

ZARAGOZA BRIDGE PAVILION [ZARAGOZA, SPAIN]

2005-2008

PROGRAM:	Interactive exhibition area focusing on water sustainability, integrating a pedestrian bridge to perform as gateway for the Zaragoza Expo 2008.	
CLIENT:	Expoagua Zaragoza 2008	
ARCHITECTS:	Design	Zaha Hadid with Patrik Schumacher
	Project Architect	Manuela Gatto (Associate)
	Project team	Fabian Hecker , Matthias Baer, Soohyun Chang, Feng Chen, Atrey Chhaya, Ignacio Choliz, Federico Dunkelberg, Dipal Kothari, Maria Jose Mendoza, José Monfa, Marta Rodriguez, Diego Rosales, Guillermo Ruiz, Lucio Santos, Hala Sheikh, Marcela Spadaro, Anat Stern, Jay Suthadarat.
	Competition Team	Feng Chen, Atrey Chhaya, Diapl Kotari
CONSULTANTS:	Engineers	ARUP Associates
	Cost Consultants	ARUP Associates / IDOM
SIZE:	Length:	270m (185m from the island to the right bank + 85m from the island to the Expo riverbank).
	Maximum height:	30m.
	Foundation pile depth:	68m
	Total floor area:	6415m ²
	Exhibition surface area:	3915m ²
	Pedestrian Bridge surface:	2500m ²
	North Section (3 'pods') weight	3,500 tons
	South Section (1 'pod') weight	2,200 tons
Completion:	13 June 2008	



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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.

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 68m 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.



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PRESS RELEASE**14 June, 2008*****For Immediate Release*****Zaragoza Bridge Pavilion opens for the Expo Zaragoza 14 June, 2008**

Zaha Hadid Architects are pleased to announce that the Zaragoza Bridge Pavilion, Zaragoza, Spain opens to the public on June 14, 2008.

"The Bridge Pavilion is a seminal project for the practice as it will be our first completed bridge anywhere in the world." states Zaha Hadid.

The Zaragoza Bridge Pavilion is organized around 4 main elements, or "pods", that perform both as structural elements and as spatial enclosures, where each 'pod' corresponds to a specific exhibition space. These pods intersect and brace each other, allowing the weight of the bridge to be distributed across the four trusses instead of a singular main element. This has resulted in a reduction in the size of load-bearing members required to span the 155m and 125m sections of the bridge (measured from foundation to foundation) that cross the River Ebro.

Expo Zaragoza originally envisaged the concept of an enclosed exhibition pavilion spanning the river. This concept is extremely exciting and Zaha Hadid Architects worked to develop the design that couples architecture and engineering. For this reason, the structure is largely visible and plays an important role in defining the Bridge Pavilion's external envelope. The unique design meets the client's wish for enclosed exhibition spaces, yet offers direct visual connections with the river whilst also shading from the sun.

The Bridge Pavilion represents over 30 years of detailed research and examination by Zaha Hadid into bridge design. The practice has a welcome reputation for extracting the maximum potential from structural advancements and technical innovations, with the Bridge Pavilion design using the latest in design and construction technologies.

"We like projects which are structurally ambitious and I think the Bridge Pavilion illustrates the excellent symbiotic relationship we have with engineers." says Hadid. "Our ambitions towards creating fluid, dynamic and therefore complex structures has been aided by technological innovations, and applying this knowledge to the Bridge Pavilion has been a very rewarding process."

The hybrid nature of the Zaragoza Bridge Pavilion represented the perfect challenge for Zaha Hadid Architects. The design merges two traditionally distinct and separate building typologies: the "infrastructure" element (the bridge) and an "architectural" element (the pavilion). With the Bridge Pavilion design, Zaha Hadid Architects has challenged the conventional idea of a bridge being purely engineering.

"As the Bridge Pavilion is not one particular building typology, this really adds to the richness of the spaces inside." explains Hadid. "We build the complexity of all our projects in relationship to the inherent complexity of the program, but then clarify the diagram as much as possible to be a logical configuration. This is evident in our design for the Bridge Pavilion. All the forces operate at the same time, so that the view of the exhibition is inherently related to nature of the visitors' path through the Bridge Pavilion - but equally, the experience of the path shifts according to what the viewer is seeing at a given moment."

