# PROJECTS PORTFOLIO

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PROJECTS SUMMARY

- Bologna – New Technical Center
- Cairo – New Stadium
- Florence – TAV Highspeed railway Station
- Florence – TSH Belfiore Student Hotel
- Bologna – Pavilion 37
- Ravenna – New multi-purpose Arena
- Bologna – New Renato Dall'Ara Stadium
- Bologna – People Mover Pedestrian Bridge
- Bologna – via Serlio Student Hotel
- Calderara di Reno – Bonfiglioli Headquarters
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- Classe – Archeological Museum
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- Sassuolo – Pedestrian bridge on Secchia River
- Casalecchio – Pedestrian Bridge
- Bologna – Unipol Tower
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- Dozza – Pedestrian bridge over A13 Highway
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- Salonicco –Thermis Olympic Complex
- Bologna – Pavilion 20
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- Turin – Delle Alpi Stadium
- Rome – Olympic Stadium Roof
- Athens – Sport Hall

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# Bologna – New Technical Center

## DESCRIPTION

The design concern buildings inside lot 4 of the new Data Center for CINECA and INFN corporation in order to get in position EURO HPC Supercalulator. The project is inside the old Tobacco factory designed by Eng. Pier Luigi Nervi in the 50s.

The structure is subdivided in the following parts:

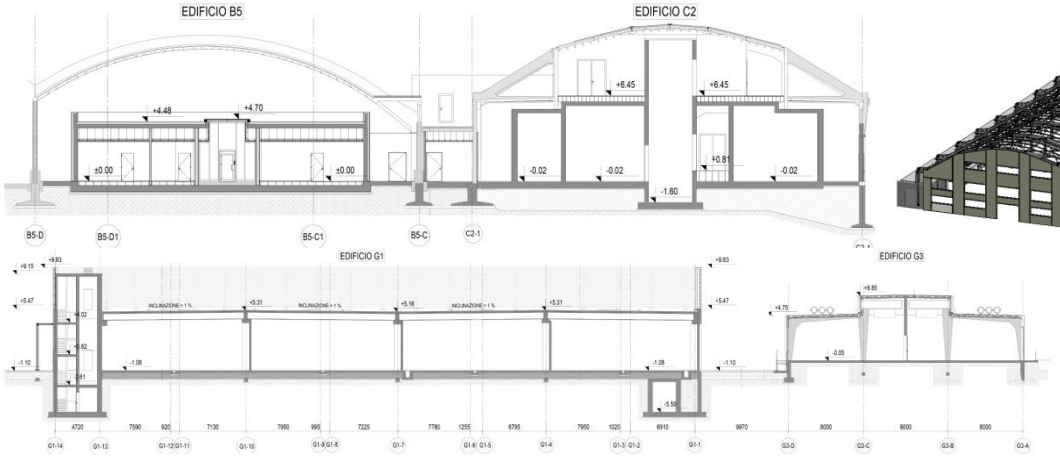
- Two existing concrete buildings (C2 and G3) upgrade;
- New buildings inside existing buildings B5 and C2;
- New precast building G1;
- New tunnel under a portion of building A «Ballette».

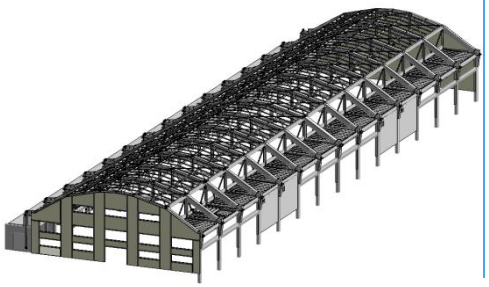
**Design service:** Final structural design

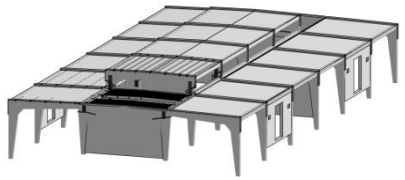
**Client:** Cineca

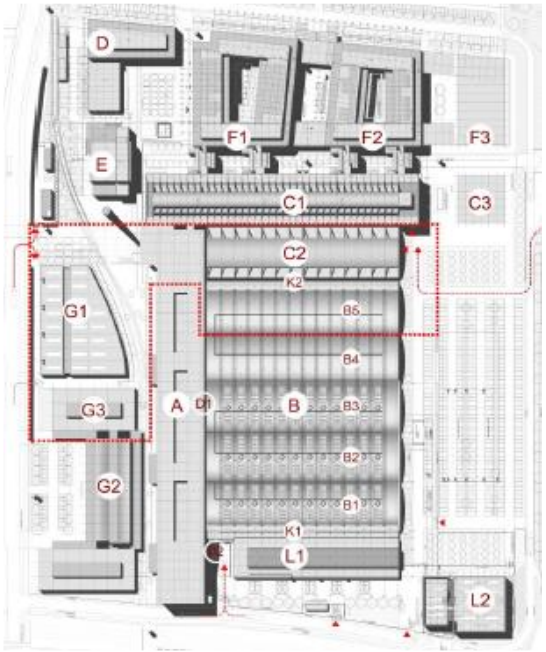
**Year:** 2021-2022

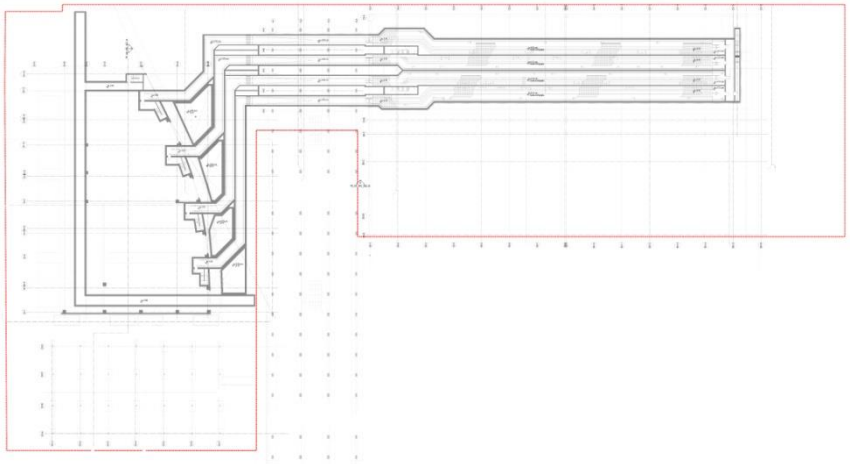
**Structural works budget:** € 18'000'000







# Cairo – New Stadium

## DESCRIPTION

New Cairo stadium cover roof is a light spoke wheel structure, that is the most suitable structural system for big span design.

Following architectural design, roof structural system is composed by:

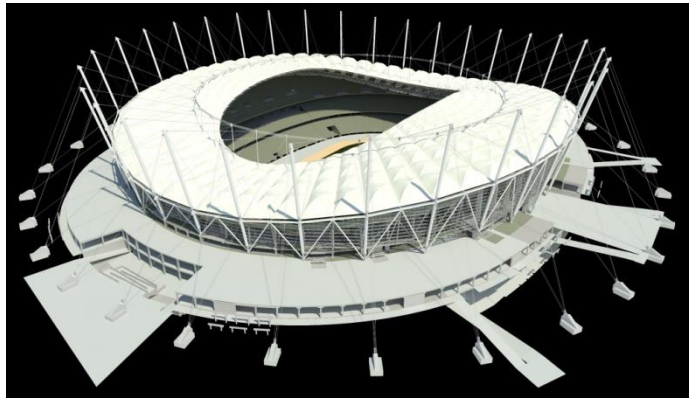
- Principal tridimensional tensile structure composed by:
  - ✓ An internal tension ring;
  - ✓ 32 internal radial bearing cables;
  - ✓ 32 internal radial stabilizing cables;
  - ✓ 32 hanging details with variable length;
  - ✓ 32 inclined pylon.
- Secondary structural system composed by:
  - ✓ 64 secondary spatial trusses that follow roof cover *wave* shape;
  - ✓ 64 membrane cover panels.

**Design service:** Tender, preliminary and final structural and architectural desgin. Building site support.

**Client:** ORASCOM

**Year:** 2019-2022 Under construction

**Structural works budget :** € 270'000'000



# Florence – TAV Highspeed railway Station

## DESCRIPTION

Final architectural design has been developed by Sir. N. Foster, while final structural design has been developed by ARUP.

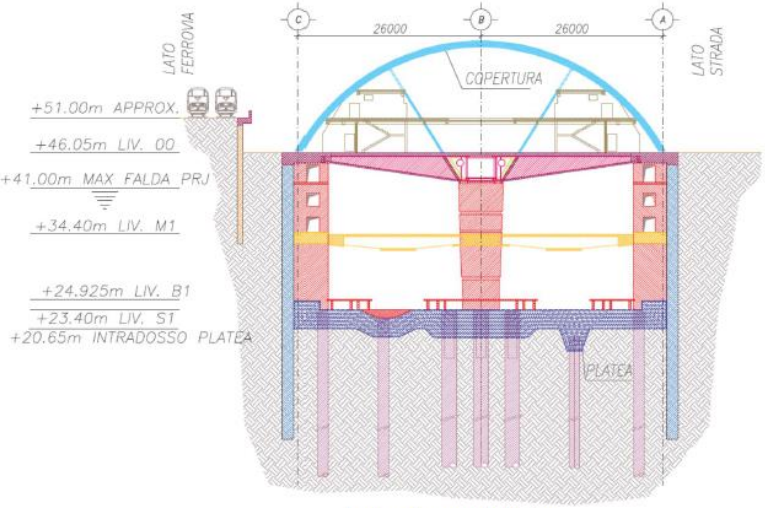
Railway Station has a dimension of 500x52m and has an underground structure of 25m depth: final design has modified erection methodology from bottom-up to top-down. Over ground part of the structure (to which 2 commercial levels are suspended) is composed by 172m span steel arches. Among preparatory design must be mentioned a double-bar underground hydraulic path 150m long, erected with the “push” technique under the rail.

**Design service:** Final structural design. Working project structural design.

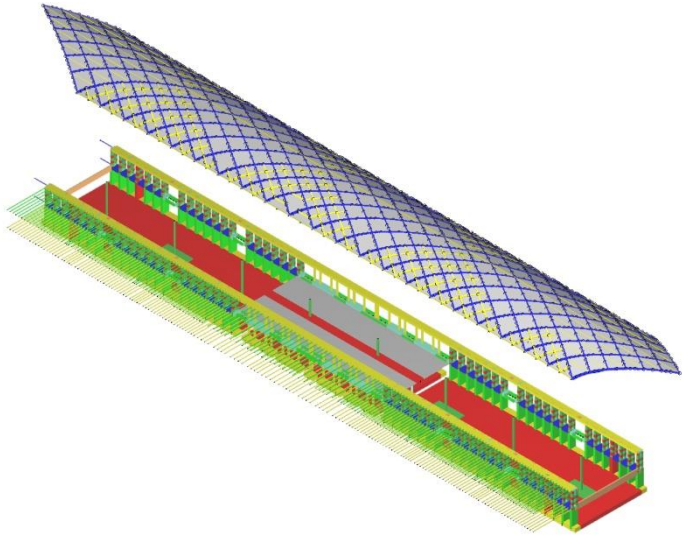
**Client:** RFI Rete Ferroviaria Italiana (Italian Rialway Net)

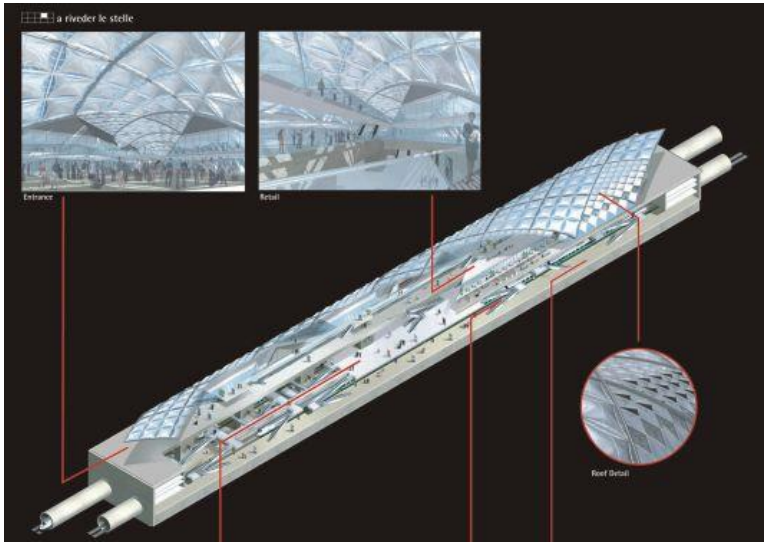
**Year:** 2008-2011, 2015-2016, 2020 – Under construction

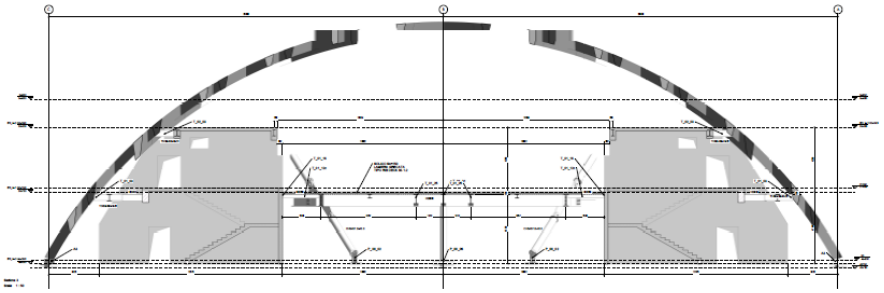
**Structural works budget :** € 250’000’000

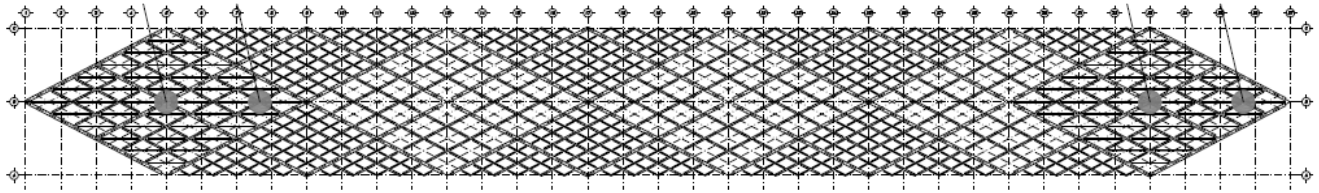



Sezione trasversale tipica







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# Florence – TSH Belfiore Student Hotel

## DESCRIPTION

The building is composed by two main elevation structures (A and B) and 4 underground levels (in some location 3 underground levels are provided, only) and a majestic stair from the ground floor to the rooftop terrace.

Structure A and B are linked by pedestrian bridges in the rooftop which guarantee, with their detail a restrain system which will keep the two structures independent from the seismic point of view.

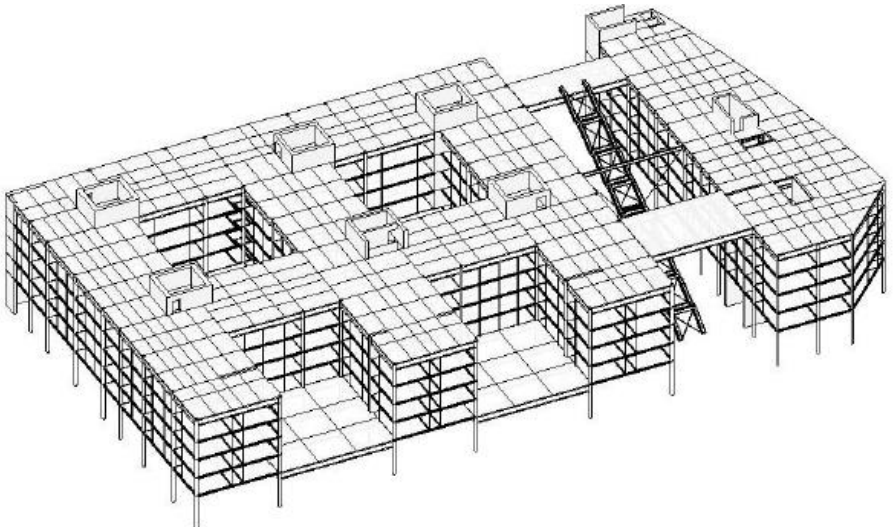
Beams at levels 1, 2, 3 and 4 are linked to the level 5 beams (top roof level) with vertical hanging elements. This allows to minimize column number at ground floor where huge open spaces are provided.

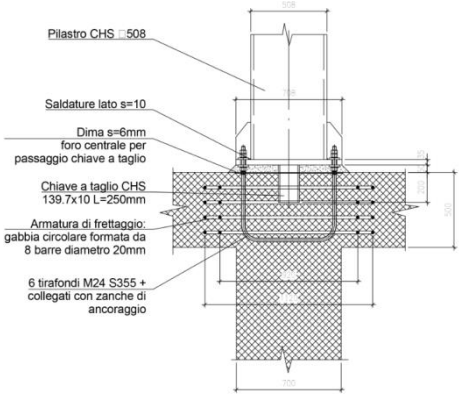
**Design Service:** Tender and preliminary structural design

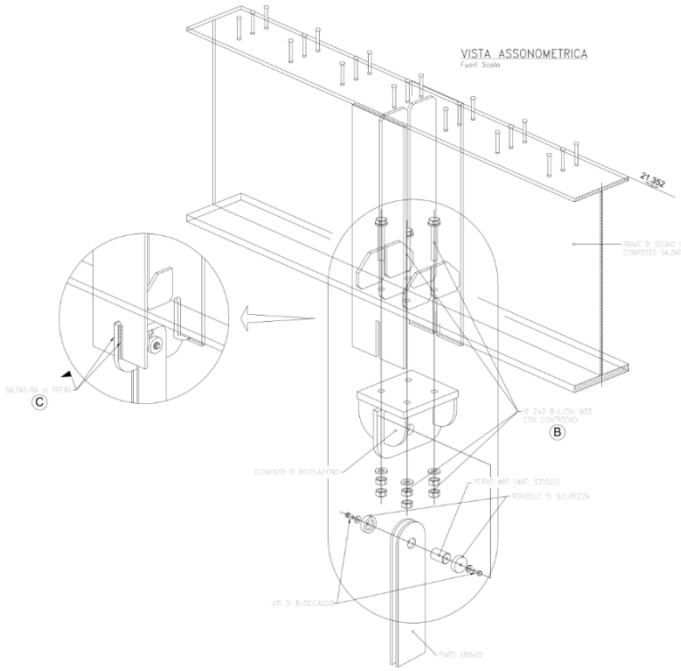
**Client:** TSH Student Hotel

**Year:** 2018-2019

**Structural works budget :** € 8'000'000






# Bologna – Pavilion 37

## DESCRIPTION

The project is composed by three main structures: Pavilion 37, East Body and Mall.

Pavilion 37 is a 80.8m x184m one-storey building aim to host trade shows. The main structure has no internal support since it consists of a variable height truss beam. Retractable roof cover is the main feature of this Pavilion. The two central quartes of the roof can shift over the lateral quartes.

East boby is a steel structure for plant services.

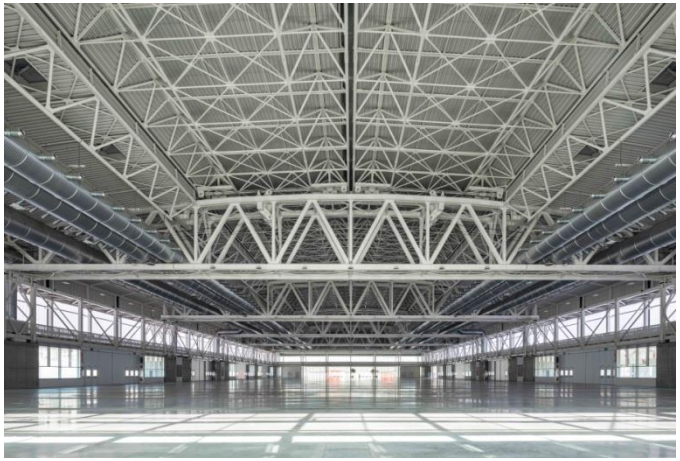
The Mall is a structure built up of 400x400mm columns and beams, whose main aim is to be the entrance to the pavilion, link to other pavilions and pedestrian flow management.

**Design Service:** Tender, preliminary and final structural desgin.

**Client:** Bologna Fiere S.p.A.

**Year:** 2018-2021

**Structural works budget:** € 14'000'000




# Ravenna – New multi-purpose Arena

## DESCRIPTION

The design structure is a multi-purpose arena, aim to host international sport events (like basketball or volleyball games) with 6'000 seats and trade shows. Its capacity could be modified depending on specific needs of the event.

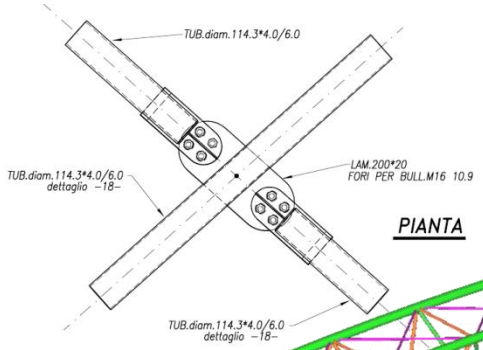
The main structure is a 80m x 90m square plan building, whose height is almost 24m. The structure is composed by 4 concrete core at the 4 apex of the plan; the steel roof cover is made up of 8 79m length truss beam, with adjacent 10m spans. This is due to the fact that no intermediate support can be provided. Each truss has a transversal triangular cross section, built up by two top chord and one bottom chord.

