinamico=OK, SkewV=6,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.212e+09

Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 13; [0.7-0.9]: 15;
[0.4-0.7]: 31; [0.1-0.4]: 71; [<=0.1]: 0;

>> Checkpoint saved (Gen=8, FunEval=443): D:\000.Robinson
Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
8 443 1.717e+08 4.507e+18 2

=====
--- STARTING GA ITERATION No. 444 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 14.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE260B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2149.51 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9267 mm
F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37
L.Inf (2.54) < X (5.37) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.6105 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.6105) = 10222028.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00009555 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.4185 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=159.0275,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.6726,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=162.5471,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=176.7993,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=170.6135,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=208.0023,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=15.9193,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.0490,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2149.51 kN, MaxRatio=1.774, F60_Dinamico=OK, SkewV=8,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=1.565e+09
 Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 10; [0.7-0.9]: 22;
 [0.4-0.7]: 62; [0.1-0.4]: 47; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 445 ---
=====
```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 750.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 20.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 120.0 mm
CTB_tf: 18.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE550B
TRS: HE280B
LG: HE360M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2446.37 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6893 mm

F60 Dynamic check (L=43.0 m): |U3|=9.69 mm -> X=5.70

L.Inf (2.54) < X (5.70) < L.Sup (5.69) -> Check: a dynamic analysis

is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 192

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.0842
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.0842) = 9596538.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007985 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.1784 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=138.2499,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=40.4451,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=208.3070,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=176.5184,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=193.0890,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=245.0499,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.6420,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.2818,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2446.37 kN, MaxRatio=131675.322, F60_Dinamico=Check, dynamic
analysis required, SkewV=192, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=4.242e+19
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 6; [0.7-0.9]: 26;
[0.4-0.7]: 54; [0.1-0.4]: 47; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 446 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 750.0 mm

```


TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 20.0 mm
DGB_bf: 400.0 mm
DGB_tf: 24.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 450.0 mm
TRB_tf: 32.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 10.0 mm
VER: HE500B
TRS: HE260B
LG: HE500M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2485.14 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.7233 mm

F60 Dynamic check (L=43.0 m): |U3|=9.72 mm -> X=5.69

L.Inf (2.54) < X (5.69) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.1734

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.1734) = 10423511.3$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008155 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2146 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=139.3015,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=33.4268,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=156.2559,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=211.8276,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=146.1723,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=184.0721,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=16.4316,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.2596,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2485.14 kN, MaxRatio=1.496, F60_Dinamico=Check, dynamic analysis required, SkewV=22, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.613e+10

Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 9; [0.7-0.9]: 26; [0.4-0.7]: 66; [0.1-0.4]: 53; [<=0.1]: 0;

===
--- STARTING GA ITERATION No. 447 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 500.0 mm

BC_tf: 22.0 mm

BC_tw: 32.0 mm

TC_h: 600.0 mm

TC_tf: 16.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 20.0 mm

DGA_tw: 14.0 mm

DGB_bf: 400.0 mm

DGB_tf: 34.0 mm

DGB_tw: 16.0 mm

TRB_h: 800.0 mm
TRB_bf: 700.0 mm
TRB_tf: 40.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE280B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2277.63 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.2976 mm

F60 Dynamic check (L=43.0 m): |U3|=11.30 mm -> X=5.28

L.Inf (2.54) < X (5.28) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 6

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3496
mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.3496) = 9117483.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006626 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.7948 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=127.6684,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=28.7351,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=134.5922,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.5330,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=93.2579, Limit=92.5926
-> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=117.2400,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.8695,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.7194,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2277.63 kN, MaxRatio=94048.740, F60_Dinamico=OK, SkewV=6,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=2.015e+19

Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 6; [0.7-0.9]: 48;
 [0.4-0.7]: 36; [0.1-0.4]: 46; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 448 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 500.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 800.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 30.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 22.0 mm
TRB_h: 750.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 100.0 mm

```

STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE260B
LG: HE550M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2205.26 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.8245 mm

F60 Dynamic check (L=43.0 m): |U3|=10.82 mm -> X=5.40

L.Inf (2.54) < X (5.40) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.4609 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.4609) = 9448755.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012655 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3190 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=149.8670,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=38.2553,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=169.3344,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

```

    -> Sheet: FramesRSTForFatigue . S11_final=178.6364,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=212.1242,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=248.7543,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=17.5304,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=18.0465,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2205.26 kN, MaxRatio=1.631, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.164e+09

```

```

    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 15; [0.7-0.9]: 50;
[0.4-0.7]: 31; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 449 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 550.0 mm
    BC_tf: 26.0 mm
    BC_tw: 32.0 mm
    TC_h: 750.0 mm
    TC_tf: 30.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 550.0 mm
    DGA_tf: 28.0 mm
    DGA_tw: 18.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 32.0 mm
    DGB_tw: 22.0 mm
    TRB_h: 600.0 mm
    TRB_bf: 450.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 160.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 18.0 mm
    STCTB_h: 110.0 mm
    STCTB_tf: 12.0 mm
    VER: HE320B
    TRS: HE220B
    LG: HE450M
    R_TR_B: HE340B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
  Total Weight (Sum |FZ_dead|): 2231.97 kN
  U3 displacement at F60 (COMB01-PER-LOAD): -9.9546 mm
  F60 Dynamic check (L=43.0 m): |U3|=9.95 mm -> X=5.63
  L.Inf (2.54) < X (5.63) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
  Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
  Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
  Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
  Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
  Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
  Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
  Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
  Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
  Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
  Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
  Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
  Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
  Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
  Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
  Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
  Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.3549
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 31.3549) = 7371258.0$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00014045 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4555 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
  -> Sheet: FramesWBTFForFatigue . S11_final=146.7760,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
  -> Sheet: FramesRBTForFatigue . S11_final=46.3274,
Limit=118.5185 -> OK
  -> Sheet: FramesWSTForFatigue . S11_final=171.3318,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
  -> Sheet: FramesRSTForFatigue . S11_final=136.1834,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
  -> Sheet: FramesIBBForFatigue . S11_final=226.7475,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
  -> Sheet: FramesEBBForFatigue . S11_final=275.6103,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
  -> Sheet: FramesEBTForFatigue . S11_final=15.0867,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=14.5863,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2231.97 kN, MaxRatio=2.071, F60_Dinamico=OK, SkewV=52,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.831e+09

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 13; [0.7-0.9]: 43;
[0.4-0.7]: 51; [0.1-0.4]: 39; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 450 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 26.0 mm
BC_tw: 38.0 mm
TC_h: 700.0 mm
TC_tf: 24.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 30.0 mm
DGB_tw: 22.0 mm
TRB_h: 800.0 mm
TRB_bf: 650.0 mm
TRB_tf: 34.0 mm
TRB_tw: 26.0 mm
CTT_h: 120.0 mm
CTT_tf: 17.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE280B
LG: HE340M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2439.94 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8172 mm
F60 Dynamic check (L=43.0 m): |U3|=9.82 mm -> X=5.67
L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 231

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.9060
mm
Horizontal check: $R = (43000.0)^2 / (8 * 27.9060) = 8282255.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007417 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3177 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=100.2515,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.0386,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=174.4658,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=124.0169,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=105.9499,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=131.1526,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.2869,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.4876,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2439.94 kN, MaxRatio=96002.921, F60_Dinamico=OK, SkewV=231, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.249e+19

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 13; [0.7-0.9]: 24; [0.4-0.7]: 56; [0.1-0.4]: 48; [<=0.1]: 0;

>> Snapshot iter 450 saved: D:\000.Robinson Mercado\001.Model 3D\05.MatLAB\Logs\snapshot_iter_450_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 451 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 26.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 650.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE360B
TRS: HE260B
LG: HE600M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2158.11 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.7166 mm
F60 Dynamic check (L=43.0 m): |U3|=10.72 mm -> X=5.42
L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3907
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 25.3907) = 9102740.3$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010174 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.2141 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=138.6618,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.6098,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=140.0116,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=113.2198,
Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=151.7485,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=180.7860,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.8431,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.9799,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2158.11 kN, MaxRatio=1.931, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=1.958e+09
Ratio counts by range: [>1.0]: 27; [0.9-1.0]: 8; [0.7-0.9]: 24;
[0.4-0.7]: 59; [0.1-0.4]: 48; [<=0.1]: 0;

=====

```

--- STARTING GA ITERATION No. 452 ---

=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 28.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE300B
LG: HE550M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2319.20 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.9808 mm
F60 Dynamic check (L=43.0 m): |U3|=9.98 mm -> X=5.62
L.Inf (2.54) < X (5.62) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.8745
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.8745) = 9291637.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009970 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.4763 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=124.2222,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.2764,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=166.8463,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=267.7884,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=149.2897,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=174.9341,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.0436,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.8797,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2319.20 kN, MaxRatio=2.064, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.926e+09
Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 5; [0.7-0.9]: 32;
[0.4-0.7]: 57; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 453 ---
=====
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 550.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 14.0 mm
TC_tw: 36.0 mm

```

DGA_bf: 600.0 mm
DGA_tf: 30.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 34.0 mm
DGB_tw: 16.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE280B
LG: HE450M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2365.64 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8229 mm

F60 Dynamic check (L=43.0 m): |U3|=9.82 mm -> X=5.66

L.Inf (2.54) < X (5.66) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 75

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.4466

mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.4466) = 9454270.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009736 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3188 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=119.9004,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=29.7127,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=179.2487,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=267.2678,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=143.9970,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=173.7639,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.5909,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.1079,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2365.64 kN, MaxRatio=1.503, F60_Dinamico=OK, SkewV=75,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.491e+09

Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 9; [0.7-0.9]: 47;
[0.4-0.7]: 34; [0.1-0.4]: 57; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 454 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 550.0 mm

BC_tf: 28.0 mm

BC_tw: 32.0 mm

TC_h: 650.0 mm

TC_tf: 22.0 mm

TC_tw: 36.0 mm

DGA_bf: 550.0 mm

DGA_tf: 36.0 mm

DGA_tw: 14.0 mm

DGB_bf: 550.0 mm

DGB_tf: 30.0 mm

DGB_tw: 18.0 mm

TRB_h: 850.0 mm

TRB_bf: 400.0 mm

TRB_tf: 40.0 mm

TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE280B
LG: HE340M
R_TR_B: HE200B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2301.92 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8026 mm

F60 Dynamic check (L=43.0 m): |U3|=9.80 mm -> X=5.67

L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 237

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.3232
mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.3232) = 7881979.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009007 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3030 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...


```

    -> Sheet: FramesWBTForFatigue . S11_final=129.7920,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=31.9214,
Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=180.1691,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=335.1739,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=139.1146,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=171.7168,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=12.0019,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=12.1930,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2301.92 kN, MaxRatio=1.800, F60_Dinamico=OK, SkewV=237,
    HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
    failures) -> Cost=7.044e+09

```

```

    Ratio counts by range: [>1.0]: 30; [0.9-1.0]: 8; [0.7-0.9]: 49;
    [0.4-0.7]: 30; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 455 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 14.0 mm
    BC_tw: 30.0 mm
    TC_h: 550.0 mm
    TC_tf: 32.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 24.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 34.0 mm
    DGB_tw: 26.0 mm
    TRB_h: 750.0 mm
    TRB_bf: 550.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 110.0 mm
    CTT_tf: 16.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 11.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 15.0 mm
    VER: HE360B

```

TRS: HE340B
LG: HE600M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2268.72 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1276 mm

F60 Dynamic check (L=43.0 m): |U3|=10.13 mm -> X=5.58

L.Inf (2.54) < X (5.58) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.9821
mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.9821) = 8565865.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011578 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6251 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=151.2031,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.7323,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=150.4842,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=141.9018,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=187.4778,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=218.0893,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=10.3559,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.5221, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2268.72 kN, MaxRatio=2.982, F60_Dinamico=OK, SkewV=0,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.026e+09

```

```

    Ratio counts by range: [>1.0]: 38; [0.9-1.0]: 12; [0.7-0.9]: 17;
[0.4-0.7]: 56; [0.1-0.4]: 43; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 456 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 600.0 mm
    BC_tf: 24.0 mm
    BC_tw: 32.0 mm
    TC_h: 650.0 mm
    TC_tf: 38.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 500.0 mm
    DGA_tf: 26.0 mm
    DGA_tw: 14.0 mm
    DGB_bf: 450.0 mm
    DGB_tf: 14.0 mm
    DGB_tw: 14.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 500.0 mm
    TRB_tf: 34.0 mm
    TRB_tw: 20.0 mm
    CTT_h: 140.0 mm
    CTT_tf: 14.0 mm
    CTB_h: 160.0 mm
    CTB_tf: 13.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 11.0 mm
    VER: HE550B
    TRS: HE220B
    LG: HE450M
    R_TR_B: HE260B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2394.24 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -10.3731 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.37 mm -> X=5.51
 L.Inf (2.54) < X (5.51) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 60

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 21.8250
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 21.8250) = 10589927.4$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00006926 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.8631 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=100.9488,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=28.4296,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=156.2149,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=175.3339,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=126.5572,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=158.5655,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=14.7007,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.5846,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2394.24 kN, MaxRatio=1.579, F60_Dinamico=OK, SkewV=60,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.358e+09
    Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 9; [0.7-0.9]: 11;
[0.4-0.7]: 64; [0.1-0.4]: 64; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 457 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 600.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 36.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 600.0 mm
DGB_tf: 26.0 mm
DGB_tw: 16.0 mm
TRB_h: 900.0 mm
TRB_bf: 600.0 mm
TRB_tf: 18.0 mm
TRB_tw: 22.0 mm
CTT_h: 120.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE400B
TRS: HE360B
LG: HE300M
R_TR_B: HE360B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2383.53 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -9.8025 mm
    F60 Dynamic check (L=43.0 m): |U3|=9.80 mm -> X=5.67
    L.Inf (2.54) < X (5.67) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 276

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.0853
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.0853) = 10465124.5$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00010731 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.2991 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=111.2404,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=29.4699,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=271.4047,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=212.9336,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=153.1344,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=183.2877,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=9.0576, Limit=118.5185
 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=7.8983, Limit=118.5185
 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2383.53 kN, MaxRatio=2.093, F60_Dinamico=OK, SkewV=276,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=9.544e+09
 Ratio counts by range: [>1.0]: 25; [$0.9-1.0$]: 6; [$0.7-0.9$]: 29;
 [$0.4-0.7$]: 45; [$0.1-0.4$]: 61; [≤ 0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 458 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 550.0 mm
DGA_tf: 36.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 26.0 mm
TRB_h: 550.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 18.0 mm
CTB_h: 120.0 mm
CTB_tf: 13.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 10.0 mm
VER: HE360B
TRS: HE340B
LG: HE340M
R_TR_B: HE320B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2255.60 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.7697 mm
F60 Dynamic check (L=43.0 m): |U3|=9.77 mm -> X=5.68
L.Inf (2.54) < X (5.68) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 234

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 31.7005
mm
Horizontal check: $R = (43000.0)^2 / (8 * 31.7005) = 7290895.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011393 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.2665 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=157.8332,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=49.4938,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=201.6124,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=155.6906,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=227.1599,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=290.1268,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.7248,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.4168,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2255.60 kN, MaxRatio=142671.111, F60_Dinamico=OK, SkewV=234,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.591e+19
Ratio counts by range: [>1.0]: 66; [0.9-1.0]: 14; [0.7-0.9]: 0;
[0.4-0.7]: 58; [0.1-0.4]: 28; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 459 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 12.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm

TC_tf: 30.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 28.0 mm
DGB_bf: 400.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 600.0 mm
TRB_bf: 450.0 mm
TRB_tf: 34.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE300B
LG: HE450M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2298.77 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.4774 mm

F60 Dynamic check (L=43.0 m): |U3|=10.48 mm -> X=5.48

L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9375

mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.9375) = 10076284.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008201 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.9702 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=143.5501,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.6960,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=151.2296,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.3654,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=162.2233,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=204.2581,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.7216,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.0916,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2298.77 kN, MaxRatio=1.755, F60_Dinamico=OK, SkewV=52,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=2.619e+09
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 26;
[0.4-0.7]: 39; [0.1-0.4]: 60; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 460 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 26.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 26.0 mm
DGB_tw: 26.0 mm
TRB_h: 750.0 mm

TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 20.0 mm
CTT_h: 180.0 mm
CTT_tf: 15.0 mm
CTB_h: 140.0 mm
CTB_tf: 13.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE340B
LG: HE500M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2308.96 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5435 mm

F60 Dynamic check (L=43.0 m): |U3|=10.54 mm -> X=5.47

L.Inf (2.54) < X (5.47) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.9554

mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.9554) = 8904683.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010268 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0389 mm (Limit: 71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=154.1068,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.6867,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=152.8975,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=131.0852,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=159.7529,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=199.0353,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.0250,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.7572,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2308.96 kN, MaxRatio=121040.532, F60_Dinamico=OK, SkewV=22,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=3.383e+19