The predominant theme of Expo Zaragoza is "Good administration of water". Zaha Hadid Architects has interpreted this on several levels, from the building's performance to the visitor experience whilst moving through the exhibition. The Bridge Pavilion hosts an interactive exhibition "Water, A Unique Resource" designed by Ralph Appelbaum Associates of New York. This multimedia exhibition explores the water crisis and its solutions.

"We designed an envelope for the Bridge Pavilion that encloses the exhibition spaces yet can be permeated by natural elements. The internal micro-environment varies with the external climate and requires minimal cooling or heating infrastructure." says Hadid. "In particular, we considered the local Cierzo wind when designing the Bridge Pavilion's skin. A variety of openings convey and direct air into the building's interior - cooling visitors in the heat of the summer."

About Zaha Hadid Architects

Zaha Hadid, founding partner of Zaha Hadid Architects, was awarded the Pritzker Prize (considered to be the Nobel Prize of architecture) in 2004 and is internationally known for both her theoretical and academic work. Each of her dynamic and innovative projects builds on over thirty years of revolutionary experimentation and research in the interrelated fields of urbanism, architecture and design. Zaha Hadid is now widely known as an innovative architect who constantly tests the boundaries of architecture and design.

Working with senior office partner Patrik Schumacher, Hadid's interest is in the rigorous interface between architecture, landscape, and geology as the Practice integrates natural topography and human-made systems that lead to experimentation with cutting-edge technologies. Such a process often results in unexpected and dynamic architectural forms moulded by the realities of site and building requirements.

The BMW Central Building in Leipzig and the Phaeno Science Center in Wolfsburg, Germany are excellent demonstrations of the Practice's quest for complex, dynamic and fluid spaces. Previous seminal buildings, such as the Vitra Fire Station and the Rosenthal Center for Contemporary Art in Cincinnati have also been hailed as architecture that transforms our vision of the future with new spatial concepts and bold, visionary forms.

Currently Zaha Hadid Architects are working on a multitude of projects including; the Fiera di Milano masterplan and tower, The Aquatic Centre for the London 2012 Olympic Games, The Performing Arts Centre in Abu Dhabi; The Signature Towers in Dubai; High-Speed Train Stations in Naples and Durango, the CMA CGM Head Office tower in Marseille, Opera Houses in Dubai and China, the Museum of Contemporary Arts in Sardinia, private residences in Moscow and the USA, as well as major master-planning projects in Bilbao, Istanbul, and the Middle East.

For further information on the Zaragoza Bridge Pavilion and all projects by Zaha Hadid Architects, please contact:

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Zaragoza Bridge Pavilion

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Zaragoza Bridge Pavilion

Zaragoza, Spain

Zaha Hadid Architects

2005-2008

List of Suppliers

Steel structure and steel cladding

Fabrication and installation:

URSSA (Spain)

Facade

Fabrication of substructure and panels:

Glass Reinforced Concrete:

Installation:

Prince Cladding (Holland)

Rieder (Austria)

Eurogramco (Spain)

Curtain walls and internal glazing:

Joan Obré (Spain)

Internal finishes:

Internal cladding (Plaster-board with resin coating)

Installer: Opersis (Spain)

Supplier: Iberplaco (Spain)

Resin flooring:

Installer: Oka (Spain)

Supplier: Basf (Spain)

Cladding of the structural arches:

Ebrim (Spain)

Architectural metalwork:

Inoxbier (Spain)

Electrical Services:

Installation: Cymi (Spain)

Mechanical Services:

Installation: Lac (Spain)

Lighting:

Fabrication:

Durlum (Germany)

Installation:

Cymi (Spain)

Programming of lighting control:

Erco (Spain)

Fire Services:

Installation:

Parsi (Spain) and

Stoc + Stoebich - *fire curtains only* - (Spain)