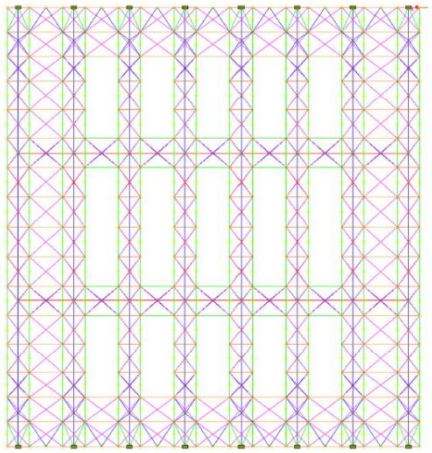
**Design Service:** Final structural design for steel roof structure

**Client:** Ravenna Municipality

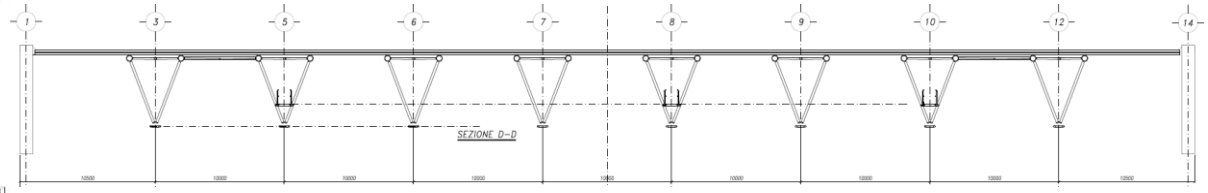
**Year:** 2019 – 2022 Under Construction

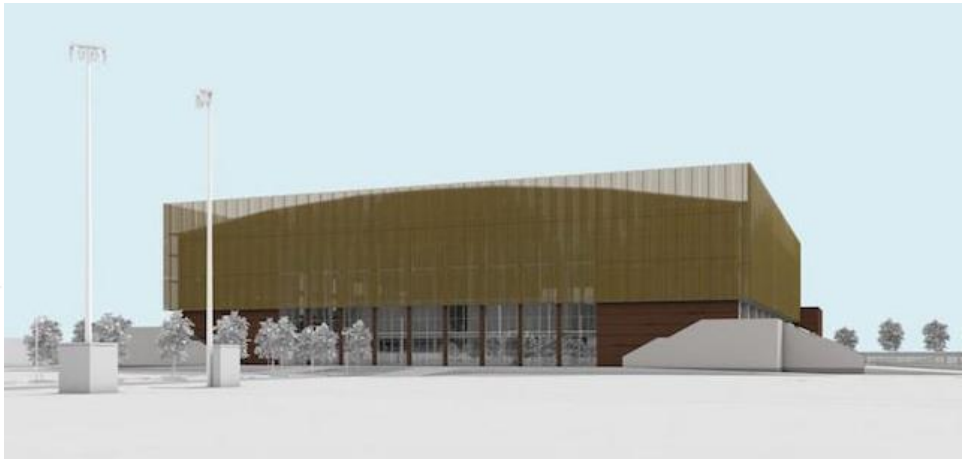
**Structural works budget:** € 7'000'000







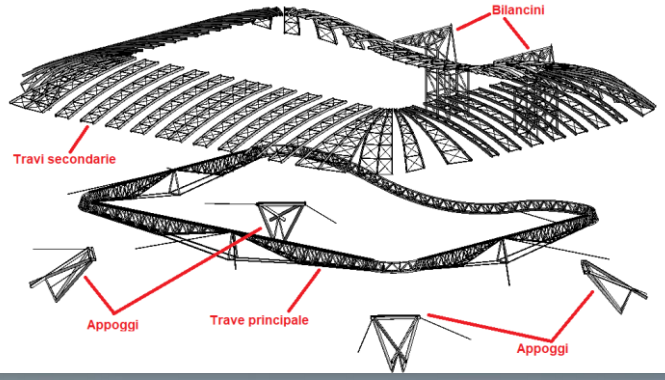
# Bologna – New Renato Dall'Ara Stadium

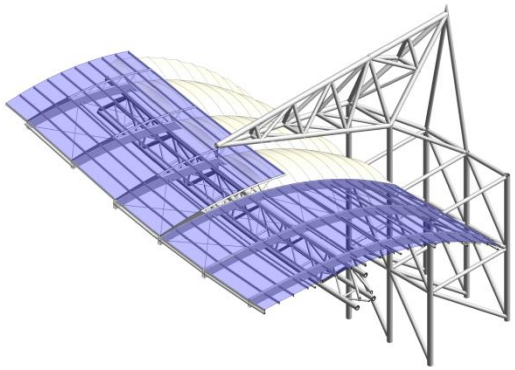
## DESCRIPTION

The New Renato Dall'Ara Stadium design involves a revamping and modernization of current structural, inside a neighbourhood upgrading. The main items are:

- New grandstands (with steel rakers and precast risers) moved closer to the field with respect to the current ones;
- Historical-artistic exploitation of masonry existing elements (Maratona Tower and ring of walls);
- New roof (to cover all seats).

The 20'000mq roof cover is supported by a structural system of main and secondary beams, covered by membrane supported by steel arches. Main roof trusses are 122m span (over main granstand) and 83m span (over lateral stands).



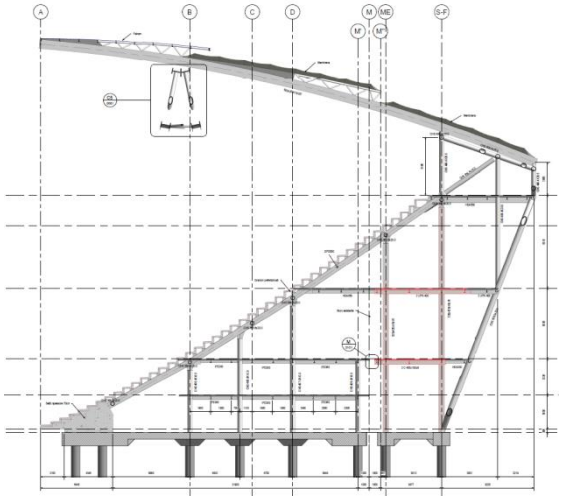



**Design Service:** Tender and preliminary structural design

**Client:** Bologna Football Club

**Year:** 2019-2022

**Structural works budget:** € 63'000'000



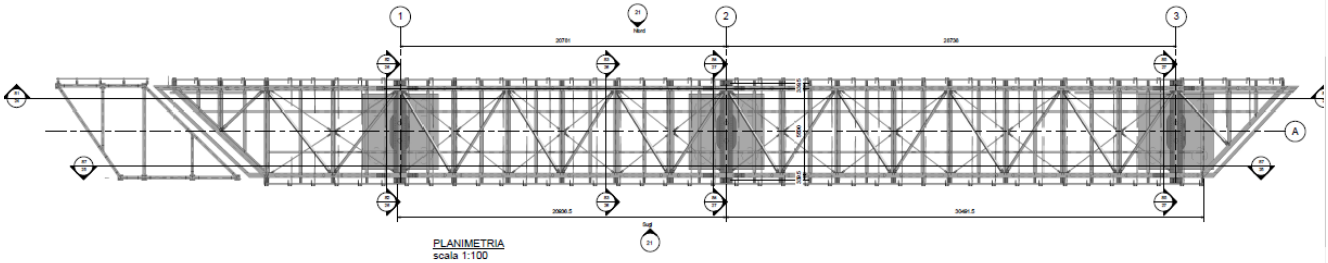
# Bologna – People Mover Pedestrian Bridge

## DESCRIPTION

Pedestrian Bridge structure starts from +42.58m level at Aerostation and ends at +45.48m level at the Peple Mover slab, with a constant slope. Furthermore, it is a 65m span bridge (at longitunial axes) with a 5m clear width.

The main structure is made up truss beams along the longitudinal axes. Both far ends of the structure are inclined, thus the main beams are 71m and 60m length. The deck is build up by steel corrugated sheet with a concrete slab working together; this slab is linked to the main deck beams by proper omega profiles. The deck has horizontal rod windbracing.

The three header are made by two steel plates and two steel webs, which build up a welded rectangular cross section with variable height.

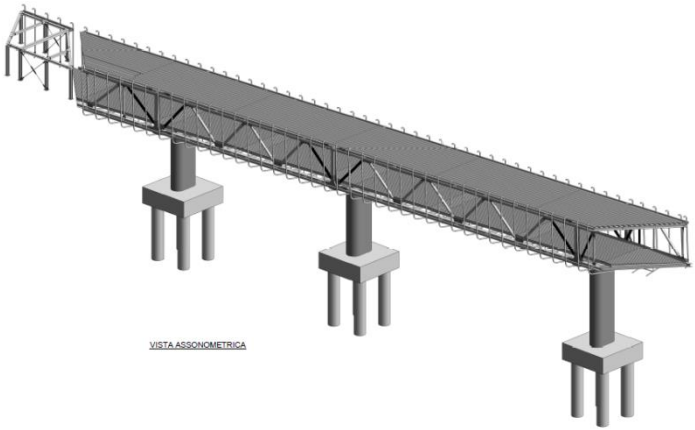



**Design Service:** Tender, preliminary and final structural design. Building site support.

**Client:** Bologna Airport

**Year:** 2018-2019

**Structural works budget:** € 581'000



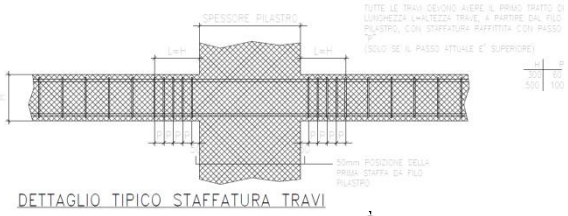

# Bologna – via Serlio Student Hotel

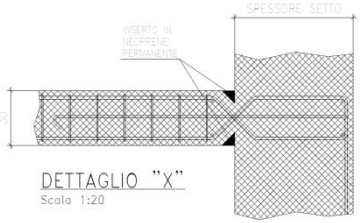
## DESCRIPTION

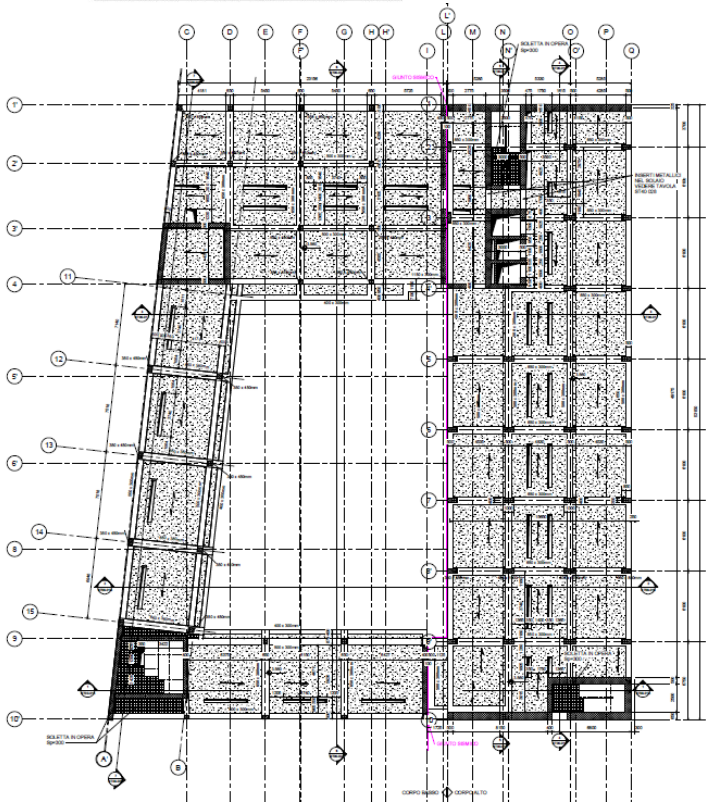
The design is composed by two separate structures (high structure and low structure).

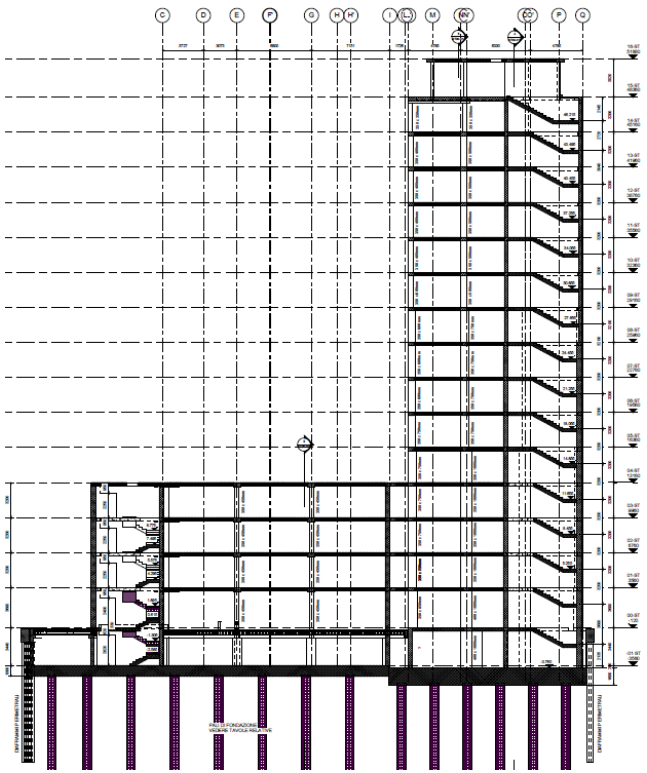
High structure is a 52m height structure with a 16m x 53m rectangular plan with main North-South axes. Low structure, adjacent to the West part of the high structure is composed by a30m x 60m underground floor designated as garage.

Both structures are made up by cast in situ concrete slabs with bottom reinforced precast sheets with tick beams. Concrete columns and cores (with cast in situ concrete stairs) built up main vertical structures. The underground floor level is made by “Spiroll” precast slabs and precast beams, supported by cast in situ columns.



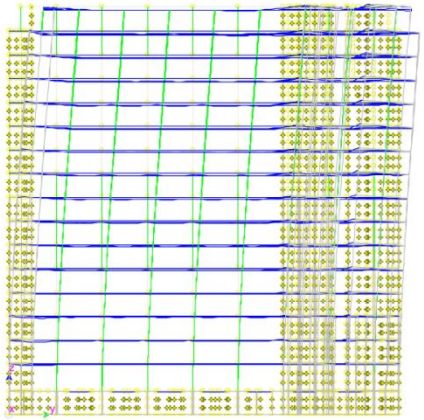


**Design Service:** Tender, preliminar and final structural design.

**Client:** Fiera 2000 S.r.l.

**Year:** 2018 – 2022 Under construction

**Structural works budget:** € 6’309’000



# Calderara di Reno – Bonfiglioli Headquarters

## DESCRIZIONE

Bonfiglioli Headquarters is made up by 4 independent structures: building office (PTS), restaurant, entrance portico and linking structure.

PTS is a cast in situ concrete three storey building, with a steel span that is the lobby entrance of the building. Entrance portico is a one storey steel structure with no wind bracing and no lateral walls. From PTS it is possible to reach the one-storey precast building of the restaurant, that is made up by precast slabs to guarantee 10-15m spans needed to guarantee proper interior layout to the restaurant. Linking structure is a one-storey steel structure with windbracing system.

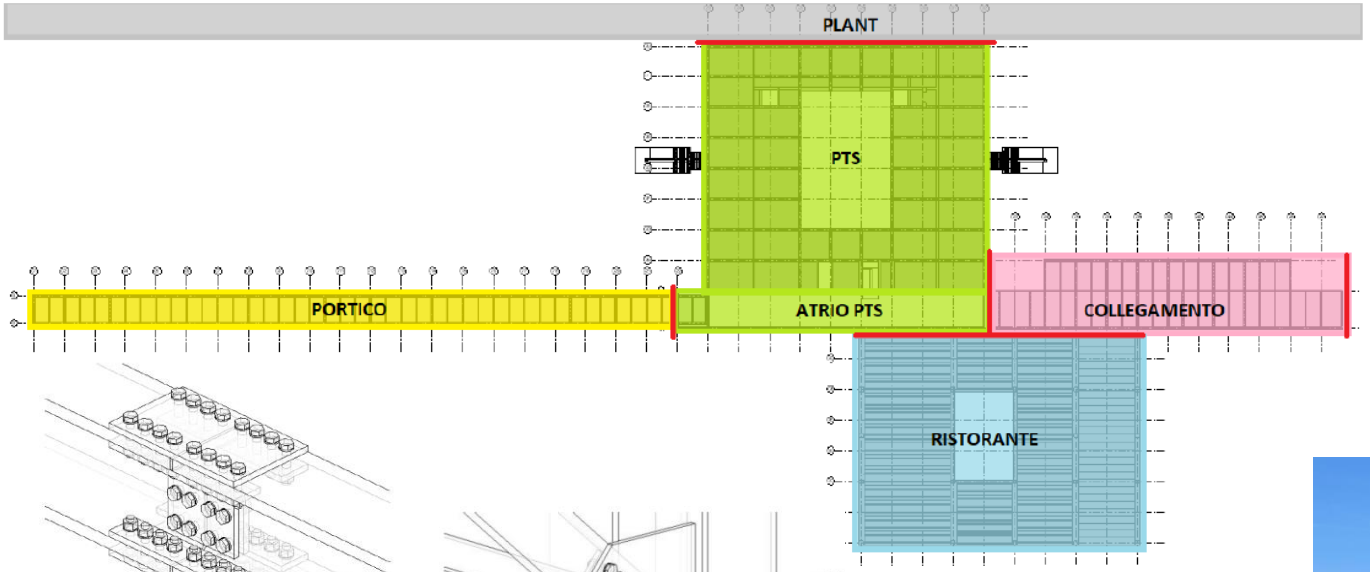
Each structure is distinct from the adjacent ones thanks to a structural seismic joint.

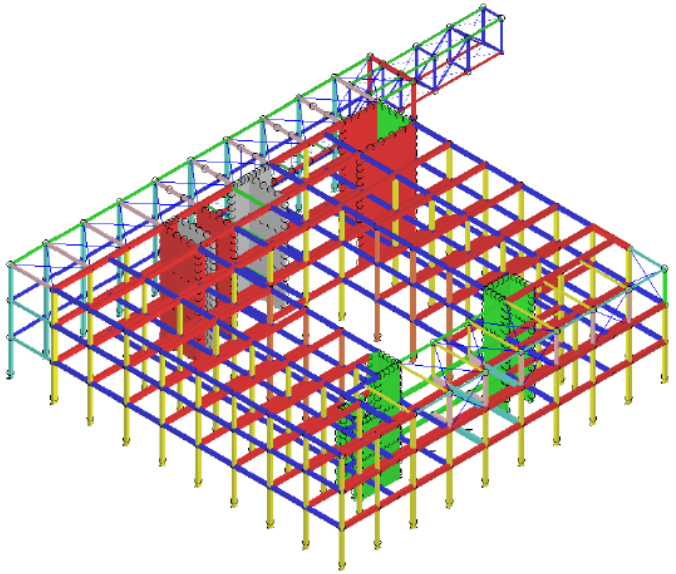
**Design service:** Tender, preliminar and final structural design. Building site support.

**Client:** Bonfiglioli Riduttori S.p.A.

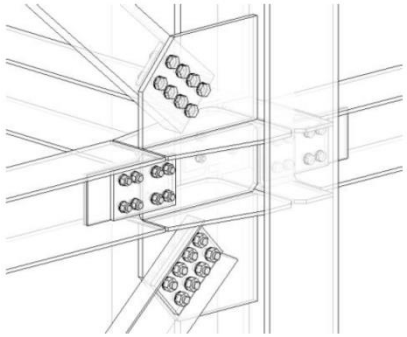
**Year:** 2018 - 2021

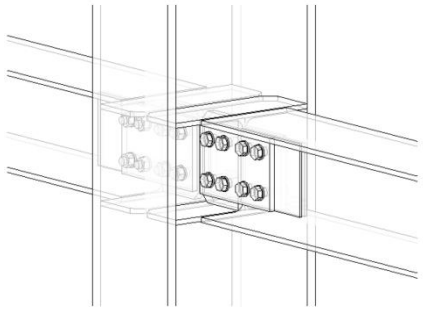
**Structural works budget:** € 4'000'000










# Yaoundé – Paul Biya Stadium

## DESCRIPTION

This stadium is composed by reinforced precast concrete (North, South and East sectors) and steel grandstands (West sector).

Roof cover steel structure is made up by two internal rings (RHS upper inner ring and cables lower inner ring, connecter by CHS cross section compressed struts) and one external compression ring, that is a truss beam with triangular cross section.

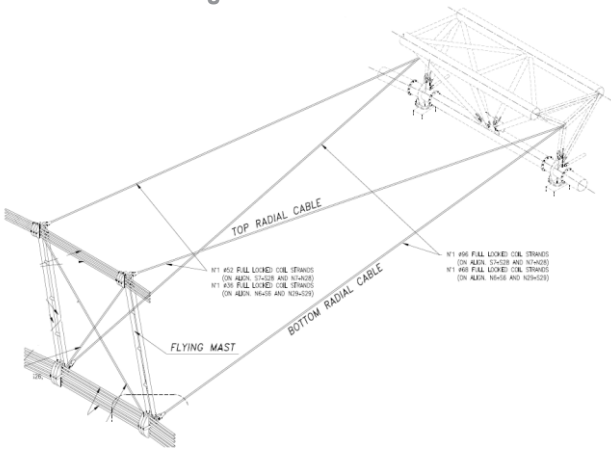
Steel roof has a plan dimension of 300m x 245m with an height of 46m above ground level. Structural concept is based on equilibrium between external compression ring forces and tensile forces in the inner ring. Structural static and dynamic stiffners are related to the stadium transversal section geometry.

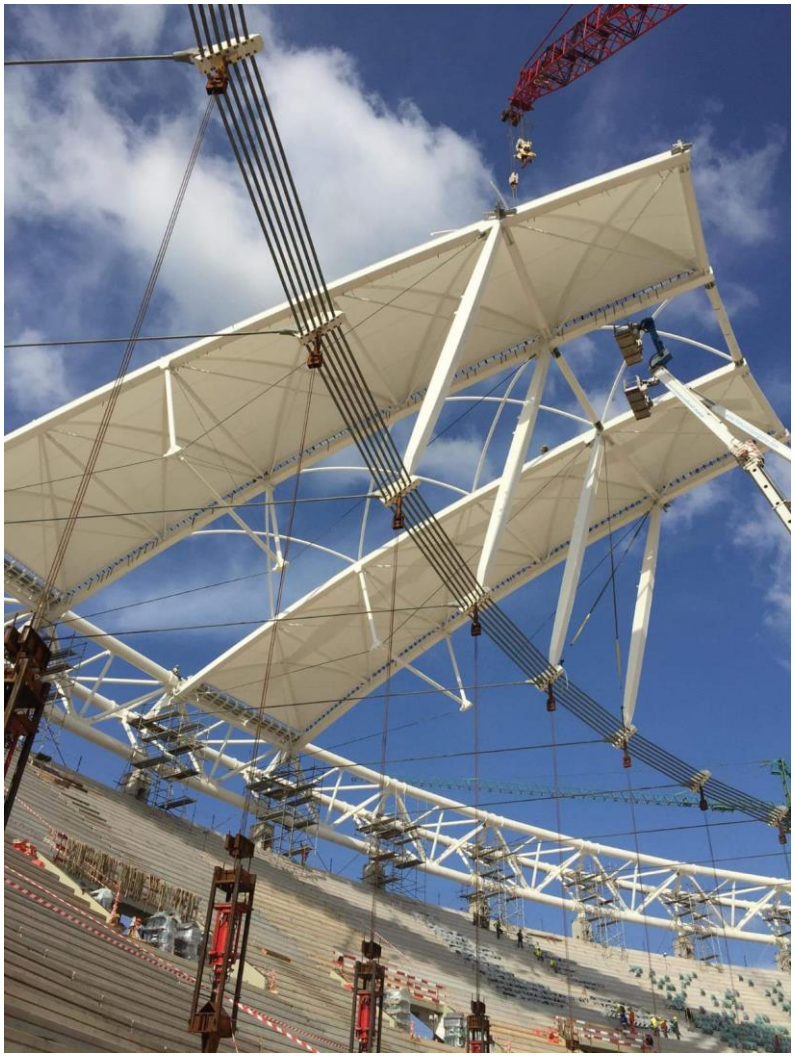
**Design Service:** Tender, preliminar and final structural design.

**Client:** Piccini Group

**Year:** 2017 - 2022

**Structural works budget:** € 92'500'000



# Milano – New UnipolSai Tower

## DESCRIPTION

New UnipolSai Tower is a 120m tall, 23-storey building. Its plan has a 52m x 31.3m elliptical shape, so each floor has 850mq net surface.

