

Steel Structures of the Giant Bigo Exhibition Area of Genoa's Old Harbour

General information

- ✓ Years: 1990-1991-1992
- ✓ Grantor: Ente Colombo '92 - Genoa
- ✓ Agency: IRITECNA - Genoa

Architectural plan:

Renzo Piano

Building Workshop - Genoa

Steel structures plan:

Ove Arup and Partners - London (UK)

Sidercad - Genoa

Masts construction:

CMF - Leghorn

Tensioned structure construction:

Canobbio - Milan

Features

The Giant Bigo, designed by the architect, Renzo Piano, during the Colombian celebrations of Expo '92, stands on an artificial island at the centre of the Old Harbour waterfront and, with its steel structures, resembles the traditional equipment once used on vessels to handle goods. Eight cylindrical masts tapered at the ends are laid on the central island and held in position by stainless steel backstays. From a structural point of view there are two independent systems where the masts act as struts and pulling rods. In the first system the biggest mast, with a maximum diameter of 2.3 mt., supports the elevator that, rotating around itself, raises 65 people way above 50 mt., From the elevator visitors are able to admire the fascinating view of the harbour and historic centre.

In the other system, two masts act as a support with the use of fan-shaped

metal wires, four slender bows connected to a translucent PTFE Fiberglass membrane of about 2000 sqm that covers the pier below. This is the Piazza delle Feste, a common meeting area and original location for theatrical and musical performances.

Design aspects

Behind the striking aspect of the work lie major commitment and effort. The structural planning required sophisticated analysis and the use of advanced technologies in order to address complex problems tied to a very special structure in terms of size and design.

For analysis of the steel structures were used calculation codes of both linear and non-linear finite elements. Studies at the University of Bristol (UK) were carried out for the study of the complex issues linked to the wind factor on the masts and on the membrane wind tunnel. Stability analysis of aeroelastic phenomenon specifications was also conducted.



Assembly phase

Sidercad S.p.A.

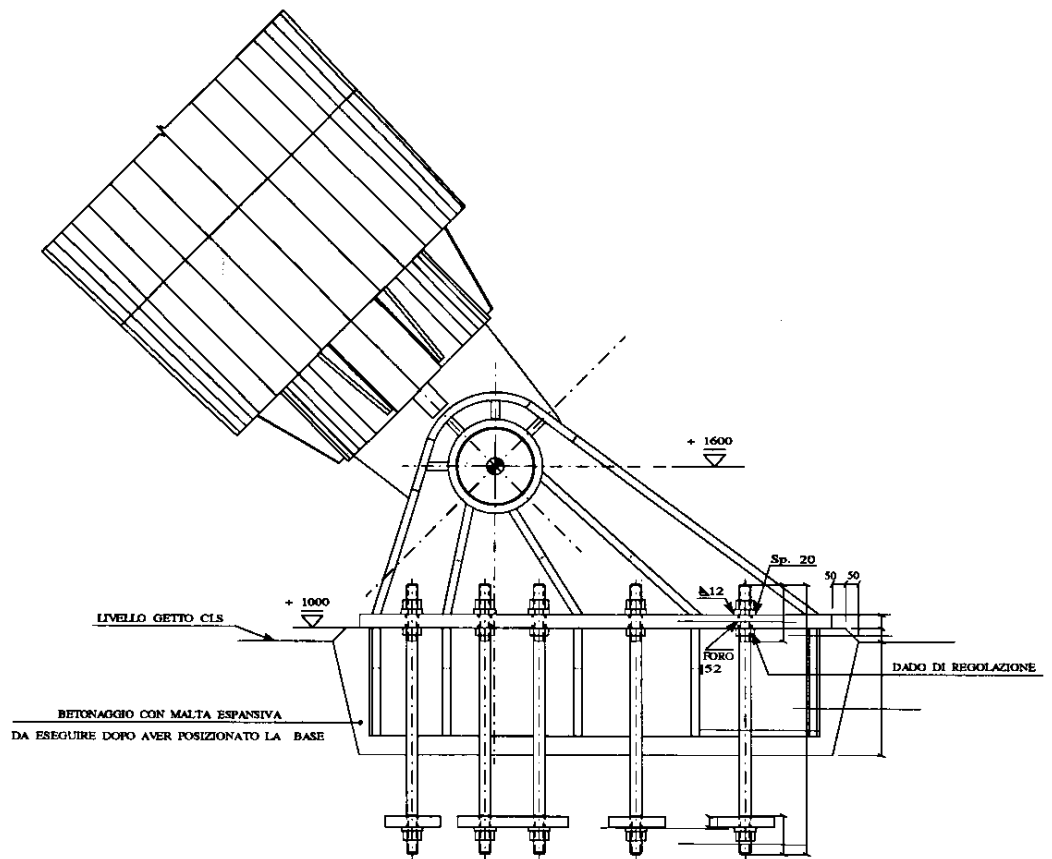
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The assembly drawings and construction details were created by using CAD techniques based on bi/tridimensional models. In particular, Sidercad collaborated with Ove Arup and Partners to the design and carried out the executive designs of the structural details for all the masts and cable anchorages. It also supervised the drafting of the technical documentation for the calculations and revision of workshop designs, providing assistance during the manufacturing phase and keeping relations with the Grantor.

Development aspects

The main structures (masts, arcs and tensioned structure support) were made of Fe510 C steel; for the construction of certain structural elements special materials with high resistance and durability were used, such as, for example, the "Ferralium" alloy for the anchoring bars of the tensioned structure and the PTFE reinforced with fibreglass for the membrane. For the assembly works and set up of the structural support system of the tensioned structure, special adjustment devices controlled by jacks were provided on the central mast. This was carried out in order to ensure expected stress on the different elements. The assembly resulted in a complex series of steps with the use of lifting equipment on the ground or on boats.

For the creation of the Giant Bigo about 400 tons of steel and 3 kilometers of wire rope were used.



Detail of the masts' foundation