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 14; [0.7-0.9]: 14;
 [0.4-0.7]: 56; [0.1-0.4]: 38; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 461 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 16.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm
DGA_tw: 24.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 24.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 18.0 mm
TRB_tw: 30.0 mm
CTT_h: 140.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 13.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm

```

VER: HE450B
TRS: HE280B
LG: HE320M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2109.25 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.7305 mm

F60 Dynamic check (L=43.0 m): |U3|=10.73 mm -> X=5.42

L.Inf (2.54) < X (5.42) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 268

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.2818 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.2818) = 10372824.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011629 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2221 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=124.4086,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.4332,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=218.3995,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.8037,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

```

    -> Sheet: FramesIBBForFatigue . S11_final=235.1228,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=254.7337,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=14.3329,
Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=14.6812,
Limit=118.5185 -> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2109.25 kN, MaxRatio=1.826, F60_Dinamico=OK, SkewV=268,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=7.197e+09

```

```

    Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 12; [0.7-0.9]: 34;
[0.4-0.7]: 48; [0.1-0.4]: 49; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 462 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 16.0 mm
    BC_tw: 26.0 mm
    TC_h: 650.0 mm
    TC_tf: 20.0 mm
    TC_tw: 36.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 22.0 mm
    DGA_tw: 12.0 mm
    DGB_bf: 500.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 12.0 mm
    TRB_h: 800.0 mm
    TRB_bf: 600.0 mm
    TRB_tf: 14.0 mm
    TRB_tw: 22.0 mm
    CTT_h: 170.0 mm
    CTT_tf: 13.0 mm
    CTB_h: 150.0 mm
    CTB_tf: 12.0 mm
    STCTB_h: 120.0 mm
    STCTB_tf: 14.0 mm
    VER: HE500B
    TRS: HE260B
    LG: HE450M
    R_TR_B: HE360B

```

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

```

    Total Weight (Sum |FZ_dead|): 2098.38 kN

```

U3 displacement at F60 (COMB01-PER-LOAD): -11.1530 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.15 mm -> X=5.31
 L.Inf (2.54) < X (5.31) < L.Sup (5.69) -> OK
 Starting Skew check for 16 combinations...
 Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 74

 Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 22.9392
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.9392) = 10075564.1$ mm
 Horizontal check result (R > 6000000.0 mm?): OK

 Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00011162 rad (Limit:
 0.002000). Estado: OK

 Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 18.6401 mm (Limit:
 71.6667 mm). Estado: OK

 Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=124.8132,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=33.1517,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=209.4762,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=183.8284,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=202.7046,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=243.3193,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=17.9281,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=15.6424,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```
Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
    Peso=2098.38 kN, MaxRatio=1.919, F60_Dinamico=OK, SkewV=74,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.430e+09
    Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 12; [0.7-0.9]: 27;
[0.4-0.7]: 62; [0.1-0.4]: 32; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 463 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 22.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 16.0 mm
DGB_bf: 500.0 mm
DGB_tf: 30.0 mm
DGB_tw: 12.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 24.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 13.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 14.0 mm
VER: HE320B
TRS: HE280B
LG: HE500M
R_TR_B: HE280B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
    Total Weight (Sum |FZ_dead|): 2205.71 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.4725 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.47 mm -> X=5.48
    L.Inf (2.54) < X (5.48) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```


Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
 Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...
 Extracción Horizontal completada. Máximo U2 (abs) encontrado: 27.5476
 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.5476) = 8390015.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00009911 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.9716 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=99.5314, Limit=92.5926
 -> NOT OK! (Cumulative failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=31.2955,
 Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=161.0193,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=153.9766,
 Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=142.3177,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=173.2687,
 Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=13.3655,
 Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=15.3546,
 Limit=118.5185 -> OK
 Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
 Design completed.
 >> RESULTADOS FINALES ITERACIÓN:
 Peso=2205.71 kN, MaxRatio=1.428, F60_Dinamico=OK, SkewV=22,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
 failures) -> Cost=1.000e+09
 Ratio counts by range: [>1.0]: 19; [0.9-1.0]: 10; [0.7-0.9]: 55;
 [0.4-0.7]: 35; [0.1-0.4]: 47; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 464 ---
=====
```

```
>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
```

```
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 800.0 mm
TC_tf: 34.0 mm
TC_tw: 36.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 20.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 850.0 mm
TRB_bf: 450.0 mm
TRB_tf: 28.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 13.0 mm
CTB_h: 130.0 mm
CTB_tf: 14.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE450B
TRS: HE220B
LG: HE400M
R_TR_B: HE220B
```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> RESULTADOS POST-ANÁLISIS (Preliminares):
```

```
Total Weight (Sum |FZ_dead|): 2346.21 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8888 mm
F60 Dynamic check (L=43.0 m): |U3|=9.89 mm -> X=5.64
L.Inf (2.54) < X (5.64) < L.Sup (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 134

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 25.3344
mm
Horizontal check: $R = (43000.0)^2 / (8 * 25.3344) = 9122969.6$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00009721 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.3859 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=102.4344,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.5689,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.9934,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=266.7356,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=152.0065,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=182.6158,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.3006,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1334,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2346.21 kN, MaxRatio=125355.998, F60_Dinamico=OK, SkewV=134,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=3.687e+19
Ratio counts by range: [>1.0]: 28; [0.9-1.0]: 8; [0.7-0.9]: 27;
[0.4-0.7]: 60; [0.1-0.4]: 43; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 465 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm

TC_tf: 30.0 mm
TC_tw: 36.0 mm
DGA_bf: 600.0 mm
DGA_tf: 30.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 28.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 28.0 mm
CTT_h: 140.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE320B
TRS: HE260B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2422.62 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.4466 mm

F60 Dynamic check (L=43.0 m): |U3|=9.45 mm -> X=5.78

L.Inf (2.54) < X (5.78) < L.Sup (5.69) -> Check: a dynamic analysis
is required

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 26.8631

mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.8631) = 8603802.5$ mm

Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009131 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9469 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=106.0443,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=28.3559,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=148.1780,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=148.6314,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=131.5343,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=158.3705,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.6400,
Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.1562,
Limit=118.5185 -> OK

Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2422.62 kN, MaxRatio=1.545, F60_Dinamico=Check, dynamic
analysis required, SkewV=8, HorizCheck=OK, AngularCheck=OK,
VertCheck_F60=OK, FatigueS11=NOT OK (5 failures) -> Cost=2.526e+10

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 6; [0.7-0.9]: 32;
[0.4-0.7]: 52; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 466 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 650.0 mm

BC_tf: 26.0 mm

BC_tw: 30.0 mm

TC_h: 650.0 mm

TC_tf: 26.0 mm

TC_tw: 36.0 mm

DGA_bf: 600.0 mm

DGA_tf: 22.0 mm

DGA_tw: 10.0 mm

DGB_bf: 450.0 mm

DGB_tf: 18.0 mm

DGB_tw: 26.0 mm

TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 180.0 mm
CTT_tf: 16.0 mm
CTB_h: 140.0 mm
CTB_tf: 10.0 mm
STCTB_h: 100.0 mm
STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE280B
LG: HE550M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2020.70 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6487 mm

F60 Dynamic check (L=43.0 m): |U3|=10.65 mm -> X=5.44

L.Inf (2.54) < X (5.44) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 33.6167
mm

Horizontal check: $R = (43000.0)^2 / (8 * 33.6167) = 6875308.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014386 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1490 mm (Limit:
71.6667 mm). Estado: OK

```

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=135.1177,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=44.5874,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=160.8529,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=267.4306,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=209.9458,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=254.8798,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.1881,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=15.4866,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

Peso=2020.70 kN, MaxRatio=3.102, F60_Dinamico=OK, SkewV=2,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=9.066e+09

```

```

Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 18; [0.7-0.9]: 50;
[0.4-0.7]: 47; [0.1-0.4]: 26; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 467 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

BC_h: 650.0 mm
BC_tf: 30.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 22.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 34.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 11.0 mm
STCTB_h: 140.0 mm

```

STCTB_tf: 11.0 mm
VER: HE300B
TRS: HE340B
LG: HE400M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2062.07 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9650 mm

F60 Dynamic check (L=43.0 m): |U3|=10.97 mm -> X=5.36

L.Inf (2.54) < X (5.36) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 132

Starting Horizontal U2 check for 24 combinations...

Extracción Horizontal completada. Máximo U2 (abs) encontrado: 29.0657 mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.0657) = 7951799.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00014491 rad (Limit: 0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4646 mm (Limit: 71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=106.1382,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.2939,
Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=207.2277,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)


```

    -> Sheet: FramesRSTForFatigue . S11_final=175.4955,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=211.8278,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=257.8403,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.9223, Limit=118.5185
-> OK
    -> Sheet: FramesIBTForFatigue . S11_final=9.5434, Limit=118.5185
-> OK
    Fatigue S11 check completed. Overall status: NOT OK (5 failures)

```

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

```

    Peso=2062.07 kN, MaxRatio=1.837, F60_Dinamico=OK, SkewV=132,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=4.271e+09

```

```

    Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 9; [0.7-0.9]: 57;
[0.4-0.7]: 51; [0.1-0.4]: 31; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 468 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

```

    BC_h: 650.0 mm
    BC_tf: 38.0 mm
    BC_tw: 32.0 mm
    TC_h: 700.0 mm
    TC_tf: 22.0 mm
    TC_tw: 38.0 mm
    DGA_bf: 450.0 mm
    DGA_tf: 20.0 mm
    DGA_tw: 20.0 mm
    DGB_bf: 400.0 mm
    DGB_tf: 16.0 mm
    DGB_tw: 26.0 mm
    TRB_h: 700.0 mm
    TRB_bf: 600.0 mm
    TRB_tf: 24.0 mm
    TRB_tw: 24.0 mm
    CTT_h: 130.0 mm
    CTT_tf: 12.0 mm
    CTB_h: 170.0 mm
    CTB_tf: 11.0 mm
    STCTB_h: 90.0 mm
    STCTB_tf: 13.0 mm
    VER: HE500B
    TRS: HE320B
    LG: HE550M
    R_TR_B: HE340B

```

Running analysis...

Analysis completed.

```

>> RESULTADOS POST-ANÁLISIS (Preliminares):
    Total Weight (Sum |FZ_dead|): 2481.99 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.0620 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.06 mm -> X=5.60
    L.Inf (2.54) < X (5.60) < L.Sup (5.69) -> OK
Starting Skew check for 16 combinations...
    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
    Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
    Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
    Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
    Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
    Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
    Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
    Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
    Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
    Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
    Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
    Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
    Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 19.2896
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 19.2896) = 11981820.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00008188 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.5528 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=82.8362, Limit=92.5926
-> OK
-> Sheet: FramesRBTForFatigue . S11_final=29.3038,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=152.0614,
Limit=118.5185 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=126.8347,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=136.1368,
Limit=92.5926 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=167.1865,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=10.6651,
Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=9.0076, Limit=118.5185
-> OK
Fatigue S11 check completed. Overall status: NOT OK (4 failures)

Running design...

Design completed.

>> RESULTADOS FINALES ITERACIÓN:

Peso=2481.99 kN, MaxRatio=2.363, F60_Dinamico=OK, SkewV=4,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (4
failures) -> Cost=4.809e+09

Ratio counts by range: [>1.0]: 22; [0.9-1.0]: 5; [0.7-0.9]: 14;
[0.4-0.7]: 84; [0.1-0.4]: 41; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 469 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 12.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE280B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2176.62 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2705 mm
F60 Dynamic check (L=43.0 m): |U3|=10.27 mm -> X=5.54
L.Inf (2.54) < X (5.54) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.1582
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.1582) = 9567140.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011116 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.7664 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=133.8228,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.3745,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=157.7101,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=149.1322,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.9328,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=229.8575,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.9384,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.0655,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:

Peso=2176.62 kN, MaxRatio=1.627, F60_Dinamico=OK, SkewV=8,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.140e+09

Ratio counts by range: [>1.0]: 37; [0.9-1.0]: 12; [0.7-0.9]: 17;
[0.4-0.7]: 49; [0.1-0.4]: 51; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 470 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 22.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE280B
LG: HE550M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2176.68 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.3525 mm
F60 Dynamic check (L=43.0 m): |U3|=11.35 mm -> X=5.27
L.Inf (2.54) < X (5.27) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.2032
mm
Horizontal check:  $R = (43000.0)^2 / (8 * 24.2032) = 9549355.9$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00007909 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.8518 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=106.3263,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.8550,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=132.8710,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=122.7127,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=114.7819,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=145.3667,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.9998,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.0737,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2176.68 kN, MaxRatio=1.890, F60_Dinamico=OK, SkewV=2,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=1.875e+09
Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 4; [0.7-0.9]: 18;
[0.4-0.7]: 62; [0.1-0.4]: 47; [<=0.1]: 0;

```

```

=====
--- STARTING GA ITERATION No. 471 ---
=====

```

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:

BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 750.0 mm
TC_tf: 32.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 18.0 mm
DGB_bf: 350.0 mm
DGB_tf: 30.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 38.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE280B
LG: HE340M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> RESULTADOS POST-ANÁLISIS (Preliminares):

Total Weight (Sum |FZ_dead|): 2266.25 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.7031 mm
F60 Dynamic check (L=43.0 m): |U3|=10.70 mm -> X=5.43
L.Inf (2.54) < X (5.43) < L.Sup (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 239

Starting Horizontal U2 check for 24 combinations...
Extracción Horizontal completada. Máximo U2 (abs) encontrado: 24.3987
mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3987) = 9472836.9$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010006 rad (Limit:
0.002000). Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 18.2020 mm (Limit:
71.6667 mm). Estado: OK

Starting Fatigue S11 check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=129.1635,
Limit=92.5926 -> NOT OK! (Cumulative failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.9126,
Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=176.5159,
Limit=118.5185 -> NOT OK! (Cumulative failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=263.4815,
Limit=118.5185 -> NOT OK! (Cumulative failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=164.4712,
Limit=92.5926 -> NOT OK! (Cumulative failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=203.4279,
Limit=92.5926 -> NOT OK! (Cumulative failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8980,
Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.8417,
Limit=118.5185 -> OK
Fatigue S11 check completed. Overall status: NOT OK (5 failures)

Running design...
Design completed.
>> RESULTADOS FINALES ITERACIÓN:
Peso=2266.25 kN, MaxRatio=1.406, F60_Dinamico=OK, SkewV=239,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigueS11=NOT OK (5
failures) -> Cost=5.903e+09
Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 20; [0.7-0.9]: 22;
[0.4-0.7]: 47; [0.1-0.4]: 53; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 472 ---
=====

>> GEOMETRÍA SELECCIONADA PARA ESTA ITERACIÓN:
BC_h: 700.0 mm
BC_tf: 14.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm

DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 12.0 mm
TRB_h: 700.0 mm
TRB

MATLAB Command Window Page 1

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 78

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.8113 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.8113) = 9706530.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009463 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.9067 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=75.1209, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=25.8582, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=198.0554, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=169.6104, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=129.6190, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=152.6485, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=10.5987, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.8498, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2278.72 kN, MaxRatio=1.307, F60_Dinamico=OK, SkewV=78, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=2.
083e+09

Ratio counts by range: [>1.0]: 7; [0.9-1.0]: 8; [0.7-0.9]: 35; [0.4-0.7]:
61; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 481 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm

BC_tf: 24.0 mm

BC_tw: 32.0 mm
 TC_h: 600.0 mm
 TC_tf: 34.0 mm
 TC_tw: 40.0 mm
 DGA_bf: 400.0 mm
 DGA_tf: 38.0 mm
 DGA_tw: 24.0 mm
 DGB_bf: 500.0 mm
 DGB_tf: 16.0 mm
 DGB_tw: 24.0 mm
 TRB_h: 750.0 mm
 TRB_bf: 700.0 mm
 TRB_tf: 22.0 mm
 TRB_tw: 24.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 16.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 16.0 mm
 STCTB_h: 90.0 mm
 STCTB_tf: 11.0 mm
 VER: HE450B
 TRS: HE300B
 LG: HE550M
 R_TR_B: HE340B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2535.54 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.1808 mm

F60 Dynamic check (L=43.0 m): |U3|=9.18 mm -> X=5.86

L.Lower (2.54) < X (5.86) < L.Upper (5.69) -> Verificar, es necesario un análisis dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 20.5328 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 20.5328) = 11256404.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008791 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.6757 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=77.7542, Limit=92.5926 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=25.8065, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=153.9590, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=133.3768, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=132.8674, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=164.5287, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=10.9874, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.1308, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2535.54 kN, MaxRatio=1.475, F60_Dinamico=Verificar, es necesario un
 análisis dinámico, SkewV=8, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK,
 FatigaS11=NO CUMPLE (4 fallos) -> Costo=2.623e+10
 Ratio counts by range: [>1.0]: 10; [$0.9-1.0$]: 10; [$0.7-0.9$]: 23; [$0.4-0.7$]:
 44; [$0.1-0.4$]: 79; [≤ 0.1]: 0;

=====
 --- STARTING GA ITERATION No. 482 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm
 BC_tf: 24.0 mm
 BC_tw: 36.0 mm
 TC_h: 600.0 mm
 TC_tf: 32.0 mm
 TC_tw: 36.0 mm
 DGA_bf: 400.0 mm
 DGA_tf: 26.0 mm
 DGA_tw: 22.0 mm
 DGB_bf: 400.0 mm
 DGB_tf: 20.0 mm
 DGB_tw: 26.0 mm
 TRB_h: 800.0 mm

TRB_bf: 600.0 mm
 TRB_tf: 30.0 mm
 TRB_tw: 26.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 17.0 mm
 CTB_h: 180.0 mm
 CTB_tf: 15.0 mm
 STCTB_h: 120.0 mm
 STCTB_tf: 11.0 mm
 VER: HE340B
 TRS: HE320B
 LG: HE550M
 R_TR_B: HE400B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2397.13 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2220 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.22 mm -> X=5.55
 L.Lower (2.54) < X (5.55) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.0212 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 23.0212) = 10039654.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009025 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7210 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=77.4024, Limit=92.5926 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=25.6527, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=144.2496, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=111.3794, Limit=118.5185 -> OK
 -> Sheet: FramesIBBForFatigue . S11_final=124.6535, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesEBBForFatigue . S11_final=153.3313, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBTForFatigue . S11_final=9.9375, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.2091, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (3 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2397.13 kN, MaxRatio=1.294, F60_Dinamico=OK, SkewV=8, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (3 fallos) -> Costo=4.
 707e+08

Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 4; [0.7-0.9]: 23; [0.4-0.7]:
 80; [0.1-0.4]: 47; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 483 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
 BC_tf: 28.0 mm
 BC_tw: 40.0 mm
 TC_h: 500.0 mm
 TC_tf: 38.0 mm
 TC_tw: 38.0 mm
 DGA_bf: 550.0 mm
 DGA_tf: 32.0 mm
 DGA_tw: 18.0 mm
 DGB_bf: 500.0 mm
 DGB_tf: 38.0 mm
 DGB_tw: 10.0 mm
 TRB_h: 900.0 mm
 TRB_bf: 400.0 mm
 TRB_tf: 30.0 mm
 TRB_tw: 20.0 mm
 CTT_h: 170.0 mm
 CTT_tf: 16.0 mm
 CTB_h: 180.0 mm
 CTB_tf: 17.0 mm
 STCTB_h: 80.0 mm
 STCTB_tf: 14.0 mm
 VER: HE450B
 TRS: HE220B
 LG: HE360M
 R_TR_B: HE280B

