

DG XII PROGRAMME. RETROFITTING OF MUSEUMS FOR ANTIQUITIES IN THE MEDITERRANEAN COUNTRIES

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ABSTRACT

The JOULE III programme has studied a selection of 16 typical museums for antiquities in five Mediterranean countries.

Through an elaborate analysis and complete refurbishment of the archaeological museum of Delphi the programme is setting an example for an innovative museum design based on present-day know-how.

KEYWORDS

Museum, Retrofitting, Bioclimatic Design, Daylighting, Passive Cooling, Natural Ventilation, Simulations, Modelling

INTRODUCTION

In most museums issues of bioclimatic, environmental-friendly and energy-conscious design have been completely ignored. Good reasons seem to support the opinion that museums should be lit, heated and ventilated by artificial means. This leads to buildings fully dependable on M/E installations. The sensitivity of the objects exhibited is the main argument to justify this position. The exhibits can be better preserved when light, temperature etc. are fully controllable and adjustable according to the special requirements of each object. Furthermore special lighting effects often enhance the "exhibition value" of the items on display.

This however, need not be the case as far as antiquities and especially antique sculpture is concerned. Sculpture in general is not affected or damaged by daylight, on the contrary daylight often even makes the best out of sculpture.

PROJECT OBJECTIVES

From the wide range of museums that exist the JOULE III programme has particularly addressed itself to museums for Antiquities with an emphasis on sculpture and other smaller artefacts. It has studied a selection of 16 typical museums for antiquities in five different Mediterranean countries.

Having defined their problems and energy consumption, the project is setting an example for an innovative museum design based on present-day know-how through the retrofitting of the Archaeological Museum of Delphi.

The following aspects were treated with priority:

- Daylighting
- Passive heating and especially passive cooling
- Natural ventilation
- Use of new energy-saving artificial lighting components
- Use of efficient energy management systems
- Use of environmental friendly materials
- Acoustics

The application of the acquired know-how is aimed at resulting in museum buildings with:

- An enhanced exhibition of the objects on display
- A better indoor air quality
- Maximum visual and thermal comfort
- Low energy consumption and rational use of energy.

METHODOLOGY

The programme consisted of three major phases:

1. The analysis of museums

A selection of 16 archaeological museums in five Mediterranean countries were short-term monitored, spot-measured, analysed and evaluated in order to gain an overview of the situation of archaeological museums in the Mediterranean, their generic problems and potential.

2. The research and evaluation of the Museum of Delphi

In this task long-term monitoring, analyses and evaluations were performed. The aim was to gain a thorough picture of all important aspects of the museum building of Delphi, which form the basis of the exemplary proposal design.

3. A proposal design for the Museum of Delphi based on the evaluation and extensive simulations

Extensive energy, lighting and acoustic simulations and the according derivation of an innovative architecture, electro/mechanical, lighting and acoustic proposal design were carried out. The aim of this stage was an innovative retrofitting design for an archaeological museum, which serves as an example to other museums in the Mediterranean.

1. ANALYSIS OF MUSEUMS

The results show the following similarities:

- The majority of buildings originally depended on daylight and natural ventilation and consists of older shells transformed to house museums with many problems of obsolescence.
- The pace of finding new archaeological sites has been slowed down considerably so few new buildings are being erected. But the old ones have a great need of expansion in order to accommodate new findings from the existing sites.
- The great majority of buildings belong to the public sector with tight budgets and administration restrictions. Obtaining data has not always been easy.
- The majority of buildings have a strong relation to the adjacent environment, either because they are actually part of an archaeological site, or because they are landmarks tied to their historic context.
- There is an increasing need for "peripheral" uses such as shopping rooms, lecture rooms, cafeterias etc. That enhances the idea of the modern museum as a multi-functional didactic and research centre.
- Many museums have strong qualities in terms of spatial organisation, which forms a good basis for contemporary retrofitting.
- In most cases there is a great need for improvement of the electro/mechanical systems, including retrofitting, updating and replacement.
- There is a prevailing trend among museum authorities towards the hermetically sealed museum-box that should provide a better control. Even in older shells, that used to depend on natural light and ventilation, new interventions call to blocking the skin apertures.
- Generally there is a strong potential for retrofitting of museums for antiquities, which can bring about substantial benefits in quality, comfort, sustainability and finances.