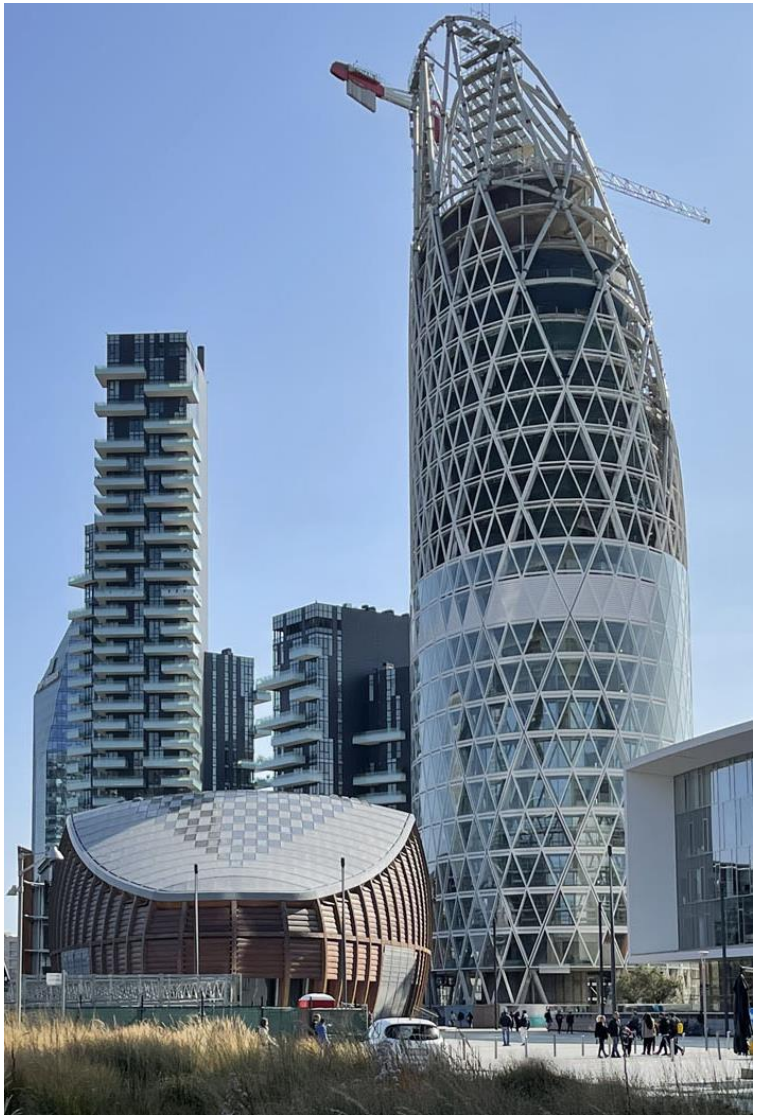
An external diagrid is the main structure; it is connected to the slabs each 3-storey by a detail with an hanging element that suspends the two below storeys. Two central concrete cores contribute to horizontal action resistance together with diagrid; they also contain stairs, elevators and plants.

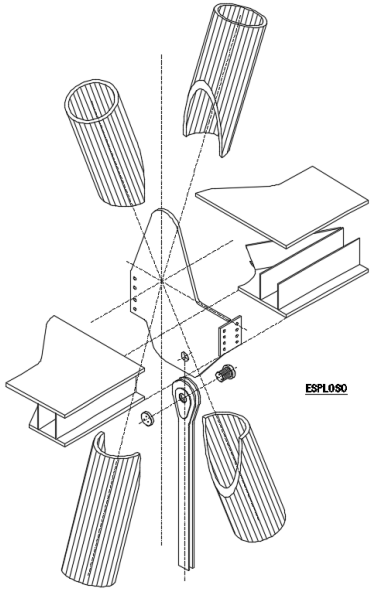
**Design Service:** Tender, preliminar and final structural design. Construction supervisor. Building site support.

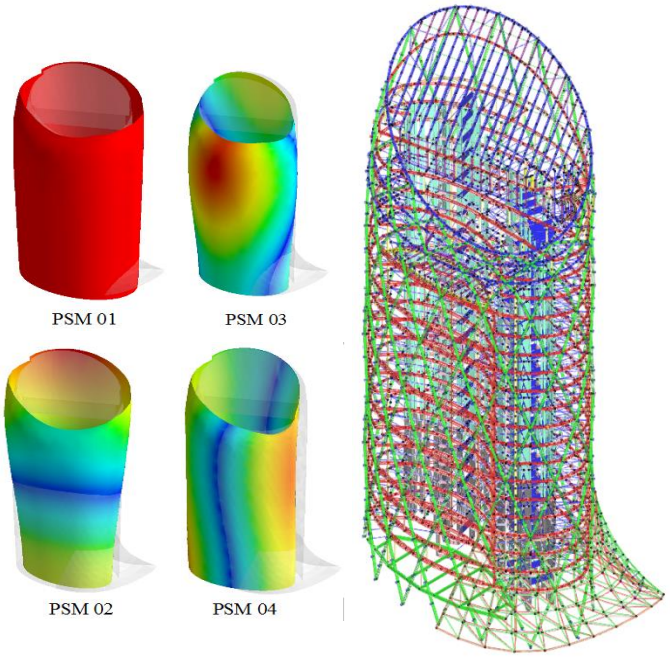
**Client:** UnipolSai Insurance

**Year:** 2017 – 2022 Under construction

**Structural works budget:** € 32'000'000






# Bologna – Pavilions 29 e 30

## DESCRIPTION

This project is inside Bologna Exhibition district revamping intervention; it is made by four buildings: Pavilion 29, Pavilion 30, Multi-purpose building and Mall.

Pavilions 29 and 30 are one-storey buildings whose dimensions are respectively 68.80m x 112.50m and 81.20m x 173.00m; they lay respectively along North-South axes and East-West axes. In North-East part of intervention, a two-storey multi-purpose building has been designed in order to host restaurants, convention halls and plants (on the roof).

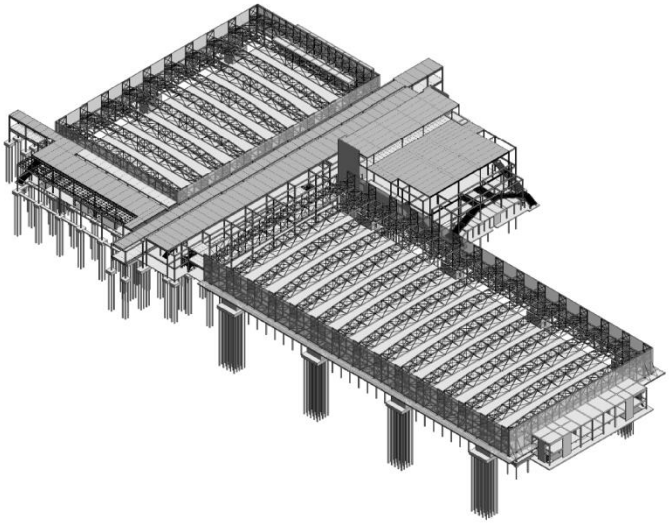
The Mall is a structure built up of 400x400mm columns and beams, whose main aim is to connect the three main structures and pedestrian flow management.


**Design Service:** Tender and preliminar structural design.

**Client:** Bologna Fiere S.p.A.

**Year:** 2017 - 2020

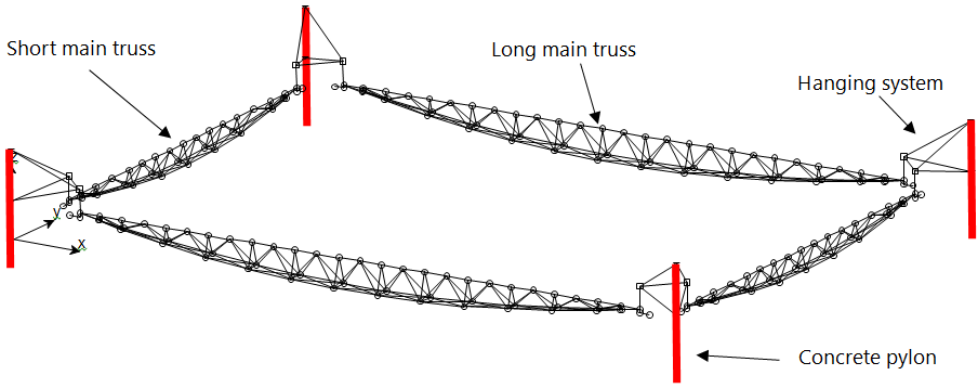
**Structural works budget** € 33’000’000



# Athens – New AEK Stadium

## DESCRIPTION

New AEK Stadium Roof cover main structure is made by 4 truss beams, parallel to the ground and suspended at their own end by 4 concrete pylons. These 4 main trusses, that have a triangular 6m height cross section, support secondary beams with triangular cross sections and intermediate span of 10.2m, and corrugated sheet cover.

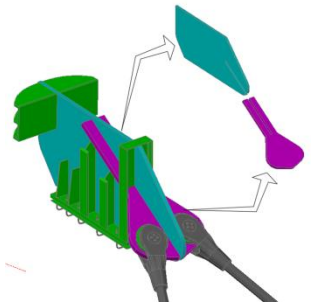


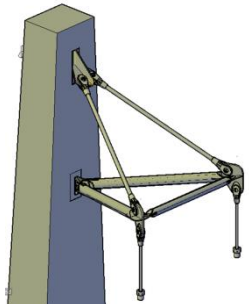

**Design service:** Tender, preliminar and final structural design of steel roof.

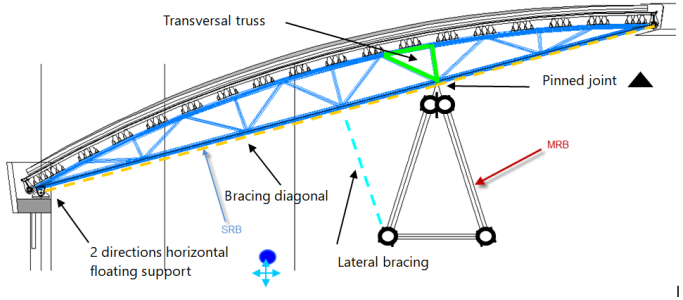
**Client:** AEK Atene Football Club

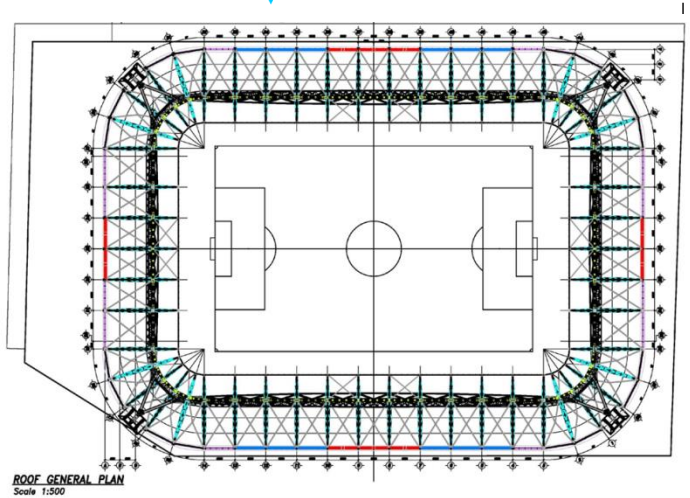
**Year:** 2017 - 2021

**Structural works budget:** € 12'000'000







# Perth – Matagarup Pedestrian Bridge on Swan River

## DESCRIPTION

This 400m length bridge (144m length central span and 84m length two lateral spans) is made by three steel arches that support a steel deck by cable stays. Arches geometry follows architectural shape: each arch is composed by 4 legs supported by concrete piers.

Main arches are linked with a hinge detail which allows rotation in longitudinal plane, but guarantees a transversal rigid connection. At apex location each arch has a 25m cantilever part.

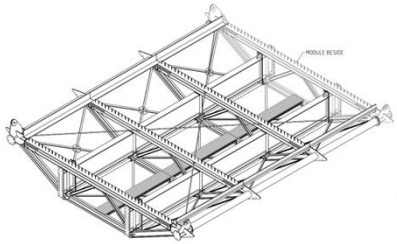
The two lateral arches are connected at the top with a CHS profile, that is an hinge restrain with vertical axis, such to improve arches instability resistance under transversal wind load action effect.

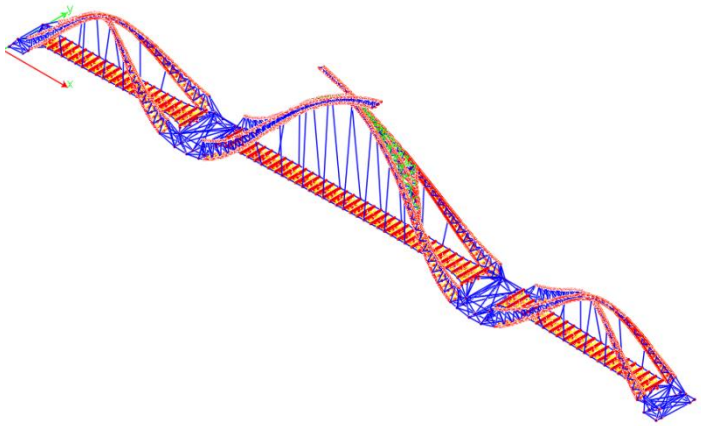
**Design service:** Tender, preliminar and final structural design.

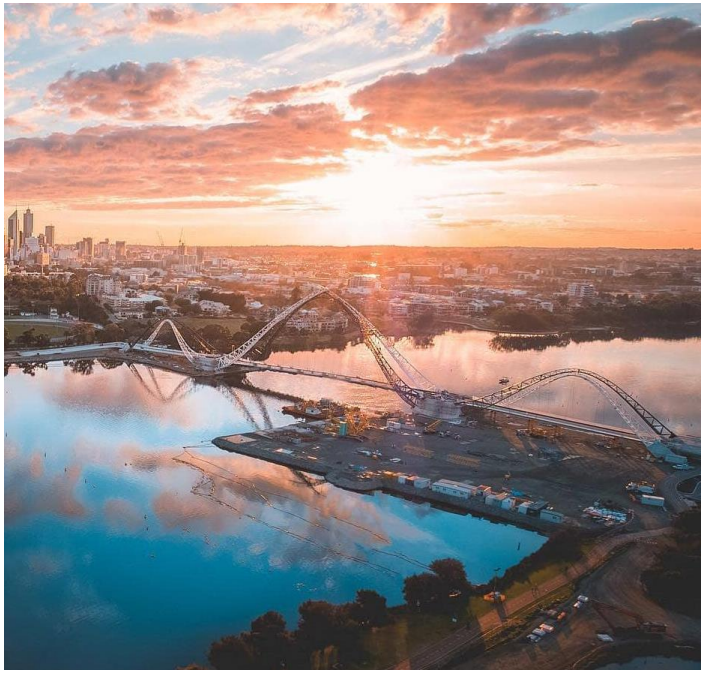
**Client:** York Rizzani Joint Venture

**Year:** 2015 - 2020

**Structural works budget:** € 40'000'000







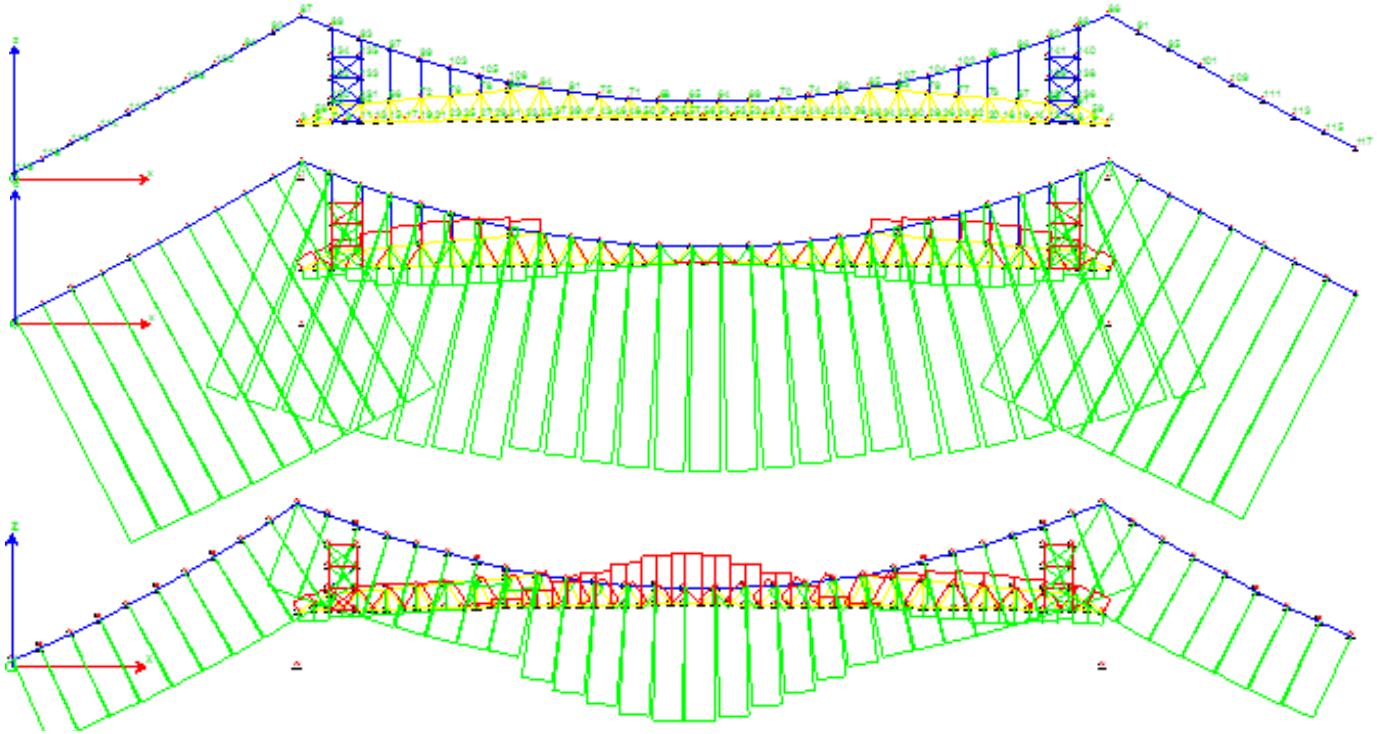
# Florianopolis – Hercilio Luz Bridge

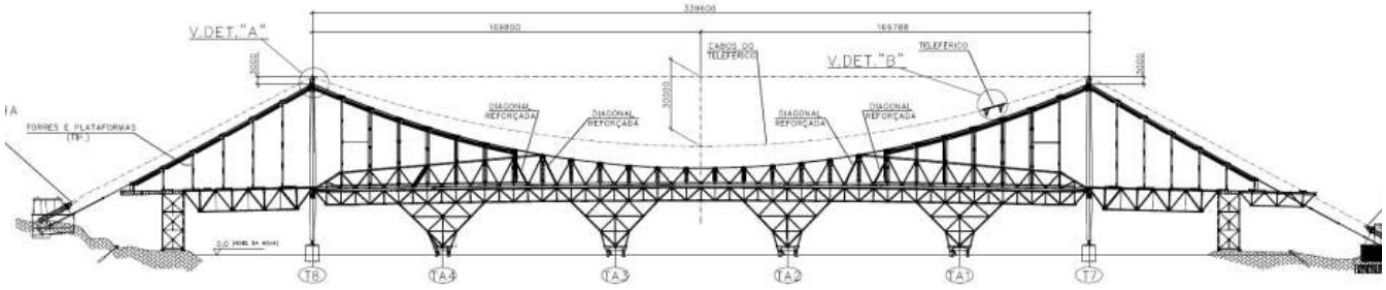
## DESCRIPTION

The initial analysis condition of the bridge represents the monitored configuration on May 2016, when the deck has been removed and deck beams and cable were still present, only.

Numerical simulation main aim was to represent stress in structural elements configuration and bridge geometry, in each maintenance phase condition (which may differ one from an other for the applied loads).

Calculation Model provided by MJW Structures has been developed by using RETE software, that is specialized in tensile-structures shape research, whose results have been managed with TENSO software, that is specialized in non-linear structural analysis for structures and tensile-structures in big displacements regime, re- defynig the geometry step by step



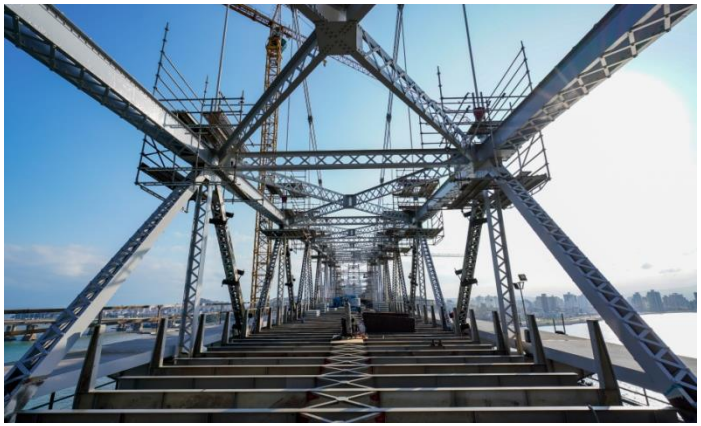



**Design service:** Final structural deisgn cunsultant.

**Client:** MMI

**Year:** 2016

**Structural works budget:** € 30'000'000



# Iraq – As Samawah Stadium

## DESCRIPTION

This 20’000 seats stadium has a membrane cover roof, recalling Iraqi architecture.

Structural system is mainly composed by:

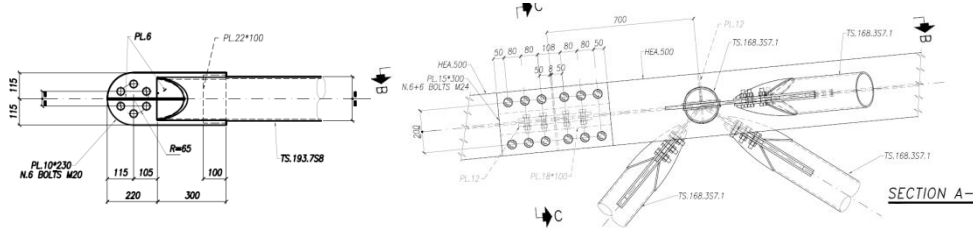
- Concrete frames with steel beams and concrete slabs, for the grandstands zones;
- Precast risers;
- Cantilever steel beams for the cover roof;
- Piles foundations.

