

**Typological and performance analysis of hybrid ventilation systems**

by Margherita Mariella

Tutors: Marco Perino and Marco Citterio

The contemporary architecture is getting more and more influenced by the concept of sustainability and by strategies of energy savings.

In this architectural field we are dealing with strategies of ventilation, especially hybrid ventilation; according to this concept the “building system” should act to assure a comfortable indoor environment, by using the different characteristics of mechanical and natural ventilation system, in different hours, days or season, in order to reach a new conception of the project path.

The hybrid ventilation system is due to the fusion between two long-studied ventilation systems; the aim of hybrid ventilation system is the control of indoor air quality and thermal comfort in summer. Now we have to understand which are the best ways to realize this union.

The hybrid ventilation considers the building as an “active” system, which is constantly related with the outdoor environment. The building will have to modify its own behaviour according to the changes of outdoor and indoor conditions, and will optimise its decisional strategy in order to save energy, indoor air quality and thermal comfort.

The following work consists of a theoretical and a practical part.

In the first part, the concept of ventilation has been studied as a development process about air flow, in its close relationship with the control strategies, the environmental parameters and the limits which its application implies.

Afterwards fifteen new or recently restructured buildings which exploit the hybrid ventilation technique have been analysed in order to understand the conditions and the application limits of this technique, in different building system and in several climatic regions. Only twelve out of the fifteen buildings have been monitored; this monitoring process belongs to a series of “pilot studies” carried out by an international research team which intends to analyze the phenomenon of hybrid ventilation.

The research project started in 1998 and should be concluded by the year 2002; it involves about thirty research institutes, universities and private companies of fifteen European and extra European countries, included Italy.

This project is called *Annes 35*, the research work has been suggested by IEA (International Energy Agency) and it has been realized in accordance with ECBCS (Energy Conservation in Building an Community System).

The objectives of the HybVent-project are:

- to promote energy and cost-effective hybrid ventilation systems in office and educational buildings,
- to develop methods to predict hybrid ventilation performance and
- to develop control strategies for hybrid ventilation systems.

The practical part contains the analysis and the application of simulation programs, such as “Comis”, “CpCalc” and “Trnsys”, which have been applied to the “I Guzzini” building in Recanati (MC – Italy) and to four building typologies: single family house, terrace house, row house and tower house. The simulations have been carried out in order to study the variations of temperature and ventilation according to the different boundary conditions in July and December.



“I Guzzini di Recanati” building, Macerata, Italy - south side



"I Guzzini di Recanati" building's hall,  
a representative element of hybrid ventilation strategy



Details of the building's openings  
("I Guzzini di Recanati")

The projecting of hybrid ventilation systems represents a new way to look at the architecture, as something which interacts the outdoor environment and where every single part works in close connection with the other parts belonging to the same building system.

For further information, e-mail: [margheritamariella@libero.it](mailto:margheritamariella@libero.it)

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CISDA - HypArc, e-mail: [hyparc@polito.it](mailto:hyparc@polito.it)