There are some positive exceptions to some of the negative observations.

Potential for retrofitting

Despite the problems of original design mistakes, ill maintenance, overcrowding etc., many museum buildings for antiquities prove to have strong qualities in terms of spatial organisation and relation to the environment. So the analysis of this type of building and the proposal for a retrofitting methodology are worth the effort, and if realised, would drastically improve the function and the image of the building. The effort should be addressed to all parties involved, but mainly to Museum Authorities and responsible public services in order to convince for the necessity and the viability - both in a scientific and an economic way - of the retrofitting process.

General conclusions

- There is a great need and also a great "market" for retrofitting of older museum buildings in order to accommodate the increased needs.
- There is need to convince the authorities of the economic and cultural benefits for retrofitting by the use of passive methods.
- Any suggestions in order to be realistic should take into consideration the timing and technical restrictions of any public sector.
- The "new" problems of obnoxious environment should be taken into consideration.

2. RESEARCH AND EVALUATION OF THE MUSEUM OF DELPHI

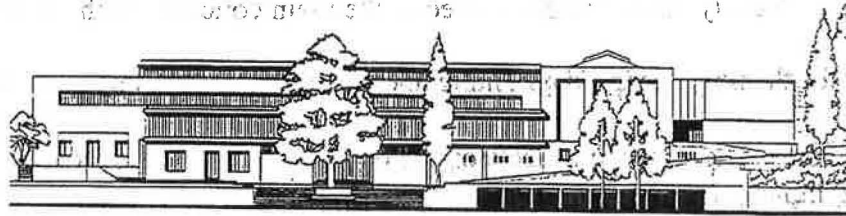


Figure 1: The museum of Delphi, elevation

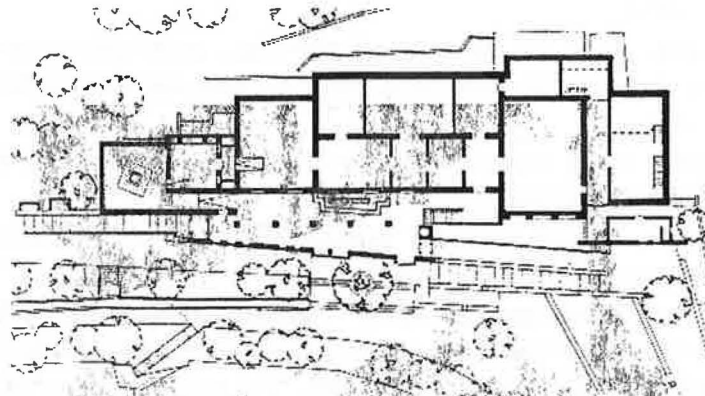


Figure 2: Ground floor plan

The review of the museum building of Delphi (figure 1 and 2) showed the following main characteristics:

- The building consists of an old shell with many problems of obsolescence.
- The pace of finding new archaeological items on the greater area of Delphi has been slowed down considerably so the need of a better handling of the existing exhibits is prevailing over the need of expansion in order to accommodate new findings.
- The Museum belongs to the public sector with tight budgets and administration restrictions.
- The building has a strong relation to the adjacent environment, being virtually a part of the archaeological site.
- The environment is relatively unpolluted.
- There is a well stated need for "peripheral" uses such as a vending room, a multi-purpose room, a cafeteria, stores and workshops etc. that will enhance the image of the museum as a multi-functional didactic and research centre.

The museum of Delphi was basically facing two problems:

- Bad exhibition of the objects of art and
- Bad indoor quality deriving from the conditions mentioned above.

3. PROPOSAL DESIGN FOR THE MUSEUM OF DELPHI

The project includes the complete renovation and re-exhibition of artefacts of the important archaeological museum of Delphi plus an extension that incorporates a new entrance hall,

supporting facilities and a hall for the famous sculpture of the Charioteer. Natural ventilation, acoustics and especially daylighting are three of the main concerns of the design.

The strategy for the new energy, daylighting and acoustics focuses on the following aspects:

- Maximisation of the positive aspects of the existing building, regarding mainly its use of natural daylight and ventilation,
- Correctional actions for the negative aspects of the old building, regarding mainly heat losses, acoustics and obsolete M/E installations and
- Rethinking of the daylighting practices to be followed in the main rooms of the extension building.