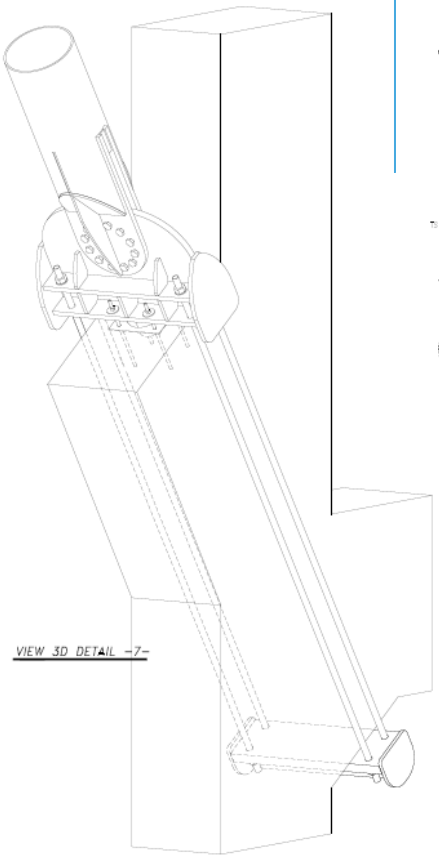
**Design service:** Tender, preliminar and final structural and architectural design

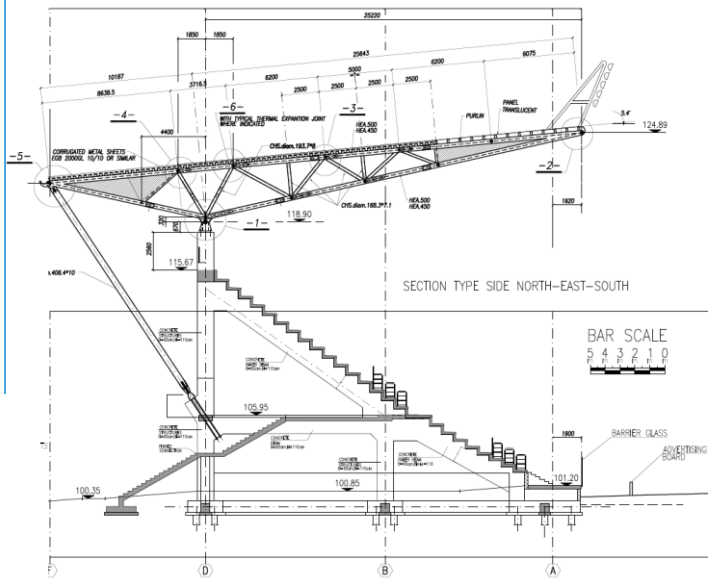
**Client:** T&T Costruzione S.r.l.

**Year:** 2013-2015

**Stadium budget:** € 50’000’000




# Iraq – Karbala Stadium

## DESCRIPTION

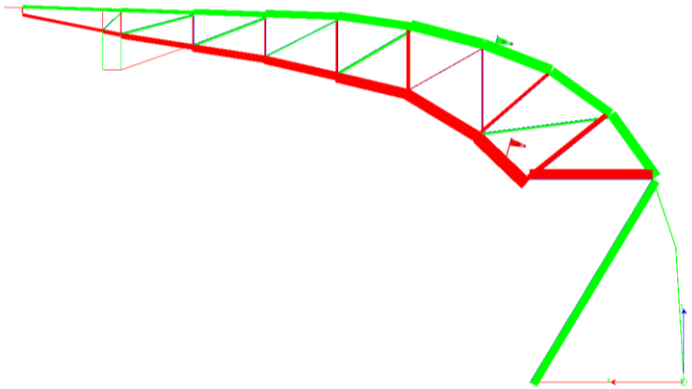
This 30’000 seats stadium according to FIFA codes is composed by cast in situ reinforced concrete frames for grandstands and steel cover roof.

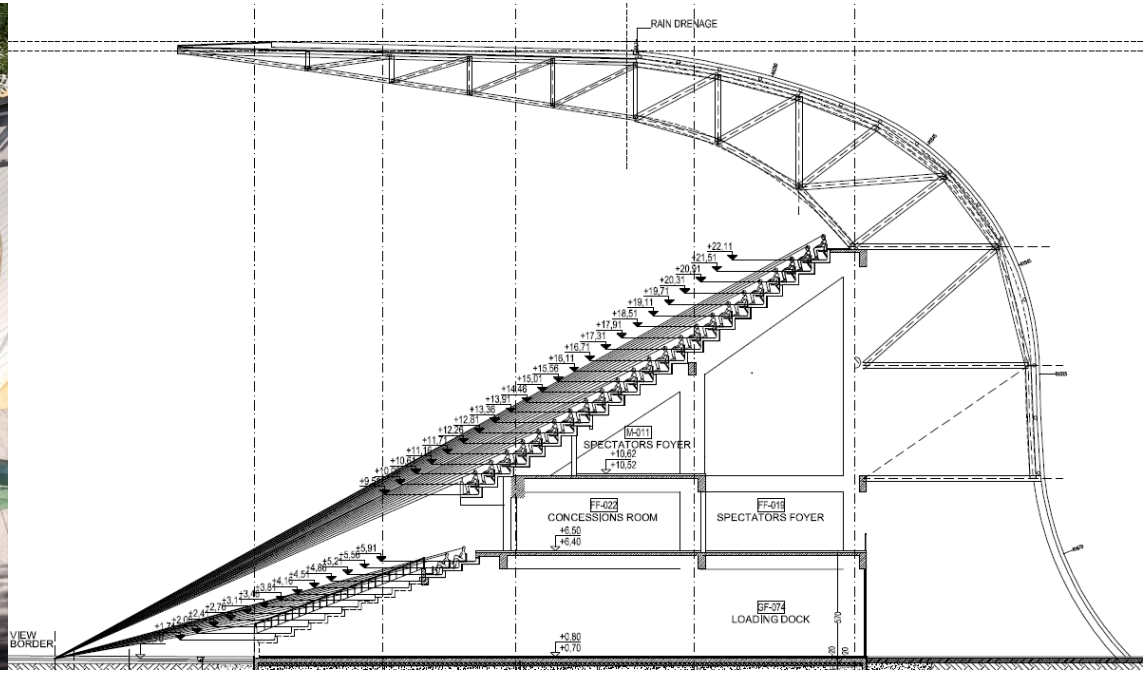
Roof beams are fixed to concrete frames and transfer to them horizontal and uplift forces and they are hinged in the bottom part.

**Design service:** Final structural design validation

**Client:** Open Project

**Year:** 2012 - 2013





# Milan – EXPO Bridges

## DESCRIPTION

"EXPO Viaduct" is between two aesthetical arches, that guarantee a formal continuity to the infrastructural system composed by "arch bridge over A4 Highway" "EXPO Viaduct" and "arch bridge over A8 Highway".

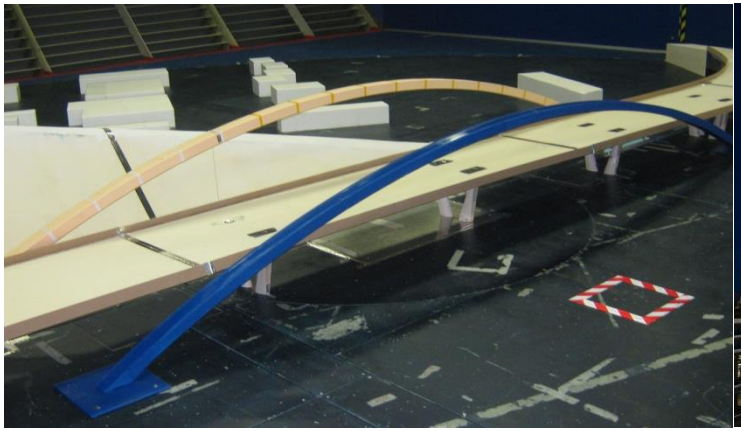
This is a one continuous deck bridge with 5 equal length spans supported by 4 internal and 2 external piers. An additional trapezoidal span, that connect this bridge with the adjacent arch bridge over A4 Highway, is supported by pier 1 and the other bridge.

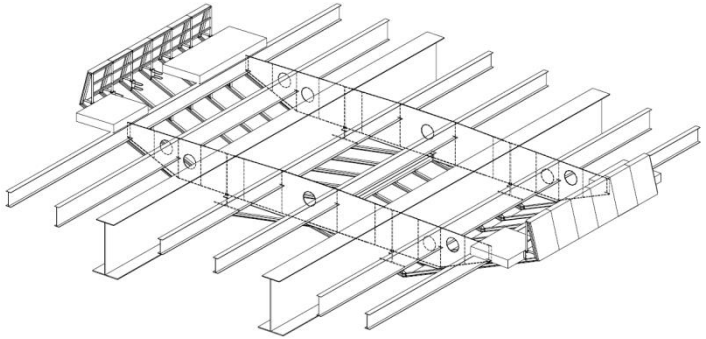
**Design Service:** Final design consultant

**Client:** Politecnica

**Year:** 2012

**Structural works budget:** € 13'000'000





# Milan –EXPO 2015 Pedestrian Paths Cover

## DESCRIPTION

EXPO 2015 Masterplan highlights for pedestrian paths cover a light and simple structural solution: the tent.

After several graphical simulations (rendering and 3Ds) it has been chosen the following structural solution:

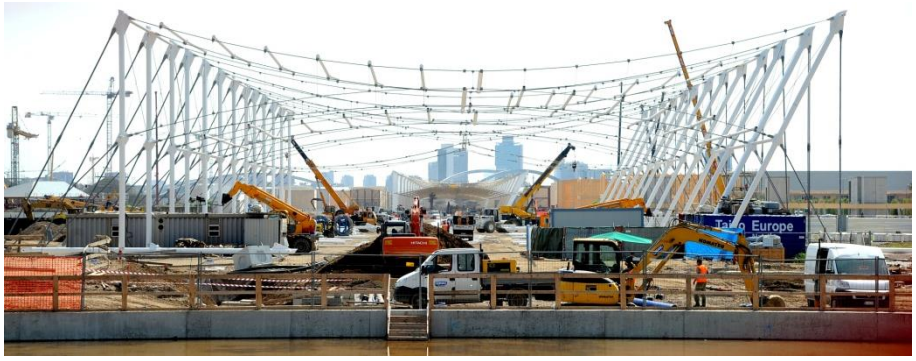
- Tensile Horizontal structural system made by cables with opposite curvature and vertical connections;
- Translucent prestressed membrane cover, stabilized by transversal tubes;
- Vertical structures as anchorage and support as truss beam structure;
- Foundation with plinths and gravity anchorage foundation.

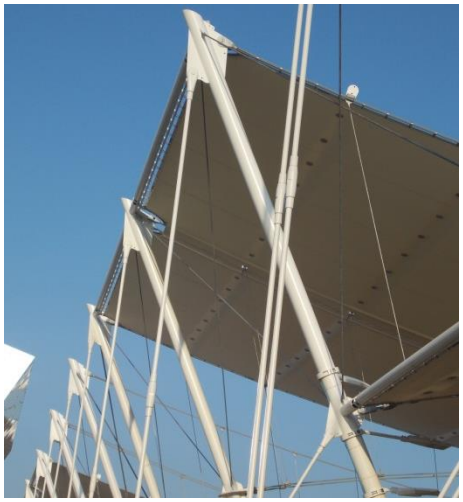
**Design Service:** Tender, preliminar and final structural and architectural design.

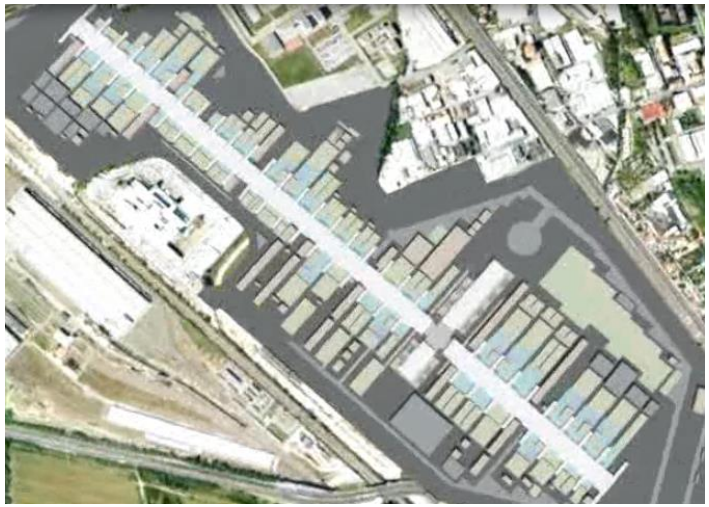
**Client:** Metropolitana Milanese S.p.A.

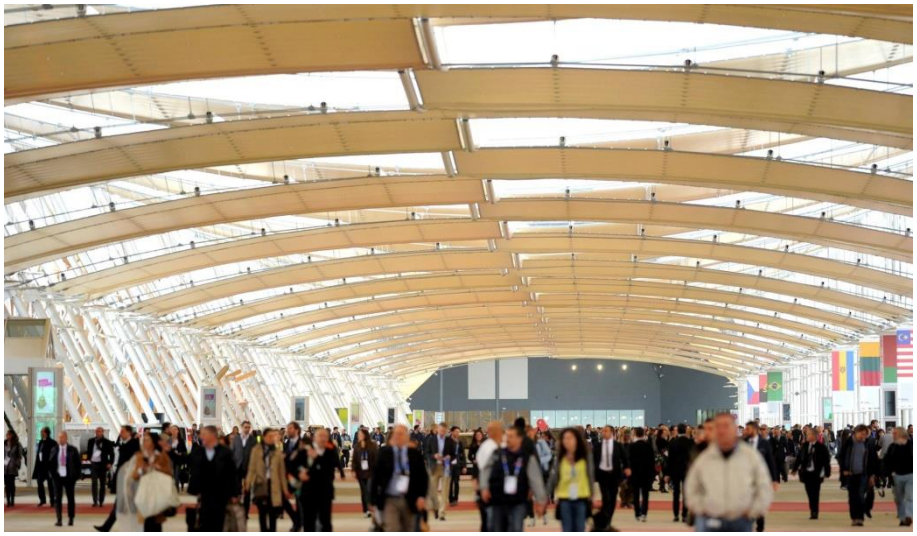
**Year:** 2012 - 2015

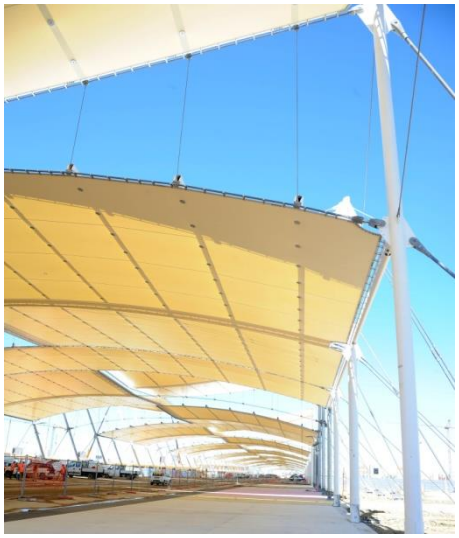
**Structural works budget:** € 22'000'000









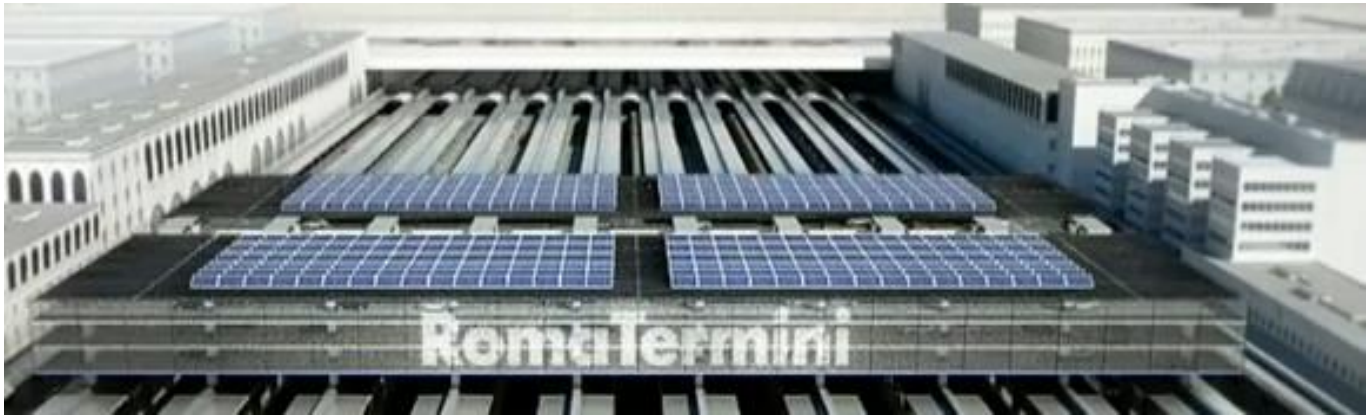


# Rome – New Termini station Parking

## DESCRIPTION

Garage plate in Termini Station in Rome is over the tracks zone, with a ramp to guarantee the access from Marsala road.

Three level of this 80m x 176m plate has been erected with function of parking. The column number has been reduced in order to minimize needed works on tracks for foundation. Each deck is made by main and secondary beams with corrugated sheet slabs working with a cast in situ reinforced concrete slab. Beams have assembled with flange details in order to have an erection sequence as fast as possible.

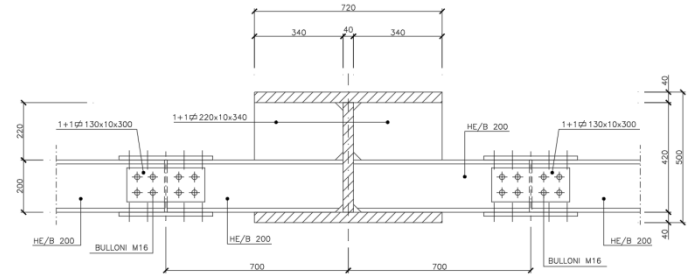


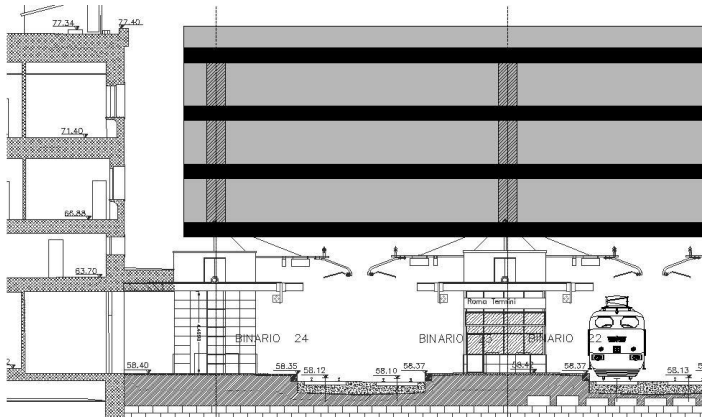

**Design Service:** Final structural design

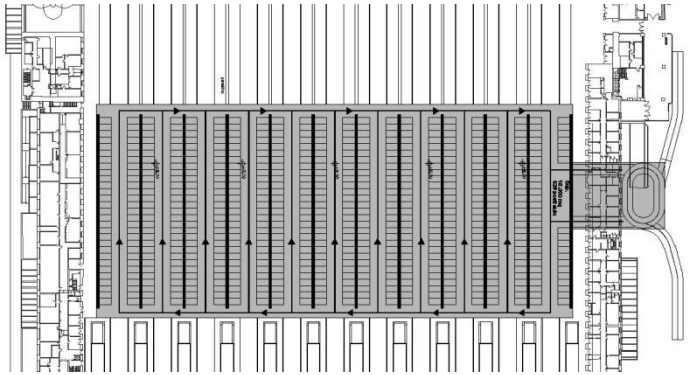
**Client:** Termini Scarl.

**Year:** 2012 - 2018

**Structural works budget:** € 62'000'000



# Bologna – Pepoli Palace

## DESCRIPTION

The main design aim was to reinforce the main rooms of the palace and its Iron Tower to host temporary exhibits and link them in an organic way in a flowing museum path.

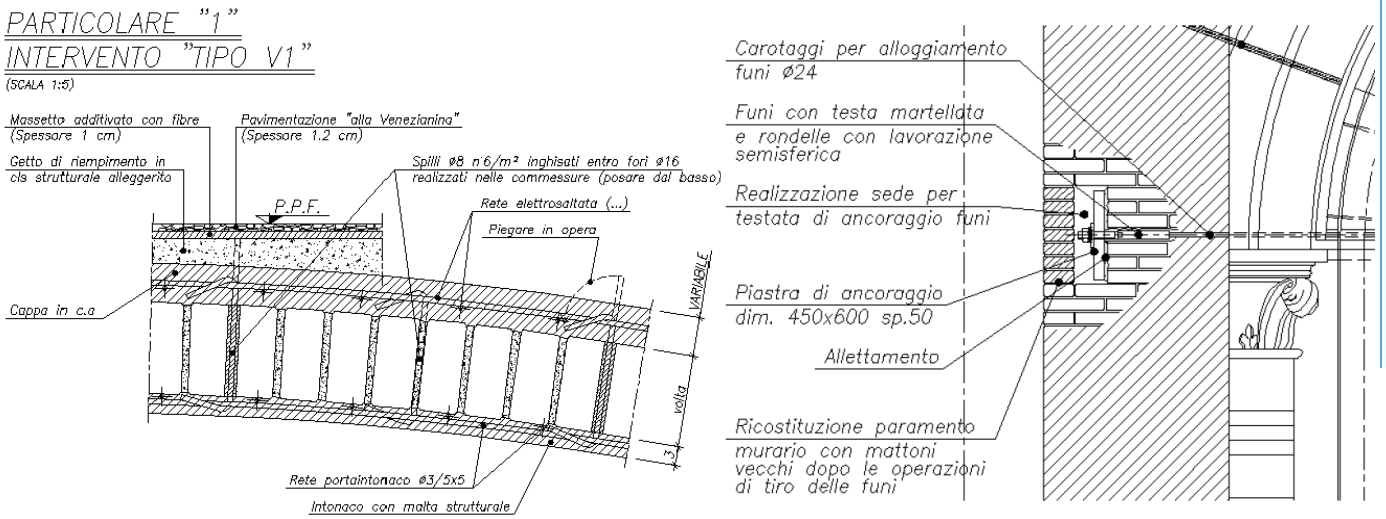
Stairs and an elevator have been located inside the Iron Tower in order to allow an easy access to all the rooms and to the entire restored Palace.

**Design Services:** Final and working structural design.

**Client:** Fondazione Cassa di Risparmio

**Year:** 2005 - 2011

**Project budget :** € 17'000'000




# Turin – New Allianz Stadium Juventus

## DESCRIPTION

The grandstands are made by concrete frames and concrete or steel rakers. Some frames groups work together thanks to rigid levels and continuous beams.

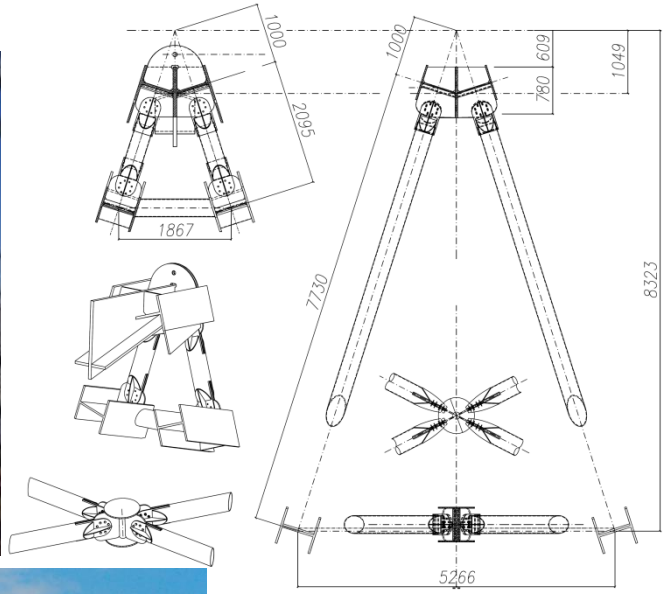
The hanging stayed system is made by two couples of truss beams at the 4 edges of the field, supported at each end by a bundle of closed spiroidal high resistance level steel cables. These bundle merge at pairs on an apex of a reversed V tripod. This tripod is 45m base and 84m height. After the tripod, the bundle go towards outside with a bundle of 6 105 diameter cables, that is anchored at the ground.