```

-----
Running analysis...
Analysis completed.
>> POST-ANALYSIS RESULTS (Preliminary):
    Total weight (Sum |FZ_dead|): 2677.86 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -8.3384 mm
    F60 Dynamic check (L=43.0 m): |U3|=8.34 mm -> X=6.15
    L.Lower (2.54) < X (6.15) < L.Upper (5.69) -> Verificar, es necesario un análisis
dinámico
Starting Skew check for 16 combinations...
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
Skew check completed. Total violations (> 0.8 mm): 201

Starting Horizontal U2 check for 24 combinations...
Horizontal extraction completed. Maximum U2 (abs) found: 23.0466 mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.0466) = 10028598.7$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00010072 rad (Limit: 0.002000).
Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 15.8370 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=79.9097, Limit=92.5926 -> OK
-> Sheet: FramesRBTForFatigue . S11_final=24.1733, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=208.4110, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=190.9422, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=155.4319, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=174.9905, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=14.5177, Limit=118.5185 -> OK

```

-> Sheet: FramesIBTForFatigue . S11_final=16.0029, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2677.86 kN, MaxRatio=1.105, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=201, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=3.230e+10

Ratio counts by range: [>1.0]: 4; [0.9-1.0]: 2; [0.7-0.9]: 12; [0.4-0.7]: 66; [0.1-0.4]: 82; [<=0.1]: 0;

--- STARTING GA ITERATION No. 484 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 12.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 14.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 14.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE240B
LG: HE600M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2214.83 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2778 mm
F60 Dynamic check (L=43.0 m): |U3|=10.28 mm -> X=5.54
L.Lower (2.54) < X (5.54) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.7069 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.7069) = 9354691.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009938 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7752 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFatigue . S11_final=98.3728, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=27.9689, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=163.2476, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=267.9491, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=155.5133, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=186.0021, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=14.7686, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=13.3073, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2214.83 kN, MaxRatio=95082.742, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
 002e+19

Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 9; [0.7-0.9]: 15; [0.4-0.7]:
 67; [0.1-0.4]: 39; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 485 ---
=====
>> SELECTED GEOMETRY FOR THIS ITERATION:
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 24.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 36.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE240B
LG: HE340M
R_TR_B: HE260B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> POST-ANALYSIS RESULTS (Preliminary):
Total weight (Sum |FZ_dead|): 2226.04 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.9346 mm
F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37
L.Lower (2.54) < X (5.37) < L.Upper (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

```

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Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 231

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.2276 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.2276) = 9161592.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006568 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4334 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=88.8557, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=25.9716, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=158.4924, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=172.2372, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=92.4380, Limit=92.5926 -> OK

-> Sheet: FramesEBBForFatigue . S11_final=114.0148, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBTForFatigue . S11_final=16.8240, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=21.1818, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (3 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2226.04 kN, MaxRatio=1.548, F60_Dinamico=OK, SkewV=231, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (3 fallos) -> Costo=5.
877e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 15; [0.7-0.9]: 39; [0.4-0.7]:
32; [0.1-0.4]: 57; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 486 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 500.0 mm

BC_tf: 22.0 mm

BC_tw: 32.0 mm

TC_h: 600.0 mm

TC_tf: 20.0 mm

TC_tw: 40.0 mm

DGA_bf: 500.0 mm

DGA_tf: 32.0 mm

DGA_tw: 22.0 mm
DGB_bf: 600.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE220B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2135.99 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.5388 mm
F60 Dynamic check (L=43.0 m): |U3|=10.54 mm -> X=5.47
L.Lower (2.54) < X (5.47) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 30.9649 mm
Horizontal check: $R = (43000.0)^2 / (8 * 30.9649) = 7464103.7$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011839 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0391 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=164.6384, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=41.2667, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=155.8268, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=175.8070, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=183.8227, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=230.8148, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=19.6271, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=23.0689, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2135.99 kN, MaxRatio=1.802, F60_Dinamico=OK, SkewV=24, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.992e+09

Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 12; [0.7-0.9]: 53; [0.4-0.7]: 33; [0.1-0.4]: 51; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 487 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 550.0 mm
BC_tf: 8.0 mm
BC_tw: 26.0 mm
TC_h: 750.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 38.0 mm
DGA_tw: 30.0 mm
DGB_bf: 400.0 mm
DGB_tf: 38.0 mm
DGB_tw: 10.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 14.0 mm
TRB_tw: 30.0 mm
CTT_h: 170.0 mm
CTT_tf: 11.0 mm
CTB_h: 180.0 mm
```

CTB_tf: 20.0 mm
 STCTB_h: 150.0 mm
 STCTB_tf: 11.0 mm
 VER: HE600B
 TRS: HE200B
 LG: HE300M
 R_TR_B: HE400B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2481.79 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2183 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.22 mm -> X=5.55
 L.Lower (2.54) < X (5.55) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 301

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.8776 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.8776) = 8290717.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008883 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7072 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=194.2468, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=46.7704, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=231.7169, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

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```
-> Sheet: FramesRSTForFatigue . S11_final=156.9665, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=367.7275, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=396.1710, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.5262, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.6462, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2481.79 kN, MaxRatio=2.862, F60_Dinamico=OK, SkewV=301, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
620e+10

Ratio counts by range: [>1.0]: 44; [0.9-1.0]: 2; [0.7-0.9]: 13; [0.4-0.7]:
42; [0.1-0.4]: 65; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 488 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 18.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 20.0 mm
TRB_h: 650.0 mm
TRB_bf: 400.0 mm
TRB_tf: 34.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 15.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE260B
LG: HE340M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2312.50 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.9585 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.96 mm -> X=5.62
 L.Lower (2.54) < X (5.62) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 232

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 20.9616 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 20.9616) = 11026088.5$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008032 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4485 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=101.2440, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=32.5288, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=172.6154, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=147.3712, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=163.3824, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=202.6575, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.9058, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=17.2832, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2312.50 kN, MaxRatio=1.730, F60_Dinamico=OK, SkewV=232, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=6.
714e+09

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 3; [0.7-0.9]: 10; [0.4-0.7]:
77; [0.1-0.4]: 55; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 489 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm
BC_tf: 14.0 mm
BC_tw: 30.0 mm
TC_h: 650.0 mm
TC_tf: 32.0 mm
TC_tw: 34.0 mm
DGA_bf: 500.0 mm
DGA_tf: 20.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 24.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 160.0 mm
CTB_tf: 12.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE280B
LG: HE340M
R_TR_B: HE240B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2234.84 kN
U3 displacement at F60 (COMB01-PER-LOAD): -9.8658 mm
F60 Dynamic check (L=43.0 m): |U3|=9.87 mm -> X=5.65
L.Lower (2.54) < X (5.65) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 222

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.7949 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.7949) = 9321461.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010770 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3603 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=104.9739, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=36.9936, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=231.0690, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=227.4418, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=209.2038, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=266.1269, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=13.1132, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.6965, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2234.84 kN, MaxRatio=1.665, F60_Dinamico=OK, SkewV=222, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=6.
 061e+09

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 11; [0.7-0.9]: 31; [0.4-0.7]:
 57; [0.1-0.4]: 38; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 490 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm
 BC_tf: 12.0 mm
 BC_tw: 26.0 mm
 TC_h: 600.0 mm
 TC_tf: 16.0 mm
 TC_tw: 40.0 mm
 DGA_bf: 350.0 mm
 DGA_tf: 20.0 mm
 DGA_tw: 14.0 mm
 DGB_bf: 600.0 mm
 DGB_tf: 14.0 mm
 DGB_tw: 10.0 mm
 TRB_h: 850.0 mm
 TRB_bf: 700.0 mm
 TRB_tf: 14.0 mm
 TRB_tw: 26.0 mm
 CTT_h: 180.0 mm
 CTT_tf: 19.0 mm
 CTB_h: 100.0 mm
 CTB_tf: 19.0 mm
 STCTB_h: 100.0 mm
 STCTB_tf: 14.0 mm
 VER: HE340B
 TRS: HE360B
 LG: HE340M
 R_TR_B: HE220B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 1967.24 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -11.9456 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.95 mm -> X=5.14
 L.Lower (2.54) < X (5.14) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 235

Starting Horizontal U2 check for 24 combinations...
Horizontal extraction completed. Maximum U2 (abs) found: 26.1488 mm
Horizontal check: $R = (43000.0)^2 / (8 * 26.1488) = 8838848.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
Angular check completed. Max Theta (abs): 0.00011948 rad (Limit: 0.002000).
Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 19.4420 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=109.6934, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.4703, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=229.0057, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=268.0165, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=190.6711, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=232.7302, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8336, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.5421, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...
Design completed.
>> FINAL RESULTS - ITERATION:
Weight=1967.24 kN, MaxRatio=152213.870, F60_Dinamico=OK, SkewV=235,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
Costo=4.558e+19
Ratio counts by range: [>1.0]: 58; [$0.9-1.0$]: 12; [$0.7-0.9$]: 34; [$0.4-0.7$]:
37; [$0.1-0.4$]: 25; [≤ 0.1]: 0;

=====
--- STARTING GA ITERATION No. 491 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:
BC_h: 500.0 mm
BC_tf: 28.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 14.0 mm
DGB_bf: 400.0 mm

DGB_tf: 18.0 mm
 DGB_tw: 14.0 mm
 TRB_h: 900.0 mm
 TRB_bf: 450.0 mm
 TRB_tf: 28.0 mm
 TRB_tw: 28.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 10.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 11.0 mm
 STCTB_h: 140.0 mm
 STCTB_tf: 15.0 mm
 VER: HE400B
 TRS: HE240B
 LG: HE500M
 R_TR_B: HE200B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2030.80 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -11.6768 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.68 mm -> X=5.19
 L.Lower (2.54) < X (5.19) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.3927 mm

Horizontal check: $R = (43000.0)^2 / (8 * 25.3927) = 9102035.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010007 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.1715 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=134.2505, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=30.5043, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=193.3239, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=341.3470, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=151.3572, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=176.9381, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.4724, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=14.5371, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2030.80 kN, MaxRatio=1.909, F60_Dinamico=OK, SkewV=22, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
227e+09

Ratio counts by range: [>1.0]: 29; [0.9-1.0]: 4; [0.7-0.9]: 30; [0.4-0.7]:
66; [0.1-0.4]: 37; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 492 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 500.0 mm
BC_tf: 36.0 mm
BC_tw: 26.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 22.0 mm
DGA_tw: 10.0 mm
DGB_bf: 550.0 mm
DGB_tf: 20.0 mm
DGB_tw: 18.0 mm
TRB_h: 900.0 mm
TRB_bf: 400.0 mm
TRB_tf: 16.0 mm
TRB_tw: 28.0 mm
CTT_h: 110.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
```

STCTB_tf: 11.0 mm
 VER: HE400B
 TRS: HE260B
 LG: HE300M
 R_TR_B: HE220B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2141.81 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.8883 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.89 mm -> X=5.38
 L.Lower (2.54) < X (5.38) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 290

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.5963 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.5963) = 9029619.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013116 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3840 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=144.5217, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.6420, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=242.4003, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=268.5078, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)

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```
-> Sheet: FramesIBBForFatigue . S11_final=281.5472, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=296.8234, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.6586, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.6537, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```
Weight=2141.81 kN, MaxRatio=2.330, F60_Dinamico=OK, SkewV=290, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
010e+10
```

```
Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 7; [0.7-0.9]: 21; [0.4-0.7]:
30; [0.1-0.4]: 72; [<=0.1]: 0;
```

```
>> Checkpoint guardado (Gen=9, FunEval=492): D:\000.Robinson Mercado\001.Model
3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
```

```
9          492          1.717e+08          6.275e+18          3
```

```
=====
--- STARTING GA ITERATION No. 493 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 500.0 mm
BC_tf: 20.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 34.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 18.0 mm
DGB_bf: 500.0 mm
DGB_tf: 14.0 mm
DGB_tw: 16.0 mm
TRB_h: 700.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 140.0 mm
CTT_tf: 14.0 mm
CTB_h: 130.0 mm
CTB_tf: 10.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 14.0 mm
VER: HE450B
TRS: HE260B
LG: HE340M
R_TR_B: HE260B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2083.65 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.9308 mm

F60 Dynamic check (L=43.0 m): |U3|=10.93 mm -> X=5.37

L.Lower (2.54) < X (5.37) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 221

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.5391 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.5391) = 8392608.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009988 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4223 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=147.9223, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=39.3764, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=213.5061, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=192.2634, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=178.6360, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=221.5005, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=17.6998, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=13.3394, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2083.65 kN, MaxRatio=3.458, F60_Dinamico=OK, SkewV=221, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.730e+10

Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 12; [0.7-0.9]: 25; [0.4-0.7]: 45; [0.1-0.4]: 48; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 494 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 500.0 mm
 BC_tf: 28.0 mm
 BC_tw: 34.0 mm
 TC_h: 600.0 mm
 TC_tf: 32.0 mm
 TC_tw: 40.0 mm
 DGA_bf: 500.0 mm
 DGA_tf: 24.0 mm
 DGA_tw: 20.0 mm
 DGB_bf: 500.0 mm
 DGB_tf: 18.0 mm
 DGB_tw: 22.0 mm
 TRB_h: 700.0 mm
 TRB_bf: 400.0 mm
 TRB_tf: 38.0 mm
 TRB_tw: 18.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 19.0 mm
 CTB_h: 130.0 mm
 CTB_tf: 15.0 mm
 STCTB_h: 130.0 mm
 STCTB_tf: 11.0 mm
 VER: HE400B
 TRS: HE220B
 LG: HE500M
 R_TR_B: HE260B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2234.16 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2159 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.22 mm -> X=5.55
 L.Lower (2.54) < X (5.55) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 28.7711 mm

Horizontal check: $R = (43000.0)^2 / (8 * 28.7711) = 8033231.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010575 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7132 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=138.2445, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=35.8029, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=151.1498, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=176.2559, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=154.7098, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=189.4477, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=18.5403, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=18.9194, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2234.16 kN, MaxRatio=125260.317, F60_Dinamico=OK, SkewV=22,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
 Costo=3.505e+19

