MULTIFUNCTIONAL PAVILLION FOR NATURAL HEALTH CARE

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ABSTRACT

The principal goals of the project to re-build the ex cinema Stadium are the control of the internal temperature fluctuation and the achievement of an high insulating level. This will be achieved thanks to the building structure itself, used like thermal mass in the absorption processes or in the cooling transfer processes, and to ventilation ducts inside the floors, connected with the absorption or dissipation systems and with the relative control systems. The exploitation of daily temperature variations allows, on summer nights, to refresh the building by dissipating the heat accumulated during the day; while, in winter, by extending the daily sun exposure, to affect the internal heat production. Furthermore, because of thermal inertia, daily accumulation also maintains its effect during cloudy days. Therefore, through the automatic management of technologically advanced control systems it is possible the maximum energetic exploitation of the system's potentiality.

METODOLOGY OF APPROACH

Energy will represent a key issue also for the buildings already existing in the area of our study, therefore the various possible interventions to give a new functionality or structure to the existing
buildings will be aimed to restrict the energy need, to ameliorate the environmental quality and to reduce the CO_2 emission in a densely inhabited urban contest
The intervention on existing buildings, finalised to energy saving, is an aspect of major relevance in our country, where building activity is almost exclusively focused on the recovery of existing buildings. Our proposal goes beyond the minimum requirements set by the 10/91 law, that is finalised to the achievement of the standards agreed by the European Community and also by the Italian government in the recent conference meeting in Kyoto. This regulation will be included into the next Municipal Energy Planning, with different parameters for the central areas, the strategic zones and for the adjacent zone of interest.

SUSTAINABLE STRATEGIES

Ventilation
Ventilation of a new building is also fundamentally important under the sustainable approach strategy, where it is finalised at the reduction of the use of artificial heating and air conditioning systems, assuring an acceptable comfort in all the rooms during the different seasons. It also facilitates the creation of a natural ventilation, thanks to many protected openings moved by automatic or semiautomatic controls
It has been possible to create a natural lighting chimney thanks to the particular large extension of the roof's surface, compared to the external openings. This chimney will allow not only the natural lighting of the ground-

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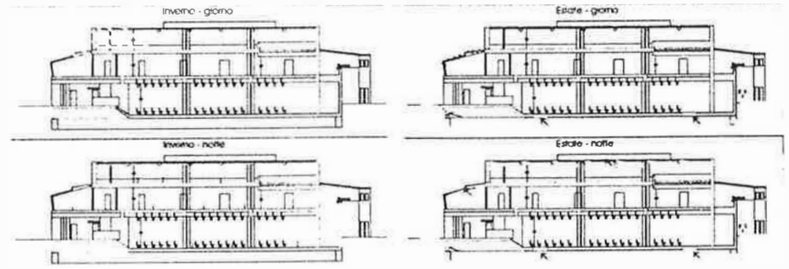
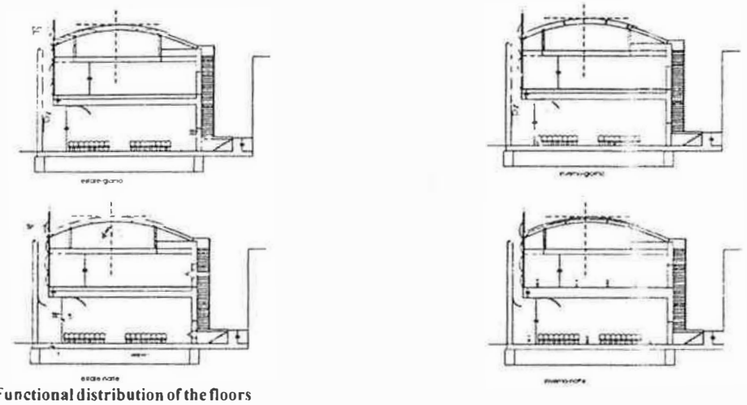
floor, but also a natural "passive" ventilation. The mechanism of passive ventilation is the same of solar chimneys, i.e. vertical ducts whose end is warmed up by the sun through a greenhouse effect, that is it creates an ascendant air column "chimney effect" capable to speed up air fluxes inside the rooms. These elements works likes lighting elements to converge the light from the roof inside the building.
In view of its energy balance, the new buildings must be considered as self-controlled systems, able to operate an optimal use of environmentally sustainable forms of energy.