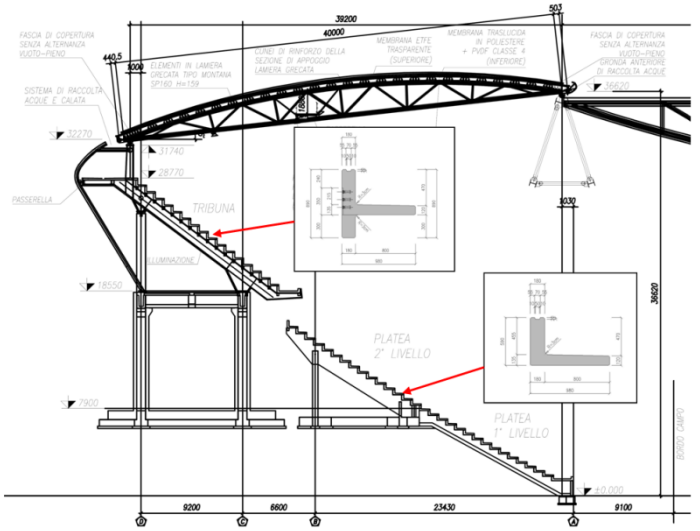
**Design Service:** Tender, preliminar and final structural design.

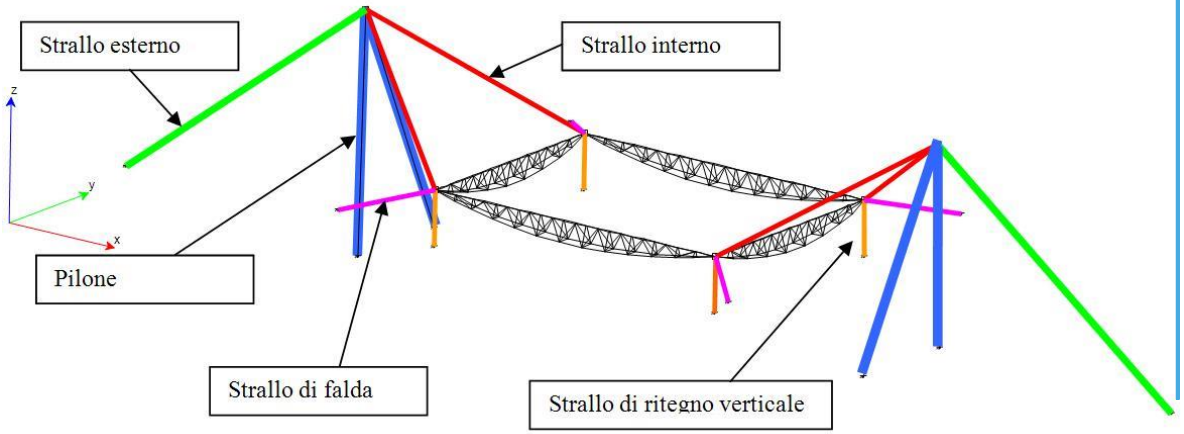
**Client:** Juventus FC

**Year:** 2008 - 2010

**Project budget :** € 105'000'000



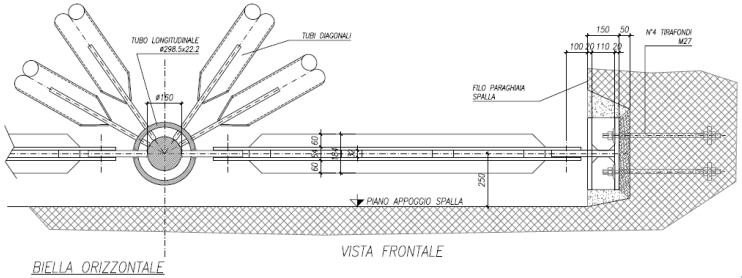



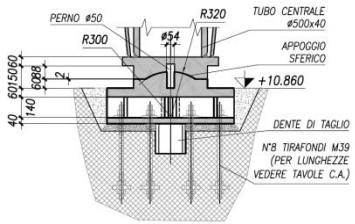
# Pesaro – Pedestrian Bridge

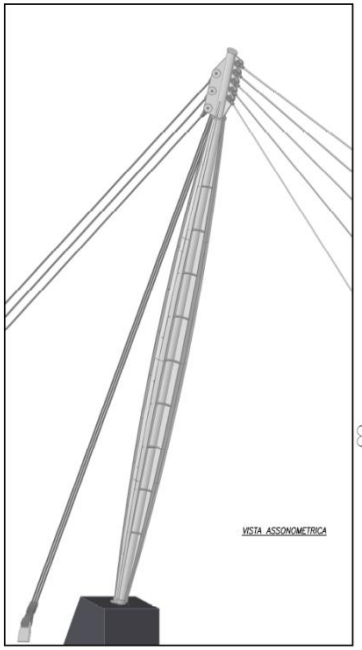
## DESCRIPTION

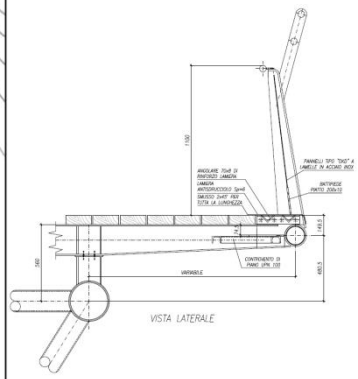
This 100m span bridge connects the two banks of Foglia river and allows a pedestrian connection between Tombaccia and Miralfiore neighbourhoods.

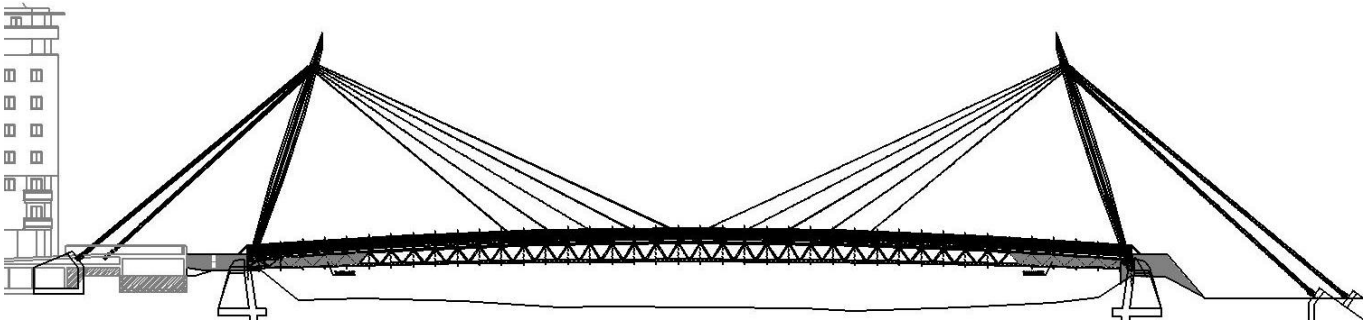
It has been designed an asymmetric suspended bridge with truss beam deck: in this way it is possible to overcome the entire span without any intermediate support inside the riverbed, minimizing wind effects on the structure, but having a light structure.



**Design service:** Tender, preliminar and final architectural and structural design.

**Client:** Pesaro Municipality

**Year:** 2008 - 2010

**Project budget :** € 800'000

# Milan – Milan Exhibition «Comet»

## DESCRIPTION

The work is inside a revamping project of an unused portion of Milan Exhibition district (Pavilions 5 and 6) and its integration with adjacent MIC, that in 2011 was the biggest congress centre in Europe, with 18k seats, a 1'500 seats auditorium, a 4'500 seats planetary hall, 73 modular rooms from 20 to 2k seats and 54'000mq exposition surfaces.

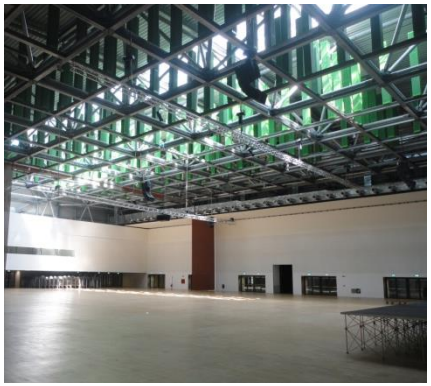
The comet has been designed considering a combination of 8'000 meters of luminescent rays that detach from a more solid nucleus, generating a tail. Each ray is supported by light steel truss beams. In the middle of these beams 8'000m of light flow in Leds powered by photovoltaic panel (thin silica layers).

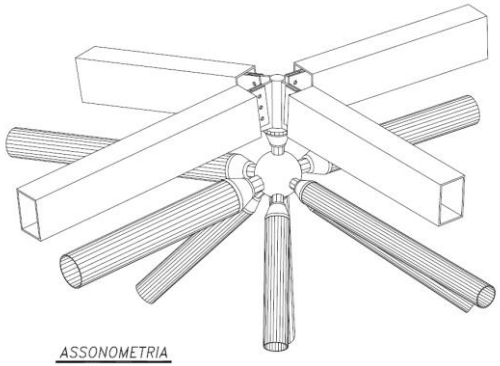
**Design Service:** Final structural design

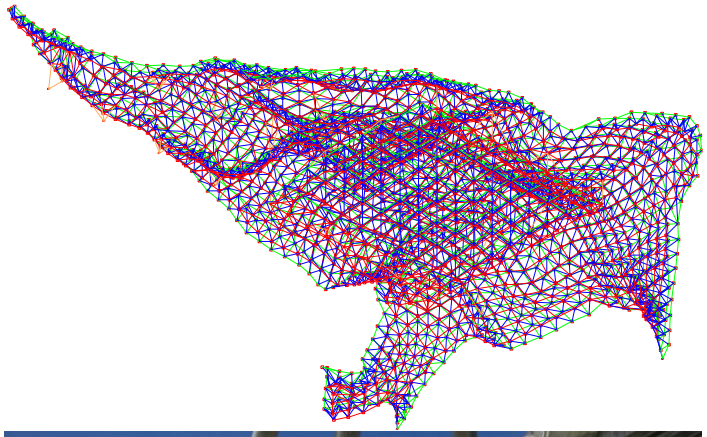
**Client:** Ente Sistema Fiera Milano

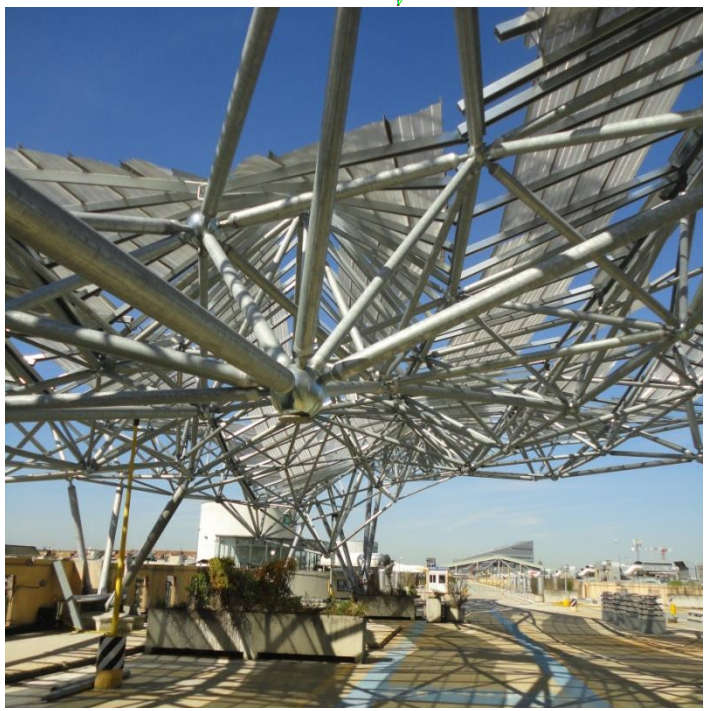
**Year:** 2008 - 2010

**Project budget:** € 50'000'000







# Larissa – AEL FC Arena

## DESCRIPTION

Larissa Stadium roof structure is made by couples of cantilever truss beams. The distance between two trusses in a couple is 4.7m, so the distance among two adjacent couple is (9.4m+4.7m) = 14.1m, and each couple is internally windbraced and linked to the based supports with proper diagonals. North and South trusses are 24m length and their cantilever part is 13,5m length.

The trusses internal support is a steel columns (with transversal X bracing) and the external support is a concrete structure. Longitudinal distance among two adjacent support is almost 7m.

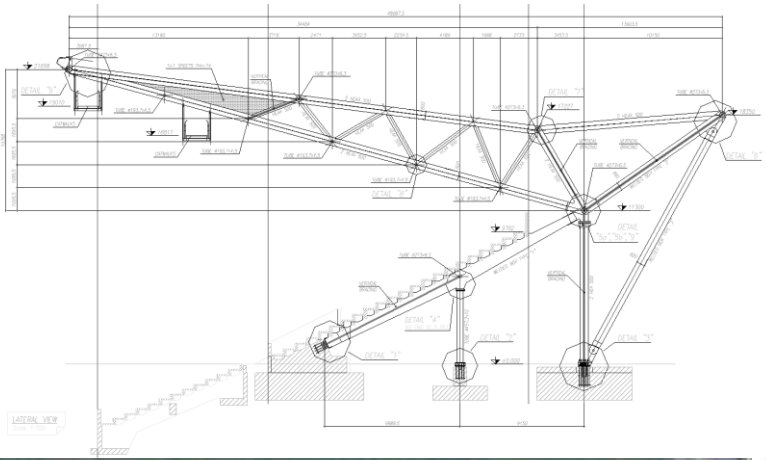
Concrete structures and windbraced transversal columns guarantee needed resistance to horizontal loads.

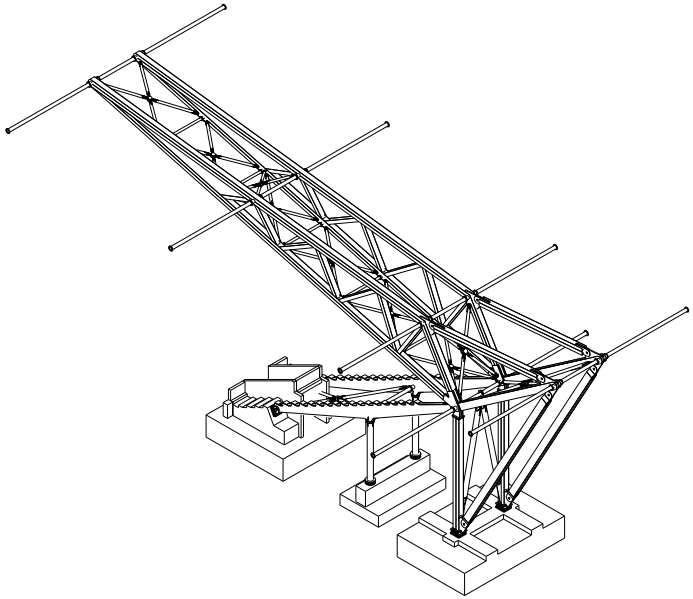
**Design service:** Tender, preliminar and final structural design.

**Client:** Larissa F.C.

**Year:** 2009 - 2012

**Project budget :** € 41'000'000

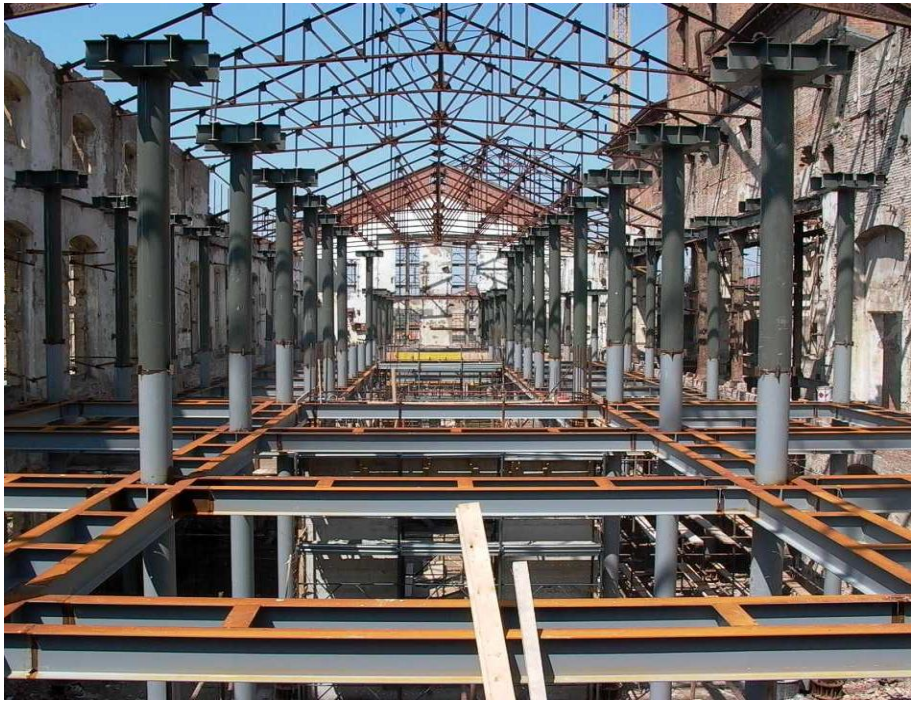




# Classe – Archeological Museum

## DESCRIPTION

Archeological Museum in Classe renovation design is aimed to partially restore masonry structures of the existing sugar factory and to re-build demolished parts with new steel and concrete structures.

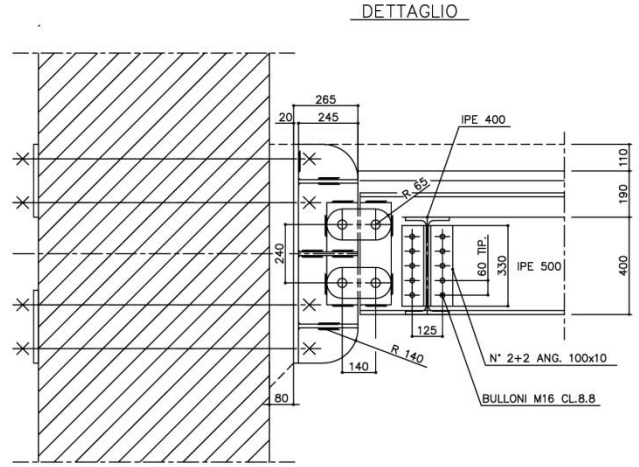


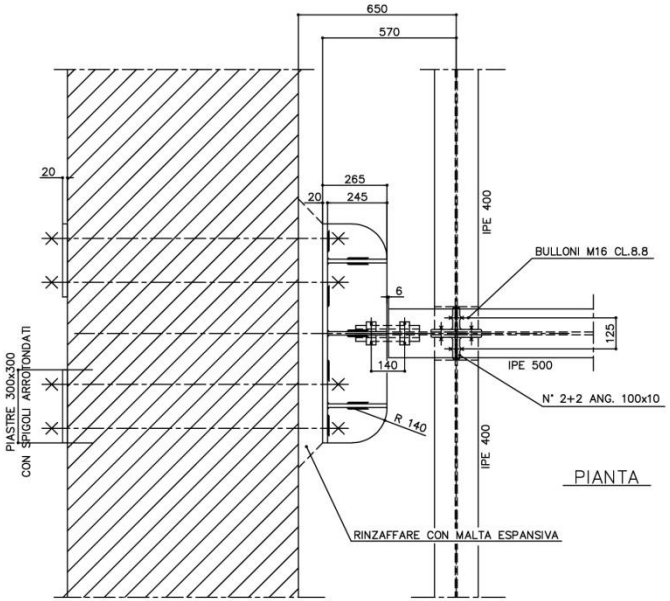
**Design service:** Final structural design

**Client:** Comune di Ravenna

**Year:** 2009 - 2010

**Project budget:** € 19'200'000



# Turin – Intesa San Paolo Skyscraper

## DESCRIPTION

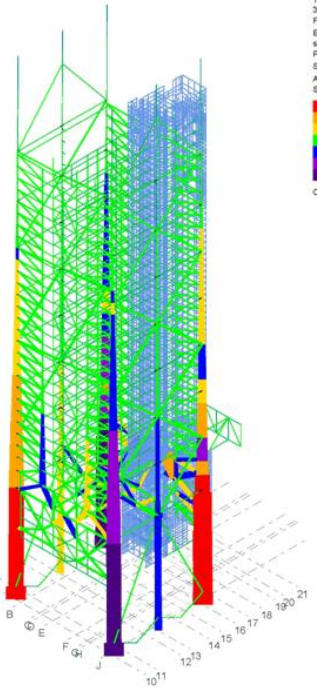
Intesa San Paolo Skyscraper is a 168m tall 39 storey building fully covered by glass, designed according to bio-architectural principal, without any air-conditioning system and with solutions able to reduce energetic consumption.

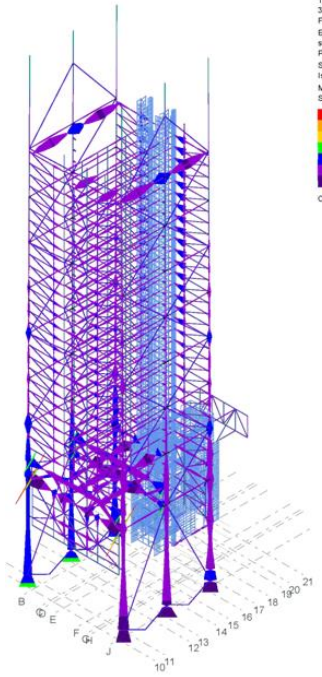
The tower is in the nearby of Torino Porta Susa station, on a 7'000mq area and it has a rooftop garden, 3'000 people office and 500seats auditorium.

**Design service:** Structural design consultant.

**Year:** 2009 - 2012

**Project budget:** € 235'000'000




# Sassuolo – Pedestrian bridge on Secchia River

## DESCRIPTION

This 5 spans (three 40m length spans and two 20m length spans) Cabled stayed bridge is 160m long and it is cable stayed to 4 intermediate pylons and 2 approaches.

The longest spans are hanged in their midpoint by 2 triplets of cables (each one connected to the adjacent pylon). The 4 pylons are alternated with respect to the deck from the planar point of view; this fact is a peculiar architectural feature of the bridge, but it also allows to give an higher stiffener to the structure in the horizontal plane. The deck is supported by a spatial structural truss, made by a lower chord, two upper chords and diagonal elements. Secondary beams are supported by the previous mentioned main truss; these beams main aim is to support the planking level.

