POLITECNICO DI TORINO
SECOND SCHOOL OF ARCHITECTURE
Master of Science in Architecture
Honors theses

Building energy saving: technical feasibility of passive house
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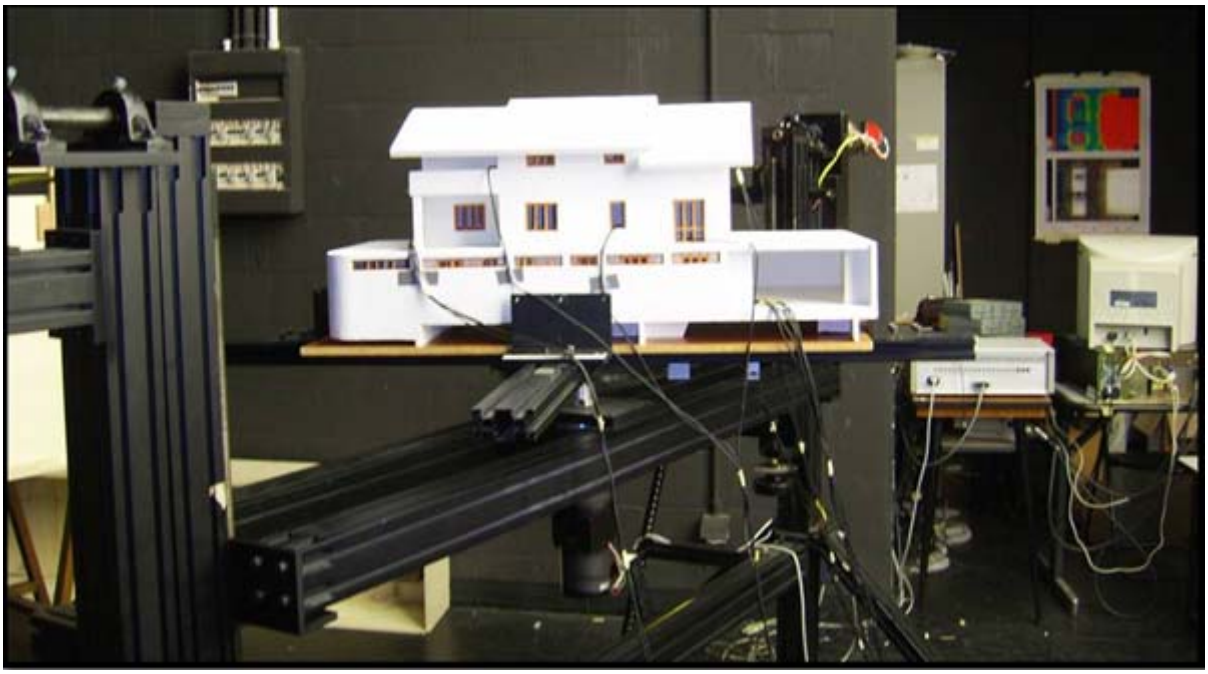
The topic of environmental protection is becoming more and more evident in the field of construction, but this is not the only area as the issues of the environmental protection are a part of daily life in many areas which have been dictated by observation of the changes taking place to the climate.
The emissions produced by combustion, in order to satisfy the growing global needs of energy, are provoking a dangerous climatic change on the planet.

Render about case study

The primary necessity to reduce emissions, along with energy prices, represents a powerful incentive to implement new rules and regulations reducing the specific energy consumption of buildings.
Europe has issued various laws, with timescales, to reduce the impact of the anthropic activities favouring a sustainable approach; the last of the key laws is 2002/91/CE, integrated with 2006/32/CE, which establishes parameters, values of reference and procedures.
Today a sustainable approach to architecture is widely possible, the main avenues to be explored are:-

- ✓ energy efficiency
- ✓ renewable sources
- ✓ correct use of materials

It is on this “passive” design path that takes full advantage of the context of the building and local conditions in order to create comfortable surroundings in terms of heat, light and noise.
The experience I have gained made me better understand the reasons for an insufficient growth of the “passive” solution and even more how vital this approach is. Above all there is a requirement for an in depth knowledge of the legislative and regulatory framework to be able to better understand the directives coming from the higher levels (European) which later arrive as regional level regulations.



Lightening relieve of model

The problems caused by air pollution and consequent global warming, have prompted me, to gain a deepening awareness of the temperatures of Turin; temperatures are higher than those used in the legislation for the calculation, it follows that all values of calculated requirements, are worse than the actual conditions of use. In the study, concerning a building situated in Rivalta of Turin (TO), the key difficulties resulted from the fact that the existing building had not enjoyed the design freedom that would characterise the creation of passive houses; however we have achieved excellent results, acting on the individual components of the covering. The index of energy performance for the winter heating Epi (15,97 kWh/m^2anno), falls fully within the 18 kWh/m^2year provided from the L.R. 13 (relating to Piemonte).

Building case study

The study of natural lighting is essential as through the proper utilization and control of solar radiation it is possible to reduce energy consumption, which is why I built a scale model for the measurement of the illumination, comparing the analytical results with those previously calculated.
In completing this thesis, I have explained the formal procedures and the technical difficulties associated when considering a “passive” house, acquiring a completely different design approach, a more mature approach with a greater awareness of the importance of energy saving.

Building with a view to sustainability means attention to detail, investment in technology and care in the choice of the materials and control of solar radiation. With minor changes, it is possible to save up to 30-35% of energy, maintaining the same conditions of comfort, be aware that this realisation will come to the reader in a progressive way as they make their way through this publication.

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