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 3; [0.7-0.9]: 30; [0.4-0.7]:
 58; [0.1-0.4]: 52; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 495 ---

```
=====
```

```
>> SELECTED GEOMETRY FOR THIS ITERATION:
```

```
BC_h: 500.0 mm
BC_tf: 30.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 18.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 40.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 450.0 mm
TRB_tf: 22.0 mm
TRB_tw: 26.0 mm
CTT_h: 110.0 mm
CTT_tf: 14.0 mm
CTB_h: 170.0 mm
CTB_tf: 15.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 11.0 mm
VER: HE400B
TRS: HE240B
LG: HE550M
R_TR_B: HE280B
```

```
-----
```

```
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```
Total weight (Sum |FZ_dead|): 2314.61 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2764 mm
F60 Dynamic check (L=43.0 m): |U3|=10.28 mm -> X=5.54
L.Lower (2.54) < X (5.54) < L.Upper (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
```

Skew check completed. Total violations (> 0.8 mm): 4

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 26.7018 mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.7018) = 8655784.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012362 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7739 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=153.6265, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=42.1023, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=152.9190, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=149.3916, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=204.4322, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=246.4869, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=13.8724, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.3892, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2314.61 kN, MaxRatio=2.781, F60_Dinamico=OK, SkewV=4, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=7.
547e+09

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 8; [0.7-0.9]: 18; [0.4-0.7]:
61; [0.1-0.4]: 46; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 496 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 550.0 mm
BC_tf: 8.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 30.0 mm
DGA_tw: 26.0 mm
```

DGB_bf: 500.0 mm
 DGB_tf: 34.0 mm
 DGB_tw: 14.0 mm
 TRB_h: 700.0 mm
 TRB_bf: 650.0 mm
 TRB_tf: 22.0 mm
 TRB_tw: 20.0 mm
 CTT_h: 140.0 mm
 CTT_tf: 10.0 mm
 CTB_h: 160.0 mm
 CTB_tf: 19.0 mm
 STCTB_h: 110.0 mm
 STCTB_tf: 14.0 mm
 VER: HE400B
 TRS: HE240B
 LG: HE550M
 R_TR_B: HE260B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2244.08 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2099 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.21 mm -> X=5.56
 L.Lower (2.54) < X (5.56) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 6

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.4509 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.4509) = 8419575.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010648 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7070 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=178.6620, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.7850, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=163.8819, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=177.1148, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=189.0677, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=227.9237, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.0189, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.7569, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2244.08 kN, MaxRatio=4.056, F60_Dinamico=OK, SkewV=6, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
120e+10

Ratio counts by range: [>1.0]: 57; [0.9-1.0]: 6; [0.7-0.9]: 3; [0.4-0.7]:
46; [0.1-0.4]: 54; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 497 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 550.0 mm
BC_tf: 18.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 34.0 mm
DGA_bf: 350.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 550.0 mm
DGB_tf: 26.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 12.0 mm
```

STCTB_h: 110.0 mm
 STCTB_tf: 11.0 mm
 VER: HE450B
 TRS: HE280B
 LG: HE550M
 R_TR_B: HE280B

 Running analysis...
 Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):
 Total weight (Sum |FZ_dead|): 2256.62 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.9661 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62
 L.Lower (2.54) < X (5.62) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.8710 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.8710) = 8933744.4$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011047 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4599 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=144.7836, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=41.4956, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=162.9875, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=153.4414, Limit=118.5185 -> ;NO


```
CUMPLE! (Accumulated failures: 3)
  -> Sheet: FramesIBBForFatigue . S11_final=220.2579, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
  -> Sheet: FramesEBBForFatigue . S11_final=261.6446, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
  -> Sheet: FramesEBTForFatigue . S11_final=14.3217, Limit=118.5185 -> OK
  -> Sheet: FramesIBTForFatigue . S11_final=12.4767, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```
Weight=2256.62 kN, MaxRatio=1.957, F60_Dinamico=OK, SkewV=8, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
362e+09
```

```
Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 9; [0.7-0.9]: 19; [0.4-0.7]:
65; [0.1-0.4]: 40; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 498 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 550.0 mm
BC_tf: 22.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 16.0 mm
DGB_bf: 350.0 mm
DGB_tf: 24.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 450.0 mm
TRB_tf: 30.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 170.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE280B
LG: HE500M
R_TR_B: HE240B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

```
Total weight (Sum |FZ_dead|): 2109.79 kN
```

U3 displacement at F60 (COMB01-PER-LOAD): -10.7824 mm

F60 Dynamic check (L=43.0 m): |U3|=10.78 mm -> X=5.41

L.Lower (2.54) < X (5.41) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 26.0993 mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.0993) = 8855588.7$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010978 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.2811 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=141.0328, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=34.0468, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=162.7093, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=212.0509, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=166.8984, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=202.9114, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=12.1101, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.4920, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

```
>> FINAL RESULTS - ITERATION:
    Weight=2109.79 kN, MaxRatio=1.672, F60_Dinamico=OK, SkewV=22, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
523e+09
    Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 12; [0.7-0.9]: 30; [0.4-0.7]:
54; [0.1-0.4]: 49; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 499 ---
=====
```

```
>> SELECTED GEOMETRY FOR THIS ITERATION:
```

```
BC_h: 600.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 30.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 16.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 24.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 15.0 mm
VER: HE400B
TRS: HE260B
LG: HE500M
R_TR_B: HE260B
```

```
-----
Running analysis...
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
    Total weight (Sum |FZ_dead|): 2227.26 kN
    U3 displacement at F60 (COMB01-PER-LOAD): -10.1916 mm
    F60 Dynamic check (L=43.0 m): |U3|=10.19 mm -> X=5.56
    L.Lower (2.54) < X (5.56) < L.Upper (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.3699 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.3699) = 9484040.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011312 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6873 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=126.9825, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=37.9593, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=163.3894, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=176.9431, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=191.5057, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=232.1759, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.2747, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=16.4145, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2227.26 kN, MaxRatio=1.316, F60_Dinamico=OK, SkewV=24, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=8.
 681e+08

Ratio counts by range: [>1.0]: 17; [0.9-1.0]: 5; [0.7-0.9]: 42; [0.4-0.7]:
 54; [0.1-0.4]: 48; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 500 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 600.0 mm
BC_tf: 26.0 mm
BC_tw: 28.0 mm
TC_h: 750.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 500.0 mm
DGA_tf: 34.0 mm
DGA_tw: 30.0 mm
DGB_bf: 450.0 mm
DGB_tf: 24.0 mm
DGB_tw: 18.0 mm
TRB_h: 650.0 mm
TRB_bf: 500.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 19.0 mm
CTB_h: 150.0 mm
CTB_tf: 19.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 12.0 mm
VER: HE500B
TRS: HE300B
LG: HE400M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2553.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.2990 mm

F60 Dynamic check (L=43.0 m): |U3|=9.30 mm -> X=5.82

L.Lower (2.54) < X (5.82) < L.Upper (5.69) -> Verificar, es necesario un análisis dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 129

Starting Horizontal U2 check for 24 combinations...
 Horizontal extraction completed. Maximum U2 (abs) found: 22.1949 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.1949) = 10413428.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00008948 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 16.7905 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=113.7604, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=36.4076, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=188.3465, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=148.9843, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=180.5706, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=226.8853, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.7917, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.5904, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2553.58 kN, MaxRatio=18.151, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=129, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=7.801e+11

Ratio counts by range: [>1.0]: 26; [$0.9-1.0$]: 5; [$0.7-0.9$]: 26; [$0.4-0.7$]: 51; [$0.1-0.4$]: 58; [≤ 0.1]: 0;

>> Snapshot iter 500 guardado: D:\000.Robinson Mercado\001.Model 3D\05.

MatLAB\Logs\snapshot_iter_500_20251114_013311.mat

=====
 --- STARTING GA ITERATION No. 501 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 600.0 mm
 BC_tf: 28.0 mm
 BC_tw: 34.0 mm
 TC_h: 500.0 mm
 TC_tf: 32.0 mm
 TC_tw: 36.0 mm
 DGA_bf: 450.0 mm
 DGA_tf: 26.0 mm

DGA_tw: 12.0 mm
 DGB_bf: 500.0 mm
 DGB_tf: 18.0 mm
 DGB_tw: 14.0 mm
 TRB_h: 900.0 mm
 TRB_bf: 600.0 mm
 TRB_tf: 26.0 mm
 TRB_tw: 24.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 10.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 19.0 mm
 STCTB_h: 150.0 mm
 STCTB_tf: 15.0 mm
 VER: HE400B
 TRS: HE360B
 LG: HE600M
 R_TR_B: HE320B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2313.50 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.6799 mm

F60 Dynamic check (L=43.0 m): |U3|=10.68 mm -> X=5.43

L.Lower (2.54) < X (5.43) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 19.1847 mm

Horizontal check: $R = (43000.0)^2 / (8 * 19.1847) = 12047330.3$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009086 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1749 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=99.9443, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.2776, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=159.0635, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=146.2016, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=131.0176, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=151.7597, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.8190, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=7.5748, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2313.50 kN, MaxRatio=1.720, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
314e+09

Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 9; [0.7-0.9]: 14; [0.4-0.7]:
70; [0.1-0.4]: 59; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 502 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 600.0 mm
BC_tf: 32.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 18.0 mm
TC_tw: 40.0 mm
DGA_bf: 450.0 mm
DGA_tf: 36.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 600.0 mm
TRB_tf: 26.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 14.0 mm
CTB_h: 150.0 mm
```


CTB_tf: 20.0 mm
 STCTB_h: 130.0 mm
 STCTB_tf: 12.0 mm
 VER: HE320B
 TRS: HE360B
 LG: HE450M
 R_TR_B: HE260B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2180.23 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.6510 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.65 mm -> X=5.44
 L.Lower (2.54) < X (5.44) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 66

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.8545 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 24.8545) = 9299108.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010622 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.1496 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=107.6886, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=35.6392, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=166.6756, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

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```
-> Sheet: FramesRSTForFatigue . S11_final=176.2785, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=151.5952, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=188.0923, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=8.8114, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.1438, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2180.23 kN, MaxRatio=95690.474, F60_Dinamico=OK, SkewV=66, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
996e+19

Ratio counts by range: [>1.0]: 21; [0.9-1.0]: 5; [0.7-0.9]: 47; [0.4-0.7]:
52; [0.1-0.4]: 41; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 503 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 600.0 mm
BC_tf: 40.0 mm
BC_tw: 32.0 mm
TC_h: 700.0 mm
TC_tf: 24.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 22.0 mm
DGB_tw: 16.0 mm
TRB_h: 600.0 mm
TRB_bf: 400.0 mm
TRB_tf: 28.0 mm
TRB_tw: 26.0 mm
CTT_h: 160.0 mm
CTT_tf: 18.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 13.0 mm
VER: HE400B
TRS: HE300B
LG: HE550M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2339.21 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.9170 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.92 mm -> X=5.64
 L.Lower (2.54) < X (5.64) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.5494 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.5494) = 9046188.8$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010967 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4131 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=104.9160, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=42.1053, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=150.1696, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=267.2956, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=183.5547, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=221.7153, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.6769, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.2041, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2339.21 kN, MaxRatio=1.512, F60_Dinamico=OK, SkewV=2, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=7.
765e+08

Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 8; [0.7-0.9]: 18; [0.4-0.7]:
89; [0.1-0.4]: 37; [<=0.1]: 0;

--- STARTING GA ITERATION No. 504 ---

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
BC_tf: 10.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 18.0 mm
DGB_bf: 450.0 mm
DGB_tf: 14.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 40.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 11.0 mm
CTB_h: 160.0 mm
CTB_tf: 17.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 10.0 mm
VER: HE400B
TRS: HE280B
LG: HE450M
R_TR_B: HE300B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2176.82 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.4160 mm
F60 Dynamic check (L=43.0 m): |U3|=11.42 mm -> X=5.25
L.Lower (2.54) < X (5.25) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 52

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 22.7631 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.7631) = 10153482.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007566 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.9119 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=125.7312, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=29.9264, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=143.1492, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=121.6372, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=122.3138, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=155.3780, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.0929, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.2843, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2176.82 kN, MaxRatio=4.099, F60_Dinamico=OK, SkewV=52, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
 214e+10

Ratio counts by range: [>1.0]: 35; [0.9-1.0]: 9; [0.7-0.9]: 25; [0.4-0.7]:
 53; [0.1-0.4]: 44; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 505 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
 BC_tf: 10.0 mm
 BC_tw: 32.0 mm
 TC_h: 650.0 mm
 TC_tf: 32.0 mm
 TC_tw: 34.0 mm
 DGA_bf: 400.0 mm
 DGA_tf: 24.0 mm
 DGA_tw: 18.0 mm
 DGB_bf: 450.0 mm
 DGB_tf: 24.0 mm
 DGB_tw: 10.0 mm
 TRB_h: 700.0 mm
 TRB_bf: 650.0 mm
 TRB_tf: 14.0 mm
 TRB_tw: 28.0 mm
 CTT_h: 170.0 mm
 CTT_tf: 15.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 19.0 mm
 STCTB_h: 100.0 mm
 STCTB_tf: 11.0 mm
 VER: HE600B
 TRS: HE200B
 LG: HE450M
 R_TR_B: HE240B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2367.64 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.9700 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.97 mm -> X=5.62
 L.Lower (2.54) < X (5.62) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 69

Starting Horizontal U2 check for 24 combinations...
 Horizontal extraction completed. Maximum U2 (abs) found: 22.6009 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 22.6009) = 10226364.9$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...
 Angular check completed. Max Theta (abs): 0.00007509 rad (Limit: 0.002000).
 Estado: OK

Starting Vertical (F60) check for 288 combinations...
 Vertical (F60) check completed. Max U3 (abs): 17.4588 mm (Limit: 71.6667 mm).
 Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
 -> Sheet: FramesWBTFForFatigue . S11_final=123.7548, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=32.2604, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=179.5310, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=212.6668, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=187.6743, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=244.2248, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=16.8540, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=16.9277, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...
 Design completed.
 >> FINAL RESULTS - ITERATION:
 Weight=2367.64 kN, MaxRatio=1.822, F60_Dinamico=OK, SkewV=69, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=3.
 353e+09
 Ratio counts by range: [>1.0]: 26; [$0.9-1.0$]: 8; [$0.7-0.9$]: 28; [$0.4-0.7$]:
 41; [$0.1-0.4$]: 63; [≤ 0.1]: 0;

=====
 --- STARTING GA ITERATION No. 506 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
 BC_tf: 12.0 mm
 BC_tw: 26.0 mm
 TC_h: 650.0 mm
 TC_tf: 20.0 mm
 TC_tw: 36.0 mm
 DGA_bf: 400.0 mm
 DGA_tf: 22.0 mm
 DGA_tw: 14.0 mm
 DGB_bf: 550.0 mm

DGB_tf: 18.0 mm
DGB_tw: 12.0 mm
TRB_h: 800.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 22.0 mm
CTT_h: 160.0 mm
CTT_tf: 13.0 mm
CTB_h: 100.0 mm
CTB_tf: 16.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE360B
LG: HE500M
R_TR_B: HE340B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 1985.05 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.6182 mm
F60 Dynamic check (L=43.0 m): |U3|=11.62 mm -> X=5.21
L.Lower (2.54) < X (5.21) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.8426 mm
Horizontal check: $R = (43000.0)^2 / (8 * 27.8426) = 8301128.1$ mm
Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013537 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.1130 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

-> Sheet: FramesWBTForFatigue . S11_final=143.0649, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=37.0752, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=194.7181, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=188.0430, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=218.2781, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=255.7970, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.1133, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=9.8629, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=1985.05 kN, MaxRatio=159014.510, F60_Dinamico=OK, SkewV=24,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
Costo=5.019e+19

Ratio counts by range: [>1.0]: 69; [0.9-1.0]: 10; [0.7-0.9]: 28; [0.4-0.7]:
33; [0.1-0.4]: 26; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 507 ---
=====

```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```

BC_h: 650.0 mm
BC_tf: 20.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 12.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 20.0 mm
DGA_tw: 16.0 mm
DGB_bf: 500.0 mm
DGB_tf: 32.0 mm
DGB_tw: 26.0 mm
TRB_h: 750.0 mm
TRB_bf: 700.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 16.0 mm
CTB_h: 160.0 mm
CTB_tf: 13.0 mm
STCTB_h: 100.0 mm

```

STCTB_tf: 11.0 mm
 VER: HE320B
 TRS: HE200B
 LG: HE320M
 R_TR_B: HE260B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2197.69 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.8620 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.86 mm -> X=5.39
 L.Lower (2.54) < X (5.39) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 274

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 31.0539 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 31.0539) = 7442707.2$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008315 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.3625 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=92.9283, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=28.9584, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=189.0771, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=174.4466, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