**Design service:** Tender, preliminar and final structural and architectural design.

**Client:** Modena District

**Year:** 2007 - 2009

**Project budget :** € 1'020'000

# Casalecchio – Pedestrian Bridge

## DESCRIPTION

This 100m span bridge connects the two banks of Reno river. Conceptual architectural and structural design inspire a swan, trying to recall its agility and grace. For this reason the steel structure has been optimized with several innovative solutions, in order to get the best weight / resistance ratio and to allow a remarkable costs reduction.

**Design service:** Tender, preliminar and final structural and architectural design.

**Client:** Casalecchio di Reno (BO) Municipality

**Year:** 2009 - 2011

**Project budget:** € 750'000

# Bologna – Unipol Tower

## DESCRIPTION

This 125m tall 28 storey building has an irregular quadrilateral plan and it hosts offices. There are two underground floors whose plane dimension is bigger than the one of the tower and a foundation slab on 16m long piles.

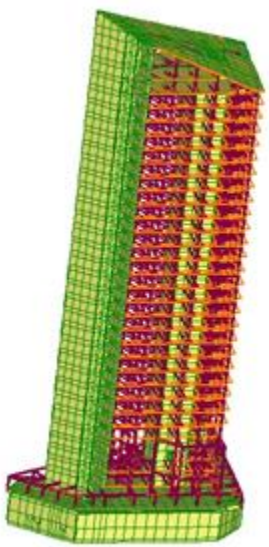
The main structure is made by three cores with stairs and elevators inside, whose shape and dimension are deeply different one from the other and that are aimed to bear horizontal forces (wind an seismic action). Each slab is supported by steel frames.

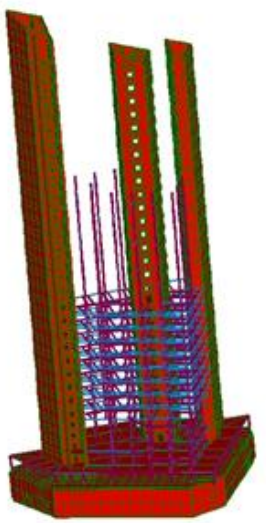
**Design Service:** Tender, preliminar and final structural design

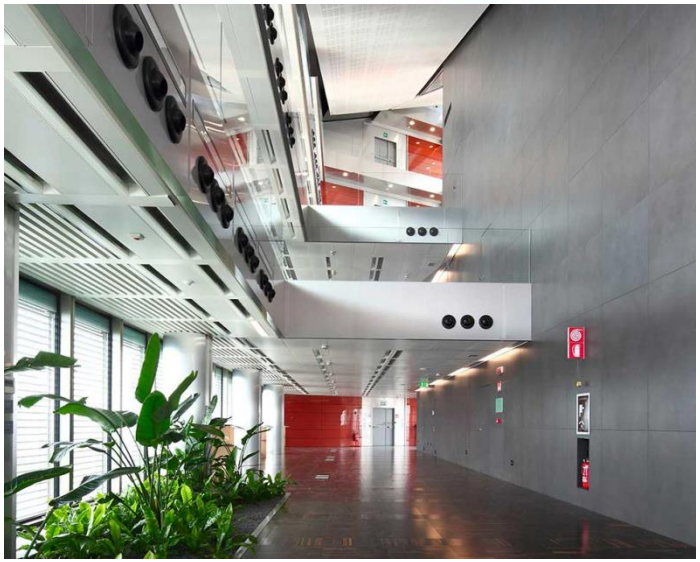
**Client:** Unifimm s.r.l.

**Year:** 2006 - 2009

**Project budget:** € 62'000'000



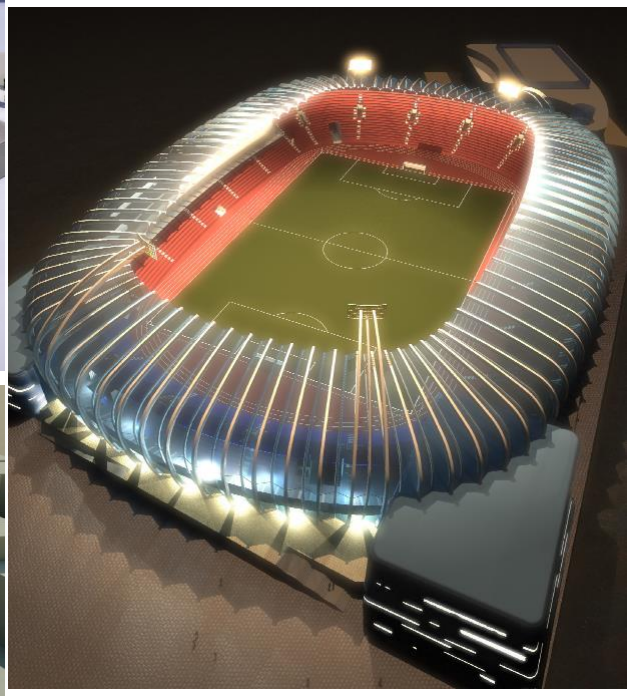


# Athens – Panionios AC Stadium

## DESCRIPTION

The designed is composed by a 12'460 seats and 3 star standard FIFA/UEFA stadium, a swimming pool, multi purposes sports halls, a technical area, administrative and security areas and a support zone.

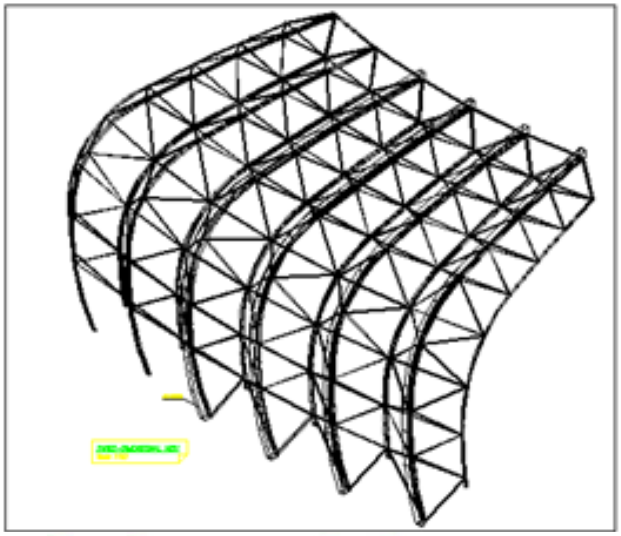
Stadium roof cover is made by an upper bent beam with RHS section (100x50cm) linked to a below lattice structure. The roof structure has a 25m length cantilever beam and its structural system is horizontally connected to the grandstands structure, where the triangle got from raker and column allow a restrain and to transfer all forces at the ground level.

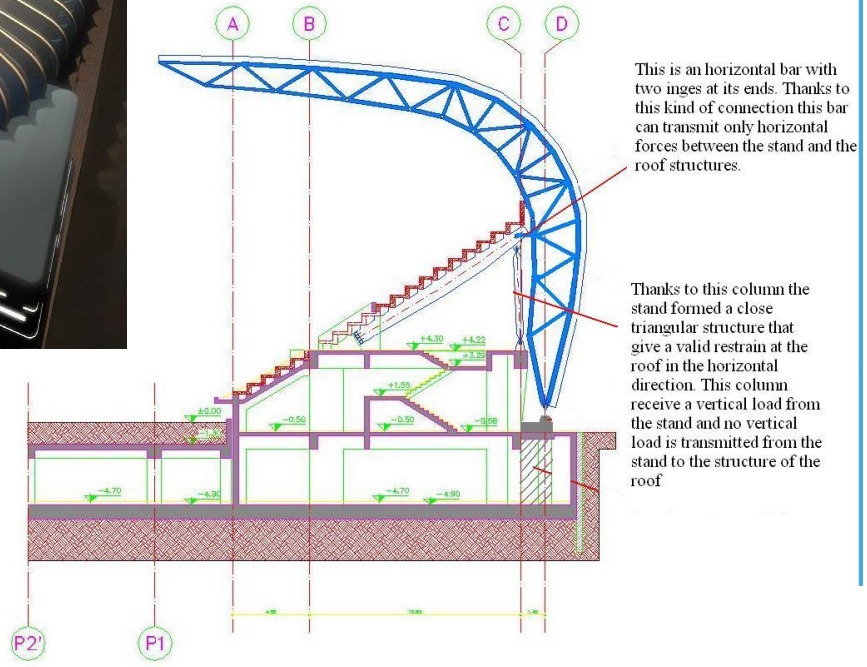


**Design Service:** Progettazion Structural Tender Design

**Client:** Dimand S.A.

**Year:** 2009





# Rome – EUR Convention Hall

## DESCRIPTION

EUR Convention Hall architectural project has been designed by Arch. Fuksas. It is a very complicated structure made by the union of three simple elements:

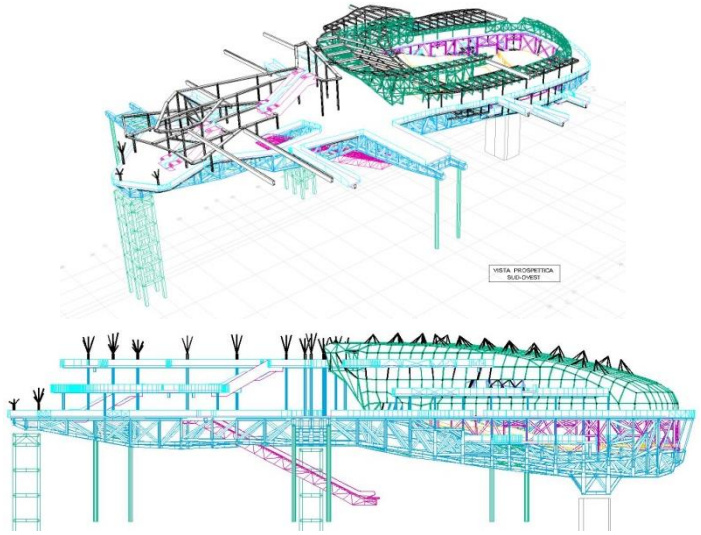
- The Case, made by steel portal frames aimed to create a box;
- The Cloud: an irregular shape volume made by tubular profiles. It is possible to enter the Cloud from the Case. This structure contains several decks and an Auditorium;
- The Blade: made by a regular steel frame and concrete cores built up to host an hotel.

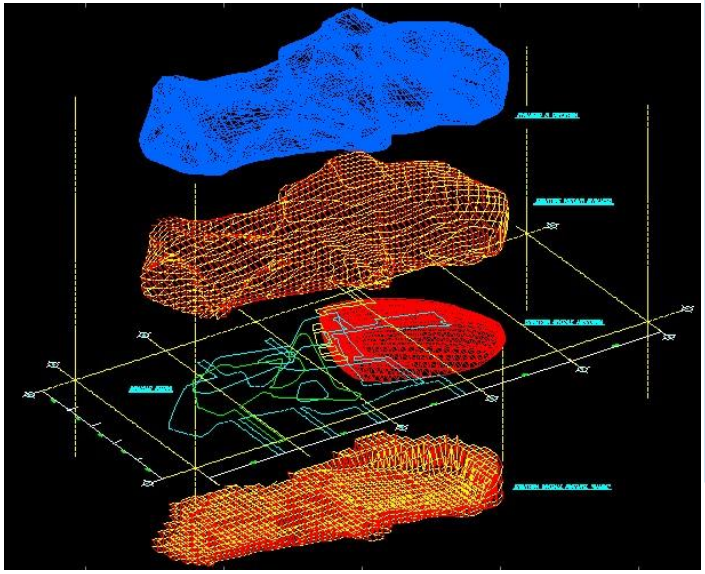
**Design Service:** Tender, preliminar and final structural design

**Client:** EUR S.p.a.

**Year:** 2008 - 2010

**Project budget:** € 276'000'000



# Bologna – Municipality Headquarters

## DESCRIPTION

The new Municipality Headquarters in Bologna develops on a 33'000 mq area, behind the central station, where there was the old fruit and vegetable market. The project is aimed to develop new commercial and service areas in order to requalify the neighbourhood, that has been re-connected to the city centre.

The design concept is split in 3 different blocks, linked to different activities. The three blocks have different height (they are 12, 10 and 8 storey buildings), but they are connected by a bent shade canopy, a 4 stroey lobby and a new decreasing public space.

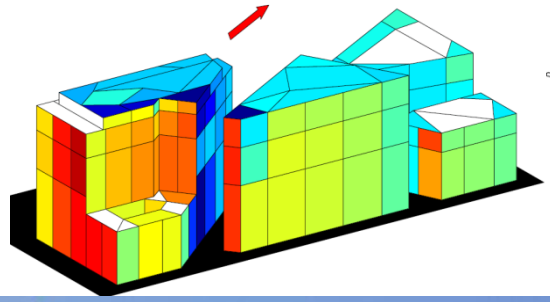
The most characteristic designed element is the huge common canopy that bent as a giant "origami" covering the buildings and the panoramic terrace. This canopy as "brise soleil" has the double aim to protect from solar radiation and give a sense of architectural cohesion to the entire complex.

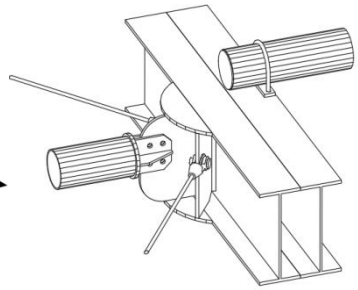
**Design Service:** Tender, preliminar and final design

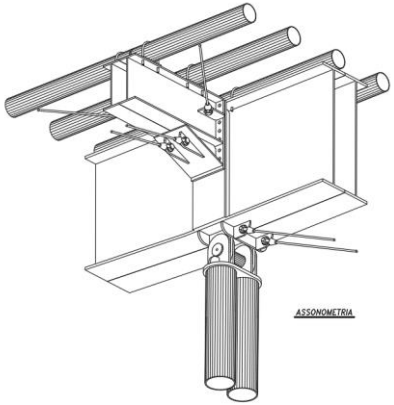
**Client:** Comune di Bologna

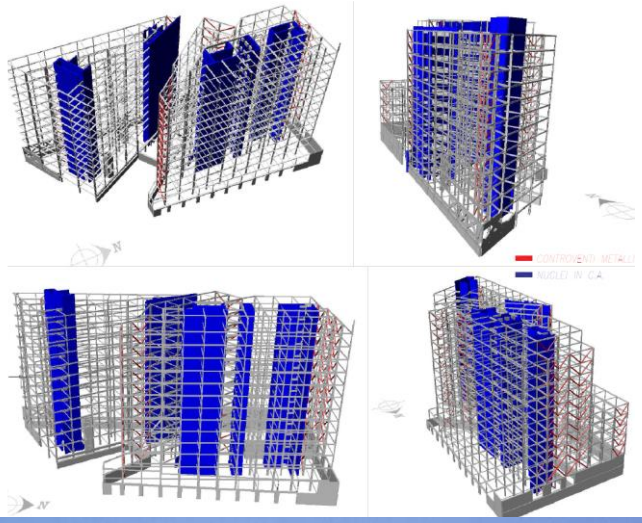
**Year:** 2005 – 2008

**Project budget:** € 68'000'000







# Bologna – Pavilions 14 and 15

## DESCRIPTION

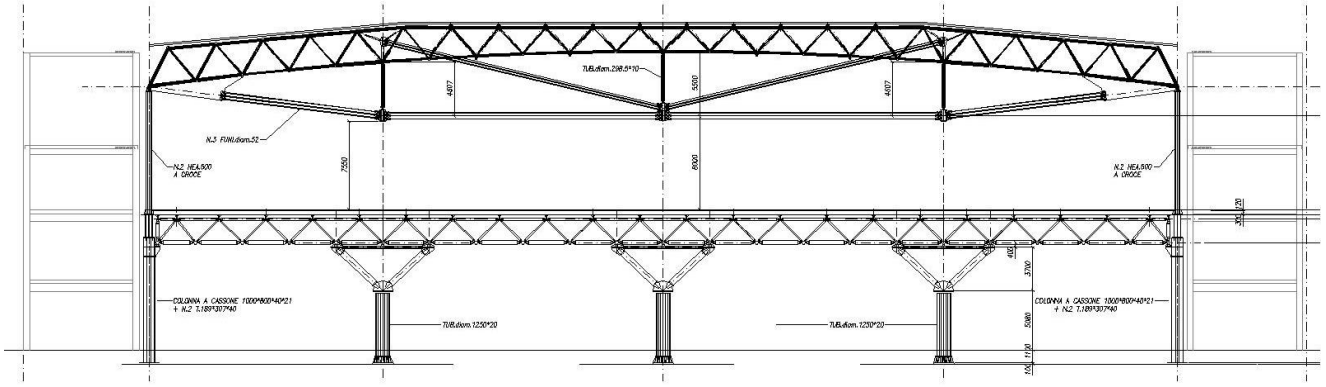
Pavilions 14 and 15 have been erected in North-West zone of Bologna Exhibition neighbourhood in order to have a medium exhibition centre neighbourhood dimension (more than 60'000mq). These pavilions are connected to pavilions 19-20 and 16-18 to provide a huge unique exhibition space. The connection allows to use pavilion 16-18 spaces and services: restaurant, multi-purpose area for offices and congress meetings. From the structural point of view pavilions 14 and 15 is made by a multi purpose area (88 x 95.7 m square plan), a deck at +12m level with a roof made by a spatial truss beam reinforced with cable and the South entrance.

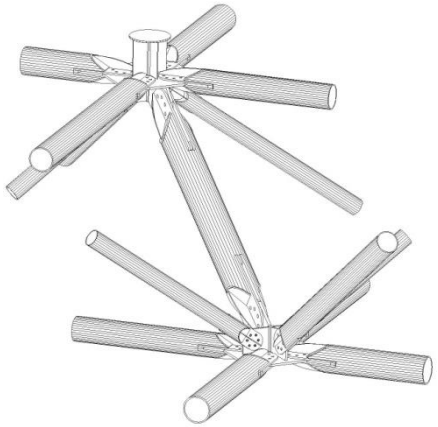
**Design Service:** Tender, preliminar and final structural design

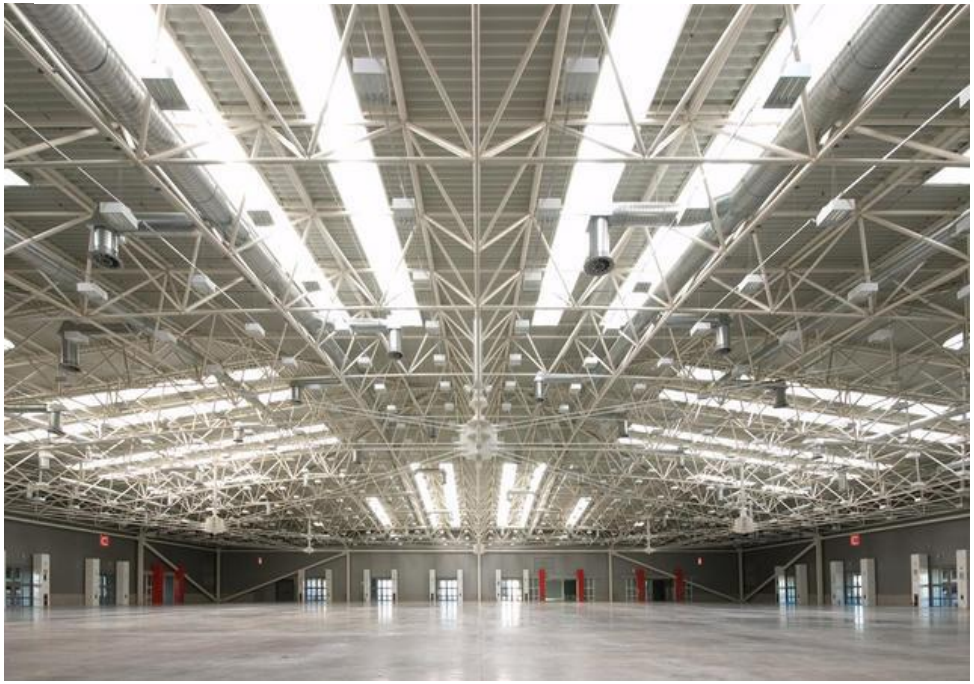
**Client:** BologneFiere S.p.a.

**Year:** 2006 – 2008

**Project budget:** € 55'500'000







# Korintos – Railway bridge

## DESCRIPTION

This bridge is part of the new railway between Korintos and Patra and overcomes the new Highway between these two cities.

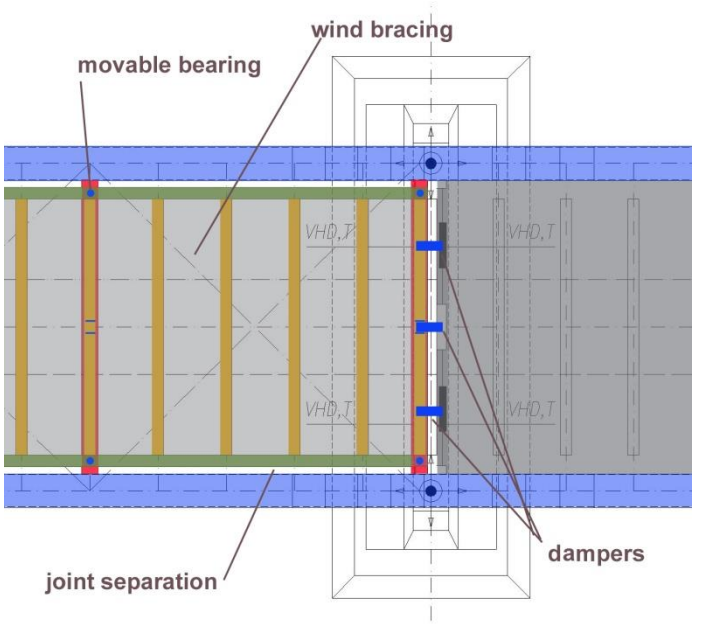
It is a three span bridge (two 45m long spans and a central 170m long span); the central span is supported by two rectangular frames at the top of whom cables hanging the deck are fixed. The 16.6m width deck is stabilized by horizontal steel bracing under the concrete slab. Viscous damping and bearing devices allow to isolate from the seismic point of view in both transversal and longitudinal direction.

**Design Service:** Final structural design

**Client:** Hellenic Railways Organisation

**Year:** 2007 – 2008

**Project budget:** € 10'000'000




# Jesolo – Aquileia Tower

## DESCRIPTION

This 73m height 22 storey building hosts flats, a lobby, commercial areas and a cafeteria. The structure has a symmetrical polygonal plan with a central core with stairs and elevators.

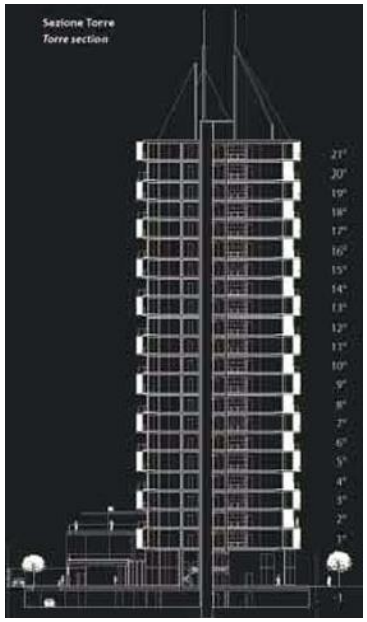
The facade structure is suspended from the roof top and made by crossed sails that, once their are lighted up, become a orientation reference point in the night. A movable intersected mesh has been design to protect the terraces from the sun and to let glimpse the flats windows, making the tower lighter.