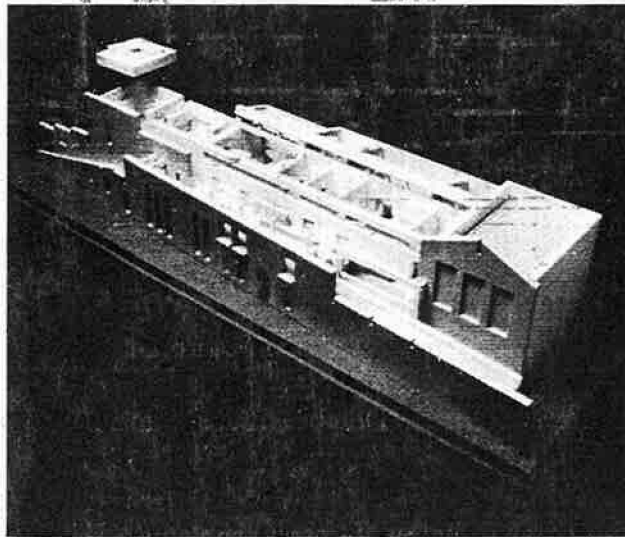


Figure 3: Open roof model

The design for the extension part focuses on the Charioteer Room with a new roof configuration and sidewall openings for daylighting (figure 3, top left and 4). The idea is to give a better daylight factor and enhance the statue while avoiding the direct light from above suggested by the previous design.

The redesign of the reception area followed the common logic of the continuous path, incorporating at the same time more advanced techniques for artificial lighting.

The design for the existing building focused on the following matters:

- Rearrangement and treatment of exhibits as parts of a whole and as separate parts in independent rooms.
- New openings in internal partitions for the creation of the new movement and visual axes.
- New skylight openings and treatment of the ceiling plane as a light directing and acoustic device.
- Incorporation of the new M/E networks and outlets and the proposed light fixtures.
- New roof configuration for the Siphnians room.

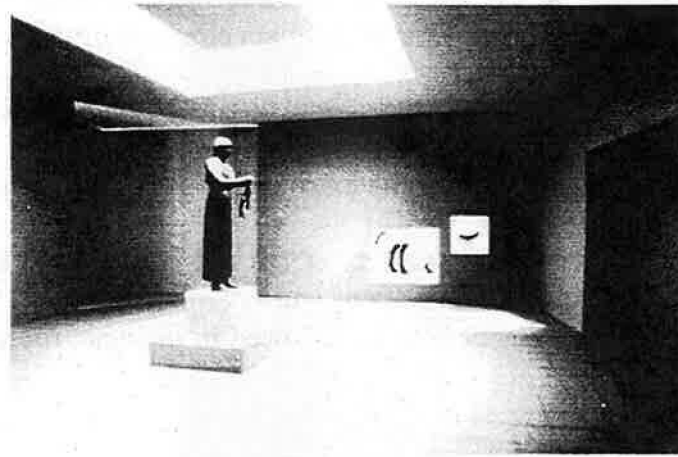


Figure 4: Inside model view of the charioteer room

Extensive simulations on the aspects of thermal behaviour (figure 5), acoustics and daylighting were carried out in order to optimise comfort conditions, the visual display of exhibits and the energy performance of the building.

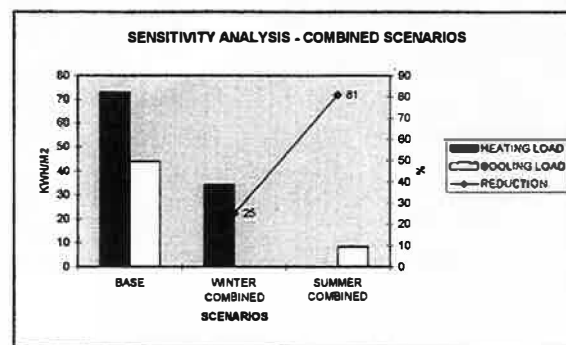


Figure 5: Thermal study,
Reduction of heating and cooling loads
through combined scenarios