```
-> Sheet: FramesIBBForFatigue . S11_final=122.1598, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=149.9176, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=22.7320, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=28.4963, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```
Weight=2197.69 kN, MaxRatio=1.563, F60_Dinamico=OK, SkewV=274, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=6.
828e+09
```

```
Ratio counts by range: [>1.0]: 52; [0.9-1.0]: 12; [0.7-0.9]: 19; [0.4-0.7]:
36; [0.1-0.4]: 47; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 508 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 34.0 mm
TC_h: 650.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 24.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 30.0 mm
TRB_h: 850.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE260B
LG: HE450M
R_TR_B: HE260B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

```
Total weight (Sum |FZ_dead|): 2274.49 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1147 mm
```

F60 Dynamic check (L=43.0 m): $|U_3|=10.11$ mm -> X=5.58

L.Lower (2.54) < X (5.58) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 74

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 22.3809 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.3809) = 10326871.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012131 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6104 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=104.0807, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=30.2230, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=200.0263, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=199.2189, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=184.2501, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=215.2033, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=15.8722, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=17.5063, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2274.49 kN, MaxRatio=1.280, F60_Dinamico=OK, SkewV=74, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
975e+09

Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 10; [0.7-0.9]: 38; [0.4-0.7]:
58; [0.1-0.4]: 52; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 509 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
BC_tf: 24.0 mm
BC_tw: 38.0 mm
TC_h: 700.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 550.0 mm
DGA_tf: 28.0 mm
DGA_tw: 14.0 mm
DGB_bf: 350.0 mm
DGB_tf: 24.0 mm
DGB_tw: 24.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 14.0 mm
TRB_tw: 28.0 mm
CTT_h: 150.0 mm
CTT_tf: 18.0 mm
CTB_h: 100.0 mm
CTB_tf: 17.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 13.0 mm
VER: HE450B
TRS: HE300B
LG: HE320M
R_TR_B: HE220B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2365.79 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.6117 mm

F60 Dynamic check (L=43.0 m): |U3|=9.61 mm -> X=5.73

L.Lower (2.54) < X (5.73) < L.Upper (5.69) -> Verificar, es necesario un análisis
dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 267

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.8130 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.8130) = 9314668.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012074 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1059 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=98.8501, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=34.7120, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=228.4593, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=268.6740, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=214.9237, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=259.2062, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=12.8474, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=11.4478, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2365.79 kN, MaxRatio=155347.358, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=267, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=5.709e+19

Ratio counts by range: [>1.0]: 36; [0.9-1.0]: 4; [0.7-0.9]: 14; [0.4-0.7]: 83; [0.1-0.4]: 29; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 510 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm
BC_tf: 28.0 mm
BC_tw: 28.0 mm
TC_h: 650.0 mm
TC_tf: 28.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 22.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 30.0 mm
TRB_h: 600.0 mm
TRB_bf: 550.0 mm
TRB_tf: 32.0 mm
TRB_tw: 22.0 mm
CTT_h: 180.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE300B
LG: HE550M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2327.38 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.9391 mm

F60 Dynamic check (L=43.0 m): |U3|=9.94 mm -> X=5.63

L.Lower (2.54) < X (5.63) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.4934 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.4934) = 8406556.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009901 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4381 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=115.0165, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=37.0503, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=131.9767, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=91.8383, Limit=118.5185 -> OK

-> Sheet: FramesIBBForFatigue . S11_final=144.6955, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=179.8290, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=12.9329, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.4966, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2327.38 kN, MaxRatio=1.352, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=3.
815e+08

Ratio counts by range: [>1.0]: 14; [$0.9-1.0$]: 5; [$0.7-0.9$]: 36; [$0.4-0.7$]:
63; [$0.1-0.4$]: 48; [≤ 0.1]: 0;

=====

--- STARTING GA ITERATION No. 511 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 650.0 mm

BC_tf: 28.0 mm

BC_tw: 34.0 mm

TC_h: 650.0 mm

TC_tf: 14.0 mm

TC_tw: 36.0 mm

DGA_bf: 450.0 mm

DGA_tf: 20.0 mm

DGA_tw: 28.0 mm

DGB_bf: 550.0 mm

DGB_tf: 18.0 mm

DGB_tw: 30.0 mm

TRB_h: 700.0 mm
 TRB_bf: 650.0 mm
 TRB_tf: 34.0 mm
 TRB_tw: 24.0 mm
 CTT_h: 130.0 mm
 CTT_tf: 12.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 14.0 mm
 STCTB_h: 90.0 mm
 STCTB_tf: 15.0 mm
 VER: HE400B
 TRS: HE200B
 LG: HE340M
 R_TR_B: HE320B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2336.85 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2098 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.21 mm -> X=5.56
 L.Lower (2.54) < X (5.56) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 237

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 25.1552 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 25.1552) = 9187943.1$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007255 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7084 mm (Limit: 71.6667 mm).

Estado: OK

```

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=85.4343, Limit=92.5926 -> OK
-> Sheet: FramesRBTForFatigue . S11_final=26.2619, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=167.5358, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=113.5448, Limit=118.5185 -> OK
-> Sheet: FramesIBBForFatigue . S11_final=108.7247, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesEBBForFatigue . S11_final=134.9825, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=16.1728, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=16.2090, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (3 fallos)

```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```

Weight=2336.85 kN, MaxRatio=2.297, F60_Dinamico=OK, SkewV=237, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (3 fallos) -> Costo=9.
540e+09

```

```

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 6; [0.7-0.9]: 37; [0.4-0.7]:
49; [0.1-0.4]: 51; [<=0.1]: 0;

```

```

-----
--- STARTING GA ITERATION No. 512 ---
-----

```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```

BC_h: 650.0 mm
BC_tf: 32.0 mm
BC_tw: 30.0 mm
TC_h: 500.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 18.0 mm
DGB_bf: 600.0 mm
DGB_tf: 30.0 mm
DGB_tw: 20.0 mm
TRB_h: 850.0 mm
TRB_bf: 400.0 mm
TRB_tf: 24.0 mm
TRB_tw: 20.0 mm
CTT_h: 160.0 mm
CTT_tf: 18.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 15.0 mm
VER: HE450B
TRS: HE280B
LG: HE320M

```

R_TR_B: HE400B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2530.84 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.0248 mm

F60 Dynamic check (L=43.0 m): |U3|=9.02 mm -> X=5.91

L.Lower (2.54) < X (5.91) < L.Upper (5.69) -> Verificar, es necesario un análisis dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 254

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 22.6060 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.6060) = 10224054.7$ mmHorizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011664 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.5197 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=95.5471, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=29.2580, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=246.9022, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=184.7040, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=203.6993, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=211.3852, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=13.5075, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=14.4737, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2530.84 kN, MaxRatio=1.532, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=254, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=3.258e+10

Ratio counts by range: [>1.0]: 13; [0.9-1.0]: 7; [0.7-0.9]: 18; [0.4-0.7]: 60; [0.1-0.4]: 68; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 513 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm

BC_tf: 10.0 mm

BC_tw: 28.0 mm

TC_h: 700.0 mm

TC_tf: 32.0 mm

TC_tw: 38.0 mm

DGA_bf: 600.0 mm

DGA_tf: 30.0 mm

DGA_tw: 20.0 mm

DGB_bf: 450.0 mm

DGB_tf: 18.0 mm

DGB_tw: 12.0 mm

TRB_h: 700.0 mm

TRB_bf: 650.0 mm

TRB_tf: 26.0 mm

TRB_tw: 28.0 mm

CTT_h: 130.0 mm

CTT_tf: 19.0 mm

CTB_h: 170.0 mm

CTB_tf: 11.0 mm

STCTB_h: 130.0 mm

STCTB_tf: 13.0 mm

VER: HE400B

TRS: HE280B

LG: HE550M

R_TR_B: HE240B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2240.45 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.5530 mm

F60 Dynamic check (L=43.0 m): |U3|=10.55 mm -> X=5.46

L.Lower (2.54) < X (5.46) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 6

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 26.2807 mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.2807) = 8794464.0$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009307 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0490 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=128.8113, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=31.8570, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=153.7461, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=212.8945, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=148.5701, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=184.2644, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.2764, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.1249, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2240.45 kN, MaxRatio=1.886, F60_Dinamico=OK, SkewV=6, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
004e+09

Ratio counts by range: [>1.0]: 45; [0.9-1.0]: 12; [0.7-0.9]: 11; [0.4-0.7]: 56; [0.1-0.4]: 42; [<=0.1]: 0;

 --- STARTING GA ITERATION No. 514 ---

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
 BC_tf: 12.0 mm
 BC_tw: 32.0 mm
 TC_h: 600.0 mm
 TC_tf: 40.0 mm
 TC_tw: 36.0 mm
 DGA_bf: 600.0 mm
 DGA_tf: 24.0 mm
 DGA_tw: 20.0 mm
 DGB_bf: 450.0 mm
 DGB_tf: 24.0 mm
 DGB_tw: 16.0 mm
 TRB_h: 850.0 mm
 TRB_bf: 500.0 mm
 TRB_tf: 18.0 mm
 TRB_tw: 20.0 mm
 CTT_h: 130.0 mm
 CTT_tf: 18.0 mm
 CTB_h: 130.0 mm
 CTB_tf: 10.0 mm
 STCTB_h: 130.0 mm
 STCTB_tf: 14.0 mm
 VER: HE450B
 TRS: HE220B
 LG: HE550M
 R_TR_B: HE220B

 Running analysis...
 Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2268.79 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.4374 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78
 L.Lower (2.54) < X (5.78) < L.Upper (5.69) -> Verificar, es necesario un análisis

dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 29.8027 mm

Horizontal check: $R = (43000.0)^2 / (8 * 29.8027) = 7755167.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012543 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9334 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=129.8502, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=31.2484, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=192.7905, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=269.6672, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=217.5297, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=248.0914, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=18.4582, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=14.9636, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2268.79 kN, MaxRatio=3.620, F60_Dinamico=Verificar, es necesario un
 análisis dinámico, SkewV=10, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK,
 FatigaS11=NO CUMPLE (5 fallos) -> Costo=3.860e+10

Ratio counts by range: [>1.0]: 46; [0.9-1.0]: 13; [0.7-0.9]: 21; [0.4-0.7]:
 29; [0.1-0.4]: 57; [<=0.1]: 0;

=====
 --- STARTING GA ITERATION No. 515 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
 BC_tf: 14.0 mm
 BC_tw: 32.0 mm

```

TC_h: 700.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 24.0 mm
DGA_tw: 20.0 mm
DGB_bf: 450.0 mm
DGB_tf: 20.0 mm
DGB_tw: 14.0 mm
TRB_h: 700.0 mm
TRB_bf: 700.0 mm
TRB_tf: 22.0 mm
TRB_tw: 20.0 mm
CTT_h: 150.0 mm
CTT_tf: 19.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE400B
TRS: HE320B
LG: HE450M
R_TR_B: HE320B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```

Total weight (Sum |FZ_dead|): 2278.32 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.3665 mm
F60 Dynamic check (L=43.0 m): |U3|=10.37 mm -> X=5.51
L.Lower (2.54) < X (5.51) < L.Upper (5.69) -> OK

```

```
Starting Skew check for 16 combinations...
```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

```
Skew check completed. Total violations (> 0.8 mm): 65
```

```
Starting Horizontal U2 check for 24 combinations...
```

```
Horizontal extraction completed. Maximum U2 (abs) found: 25.2562 mm
```

```
Horizontal check: R = (43000.0)^2 / (8 * 25.2562) = 9151210.4 mm
```


Horizontal check result (R > 6000000.0 mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009927 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8614 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=104.4864, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=32.5308, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=182.3978, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=160.5267, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=154.2354, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=192.3128, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=12.0409, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.9095, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2278.32 kN, MaxRatio=1.965, F60_Dinamico=OK, SkewV=65, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=3.717e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 6; [0.7-0.9]: 30; [0.4-0.7]: 68; [0.1-0.4]: 39; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 516 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 26.0 mm
TC_tw: 38.0 mm
DGA_bf: 600.0 mm
DGA_tf: 20.0 mm
DGA_tw: 20.0 mm
DGB_bf: 350.0 mm
DGB_tf: 34.0 mm
DGB_tw: 10.0 mm
TRB_h: 750.0 mm
TRB_bf: 450.0 mm
```

TRB_tf: 24.0 mm
 TRB_tw: 22.0 mm
 CTT_h: 170.0 mm
 CTT_tf: 13.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 13.0 mm
 STCTB_h: 80.0 mm
 STCTB_tf: 13.0 mm
 VER: HE320B
 TRS: HE200B
 LG: HE450M
 R_TR_B: HE400B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2115.83 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.2336 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.23 mm -> X=5.55
 L.Lower (2.54) < X (5.55) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 74

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 31.6325 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 31.6325) = 7306560.7$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013712 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7347 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTForFatigue . S11_final=129.4527, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=35.4072, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=180.9737, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=142.7105, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=214.1052, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=258.3758, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=18.0175, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=19.0562, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2115.83 kN, MaxRatio=1.489, F60_Dinamico=OK, SkewV=74, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
178e+09

Ratio counts by range: [>1.0]: 20; [0.9-1.0]: 20; [0.7-0.9]: 31; [0.4-0.7]:
52; [0.1-0.4]: 43; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 517 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 700.0 mm
BC_tf: 16.0 mm
BC_tw: 36.0 mm
TC_h: 600.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 30.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 34.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 15.0 mm
CTB_h: 180.0 mm
CTB_tf: 18.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE300B
LG: HE550M
```

R_TR_B: HE280B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2434.08 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.8624 mm

F60 Dynamic check (L=43.0 m): |U3|=9.86 mm -> X=5.65

L.Lower (2.54) < X (5.65) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.9192 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.9192) = 9662722.5$ mmHorizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007727 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.3624 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=88.9286, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=29.7493, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=131.3265, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=147.6715, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=110.3464, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=138.5239, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=9.5465, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=9.4248, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2434.08 kN, MaxRatio=1.580, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=9.
157e+08

Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 8; [0.7-0.9]: 14; [0.4-0.7]:
74; [0.1-0.4]: 54; [<=0.1]: 0;

--- STARTING GA ITERATION No. 518 ---

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 30.0 mm
TC_h: 600.0 mm
TC_tf: 18.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 24.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 600.0 mm
TRB_tf: 24.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 15.0 mm
CTB_h: 160.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 12.0 mm
VER: HE340B
TRS: HE260B
LG: HE550M
R_TR_B: HE280B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2218.84 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.0873 mm
F60 Dynamic check (L=43.0 m): |U3|=10.09 mm -> X=5.59
L.Lower (2.54) < X (5.59) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.9326 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.9326) = 9270005.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011249 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5860 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=105.5976, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=32.8884, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=153.8805, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=149.5427, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=167.5301, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=200.4320, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=14.4141, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=15.5083, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2218.84 kN, MaxRatio=2.099, F60_Dinamico=OK, SkewV=8, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
 966e+09