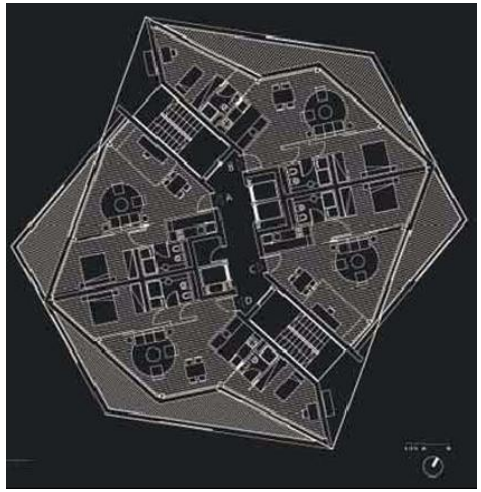
**Design Sevice:** Tender, preliminar and final structural design

**Client:** Boldrin S.p.a

**Year:** 2004 – 2009

**Project budget:** € 45'000'000



# Dozza – Pedestrian bridge over A13 Highway

## DESCRIPTION

The 100m long pedestrian bridge over A13 Highway between Padua and Bologna is made by a structural system of a no-push arch. The main structure is made by:

- A big tripod made by steel box cross-section built up by welded steel plates;
- A cable spokes cable system that hangs the deck bringing the stress to the chord in one location, only.

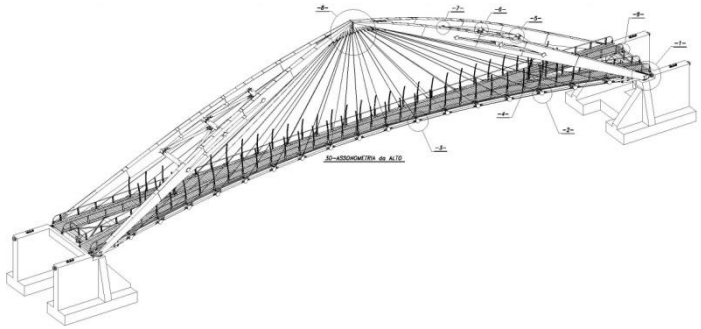
The push given by the struts is balanced by the tiers location. Deck tension stress allows, together with contrast curvatures, a stabilization for wind loading effects.

**Design Service:** Tender, preliminar and final architectural and structural design

**Client:** Bologna Municipality

**Year:** 2006 – 2009

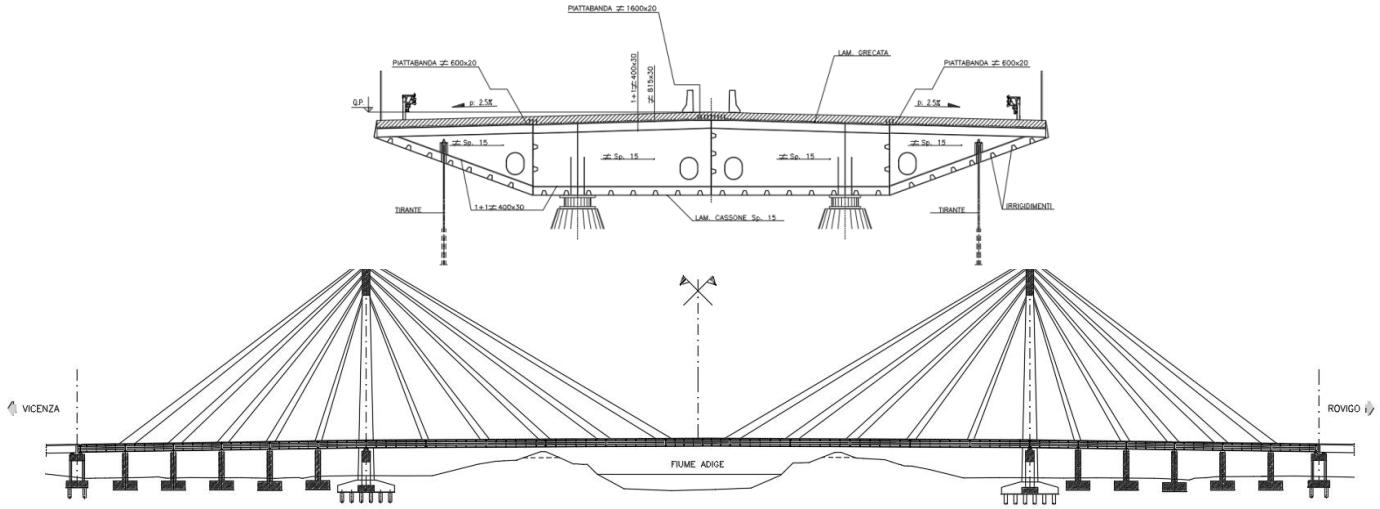
**Project budget:** € 2'100'000



# Adige – Cable Stayed Bridge

## DESCRIPTION

This 310m length cable stayed two lanes highway bridge has a concrete-steel mixed deck. The main tripods are reinforced concrete structures, while the cable fixations are steel elements.

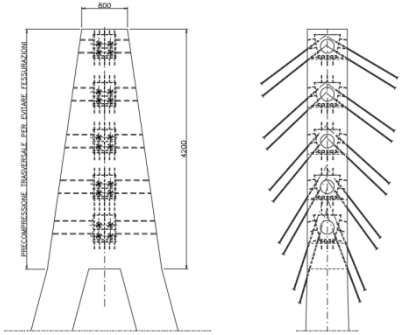



**Design Service:** Tender, preliminar and final structural design consultant for RPA Engineering Consultans S.r.l.

**Client:** Società per Azioni Autostrada Brescia Verona Vicenza Padova

**Year:** 2006 – 2007

**Project budget:** € 30'000'000



# Genova – Bridge over Polcevera River

## DESCRIPTION

This two lanes first category cable stayed bridge is made by two spans and has a concrete-steel mixed deck.

Beams, columns and cables are tubular cross section built up by zinc-coated S355 steel plates.

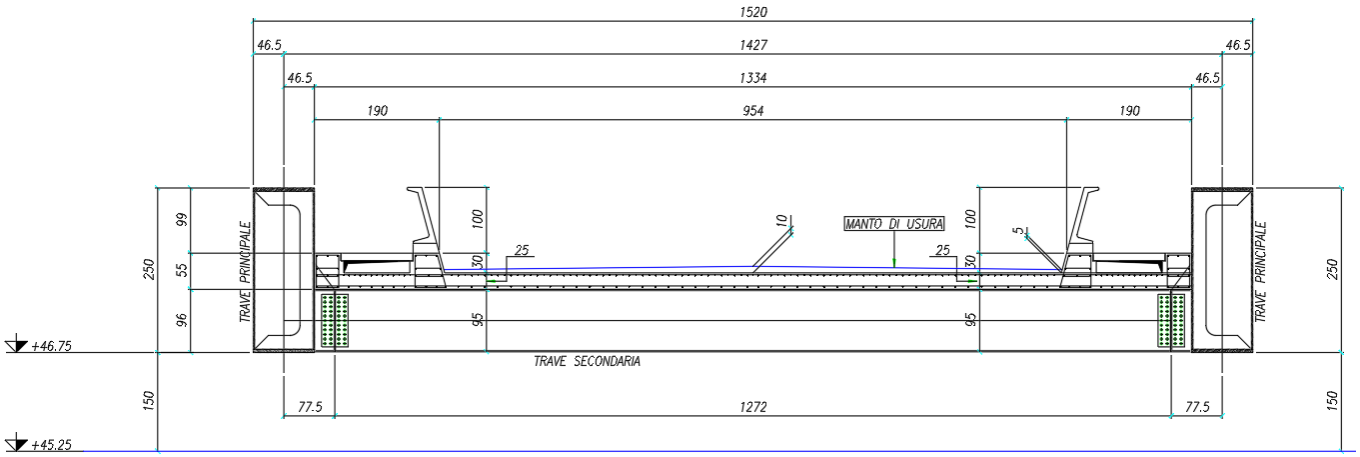
**Design Service:** Tender, preliminar and final structural design

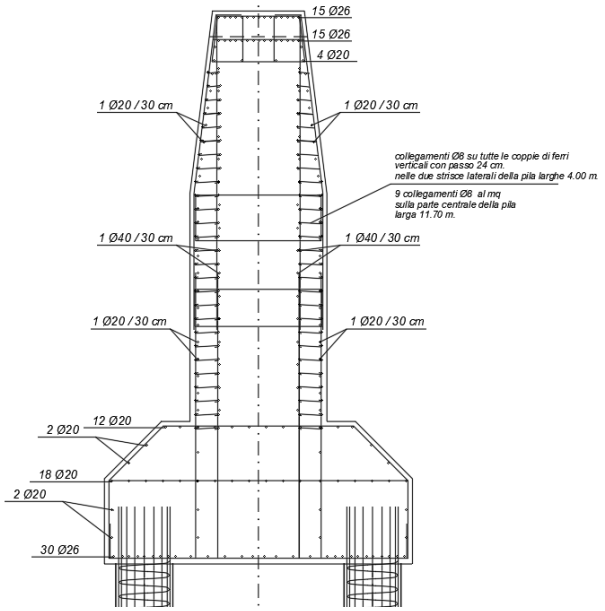
**Client:** Genova Municipality

**Year:** 2005 – 2007

**Project budget:** € 2'357'504

SEZIONE TRASVERSALE TIPICA




# Rome – New Exhibition

## DESCRIPTION

The pedestrian bridge cover is a tensile multiple span structure, with different span length (variable from 48m to 53.6m).

The suspended roof is made by 125cm width and 15/10mm thick inox steel plates, arranged according to a catenary arrangement and detached one from an other by 25cm space distance, in order to make a overall 10m transversal width. These plates work as bearing cables and have a 10% deformation/length ratio.

Over these plates a polyester fabric covered by PVDF waterproofing layer has been provided. Lateral stabilization of the cover system is provided by steel tubes over the cover layer and vertically fixed by prestressed cables to the below concrete deck at level 6m. The tensile structure spans are supported by several tubular steel portal frames with 12m pitch.

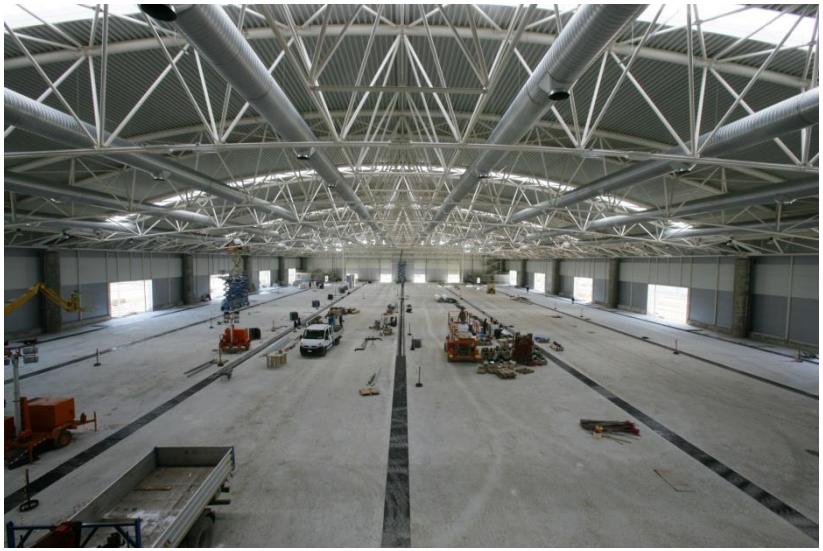
The 1500m length structural system with longitudinal windbracing portal frames guarantee redundancy and avoids any progressive collapse due to accidental causes.

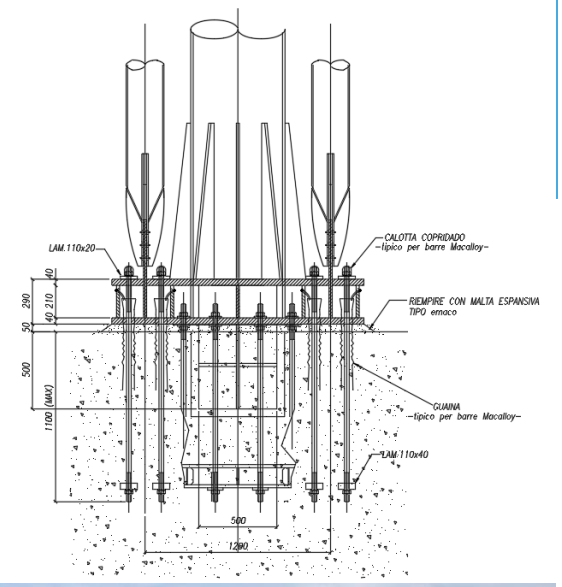
**Design Service:** Tender, Preliminar and Final structural design

**Client:** Lamaro Appalti

**Year:** 2005 – 2006

**Project budget:** € 131'000'000



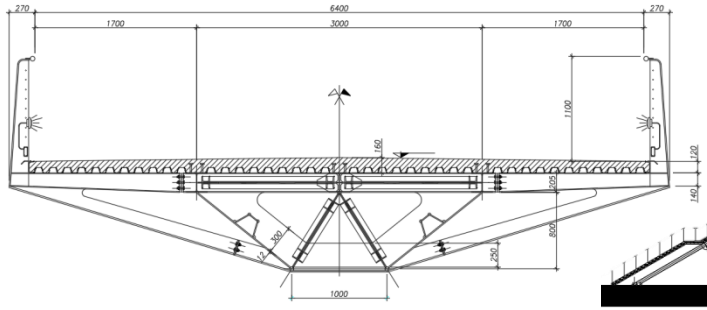


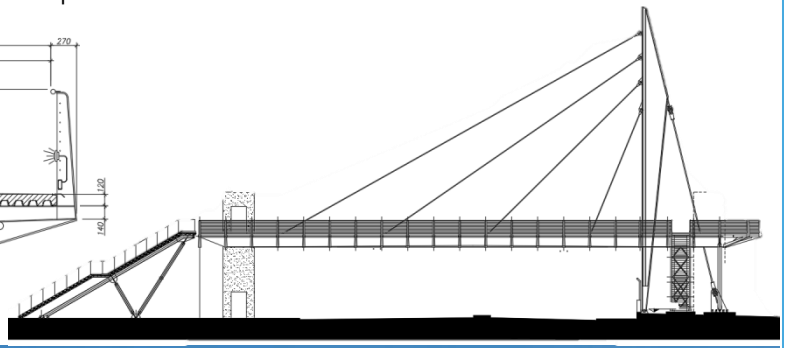

# Athens – Pedestrian Bridge

## DESCRIPTION

This 45.5m length cable stayed pedestrian bridge has a 6.4m width deck. All cables supporting the deck are fixed to the 25m high steel pylon with variable cross-section, built up by RHS steel profiles.

The pylon go through the deck without giving to it any possible restrain and it is stabilized by two cables at its back. The lateral stabilization is guaranteed by two windbracing frames that are parts of the access stairs.



**Design Service:** Final structural design

**Client:** Proprietà Portuale del Pireo

**Year:** 2006 - 2007

**Project budget:** € 1'000'000

# Rome – High speed railway Terminal «Tiburtina»

MJW structures

## DESCRIPTION

The main structure is made by a 340m x52m spatial truss. At the longitudinal ends this truss height decreases from 3.6m to 0m following a double spliced profile.

This structure is supported in 20 points by: columns at +9.00m level of existing bridge structure, new columns at -4.50m level, concrete cores.

This structures hangs with hanging tubular elements 8 peculiar structures named “Suspended Volumes”. These structures are made by a steel and wood deck and a steel CHS profile cover.

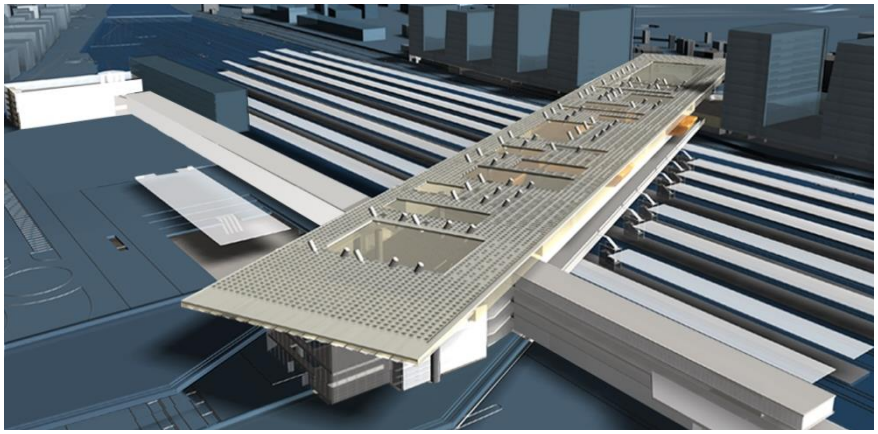
Due to their peculiar shape, the cover structure is vertically connected to the vertical rods with a vertical regulation system that allows to got the correct position during erection; roof cover profile should then be fixed to the hanging rods in order to avoid any relative horizontal displacement.

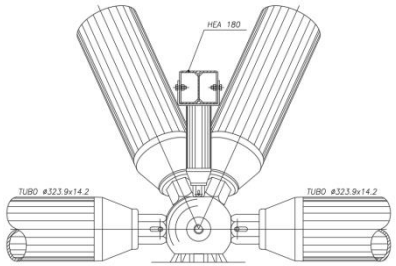
**Design Service:** Tender, preliminar and final design

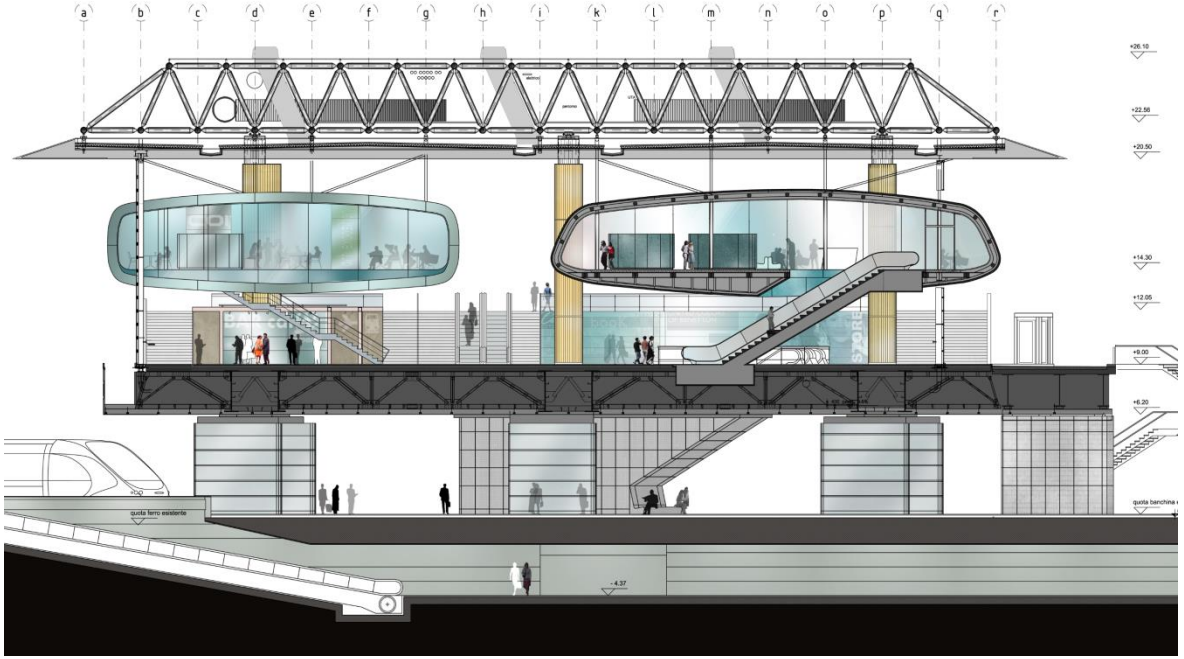
**Client:** Ferrovie dello Stato Italiane

**Year:** 2005 - 2008

**Project budget:** € 158’000’000





# Stockholm – Bridge over Oxhalssundet fiord

## DESCRIPTION

The designed structure for the bridge over Oxhalssundet fiord gives a new image for a cable stayed railway and pedestrian steel bridge.

The lightened pylons (almost transparent) are arranged at acute angle with respect to the water surface and have a spindle shape towards the sky like the big ship yard.

The cables themselves and their packed arrangement recall mast shroud of the ship that allow to lift the sails.

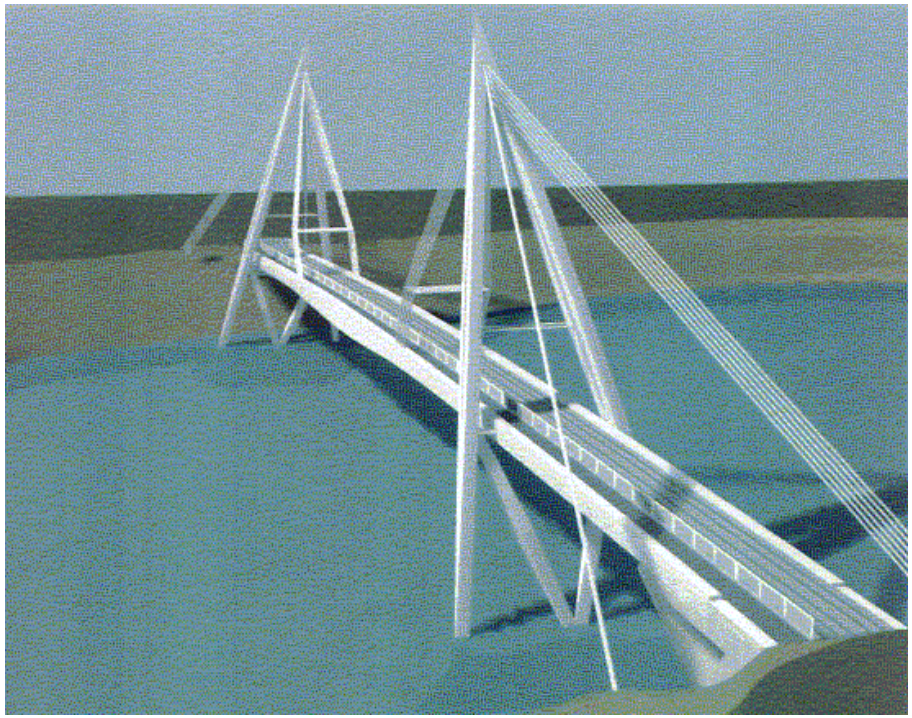
The two lateral steel box sections are considered as a smooth surface, with no shadow; this is one of the most peculiar design choice giving the opportunity to get an “continuous strip” image, substantial, but slim at the same time, since the bearing force sensation is given to the inclined pylons and to the cables.

