



POLITECNICO
DI TORINO

Honors thesis

COURSE OF ARCHITECTURE FOR THE SUSTAINABILITY DESIGN

Abstract

**Hybridization between Building Information Modeling and
Visual Programming Language. Redesign of the "The Hide"
case study and parametric software development for
Embodied Energy computation.**

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The new information technologies are rapidly spreading within society, decreeing a change not only of the way of life but of relating to the working world for the exchange of documents, data and information above all. Nowadays, one of the most important transformations is happening in the AEC construction sector.

The Computer-Aided Design (CAD) system, widely used in the built environment, sees its importance and credibility lost in the face of the potential of Building Information Modeling (BIM); key element of this revolution in the exchange of information. Although, BIM is having a practical slowly response in Italy as well, offering rosy prospects for the AEC sector; like the recent approval of the BIM decree which establishes the gradual introduction of the same in public procurement starting from 2019.

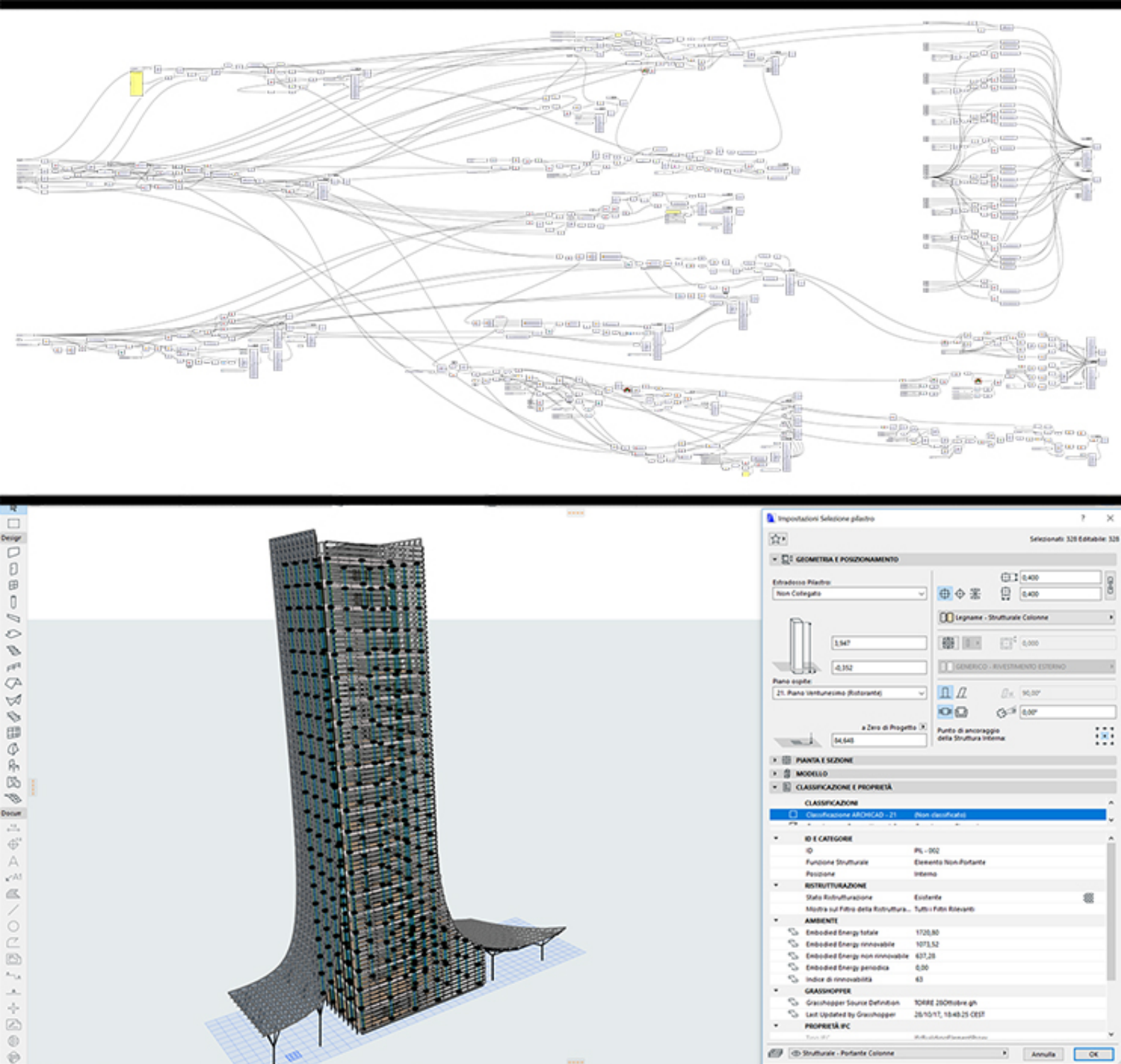
Parallel to the spread of BIM, another revolution is taking place in design field. Contemporary architecture increasingly relies on the digital world and, for this reason, even the way of thinking about architecture itself must evolve in a different way. The use of programming languages tends, more frequently, to extend as an integral part of the design process, which now becomes parametric.

The Visual Programming Language (VPL) allow to bring together figures such as those of the architect to new ways of thinking and to use sophisticated tools for the creation of complex geometric and information structures, also, in relation to the same BIM technology; arriving in some cases to speak, not only of simple interaction, but of a real hybrid software called Algorithm-Building Information Modeling (A-BIM).

The thesis is based mainly on this ground and on our awareness that, in a not distant future, these systems will be the foundations of architectural design. The first objective of this study is to examine, from a theoretical point of view, these two new tools, BIM and VPL, and to analyze, from a practical point of view, the potentials of their interaction through the redesign of a case study. Understanding how a system can affect the other, positively and negatively, is essential to try to improve the design workflow, increasingly aimed at the exchange of data and information rather than simple paper documents.

Testing the possibilities offered by the interaction between BIM and VPL, the second thesis objective consists to bring these capacities toward a new practical dimensions based on the sustainability of the project. For this reason, it was decided to parametrically develop a software, already available in the form of a spreadsheet, able to evaluate the energy and environmental performance of the building (and its components) and to be related to a BIM model consequently. So, the results obtained could become a solid basis for further analysis (6D) conducted on the same model.

The ultimate goal is therefore to highlight the practical utility, as a means to conceive, design and implement, that these tools can have during the design process. The thesis is mainly subdivided in two parts, a theoretical and an experimental one that have alternated in various phases during the writing of the same.



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