Ratio counts by range: [>1.0]: 30; [$0.9-1.0$]: 5; [$0.7-0.9$]: 52; [$0.4-0.7$]:
 28; [$0.1-0.4$]: 51; [≤ 0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 519 ---
=====
>> SELECTED GEOMETRY FOR THIS ITERATION:
BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 26.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 400.0 mm
TRB_tf: 32.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 11.0 mm
CTB_h: 100.0 mm
CTB_tf: 11.0 mm
STCTB_h: 120.0 mm
STCTB_tf: 15.0 mm
VER: HE340B
TRS: HE300B
LG: HE340M
R_TR_B: HE220B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> POST-ANALYSIS RESULTS (Preliminary):
Total weight (Sum |FZ_dead|): 2084.66 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.1706 mm
F60 Dynamic check (L=43.0 m): |U3|=10.17 mm -> X=5.57
L.Lower (2.54) < X (5.57) < L.Upper (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

```

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Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 234

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 30.8336 mm

Horizontal check: $R = (43000.0)^2 / (8 * 30.8336) = 7495873.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011704 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.6689 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=113.2410, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.6610, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=195.4717, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=266.1355, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=179.0094, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=217.7782, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.8720, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.7146, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2084.66 kN, MaxRatio=172857.778, F60_Dinamico=OK, SkewV=234,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
Costo=6.229e+19

Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 7; [0.7-0.9]: 55; [0.4-0.7]:
21; [0.1-0.4]: 30; [<=0.1]: 0;

=====
--- STARTING GA ITERATION No. 520 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm

DGA_bf: 550.0 mm
 DGA_tf: 26.0 mm
 DGA_tw: 16.0 mm
 DGB_bf: 450.0 mm
 DGB_tf: 22.0 mm
 DGB_tw: 14.0 mm
 TRB_h: 750.0 mm
 TRB_bf: 600.0 mm
 TRB_tf: 30.0 mm
 TRB_tw: 30.0 mm
 CTT_h: 160.0 mm
 CTT_tf: 15.0 mm
 CTB_h: 140.0 mm
 CTB_tf: 14.0 mm
 STCTB_h: 120.0 mm
 STCTB_tf: 11.0 mm
 VER: HE340B
 TRS: HE320B
 LG: HE400M
 R_TR_B: HE280B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2268.80 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.1117 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.11 mm -> X=5.58
 L.Lower (2.54) < X (5.58) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 124

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 26.0050 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 26.0050) = 8887697.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008784 rad (Limit: 0.002000).
Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6106 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTForFatigue . S11_final=92.6816, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=29.5749, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=164.6916, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=147.4872, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=128.4607, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=159.9481, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=10.2151, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.3389, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...
Design completed.
>> FINAL RESULTS - ITERATION:
Weight=2268.80 kN, MaxRatio=116773.525, F60_Dinamico=OK, SkewV=124,
HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
Costo=3.094e+19
Ratio counts by range: [>1.0]: 25; [0.9-1.0]: 9; [0.7-0.9]: 23; [0.4-0.7]:
71; [0.1-0.4]: 38; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 521 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
BC_tf: 28.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 36.0 mm
TC_tw: 36.0 mm
DGA_bf: 500.0 mm
DGA_tf: 32.0 mm
DGA_tw: 30.0 mm
DGB_bf: 550.0 mm
DGB_tf: 18.0 mm
DGB_tw: 10.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm

CTT_tf: 12.0 mm
 CTB_h: 170.0 mm
 CTB_tf: 17.0 mm
 STCTB_h: 130.0 mm
 STCTB_tf: 14.0 mm
 VER: HE500B
 TRS: HE240B
 LG: HE500M
 R_TR_B: HE280B

 Running analysis...
 Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2525.38 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.2352 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.24 mm -> X=5.84
 L.Lower (2.54) < X (5.84) < L.Upper (5.69) -> Verificar, es necesario un análisis

dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 20

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 20.1068 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 20.1068) = 11494878.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008252 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.7297 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=80.3184, Limit=92.5926 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=25.6447, Limit=118.5185 -> OK

```
-> Sheet: FramesWSTForFatigue . S11_final=155.8045, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=148.7034, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=127.2753, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=157.9955, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=12.4492, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.1632, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2525.38 kN, MaxRatio=1.530, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=20, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=2.657e+10

Ratio counts by range: [>1.0]: 14; [0.9-1.0]: 2; [0.7-0.9]: 17; [0.4-0.7]: 51; [0.1-0.4]: 82; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 522 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 700.0 mm
BC_tf: 30.0 mm
BC_tw: 26.0 mm
TC_h: 550.0 mm
TC_tf: 26.0 mm
TC_tw: 34.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 10.0 mm
TRB_h: 800.0 mm
TRB_bf: 600.0 mm
TRB_tf: 16.0 mm
TRB_tw: 24.0 mm
CTT_h: 150.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 11.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 14.0 mm
VER: HE500B
TRS: HE260B
LG: HE600M
R_TR_B: HE240B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2232.29 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.2997 mm

F60 Dynamic check (L=43.0 m): |U3|=10.30 mm -> X=5.53

L.Lower (2.54) < X (5.53) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 20.8077 mm

Horizontal check: $R = (43000.0)^2 / (8 * 20.8077) = 11107676.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010171 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7889 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=93.7106, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=28.7740, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=163.8541, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=213.2702, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=181.3794, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=208.9191, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=16.6955, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=15.1842, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2232.29 kN, MaxRatio=1.575, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=8.
493e+08

Ratio counts by range: [>1.0]: 27; [$0.9-1.0$]: 13; [$0.7-0.9$]: 19; [$0.4-0.7$]:
64; [$0.1-0.4$]: 43; [≤ 0.1]: 0;

=====

--- STARTING GA ITERATION No. 523 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
BC_tf: 30.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 38.0 mm
TC_tw: 38.0 mm
DGA_bf: 600.0 mm
DGA_tf: 28.0 mm
DGA_tw: 12.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 26.0 mm
TRB_h: 650.0 mm
TRB_bf: 700.0 mm
TRB_tf: 14.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 16.0 mm
CTB_h: 180.0 mm
CTB_tf: 12.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE340B
LG: HE600M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2309.57 kN

U3 displacement at F60 (COMB01-PER-LOAD): -9.5345 mm

F60 Dynamic check (L=43.0 m): |U3|=9.53 mm -> X=5.75

L.Lower (2.54) < X (5.75) < L.Upper (5.69) -> Verificar, es necesario un análisis
dinámico

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 26.4501 mm

Horizontal check: $R = (43000.0)^2 / (8 * 26.4501) = 8738164.8$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00013533 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.0339 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=99.8452, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=41.2065, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=146.5319, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=176.7769, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=202.1063, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=241.8567, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=9.1689, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=9.1684, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2309.57 kN, MaxRatio=1.360, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.351e+10

Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 10; [0.7-0.9]: 24; [0.4-0.7]: 79; [0.1-0.4]: 41; [<=0.1]: 0;

```

=====
--- STARTING GA ITERATION No. 524 ---
=====

```

```
>> SELECTED GEOMETRY FOR THIS ITERATION:
```

```

BC_h: 700.0 mm
BC_tf: 34.0 mm
BC_tw: 32.0 mm
TC_h: 600.0 mm
TC_tf: 28.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 28.0 mm
DGA_tw: 26.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 28.0 mm
TRB_h: 750.0 mm
TRB_bf: 550.0 mm
TRB_tf: 20.0 mm
TRB_tw: 26.0 mm
CTT_h: 140.0 mm
CTT_tf: 19.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 14.0 mm
VER: HE360B
TRS: HE280B
LG: HE600M
R_TR_B: HE280B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```
Total weight (Sum |FZ_dead|): 2340.35 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.6641 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.66 mm -> X=5.71
```

```
L.Lower (2.54) < X (5.71) < L.Upper (5.69) -> Verificar, es necesario un análisis
dinámico
```

```
Starting Skew check for 16 combinations...
```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

```


Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.7186 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.7186) = 9744478.4$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012265 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.1627 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=94.8016, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=31.9823, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=151.4170, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTForFatigue . S11_final=149.2552, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesIBBForFatigue . S11_final=185.7194, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBBForFatigue . S11_final=211.0294, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 5)

-> Sheet: FramesEBTForFatigue . S11_final=11.8255, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=12.9571, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2340.35 kN, MaxRatio=1.447, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=0, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.399e+10

Ratio counts by range: [>1.0]: 15; [0.9-1.0]: 8; [0.7-0.9]: 16; [0.4-0.7]: 76; [0.1-0.4]: 51; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 525 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 750.0 mm

BC_tf: 22.0 mm

BC_tw: 32.0 mm

TC_h: 550.0 mm

TC_tf: 16.0 mm

TC_tw: 38.0 mm

DGA_bf: 500.0 mm
DGA_tf: 28.0 mm
DGA_tw: 22.0 mm
DGB_bf: 500.0 mm
DGB_tf: 20.0 mm
DGB_tw: 16.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 28.0 mm
TRB_tw: 22.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 12.0 mm
VER: HE360B
TRS: HE260B
LG: HE500M
R_TR_B: HE260B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2242.90 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.1896 mm

F60 Dynamic check (L=43.0 m): |U3|=10.19 mm -> X=5.56

L.Lower (2.54) < X (5.56) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 22.8008 mm

Horizontal check: $R = (43000.0)^2 / (8 * 22.8008) = 10136712.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010066 rad (Limit: 0.002000).
Estado: OK

Starting Vertical (F60) check for 288 combinations...
Vertical (F60) check completed. Max U3 (abs): 17.6868 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...
-> Sheet: FramesWBTFForFatigue . S11_final=92.9123, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=27.3877, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=163.2026, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=176.5309, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=144.2851, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=175.6544, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=15.9155, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=18.9826, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...
Design completed.
>> FINAL RESULTS - ITERATION:
Weight=2242.90 kN, MaxRatio=1.279, F60_Dinamico=OK, SkewV=22, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=7.
797e+08
Ratio counts by range: [>1.0]: 18; [0.9-1.0]: 4; [0.7-0.9]: 45; [0.4-0.7]:
47; [0.1-0.4]: 52; [<=0.1]: 0;
>> Snapshot iter 525 guardado: D:\000.Robinson Mercado\001.Model 3D\05.
MatLAB\Logs\snapshot_iter_525_20251114_013311.mat

=====
--- STARTING GA ITERATION No. 526 ---
=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 750.0 mm
BC_tf: 26.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 20.0 mm
TRB_h: 700.0 mm
TRB_bf: 400.0 mm
TRB_tf: 30.0 mm

```

TRB_tw: 24.0 mm
CTT_h: 110.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE340B
TRS: HE300B
LG: HE550M
R_TR_B: HE300B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> POST-ANALYSIS RESULTS (Preliminary):

```

```

Total weight (Sum |FZ_dead|): 2156.03 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.7571 mm
F60 Dynamic check (L=43.0 m): |U3|=10.76 mm -> X=5.41
L.Lower (2.54) < X (5.41) < L.Upper (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

```

Skew check completed. Total violations (> 0.8 mm): 8

```

```

Starting Horizontal U2 check for 24 combinations...

```

```

Horizontal extraction completed. Maximum U2 (abs) found: 23.1216 mm
Horizontal check:  $R = (43000.0)^2 / (8 * 23.1216) = 9996058.6$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

```

```

Starting Angular (Rotation) check for 24 combinations...

```

```

Angular check completed. Max Theta (abs): 0.00012584 rad (Limit: 0.002000).

```

```

Estado: OK

```

```

Starting Vertical (F60) check for 288 combinations...

```

```

Vertical (F60) check completed. Max U3 (abs): 18.2561 mm (Limit: 71.6667 mm).

```

```

Estado: OK

```

```

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```

```

-> Sheet: FramesWBTFForFatigue . S11_final=108.9097, Limit=92.5926 -> ;NO

```

```
CUMPLE! (Accumulated failures: 1)
    -> Sheet: FramesRBTForFatigue . S11_final=34.8431, Limit=118.5185 -> OK
    -> Sheet: FramesWSTForFatigue . S11_final=144.8343, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
    -> Sheet: FramesRSTForFatigue . S11_final=124.3250, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
    -> Sheet: FramesIBBForFatigue . S11_final=185.8600, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
    -> Sheet: FramesEBBForFatigue . S11_final=222.9234, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
    -> Sheet: FramesEBTForFatigue . S11_final=8.9503, Limit=118.5185 -> OK
    -> Sheet: FramesIBTForFatigue . S11_final=8.4041, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```
Weight=2156.03 kN, MaxRatio=2.793, F60_Dinamico=OK, SkewV=8, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=7.
215e+09
```

```
Ratio counts by range: [>1.0]: 31; [0.9-1.0]: 9; [0.7-0.9]: 17; [0.4-0.7]:
63; [0.1-0.4]: 46; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 527 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 750.0 mm
BC_tf: 32.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 16.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 22.0 mm
DGA_tw: 14.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 14.0 mm
TRB_h: 800.0 mm
TRB_bf: 650.0 mm
TRB_tf: 24.0 mm
TRB_tw: 28.0 mm
CTT_h: 160.0 mm
CTT_tf: 15.0 mm
CTB_h: 170.0 mm
CTB_tf: 14.0 mm
STCTB_h: 110.0 mm
STCTB_tf: 14.0 mm
VER: HE300B
TRS: HE240B
LG: HE500M
R_TR_B: HE220B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2107.69 kN

U3 displacement at F60 (COMB01-PER-LOAD): -11.2643 mm

F60 Dynamic check (L=43.0 m): |U3|=11.26 mm -> X=5.29

L.Lower (2.54) < X (5.29) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 24

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.3721 mm

Horizontal check: $R = (43000.0)^2 / (8 * 27.3721) = 8443805.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009952 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.7646 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=78.6368, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=28.4059, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=170.9043, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=266.8601, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=138.9985, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=168.7847, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=15.1615, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=18.5251, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2107.69 kN, MaxRatio=2.387, F60_Dinamico=OK, SkewV=24, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=4.646e+09

Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 28; [0.7-0.9]: 27; [0.4-0.7]: 48; [0.1-0.4]: 40; [<=0.1]: 0;

--- STARTING GA ITERATION No. 528 ---

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 800.0 mm
BC_tf: 12.0 mm
BC_tw: 30.0 mm
TC_h: 550.0 mm
TC_tf: 34.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 24.0 mm
DGB_bf: 500.0 mm
DGB_tf: 14.0 mm
DGB_tw: 22.0 mm
TRB_h: 700.0 mm
TRB_bf: 550.0 mm
TRB_tf: 22.0 mm
TRB_tw: 24.0 mm
CTT_h: 160.0 mm
CTT_tf: 16.0 mm
CTB_h: 170.0 mm
CTB_tf: 16.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE450B
TRS: HE300B
LG: HE550M
R_TR_B: HE360B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2293.46 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.2851 mm
F60 Dynamic check (L=43.0 m): |U3|=10.29 mm -> X=5.53
L.Lower (2.54) < X (5.53) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 6

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 21.4425 mm

Horizontal check: $R = (43000.0)^2 / (8 * 21.4425) = 10778815.6$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00010166 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.7784 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=115.2065, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=31.3763, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=156.3108, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=128.0265, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=181.7690, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=220.7195, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=11.8896, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=10.7480, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2293.46 kN, MaxRatio=1.586, F60_Dinamico=OK, SkewV=6, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
 039e+09

Ratio counts by range: [>1.0]: 33; [0.9-1.0]: 12; [0.7-0.9]: 21; [0.4-0.7]:
 33; [0.1-0.4]: 67; [<=0.1]: 0;


```

=====
--- STARTING GA ITERATION No. 529 ---
=====

```

```
>> SELECTED GEOMETRY FOR THIS ITERATION:
```

```

BC_h: 800.0 mm
BC_tf: 18.0 mm
BC_tw: 28.0 mm
TC_h: 600.0 mm
TC_tf: 32.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 450.0 mm
DGB_tf: 18.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 550.0 mm
TRB_tf: 30.0 mm
TRB_tw: 24.0 mm
CTT_h: 170.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 14.0 mm
VER: HE400B
TRS: HE340B
LG: HE550M
R_TR_B: HE360B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```

Total weight (Sum |FZ_dead|): 2285.21 kN
U3 displacement at F60 (COMB01-PER-LOAD): -10.5300 mm
F60 Dynamic check (L=43.0 m): |U3|=10.53 mm -> X=5.47
L.Lower (2.54) < X (5.47) < L.Upper (5.69) -> OK

```

```
Starting Skew check for 16 combinations...
```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 8

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.2957 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.2957) = 9921374.9$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009358 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.0248 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=99.4932, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=26.1060, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=149.6070, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=125.2629, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=136.0811, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=165.8338, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=11.6555, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=11.2013, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2285.21 kN, MaxRatio=1.954, F60_Dinamico=OK, SkewV=8, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=2.
379e+09

Ratio counts by range: [>1.0]: 34; [0.9-1.0]: 4; [0.7-0.9]: 25; [0.4-0.7]:
62; [0.1-0.4]: 41; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 530 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 800.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 650.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 500.0 mm
```

```

DGA_tf: 26.0 mm
DGA_tw: 16.0 mm
DGB_bf: 450.0 mm
DGB_tf: 26.0 mm
DGB_tw: 18.0 mm
TRB_h: 800.0 mm
TRB_bf: 500.0 mm
TRB_tf: 36.0 mm
TRB_tw: 24.0 mm
CTT_h: 130.0 mm
CTT_tf: 14.0 mm
CTB_h: 180.0 mm
CTB_tf: 17.0 mm
STCTB_h: 90.0 mm
STCTB_tf: 11.0 mm
VER: HE340B
TRS: HE260B
LG: HE500M
R_TR_B: HE260B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```
Total weight (Sum |FZ_dead|): 2418.12 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.4424 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.44 mm -> X=5.78
```

```
L.Lower (2.54) < X (5.78) < L.Upper (5.69) -> Verificar, es necesario un análisis
dinámico
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
```

