POLYTECHNIC OF TORINO
FACULTY OF ARCHITECTURE 2
Degree in Architecture
Honors theses

Disassembly designing in building: comparison among techniques and environmental criteria for valuation

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The general aim of the thesis is to determine which technological systems, at present available for the designers**, can be selected to meet the compatibility requirements of the design, with particular reference to the aspects connected to the increasing value of recycling and re-use processes and to the maximization of the selective demolition operations**.
From this point of view, the thesis is aimed at analyzing some systems based on the "dry assembling components" checking that they are suitable and efficacious for the building's future easy disassembling. Moreover, consistently with the need to reduce the consumption of non-renewable resources and to protect the environment against pollution at various levels, this work is oriented in comparing the energy and environmental impact of different typologies of dry internal horizontal partitions. This comparison was realized through a analysis process called Life Cycle Assessment (LCA): a methodology that quantifies energy and the emissions released in the environment during the entire life cycle of a product.

The above mentioned objectives are related to needs of satisfying the environmental compatibility requirements of the architectural design. This determines, for the designers, to review the whole design processing, since the preliminary stage and to take into account matters. such as waste, with particular reference to the Construction and Demolition rejections (C&D).
During the last years, the European and National waste regulations have been endowed with research instruments and specific codes of practice aimed at increasing the waste recycling activities in order to reuse them as "second" materials and as energy fuel.

The information arising from these regulations contributed, with other aspects, to develop a new cultural Life Cycle Approach, which represents, through the planning of the whole building's life cycle, a model for the ecocompatible architecture. In order to make this approach operative, it is required to:

- adopt energy environmental analysis instruments, which are able to quantify the consumption of resources and energy as well as pollutants emissions, beginning from the study of the extracted raw materials, continuing through the analysis of the materials production and installation during the construction task, up to the maintenance and demolition phases;
- identify the strategies and technological systems that can optimize a harmonious relation between building and surrounding ecosystem.

On the base of these premises, the thesis was developed around different thematic sectors of investigation:

FIRST PART

- Sustainable development concept.
- Environmental themes and European policy related to the environment protection.
- Ecocompatibility in the architecture designing.
- Life Cycle Assessment (LCA) Methodology.

