

Project

Zaragoza Bridge Pavilion

Location

Zaragoza, Spain

Date

2005 / 2008

Client

Expoagua Zaragoza
2008

Status

Built

Size

6,415m²



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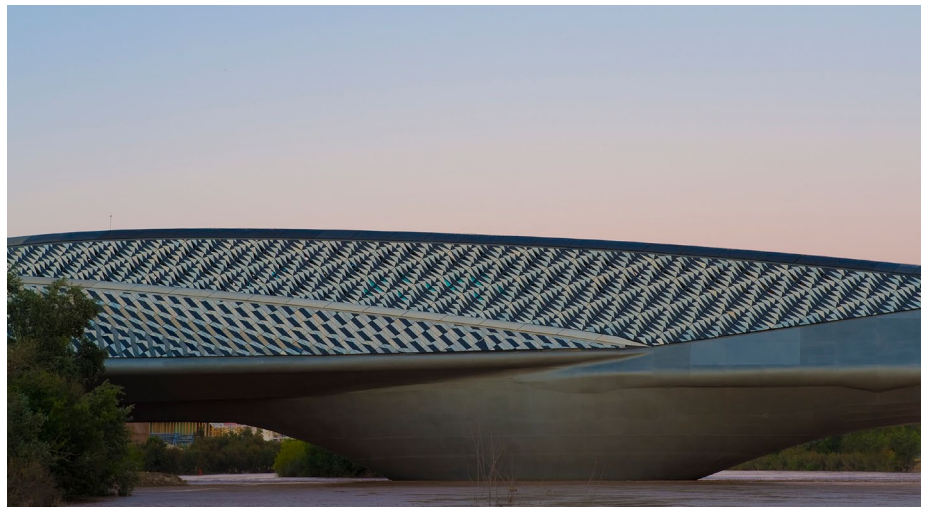
The Zaragoza Bridge Pavilion is organized around 4 main elements, or “pods”, that perform both as structural elements and as spatial enclosures. The Bridge Pavilion design is a result of detailed examination and research into the potential of a diamond shaped section which offers both structural and programming properties. As in the case of space-frame structures, a diamond section can efficiently distribute forces along a surface, whilst underneath the floor plate the resulting triangular pocket space can be used to run services.

The diamond section has also been extruded along a slightly curved path. The extrusion of this rhombus section along different paths has generated the four separate ‘pods’ of the Bridge Pavilion. The stacking and interlocking of these truss elements (the ‘pods’) satisfies two specific criteria: optimizing the structural system, and allowing for a natural differentiation of the interiors - where each ‘pod’ corresponds to a specific exhibition space. By intersecting the trusses/pods, they brace each other and loads are distributed across the four trusses instead of a singular main element, resulting in a reduction in size of load-bearing members.

Located above the main flood level, the Bridge Pavilion connects with each river bank via a smooth inclined terrain. Each pod is located on the same level, except one which is 1.5 meters above this main level and intersects with its adjacent pods. All but one of the pods include an upper floor, which hangs from the diamond section structure and provides views of the lower level.



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Design

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Project Team

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IDOM

All pods are stacked according to precise criteria - aimed at reducing the Bridge Pavilion's section as much as possible where the span is longer (approximately 185m from the island in the middle of the river to the right bank), and enlarging the section where the span is shorter (85m from the island to the Expo riverbank). One long pod spans from the right riverbank to the island, where the other three are grafted into it, spanning from island to left bank.

This interlocking of the pods has given the design many exciting possibilities. Interiors become complex spaces, where visitors move from pod to pod through small in-between spaces that act as filters - or buffer zones. These zones diffuse the sound and visual experience from one exhibition space to the next, allowing for a clearer understanding of the content within each pod. The identity of each pod remains evident inside the pavilion, almost performing as a three-dimensional orientation device.

Spatial concern is one of the main drivers of this project. Each zone within the building has its own spatial identity. Their nature varies from completely enclosed interior spaces that focus on the exhibition, to open spaces with strong visual connections to the Ebro River and the Expo.

The design capitalizes on the ambiguous nature of the original brief, maintaining both the aspect of a traditional bridge (open to the environment with the steel structure being the dominant visual element) and that of a more conventional exhibition pavilion where climate and light permeability are controlled.

Two pods housing exhibitions are acclimatized with an entirely enclosed structure. The remaining two pods are clad by a single-layer skin which leaves the grid structure visible from the inside. These two pods include small triangular apertures, with larger openings located at lower levels, allowing for the greatest degree of visual contact with the river and the Expo.

Natural surfaces have been investigated when designing the Pavilion's exterior skin. Shark scales are fascinating paradigms both for their visual appearance and for their performance. Their pattern can easily wrap around complex curvatures with a simple system of rectilinear ridges. For the Bridge Pavilion, this proves to be functional, visually appealing and economical.

The outer skin is split longitudinally into two elements: a lower deck made of structural metal plates, and on the higher level, a cladding system of glass-reinforced concrete (GRC) panels in various shades from white to black.

The lower deck follows a free-form geometry allowed for by the flexibility of its constituting material. The curvature of the upper level has been rationalized into sections of cylinders that have been subdivided into 26,500 rectangular panels of equal size. A pattern of triangles has been inscribed into these panels, limiting the variation to 10 inscriptions which, when combined with the chromatic variation to the GRC panels, creates the array of optical patterns visible on the Bridge Pavilion's façade. The bridge's internal skin constitutes of a smooth semi-gloss surface of plasterboard finished with several layers of polished polyurethane resin.

Construction

At 68.5m the Bridge Pavilion's foundation piles are the deepest ever constructed in Spain.

62,500 steel structural elements have been prefabricated in nine metal-fabrication workshops and subsequently assembled on site.

The north portion of the Bridge Pavilion's structure, comprising three pods, weighs 3,500 tons and was constructed in its final location on a temporary peninsula built in the river. The south part, weighing 2,200 tons, was assembled on the south bank of the river. It was pushed into position on the river bed, first on sleds, then by means of a 42 m high pulling tower – a complex manoeuvre due to the asymmetrical geometry of the bridge.

