



The Magic Box. Multifunctional Sports Centre by the Manzanares River in Madrid

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Abstract

The “Magic Box” is a sports building representing a major investment that can be recouped via its multifunctionality, permitting it to be used for events throughout a large part of the year. Standing out are its movable roofs and the rotundity of its metallic presence.

Keywords: Multifunctionality, sustainability, post-stressed slab, movable roof, latticework, architecture.

1. Introduction

The construction of large structures in the urban environment with public funds has the difficult task of combining economic viability and return on the considerable investment usually needed with the achieving of social benefits such as developing deprived neighbourhoods, and very often looking for a high quality architecture.

These objectives are accomplished in the Multifunctional Sports Centre, in the Manzanares Park, Madrid, popularly known as the “Magic Box”.



Image 1. External view of the complex

2. Description of the project

The main building of the complex consists of a large permeable steel-like box that rises above the water of a lake, on a series of stout concrete columns giving it the appearance of hovering slightly above ground. And above all there is the operable “lid” roofing system, three movable roofs which slide and pivot upward to multiple positions from completely closed to wide open, to multiply the functionality of the building for indoor and outdoor events.

The structures forming the stadiums are made of concrete and are housed under a large common roof sustained by slender metallic supports, with a formation of roof and false ceiling also made of steel, and with the entire assembly enveloped in semi-permeable steel mesh, giving the building the appearance of a metallic “Box” containing the stadiums inside it.

The main concrete structures are the floor slabs, especially in level +0, resolved by means of a post-stressed slab, the columns sustaining them, the gantries that sustain the prefabricated terraces and the projecting slab of what is known as the “Sky-Lounge”.

One of the most outstanding and surprising elements of the building is its roof, which provides the “Box” shape imagined by the architect, and which has three “covers” that can be opened to permit each of the three tennis courts to be fully exposed, allowing the possibility of holding competitions or events in the open air or under cover.

Each of these three movable covers is supported on the fixed roof which unifies the whole and they project on it by about five metres along its entire edge.

In order to provide a response to this design, a metallic structure naturally had to be resorted to which, due also to the need to house an entire series of installations and air conditioning machines inside it, could not have a three-dimensional lattice arrangement. Moreover, a system of elevation and displacement of the movable roofs was needed that would make this versatility possible. The solution adopted is focused on a very conventional kind of structure in terms of the typology of its resistant elements, though the dimensions and complexity of some elements in particular are extraordinary

3. Sustainability of the Construction

The construction of a complex of this type involves a major investment which nowadays cannot simply be justified in terms of political or social motivations; it requires an approach that is sustainable on the economic side, particularly when, as is the case, the investment is coming entirely from the administration.

When the need arises to construct a major complex aimed at holding important sports events (international level tennis tournaments or Olympic Games), the promoter looks for the possibility of taking advantage of the opportunity in order to achieve as many objectives as possible. That's why the collaboration was sought of a leading architect who would produce a unique building having the following outstanding characteristics:

- Spectacular for its dimensions and architectural conception, for its façade permeable to light and air, for its three movable roofs, for its box shape floating on the lake, it is going to attract the attention of the public to the city and the district.
- The structure that supports this architecture has its uniqueness in the spectacular manner in which it uses classical outlines to resolve the large dimensions and functional challenges of the complex, resulting in a beauty both in its simplicity and in its monumental scale, which is displayed as part of the actual architecture.
- The uniqueness of the pivoting displaceable roofs leads to the development of ingenious solutions which resolve the challenge with simplicity and economy, at the same time as it multiplies the use and appearance of the complex.
- The entire development of the project has as its objective the multifunctionality of the facilities for the holding of events of a very different content during the greater part of the year, in order to provide an economic profitability for the investment.
- It implies the creation of a centre of economic activity in a part of the city that has been left behind by the urban development of recent decades, which is going to lead to the relaunching of the south, as well as bringing it closer to the city by merging it into the new backbone implied by the development of the banks of the Manzanares River.
- Around a sport stadium, it links up an entire complex devoted to elite sport, capable of housing a wide range of competitions, and of becoming converted into a reference centre for the encouragement of tennis in Spain. It also forms part of the facilities supporting the candidacy of the city of Madrid for hosting the 2016 Olympic Games.