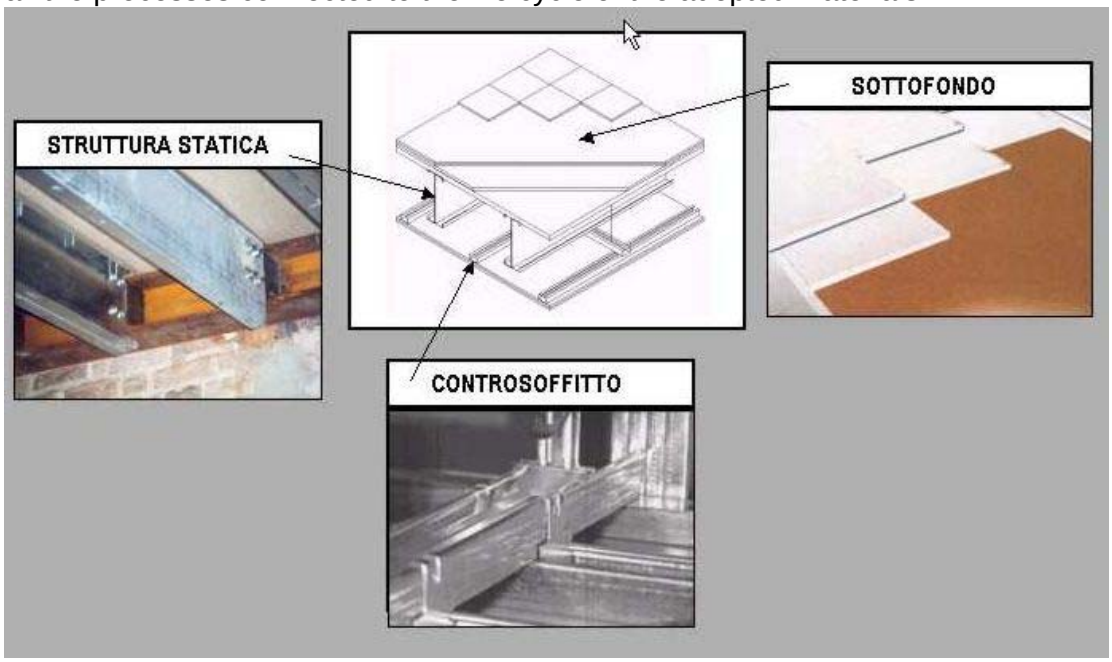
SECOND PART

- Main problems related to the waste management, with particular attention to selective demolition and recycling.
- Technological systems aiming at a correct management of the C&D wastes, based on the dry stratified construction.
- Analysis of the dry assembly techniques as well as the benefits, both in national and international contexts.
- Building systems of main classes of technical elements assembled in according to dry technique, with related product data sheets and with significant examples of what is proposed nowadays by the building market.

PICTURE 1 – Dry assembled building: Kronos in Nantes
(Arch. Dubosc e Landowski)

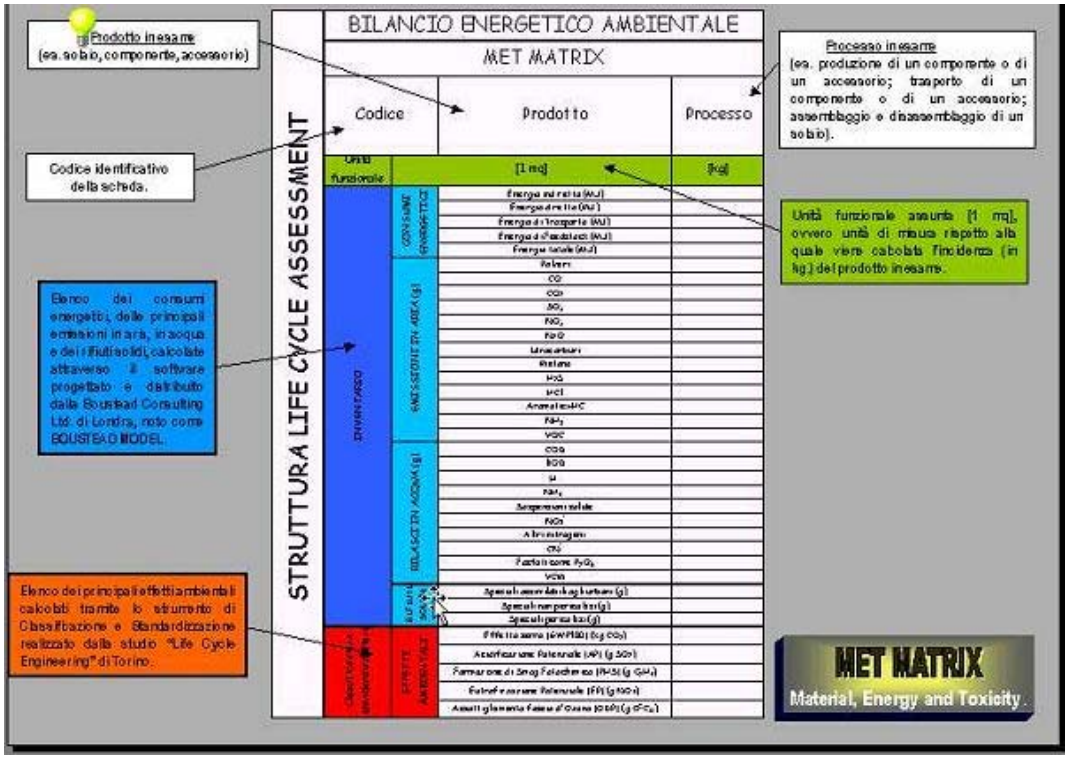
THIRD PART

Application of LCA methodology on thirteen typologies of dry floor proposed by firm VANONCINI, leader in dry assembled systems sector in Italy. Besides a detailed description of the individual floors, this part contains also an analysis of all the processes connected to the life cycle of the adopted materials.



PICTURE 2 – Vanoncini's dry floor

The results coming from the process analysis of the collected information were presented through a system for inventory and evaluation data called **Met Matrix (Material, Energy and Toxicity).** Finally the floors were compared each other according to specific classes of homogeneous performances into which the floors were subdivided.



PICTURE 3 – Met Matrix

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