Lighting strategies
Over the last few years, with the renewed interest on natural lighting of the buildings, many new researches have addressed this problem under the profiles of energy savings, comfort and environmental quality.
The possibility to transfer as much as possible natural light in the underground levels of the building, constitutes one of the necessary prerequisite for the environmental and functional acceptance. Natural lighting, although integrated with artificial lighting as needed, allows
the natural perception of time flow and variations of external light intensity. The use of natural lighting represents an eloquent example of the importance of integrating various systems and strategies of solar architecture. It is often a determinant factor in the characterisation of the architecture, mainly in the public, business and other non residential buildings
Consistent with this approach, is the introduction of new technologies making an attempt to converge and diffuse the excessive lighting instead of avoiding it. The use of advanced technologies allows to dose the quantity of light, by receiving it in a uniform way and by eliminating some negative aspects such as the dazzle effect or overheating.
The sizing of glazed surfaces and their composition, the shape of the openings, the light distribution inside the building and its integration with artificial light are project choices, whose performance control cannot be delaye to the subsequent phases. The integration between artificial and natural lighting fonts have reached a conspicuous development because of the evolution of the electronic systems measuring lighting levels and light characterisation, as well as of those controlling artificial lighting. This integration
allows a gradual phasing between the two systems, improving continuity of light and energy savings.
From a technical point of view, the natural light diffusion in the inner spaces can be obtained with various reflective systems, either natural (in particular with the diffused light) or controlled (dynamic), allowing the reflection of solar radiation from external up-take elements to farther distances.
Technological progress have also involved materials (such as lighting ducts, reflecting films, optic fibres, and Fresnel lenses) as well as predictive and control instruments, allowing an effective evaluation of the proposed design solutions
The external part of these lighting systems, which constitutes the light up-take site, shall integrate with exterio structures or institute design solution with other instruments, while the transferring ducts could be used also lik ventilation ducts or for other compatible function services areas,security exits, channels and smoke evacuation etc



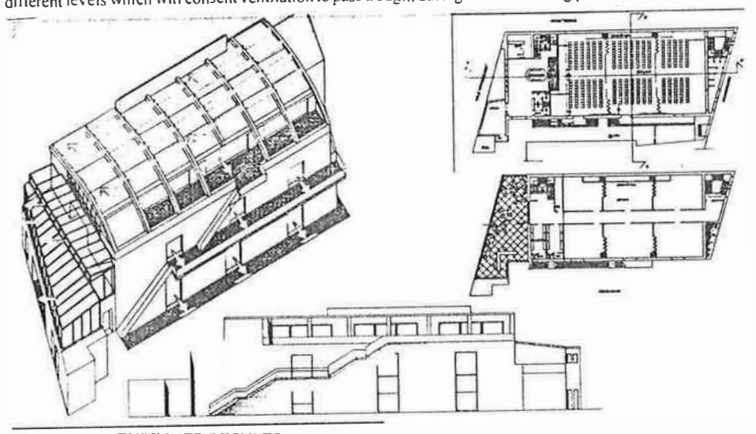


Functional distribution of the floors

Ground floor
The ground floor is designated to be used like a theatre, lecture or concert hall. The project of this room have taken into consideration the following important features:
- the high density of occupancy
- the height
- the allowed low noise level

The high density of occupancy requires an high rate of fresh air changes and a relatively high specific heat load
The large room height makes air distribution with ceiling outlets very difficult.
Low permissible noise level calls for a very careful layout of the entire ventilation and air-conditioning system from the fan to the outlet, both on the supply air return air. For these reasons the seats are planned to be movable and ventilated from the floor.
The air supply come from seats, from the front edge and from the front seat leg
In the system the air supply is conveyed from a pressurised "plenum" to the seat and discharged into the occupied zone. This is a way to have a natural ventilation and air exchanges of fresh air especially in summer, when the changed and exhausted air is collected on the roof and kept
outside from the ceiling.
Seats will be movable, in the way to get free the room from any obstacles when it is necessary.
A lighting duct system will be arranged on the west side of the building, that is the darker side; this will be obscured when required.
The duct connected with the building glazed roof will be provided of reflecting screens, able to converge the maximum available light to the ground floor.
The first floor will be used for sport activities, the big room is divided by movable walls in three sectors, to consent the best flexibility of the area. Air exchanges will occur due to the large windows and to the openings in the glazed roof which will consent cross ventilation.
At the same floor, there will be two dressing rooms and services. On the terrace there will be a bar, the roof of the bar will be realised with a greenhouse, with steel frames and a double glazing with insulating camera.
Shading devices will be realised with a movable system of aluminum profiles movable mechanically, able to rotate and shadow the inside bar.
The same system is also used to shadow the roof. Openings will be movable by pistons automatically moved by a central network, controlled by sensors (sensors are able to control humidity, overheating, lighting factors).
At the second floor a glazed roof will be realised, low emission glasses will be used, colored with double glass and air camera inside.

Inside the air camera will be positioned a movable venetian blind. The roof structure will be realised in wood sheet beams. This floor is used like a solarium, and healthy body care with dressing rooms, services, little swimming pool and hydro-massage bath
In winter, during the night, the roof will be provided by an insulating system, realised with movable panels which will reduce highly dispersions. The natural ventilation, will be guarantee by the big openings, positioned at the different levels which will consent ventilation to pass trough, during the overheating period.



EXPECTED RESULTS

The building operation depends on the use of wind and solar-driven ventilation, thermal mass with night-time cooling, ventilation machinery for peak- looping in mid-summer and mid-winter, and a sophisticated computer control system
Along with the window surfaces, a translucent Thermal Insulation-System functions as solar absorber. Automatic shading systems and air ventilation conditioning flaps prevent overheating in summer. The appearance of the glazing surfaces of the building changes according to the seasons, time of day and weather.
The use of the energy strategies analysed below will reduce highly the energy consumption of the building
Designing this building is an opportunity to apply current research into environmentally friendly construction methods and materials, and low energy systems to produce quality architecture.

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