```
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
```

```
Skew check completed. Total violations (> 0.8 mm): 22
```

```
Starting Horizontal U2 check for 24 combinations...
```

```
Horizontal extraction completed. Maximum U2 (abs) found: 23.2884 mm
```

```
Horizontal check:  $R = (43000.0)^2 / (8 * 23.2884) = 9924480.8$  mm
```

```
Horizontal check result ( $R > 6000000.0$  mm?): OK
```

```
Starting Angular (Rotation) check for 24 combinations...
```

Angular check completed. Max Theta (abs): 0.00009057 rad (Limit: 0.002000).
Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 16.9429 mm (Limit: 71.6667 mm).
Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=87.0397, Limit=92.5926 -> OK
-> Sheet: FramesRBTForFatigue . S11_final=25.5968, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=147.2041, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRSTForFatigue . S11_final=175.0153, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=128.1522, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesEBBForFatigue . S11_final=159.1118, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBTForFatigue . S11_final=11.0514, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=10.1630, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2418.12 kN, MaxRatio=1.824, F60_Dinamico=Verificar, es necesario un análisis dinámico, SkewV=22, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=2.645e+10
Ratio counts by range: [>1.0]: 23; [0.9-1.0]: 4; [0.7-0.9]: 17; [0.4-0.7]: 68; [0.1-0.4]: 54; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 531 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 800.0 mm
BC_tf: 26.0 mm
BC_tw: 36.0 mm
TC_h: 750.0 mm
TC_tf: 18.0 mm
TC_tw: 38.0 mm
DGA_bf: 450.0 mm
DGA_tf: 24.0 mm
DGA_tw: 24.0 mm
DGB_bf: 350.0 mm
DGB_tf: 18.0 mm
DGB_tw: 16.0 mm
TRB_h: 750.0 mm
TRB_bf: 750.0 mm
TRB_tf: 36.0 mm
TRB_tw: 30.0 mm
CTT_h: 180.0 mm
CTT_tf: 13.0 mm
```

CTB_h: 160.0 mm
 CTB_tf: 18.0 mm
 STCTB_h: 140.0 mm
 STCTB_tf: 13.0 mm
 VER: HE550B
 TRS: HE260B
 LG: HE500M
 R_TR_B: HE240B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2708.11 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.3540 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.35 mm -> X=5.52
 L.Lower (2.54) < X (5.52) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 22

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 16.1037 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 16.1037) = 14352332.3$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00005224 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8420 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=59.3981, Limit=92.5926 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=20.1578, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=132.7342, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

```
-> Sheet: FramesRSTForFatigue . S11_final=210.9652, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesIBBForFatigue . S11_final=78.2511, Limit=92.5926 -> OK
-> Sheet: FramesEBBForFatigue . S11_final=99.9822, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesEBTForFatigue . S11_final=14.0103, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=13.1965, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (3 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

```
Weight=2708.11 kN, MaxRatio=1.593, F60_Dinamico=OK, SkewV=22, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (3 fallos) -> Costo=1.
628e+09
```

```
Ratio counts by range: [>1.0]: 8; [0.9-1.0]: 5; [0.7-0.9]: 17; [0.4-0.7]:
87; [0.1-0.4]: 49; [<=0.1]: 0;
```

```
=====
--- STARTING GA ITERATION No. 532 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 750.0 mm
BC_tf: 8.0 mm
BC_tw: 38.0 mm
TC_h: 500.0 mm
TC_tf: 38.0 mm
TC_tw: 40.0 mm
DGA_bf: 400.0 mm
DGA_tf: 20.0 mm
DGA_tw: 28.0 mm
DGB_bf: 600.0 mm
DGB_tf: 16.0 mm
DGB_tw: 10.0 mm
TRB_h: 550.0 mm
TRB_bf: 450.0 mm
TRB_tf: 38.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 10.0 mm
CTB_h: 170.0 mm
CTB_tf: 20.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE320B
TRS: HE340B
LG: HE550M
R_TR_B: HE340B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

```
Total weight (Sum |FZ_dead|): 2224.48 kN
```

U3 displacement at F60 (COMB01-PER-LOAD): -10.9304 mm

F60 Dynamic check (L=43.0 m): $|U_3|=10.93$ mm $\rightarrow X=5.37$

L.Lower (2.54) < X (5.37) < L.Upper (5.69) \rightarrow OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.3468 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.3468) = 9899657.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00009551 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.4309 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

\rightarrow Sheet: FramesWBTFForFatigue . S11_final=121.2419, Limit=92.5926 \rightarrow ;NO

CUMPLE! (Accumulated failures: 1)

\rightarrow Sheet: FramesRBTForFatigue . S11_final=39.7739, Limit=118.5185 \rightarrow OK

\rightarrow Sheet: FramesWSTForFatigue . S11_final=120.9131, Limit=118.5185 \rightarrow ;NO

CUMPLE! (Accumulated failures: 2)

\rightarrow Sheet: FramesRSTForFatigue . S11_final=99.9468, Limit=118.5185 \rightarrow OK

\rightarrow Sheet: FramesIBBForFatigue . S11_final=168.7647, Limit=92.5926 \rightarrow ;NO

CUMPLE! (Accumulated failures: 3)

\rightarrow Sheet: FramesEBBForFatigue . S11_final=212.3715, Limit=92.5926 \rightarrow ;NO

CUMPLE! (Accumulated failures: 4)

\rightarrow Sheet: FramesEBTForFatigue . S11_final=7.0641, Limit=118.5185 \rightarrow OK

\rightarrow Sheet: FramesIBTForFatigue . S11_final=5.7324, Limit=118.5185 \rightarrow OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2224.48 kN, MaxRatio=3.458, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=1.
 353e+10
 Ratio counts by range: [>1.0]: 40; [0.9-1.0]: 17; [0.7-0.9]: 11; [0.4-0.7]:
 46; [0.1-0.4]: 52; [<=0.1]: 0;

 --- STARTING GA ITERATION No. 533 ---

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
 BC_tf: 12.0 mm
 BC_tw: 26.0 mm
 TC_h: 650.0 mm
 TC_tf: 36.0 mm
 TC_tw: 38.0 mm
 DGA_bf: 500.0 mm
 DGA_tf: 20.0 mm
 DGA_tw: 12.0 mm
 DGB_bf: 450.0 mm
 DGB_tf: 14.0 mm
 DGB_tw: 18.0 mm
 TRB_h: 700.0 mm
 TRB_bf: 650.0 mm
 TRB_tf: 36.0 mm
 TRB_tw: 20.0 mm
 CTT_h: 130.0 mm
 CTT_tf: 13.0 mm
 CTB_h: 180.0 mm
 CTB_tf: 18.0 mm
 STCTB_h: 150.0 mm
 STCTB_tf: 12.0 mm
 VER: HE340B
 TRS: HE280B
 LG: HE550M
 R_TR_B: HE300B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2149.76 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -11.8353 mm
 F60 Dynamic check (L=43.0 m): |U3|=11.84 mm -> X=5.16
 L.Lower (2.54) < X (5.16) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 2

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.1881 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.1881) = 9555305.1$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00008177 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 19.3343 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=117.3701, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRBTForFatigue . S11_final=29.9127, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=134.4852, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesRSTForFatigue . S11_final=123.1064, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesIBBForFatigue . S11_final=118.3507, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBBForFatigue . S11_final=150.1557, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 5)
 -> Sheet: FramesEBTForFatigue . S11_final=10.8735, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=9.4757, Limit=118.5185 -> OK
 S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2149.76 kN, MaxRatio=1.927, F60_Dinamico=OK, SkewV=2, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
 998e+09

Ratio counts by range: [>1.0]: 43; [0.9-1.0]: 4; [0.7-0.9]: 18; [0.4-0.7]:
 53; [0.1-0.4]: 48; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 534 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 750.0 mm

```

BC_tf: 14.0 mm
BC_tw: 36.0 mm
TC_h: 500.0 mm
TC_tf: 26.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 26.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 16.0 mm
DGB_tw: 10.0 mm
TRB_h: 700.0 mm
TRB_bf: 750.0 mm
TRB_tf: 26.0 mm
TRB_tw: 26.0 mm
CTT_h: 150.0 mm
CTT_tf: 12.0 mm
CTB_h: 170.0 mm
CTB_tf: 19.0 mm
STCTB_h: 130.0 mm
STCTB_tf: 15.0 mm
VER: HE500B
TRS: HE240B
LG: HE600M
R_TR_B: HE260B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> POST-ANALYSIS RESULTS (Preliminary):

```

```

    Total weight (Sum |FZ_dead|): 2393.52 kN

```

```

    U3 displacement at F60 (COMB01-PER-LOAD): -10.3927 mm

```

```

    F60 Dynamic check (L=43.0 m): |U3|=10.39 mm -> X=5.51

```

```

    L.Lower (2.54) < X (5.51) < L.Upper (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

    Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

```

```

    Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

```

```

    Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

```

```

    Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

```

```

    Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

```

```

    Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

```

```

    Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

```

```

    Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

```

```

    Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

```

```

    Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

```

```

    Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

```

```

    Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

```

```

    Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

```

```

    Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

```

```

    Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

```

```

    Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

```

Skew check completed. Total violations (> 0.8 mm): 0

```

```

Starting Horizontal U2 check for 24 combinations...

```

Horizontal extraction completed. Maximum U2 (abs) found: 19.1728 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 19.1728) = 12054828.0$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00007078 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8852 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=86.7204, Limit=92.5926 -> OK
 -> Sheet: FramesRBTForFatigue . S11_final=24.8381, Limit=118.5185 -> OK
 -> Sheet: FramesWSTForFatigue . S11_final=137.2208, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 1)
 -> Sheet: FramesRSTForFatigue . S11_final=176.2358, Limit=118.5185 -> ;NO
 CUMPLE! (Accumulated failures: 2)
 -> Sheet: FramesIBBForFatigue . S11_final=112.1779, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 3)
 -> Sheet: FramesEBBForFatigue . S11_final=142.8388, Limit=92.5926 -> ;NO
 CUMPLE! (Accumulated failures: 4)
 -> Sheet: FramesEBTForFatigue . S11_final=13.6049, Limit=118.5185 -> OK
 -> Sheet: FramesIBTForFatigue . S11_final=12.5256, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2393.52 kN, MaxRatio=1.636, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=1.
 063e+09

Ratio counts by range: [>1.0]: 20; [$0.9-1.0$]: 9; [$0.7-0.9$]: 13; [$0.4-0.7$]:
 51; [$0.1-0.4$]: 73; [≤ 0.1]: 0;

=====
 --- STARTING GA ITERATION No. 535 ---
 =====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 500.0 mm
 BC_tf: 10.0 mm
 BC_tw: 40.0 mm
 TC_h: 800.0 mm
 TC_tf: 14.0 mm
 TC_tw: 38.0 mm
 DGA_bf: 550.0 mm
 DGA_tf: 18.0 mm
 DGA_tw: 12.0 mm
 DGB_bf: 400.0 mm
 DGB_tf: 14.0 mm
 DGB_tw: 10.0 mm
 TRB_h: 900.0 mm

```

TRB_bf: 350.0 mm
TRB_tf: 16.0 mm
TRB_tw: 30.0 mm
CTT_h: 170.0 mm
CTT_tf: 10.0 mm
CTB_h: 110.0 mm
CTB_tf: 18.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE600B
TRS: HE220B
LG: HE550M
R_TR_B: HE200B

```

```

-----
Running analysis...

```

```

Analysis completed.

```

```

>> POST-ANALYSIS RESULTS (Preliminary):

```

```

Total weight (Sum |FZ_dead|): 2160.04 kN
U3 displacement at F60 (COMB01-PER-LOAD): -12.3617 mm
F60 Dynamic check (L=43.0 m): |U3|=12.36 mm -> X=5.05
L.Lower (2.54) < X (5.05) < L.Upper (5.69) -> OK

```

```

Starting Skew check for 16 combinations...

```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

```

```

Skew check completed. Total violations (> 0.8 mm): 10

```

```

Starting Horizontal U2 check for 24 combinations...

```

```

Horizontal extraction completed. Maximum U2 (abs) found: 22.6563 mm
Horizontal check:  $R = (43000.0)^2 / (8 * 22.6563) = 10201341.4$  mm
Horizontal check result ( $R > 6000000.0$  mm?): OK

```

```

Starting Angular (Rotation) check for 24 combinations...

```

```

Angular check completed. Max Theta (abs): 0.00009899 rad (Limit: 0.002000).

```

```

Estado: OK

```

```

Starting Vertical (F60) check for 288 combinations...

```

```

Vertical (F60) check completed. Max U3 (abs): 19.8423 mm (Limit: 71.6667 mm).

```

```

Estado: OK

```

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTForFatigue . S11_final=153.5561, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=34.1752, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=196.3477, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=342.4272, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=380.4020, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=451.3483, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.5783, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.0073, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2160.04 kN, MaxRatio=139789.911, F60_Dinamico=OK, SkewV=10,
 HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) ->
 Costo=4.221e+19

Ratio counts by range: [>1.0]: 53; [0.9-1.0]: 11; [0.7-0.9]: 34; [0.4-0.7]:
 43; [0.1-0.4]: 25; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 536 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 750.0 mm
BC_tf: 24.0 mm
BC_tw: 32.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 38.0 mm
DGA_bf: 350.0 mm
DGA_tf: 30.0 mm
DGA_tw: 26.0 mm
DGB_bf: 450.0 mm
DGB_tf: 16.0 mm
DGB_tw: 30.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 34.0 mm
TRB_tw: 30.0 mm
CTT_h: 150.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 12.0 mm
VER: HE320B
TRS: HE300B
```

LG: HE600M

R_TR_B: HE280B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2405.58 kN

U3 displacement at F60 (COMB01-PER-LOAD): -10.3868 mm

F60 Dynamic check (L=43.0 m): |U3|=10.39 mm -> X=5.51

L.Lower (2.54) < X (5.51) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71

Processing Combo: 2A51-SLE-CHR2-3-ST-LM71

Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71

Processing Combo: 2A56-SLE-CHR3-4-ST-LM71

Processing Combo: 2A58-SLE-CHR4-2-ST-LM71

Processing Combo: 2A60-SLE-CHR4-4-ST-LM71

Processing Combo: 2A61-SLE-CHR5-1-ST-LM71

Processing Combo: 2A62-SLE-CHR5-2-ST-LM71

Processing Combo: 2A63-SLE-CHR5-3-ST-LM71

Processing Combo: 2A64-SLE-CHR5-4-ST-LM71

Processing Combo: 2A66-SLE-CHR6-2-ST-LM71

Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.6889 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.6889) = 9756674.9$ mmHorizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006995 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8867 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=76.0311, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=24.4496, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=133.0248, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=147.5306, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBFForFatigue . S11_final=93.8439, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBFForFatigue . S11_final=117.5610, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

```
-> Sheet: FramesEBTForFatigue . S11_final=10.4377, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.3290, Limit=118.5185 -> OK
```

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2405.58 kN, MaxRatio=1.194, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=1.
869e+08

Ratio counts by range: [>1.0]: 16; [0.9-1.0]: 4; [0.7-0.9]: 22; [0.4-0.7]:
72; [0.1-0.4]: 52; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 537 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 650.0 mm
BC_tf: 22.0 mm
BC_tw: 28.0 mm
TC_h: 500.0 mm
TC_tf: 14.0 mm
TC_tw: 34.0 mm
DGA_bf: 400.0 mm
DGA_tf: 26.0 mm
DGA_tw: 28.0 mm
DGB_bf: 500.0 mm
DGB_tf: 18.0 mm
DGB_tw: 30.0 mm
TRB_h: 800.0 mm
TRB_bf: 750.0 mm
TRB_tf: 38.0 mm
TRB_tw: 22.0 mm
CTT_h: 150.0 mm
CTT_tf: 17.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE360B
TRS: HE220B
LG: HE340M
R_TR_B: HE240B
```

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

```
Total weight (Sum |FZ_dead|): 2199.49 kN
U3 displacement at F60 (COMB01-PER-LOAD): -11.0968 mm
F60 Dynamic check (L=43.0 m): |U3|=11.10 mm -> X=5.33
L.Lower (2.54) < X (5.33) < L.Upper (5.69) -> OK
```

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71

Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 232

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 24.9484 mm

Horizontal check: $R = (43000.0)^2 / (8 * 24.9484) = 9264134.2$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006087 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 18.5950 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=90.4851, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=23.8628, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=156.9265, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=207.5674, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=84.1170, Limit=92.5926 -> OK

-> Sheet: FramesEBBForFatigue . S11_final=103.7677, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBTForFatigue . S11_final=19.4657, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=24.8533, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (3 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2199.49 kN, MaxRatio=1.665, F60_Dinamico=OK, SkewV=232, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (3 fallos) -> Costo=6.

140e+09

Ratio counts by range: [>1.0]: 24; [$0.9-1.0$]: 6; [$0.7-0.9$]: 50; [$0.4-0.7$]:
 30; [$0.1-0.4$]: 56; [≤ 0.1]: 0;


```

=====
--- STARTING GA ITERATION No. 538 ---
=====

```

```
>> SELECTED GEOMETRY FOR THIS ITERATION:
```

```

BC_h: 500.0 mm
BC_tf: 8.0 mm
BC_tw: 38.0 mm
TC_h: 750.0 mm
TC_tf: 12.0 mm
TC_tw: 36.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 10.0 mm
DGB_bf: 400.0 mm
DGB_tf: 36.0 mm
DGB_tw: 10.0 mm
TRB_h: 900.0 mm
TRB_bf: 350.0 mm
TRB_tf: 38.0 mm
TRB_tw: 28.0 mm
CTT_h: 180.0 mm
CTT_tf: 10.0 mm
CTB_h: 180.0 mm
CTB_tf: 10.0 mm
STCTB_h: 140.0 mm
STCTB_tf: 15.0 mm
VER: HE300B
TRS: HE220B
LG: HE550M
R_TR_B: HE200B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```

Total weight (Sum |FZ_dead|): 2048.73 kN
U3 displacement at F60 (COMB01-PER-LOAD): -12.5337 mm
F60 Dynamic check (L=43.0 m): |U3|=12.53 mm -> X=5.01
L.Lower (2.54) < X (5.01) < L.Upper (5.69) -> OK

```

```
Starting Skew check for 16 combinations...
```

```

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71

```

Processing Combo: 2A70-SLE-CHR7-2-ST-LM71

Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 10

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 34.0844 mm

Horizontal check: $R = (43000.0)^2 / (8 * 34.0844) = 6780959.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00011072 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 20.0345 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

```
-> Sheet: FramesWBTFForFatigue . S11_final=207.6463, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 1)
-> Sheet: FramesRBTForFatigue . S11_final=36.5857, Limit=118.5185 -> OK
-> Sheet: FramesWSTForFatigue . S11_final=175.2354, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 2)
-> Sheet: FramesRSTForFatigue . S11_final=340.8303, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBForFatigue . S11_final=195.4978, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBForFatigue . S11_final=241.6027, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=17.9453, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=17.3852, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2048.73 kN, MaxRatio=29725.076, F60_Dinamico=OK, SkewV=10, HorizCheck=OK, AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.810e+18

Ratio counts by range: [>1.0]: 93; [0.9-1.0]: 6; [0.7-0.9]: 6; [0.4-0.7]: 18; [0.1-0.4]: 43; [<=0.1]: 0;

```
=====
--- STARTING GA ITERATION No. 539 ---
=====
```

>> SELECTED GEOMETRY FOR THIS ITERATION:

```
BC_h: 750.0 mm
BC_tf: 14.0 mm
BC_tw: 34.0 mm
TC_h: 550.0 mm
TC_tf: 32.0 mm
TC_tw: 38.0 mm
DGA_bf: 400.0 mm
```

```

DGA_tf: 26.0 mm
DGA_tw: 30.0 mm
DGB_bf: 550.0 mm
DGB_tf: 16.0 mm
DGB_tw: 10.0 mm
TRB_h: 700.0 mm
TRB_bf: 750.0 mm
TRB_tf: 28.0 mm
TRB_tw: 24.0 mm
CTT_h: 140.0 mm
CTT_tf: 12.0 mm
CTB_h: 160.0 mm
CTB_tf: 19.0 mm
STCTB_h: 150.0 mm
STCTB_tf: 15.0 mm
VER: HE500B
TRS: HE260B
LG: HE600M
R_TR_B: HE280B

```

```
-----
Running analysis...
```

```
Analysis completed.
```

```
>> POST-ANALYSIS RESULTS (Preliminary):
```

```
Total weight (Sum |FZ_dead|): 2459.92 kN
```

```
U3 displacement at F60 (COMB01-PER-LOAD): -9.9760 mm
```

```
F60 Dynamic check (L=43.0 m): |U3|=9.98 mm -> X=5.62
```

```
L.Lower (2.54) < X (5.62) < L.Upper (5.69) -> OK
```

```
Starting Skew check for 16 combinations...
```

```
Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
```

```
Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
```

```
Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
```

```
Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
```

```
Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
```

```
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
```

```
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
```

```
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
```

```
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
```

```
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
```

```
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
```

```
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
```

```
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
```

```
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
```

```
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
```

```
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71
```

```
Skew check completed. Total violations (> 0.8 mm): 0
```

```
Starting Horizontal U2 check for 24 combinations...
```

```
Horizontal extraction completed. Maximum U2 (abs) found: 18.2326 mm
```

```
Horizontal check:  $R = (43000.0)^2 / (8 * 18.2326) = 12676437.3$  mm
```

```
Horizontal check result ( $R > 6000000.0$  mm?): OK
```

```
Starting Angular (Rotation) check for 24 combinations...
```

```
Angular check completed. Max Theta (abs): 0.00006867 rad (Limit: 0.002000).
```

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.4684 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTForFatigue . S11_final=88.5597, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=24.8662, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=133.5470, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=148.7602, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=107.0231, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=136.8544, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=13.9608, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.5880, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2459.92 kN, MaxRatio=1.956, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
 AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=2.
 346e+09

Ratio counts by range: [>1.0]: 24; [0.9-1.0]: 7; [0.7-0.9]: 16; [0.4-0.7]:
 46; [0.1-0.4]: 73; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 540 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 750.0 mm

BC_tf: 10.0 mm

BC_tw: 28.0 mm

TC_h: 500.0 mm

TC_tf: 32.0 mm

TC_tw: 40.0 mm

DGA_bf: 500.0 mm

DGA_tf: 34.0 mm

DGA_tw: 20.0 mm

DGB_bf: 550.0 mm

DGB_tf: 16.0 mm

DGB_tw: 12.0 mm

TRB_h: 600.0 mm

TRB_bf: 500.0 mm

TRB_tf: 20.0 mm

TRB_tw: 26.0 mm

CTT_h: 130.0 mm

CTT_tf: 14.0 mm

CTB_h: 180.0 mm

CTB_tf: 17.0 mm
 STCTB_h: 90.0 mm
 STCTB_tf: 10.0 mm
 VER: HE360B
 TRS: HE240B
 LG: HE600M
 R_TR_B: HE260B

 Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2066.74 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.3329 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.33 mm -> X=5.52
 L.Lower (2.54) < X (5.52) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 27.0876 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 27.0876) = 8532503.6$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00012427 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.8320 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=151.3511, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTForFatigue . S11_final=42.2826, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=142.8768, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

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```
-> Sheet: FramesRSTForFatigue . S11_final=175.5951, Limit=118.5185 -> ;NO
CUMPLE! (Accumulated failures: 3)
-> Sheet: FramesIBBFForFatigue . S11_final=222.6479, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 4)
-> Sheet: FramesEBBFForFatigue . S11_final=283.1135, Limit=92.5926 -> ;NO
CUMPLE! (Accumulated failures: 5)
-> Sheet: FramesEBTForFatigue . S11_final=14.1120, Limit=118.5185 -> OK
-> Sheet: FramesIBTForFatigue . S11_final=12.8355, Limit=118.5185 -> OK
S11 fatigue check completed. Overall status: NO CUMPLE (5 fallos)
```

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2066.74 kN, MaxRatio=1.909, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (5 fallos) -> Costo=1.
810e+09

Ratio counts by range: [>1.0]: 51; [0.9-1.0]: 9; [0.7-0.9]: 4; [0.4-0.7]:
53; [0.1-0.4]: 49; [<=0.1]: 0;

=====

--- STARTING GA ITERATION No. 541 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 500.0 mm
BC_tf: 36.0 mm
BC_tw: 28.0 mm
TC_h: 550.0 mm
TC_tf: 40.0 mm
TC_tw: 40.0 mm
DGA_bf: 350.0 mm
DGA_tf: 18.0 mm
DGA_tw: 28.0 mm
DGB_bf: 600.0 mm
DGB_tf: 16.0 mm
DGB_tw: 28.0 mm
TRB_h: 850.0 mm
TRB_bf: 750.0 mm
TRB_tf: 38.0 mm
TRB_tw: 30.0 mm
CTT_h: 110.0 mm
CTT_tf: 20.0 mm
CTB_h: 180.0 mm
CTB_tf: 19.0 mm
STCTB_h: 80.0 mm
STCTB_tf: 11.0 mm
VER: HE550B
TRS: HE200B
LG: HE600M
R_TR_B: HE400B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2812.86 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -9.7492 mm
 F60 Dynamic check (L=43.0 m): |U3|=9.75 mm -> X=5.68
 L.Lower (2.54) < X (5.68) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71
 Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
 Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
 Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
 Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
 Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
 Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
 Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
 Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
 Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
 Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
 Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
 Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 19.2745 mm
 Horizontal check: $R = (43000.0)^2 / (8 * 19.2745) = 11991258.3$ mm
 Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00004992 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.2416 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=110.2743, Limit=92.5926 -> ¡NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRBTFForFatigue . S11_final=20.9799, Limit=118.5185 -> OK

-> Sheet: FramesWSTFForFatigue . S11_final=129.0081, Limit=118.5185 -> ¡NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesRSTFForFatigue . S11_final=100.2443, Limit=118.5185 -> OK

-> Sheet: FramesIBBFForFatigue . S11_final=69.5744, Limit=92.5926 -> OK

-> Sheet: FramesEBBFForFatigue . S11_final=89.1945, Limit=92.5926 -> OK

-> Sheet: FramesEBTFForFatigue . S11_final=13.7505, Limit=118.5185 -> OK

-> Sheet: FramesIBTFForFatigue . S11_final=12.7027, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (2 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2812.86 kN, MaxRatio=32164.409, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,

AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (2 fallos) -> Costo=2.910e+18

Ratio counts by range: [>1.0]: 26; [0.9-1.0]: 3; [0.7-0.9]: 9; [0.4-0.7]: 35; [0.1-0.4]: 93; [<=0.1]: 0;
 >> Checkpoint guardado (Gen=10, FunEval=541): D:\000.Robinson Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat
 10 541 1.717e+08 6.049e+18 4
 >> Checkpoint final guardado: D:\000.Robinson Mercado\001.Model 3D\05.MatLAB\Logs\GA_checkpoint_20251114_013311.mat

=====

--- STARTING GA ITERATION No. 542 ---

=====

>> SELECTED GEOMETRY FOR THIS ITERATION:

BC_h: 700.0 mm
 BC_tf: 24.0 mm
 BC_tw: 32.0 mm
 TC_h: 600.0 mm
 TC_tf: 40.0 mm
 TC_tw: 38.0 mm
 DGA_bf: 350.0 mm
 DGA_tf: 30.0 mm
 DGA_tw: 28.0 mm
 DGB_bf: 500.0 mm
 DGB_tf: 18.0 mm
 DGB_tw: 28.0 mm
 TRB_h: 800.0 mm
 TRB_bf: 750.0 mm
 TRB_tf: 34.0 mm
 TRB_tw: 28.0 mm
 CTT_h: 150.0 mm
 CTT_tf: 20.0 mm
 CTB_h: 180.0 mm
 CTB_tf: 18.0 mm
 STCTB_h: 80.0 mm
 STCTB_tf: 12.0 mm
 VER: HE340B
 TRS: HE300B
 LG: HE600M
 R_TR_B: HE280B

Running analysis...

Analysis completed.

>> POST-ANALYSIS RESULTS (Preliminary):

Total weight (Sum |FZ_dead|): 2467.14 kN
 U3 displacement at F60 (COMB01-PER-LOAD): -10.0285 mm
 F60 Dynamic check (L=43.0 m): |U3|=10.03 mm -> X=5.61
 L.Lower (2.54) < X (5.61) < L.Upper (5.69) -> OK

Starting Skew check for 16 combinations...

Processing Combo: 2A49-SLE-CHR2-1-ST-LM71
 Processing Combo: 2A50-SLE-CHR2-2-ST-LM71
 Processing Combo: 2A51-SLE-CHR2-3-ST-LM71
 Processing Combo: 2A52-SLE-CHR2-4-ST-LM71

Processing Combo: 2A54-SLE-CHR3-2-ST-LM71
Processing Combo: 2A56-SLE-CHR3-4-ST-LM71
Processing Combo: 2A58-SLE-CHR4-2-ST-LM71
Processing Combo: 2A60-SLE-CHR4-4-ST-LM71
Processing Combo: 2A61-SLE-CHR5-1-ST-LM71
Processing Combo: 2A62-SLE-CHR5-2-ST-LM71
Processing Combo: 2A63-SLE-CHR5-3-ST-LM71
Processing Combo: 2A64-SLE-CHR5-4-ST-LM71
Processing Combo: 2A66-SLE-CHR6-2-ST-LM71
Processing Combo: 2A68-SLE-CHR6-4-ST-LM71
Processing Combo: 2A70-SLE-CHR7-2-ST-LM71
Processing Combo: 2A72-SLE-CHR7-4-ST-LM71

Skew check completed. Total violations (> 0.8 mm): 0

Starting Horizontal U2 check for 24 combinations...

Horizontal extraction completed. Maximum U2 (abs) found: 23.5392 mm

Horizontal check: $R = (43000.0)^2 / (8 * 23.5392) = 9818742.5$ mm

Horizontal check result ($R > 6000000.0$ mm?): OK

Starting Angular (Rotation) check for 24 combinations...

Angular check completed. Max Theta (abs): 0.00006968 rad (Limit: 0.002000).

Estado: OK

Starting Vertical (F60) check for 288 combinations...

Vertical (F60) check completed. Max U3 (abs): 17.5279 mm (Limit: 71.6667 mm).

Estado: OK

Starting S11 fatigue check for 8 sheets (Combo: ENV01-G1-LTH-01)...

-> Sheet: FramesWBTFForFatigue . S11_final=82.6177, Limit=92.5926 -> OK

-> Sheet: FramesRBTForFatigue . S11_final=24.5868, Limit=118.5185 -> OK

-> Sheet: FramesWSTForFatigue . S11_final=134.5743, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 1)

-> Sheet: FramesRSTForFatigue . S11_final=147.5912, Limit=118.5185 -> ;NO

CUMPLE! (Accumulated failures: 2)

-> Sheet: FramesIBBForFatigue . S11_final=94.6609, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 3)

-> Sheet: FramesEBBForFatigue . S11_final=117.8174, Limit=92.5926 -> ;NO

CUMPLE! (Accumulated failures: 4)

-> Sheet: FramesEBTForFatigue . S11_final=10.6623, Limit=118.5185 -> OK

-> Sheet: FramesIBTForFatigue . S11_final=11.8425, Limit=118.5185 -> OK

S11 fatigue check completed. Overall status: NO CUMPLE (4 fallos)

Running design...

Design completed.

>> FINAL RESULTS - ITERATION:

Weight=2467.14 kN, MaxRatio=1.172, F60_Dinamico=OK, SkewV=0, HorizCheck=OK,
AngularCheck=OK, VertCheck_F60=OK, FatigaS11=NO CUMPLE (4 fallos) -> Costo=1.
717e+08

Ratio counts by range: [>1.0]: 12; [0.9-1.0]: 7; [0.7-0.9]: 21; [0.4-0.7]:
74; [0.1-0.4]: 51; [<=0.1]: 1;

Optimization terminated: maximum number of generations exceeded.

--- PROCESO DE OPTIMIZACIÓN FINALIZADO ---

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Elapsed time is 715431.504683 seconds.

Mejor costo (Peso + Penalización) encontrado:

1.7174e+08

Mejor combinación de índices encontrada:

Columns 1 through 12

5 9 4 3 15 3 1 7 10 4 3 10

Columns 13 through 24

6 9 11 6 6 11 9 9 1 3 3 6

Columns 25 through 26

9 5

Traduciendo la mejor solución:

BC_h: 700.0 mm (índice 5)

BC_tf: 24.0 mm (índice 9)

BC_tw: 32.0 mm (índice 4)

TC_h: 600.0 mm (índice 3)

TC_tf: 40.0 mm (índice 15)

TC_tw: 38.0 mm (índice 3)

DGA_bf: 350.0 mm (índice 1)

DGA_tf: 30.0 mm (índice 7)

DGA_tw: 28.0 mm (índice 10)

DGB_bf: 500.0 mm (índice 4)

DGB_tf: 18.0 mm (índice 3)

DGB_tw: 28.0 mm (índice 10)

TRB_h: 800.0 mm (índice 6)

TRB_bf: 750.0 mm (índice 9)

TRB_tf: 34.0 mm (índice 11)

TRB_tw: 28.0 mm (índice 6)

CTT_h: 150.0 mm (índice 6)

CTT_tf: 20.0 mm (índice 11)

CTB_h: 180.0 mm (índice 9)

CTB_tf: 18.0 mm (índice 9)

STCTB_h: 80.0 mm (índice 1)

STCTB_tf: 12.0 mm (índice 3)

VER: HE340B (índice 3)

TRS: HE300B (índice 6)

LG: HE600M (índice 9)

R_TR_B: HE280B (índice 5)

Presiona cualquier tecla para cerrar SAP2000...