**Design Service:** Tender structural design

**Client:** EdilCoop Scrl

**Year:** 2003-2004

**Project budget:** € 10’329’137



# Ravenna – Bridge over Candiano river

## DESCRIPTION

This 32m length movable bridge with two lanes host a 1st category street. The bridge intrados is 2.4-3.0 m over the sea level to allow the passage for small boats along the Candiano channel between S. Vitale and city Darsena.

The bridge is split in two equal and symmetrical parts that can rotate around proper hinges arranged on the abutments. It is made by two main steel box trusses connected with steel box secondary beams.

The deck is built up by a reinforced steel plate with trapezoidal steel elements welded to the secondary beams.

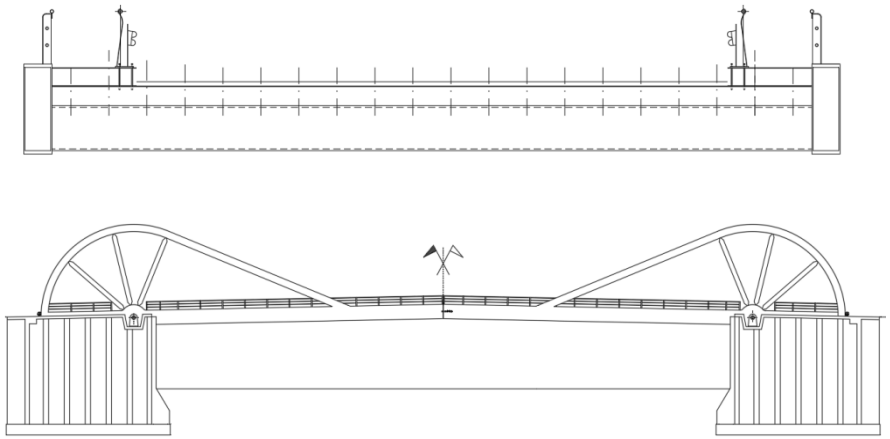
**Design Service:** Tender structural design

**Client:** Autorità Portuale

**Year:** 2003 - 2004

**Project budget:** € 3'100'000

SEZIONE TRASVERASLE



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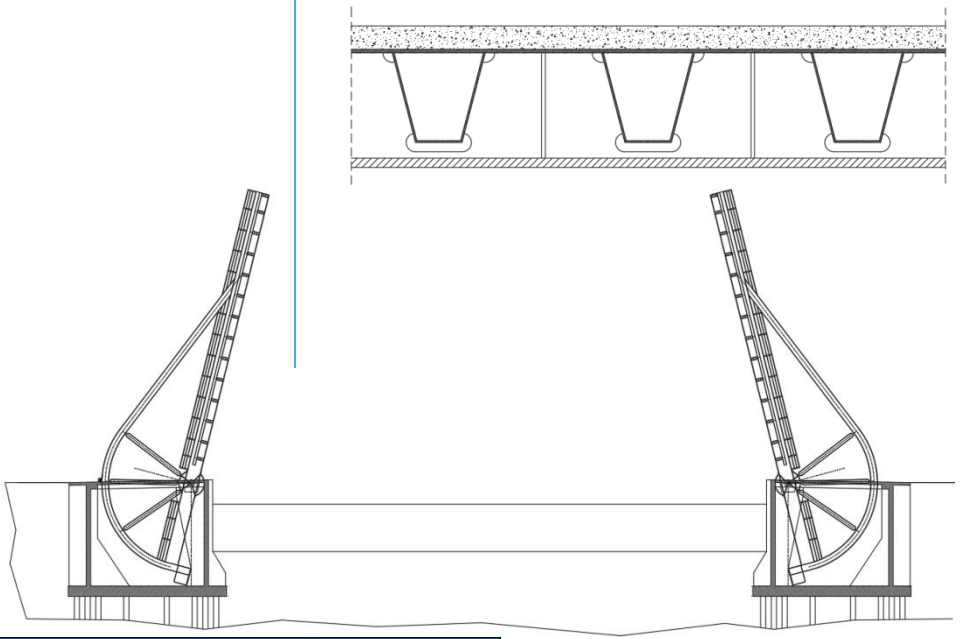
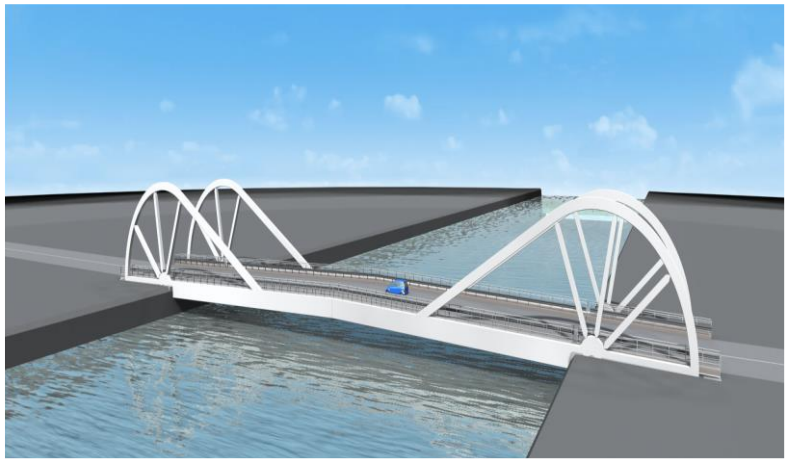




# Modena – Alberto Braglia Stadium

## DESCRIPTION

The main structure of this 22'000 seats stadium is made by tubular steel columns that support L curved beams with variable cross section on which are arranged saddles for the support for the precast risers.

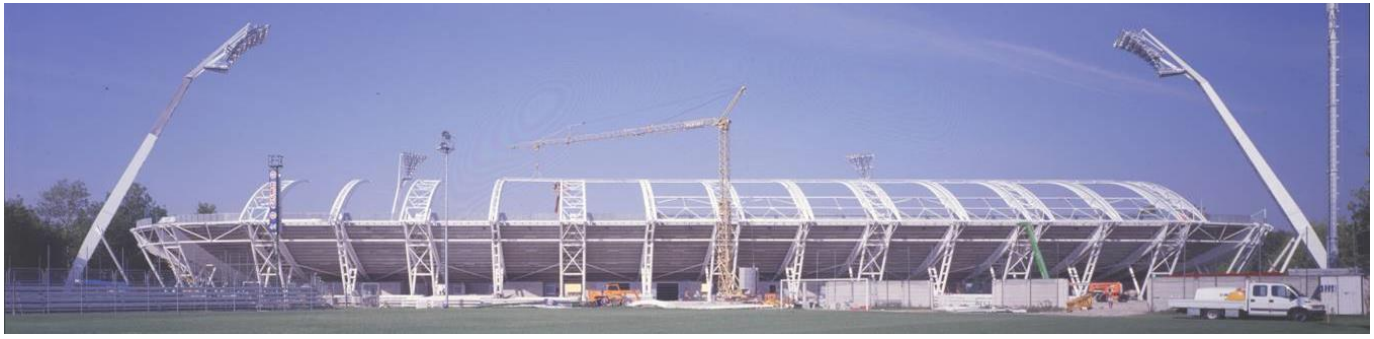
The lower beams support at their top (thanks to several struts, ties and bracing) the saber beams built up by welded steel plates that allow to have a curved section with variable height. These beams main aim is to support the roof cover, made by a couple of corrugated steel sheets with little holes. These plates are mirrored and fixed to the structures by rivets. Over the steel cover, thanks to proper wooden elements, a PTFE membrane has been provided to guarantee waterproofing.

**Design Service:** Tender, preliminar and final structural and architectural design

**Client:** Comune di Modena

**Year:** 2004 - 2006

**Project budget:** € 10'300'000



# Casalecchio – Pedestrian bridge over Reno river

## DESCRIPTION

This 100m long pedestrian suspended bridge structure is made by a system of bearing and stabilizing cables with opposite curvatures and a steel deck with peculiar trusses with “gondole” shape suspended by vertical stays.

The anchorage system is made by a “A” shaped CHS steel tripod and zinc-coated and painted cable ties.

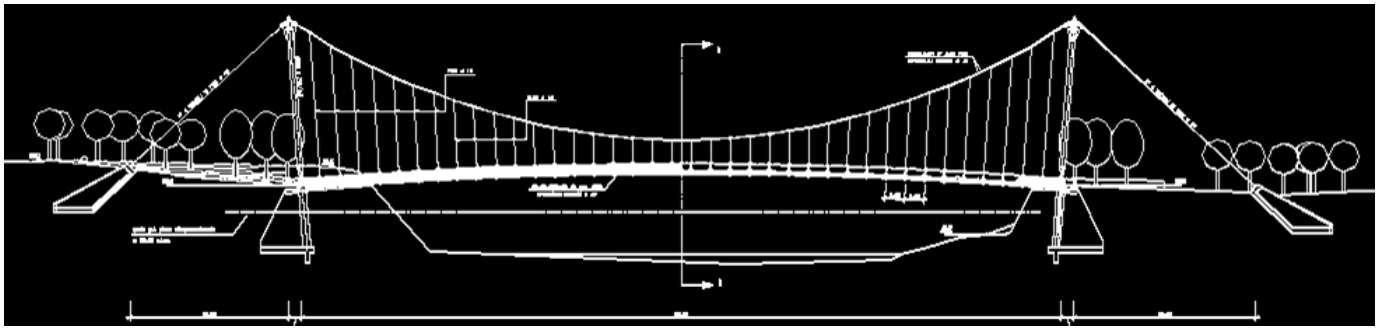
The parapet is made by inox steel cables.

**Design Service:** Tender, preliminar and final structural and architectural design

**Client:** Comune di Casalecchio di Reno (BO)

**Year:** 2002 - 2004

**Project budget:** € 620’000



# Braga – Council stadium Roof

## DESCRIPTION

The stadium geometry is clear in the central concrete grandstands, split by three galleries with a circular cross section that allow to pass through it.

The roof structure is made by two 25cm thick concrete slabs, suspended by a cable system.

This cable system is arranged transversally with respect to the field. The 220m length roof structure is a unique worldwide structural example.

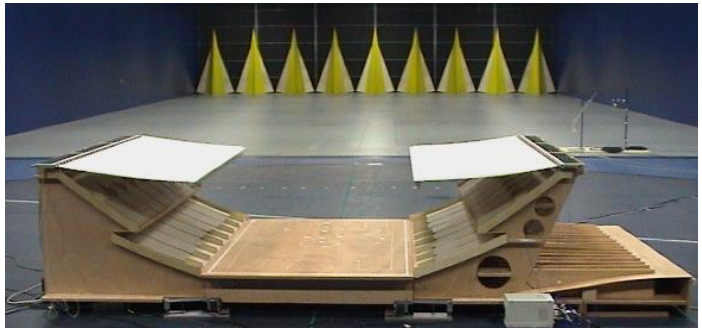
The final design has been developed together with many experimental wind tunnel tests.

**Design Service:** Final structural design of the steel roof

**Client:** Soc. Soares da Costa

**Year:** 2003 - 2004

**Project budget:** € 120'000'000



# Bologna – Connection between pavilions 21 and 22

## DESCRIPTION

This 88m x 13.5m building is the pedestrian path between pavilions 21 and 22 and pavilions 23 and 24.

It is made by a deck at +6.00m level and a roof cover at +14.00m level. It has been designed an underground level to host services and plants areas.

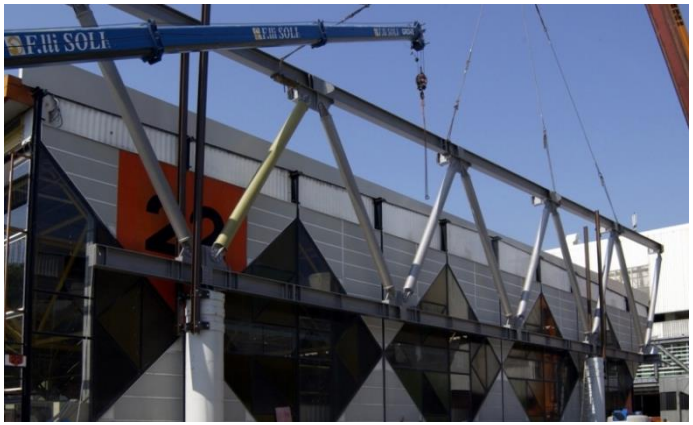
The main structure is made by two longitudinal truss beams supported by 4+4 columns (steel CHS 914mmx20mm filled by concrete) each 24m; in this way each truss beam would have 3 internal 24m spans and 2 cantilever 8m length spans.

**Design Service:** Final structural design

**Client:** Finanziaria Bologna Metropolitana

**Year:** 2004 - 2005

**Project budget:** € 4'000'000




# Athens – Olympiakos Stadium

## DESCRIPTION

This 34’000 seats stadium covers a 32’000mq area and it is made by

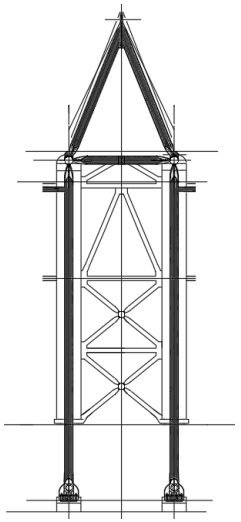
- Concrete lower grandstands elements that support roof main beams (at 6.44m level);
- Steel upper grandstands elements (rakers each);
- Roof cover steel structure, whose main elements are 14 huge cantilever beams arranged in the same plane of the rakers. Each cantilever beam is made by a macro-spatial truss and balanced by a vertical elements that reaches the ground. The radial secondary RHS steel beams support the membrane cover made by double curvature prestressed PVDF panels.

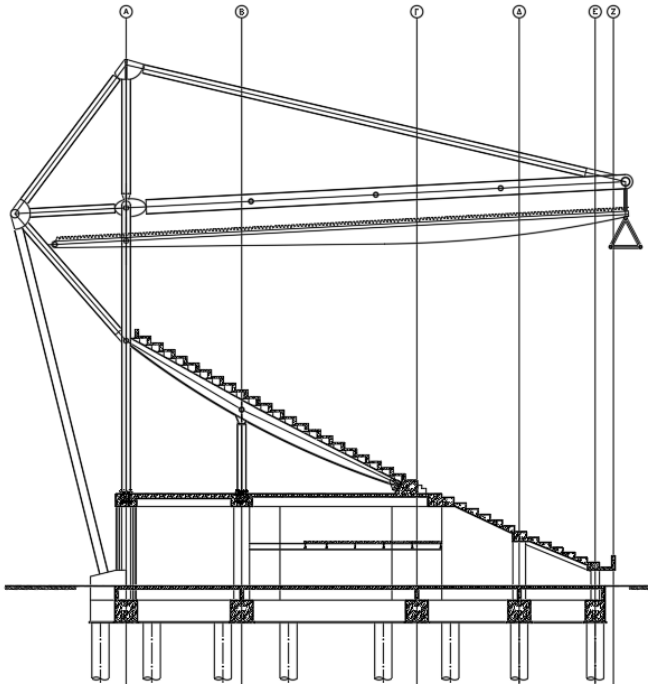
**Design Service:** Final structural design of the roof and stand of the stadium.

**Client:** Karaiskaki S.A.

**Year:** 2002 - 2004

**Project budget:** € 40’000’000





# Bologna – Carmen Longo Swimming pool

## DESCRIPTION

The conceptual design has been developed in order to optimize the design assumption and the architectural existing boundaries. It has been adopted a typological solution of retractable roof cover (over a 3'500mq area) made by the following steel sub-structures:

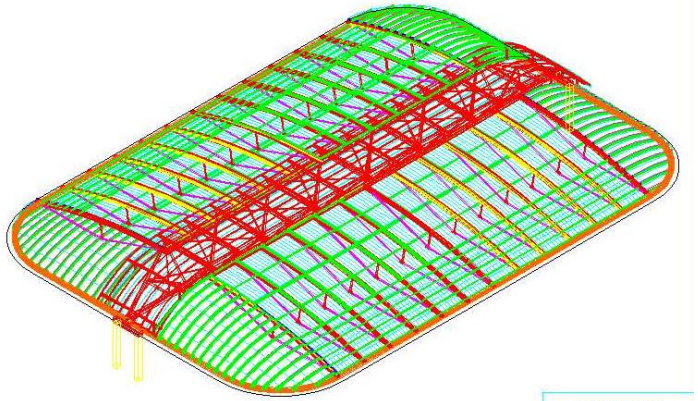
- A main bearing longitudinal beam;
- A system of transversal beams;
- A system of fixed and movable cover panels.

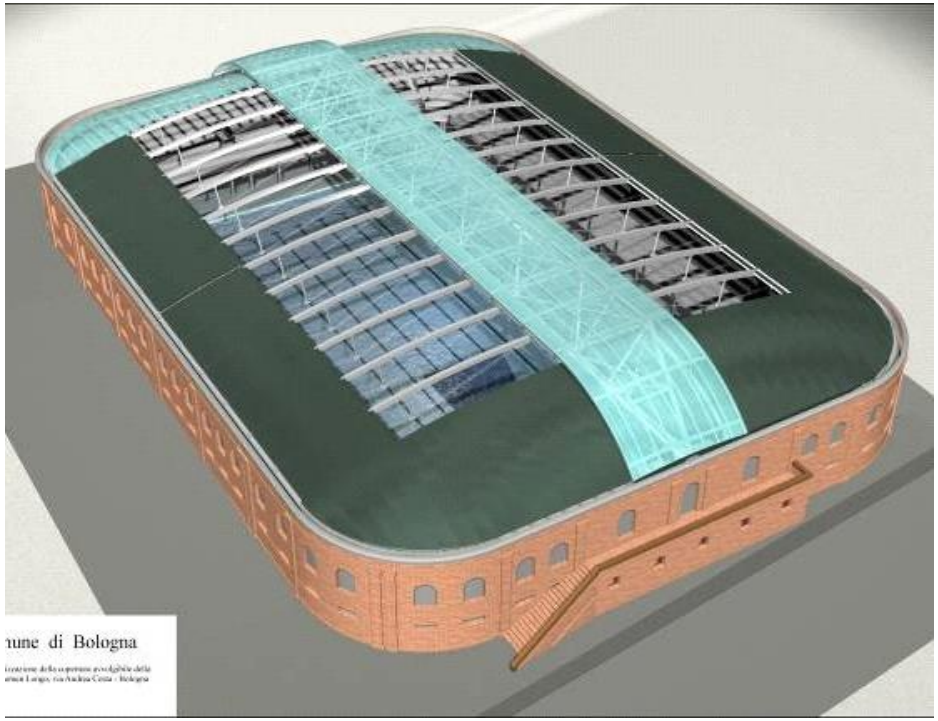
**Design Service:** Final structural design

**Client:** Bologna Municipality

**Year:** 2003 - 2004

**Project budget:** € 4'650'000





# Bologna – Pavilion 18

## DESCRIPTION

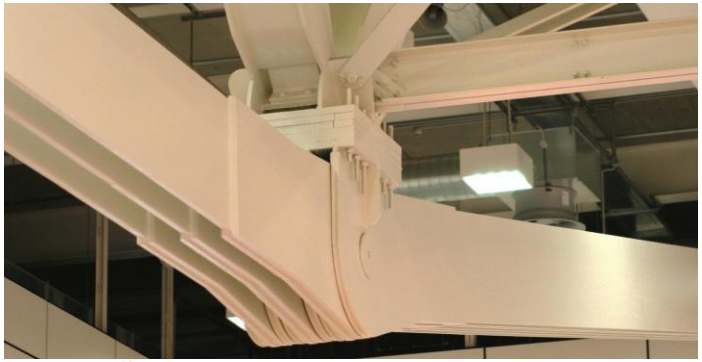
Pavilion 18, built in 2003, is a two-storey building with a central rectangular structure where two other rectangular structures are inserted in. The main columns arrangement is variable between 8m and 16m.

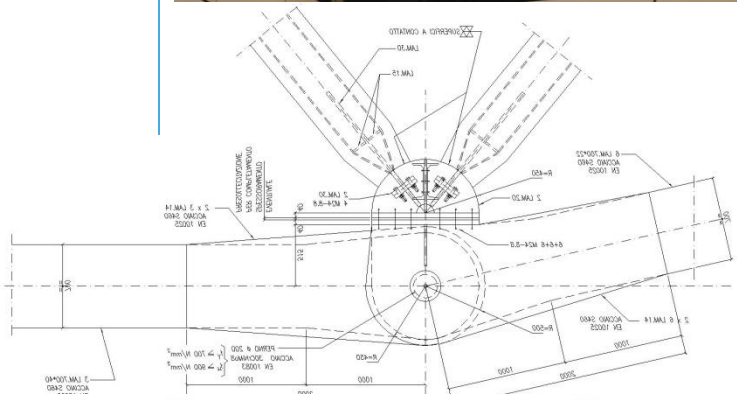
The main structure is made by reinforced beams, whose tensile elements are S460 steel plates, such to guarantee to the beams enough stiffness, since their aim is to support a parking area.

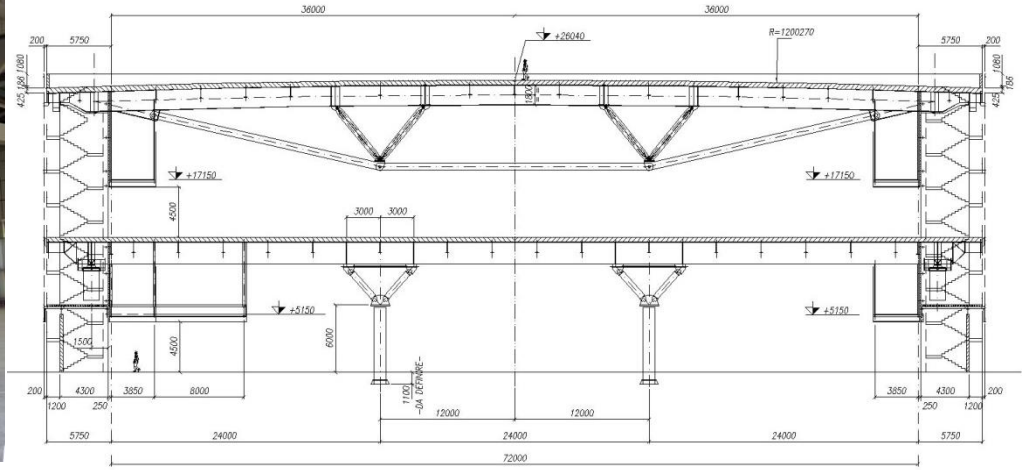
**Design service:** Final structural design

**Client:** Ente Fiera Bologna

**Year:** 2003 - 2004







# Mosca – Acquapark

## DESCRIPTION

The designed project is made by two 172m height twin towers, a steel pedestrian bridge connecting them and the steel roof cover of the aquapark made by a double layer spatial truss.

The towers have a single slab on ground foundation and their structural main system is a concrete-steel structure (steel columns filled by concrete, steel beams working with concrete slabs), where the windbracing function is done by concrete cores.

The dome geometry has been obtained by the creation of two omothetic surfaces, using a longitudinal elliptical shape with 102.6m length axes and 23.3m height and a transversal ellipsys. With a subdivision of 2m each, it has been created a spatial geometry with a tetrahedrical elementary modulus, that follow the pseudo-elliptical surface.

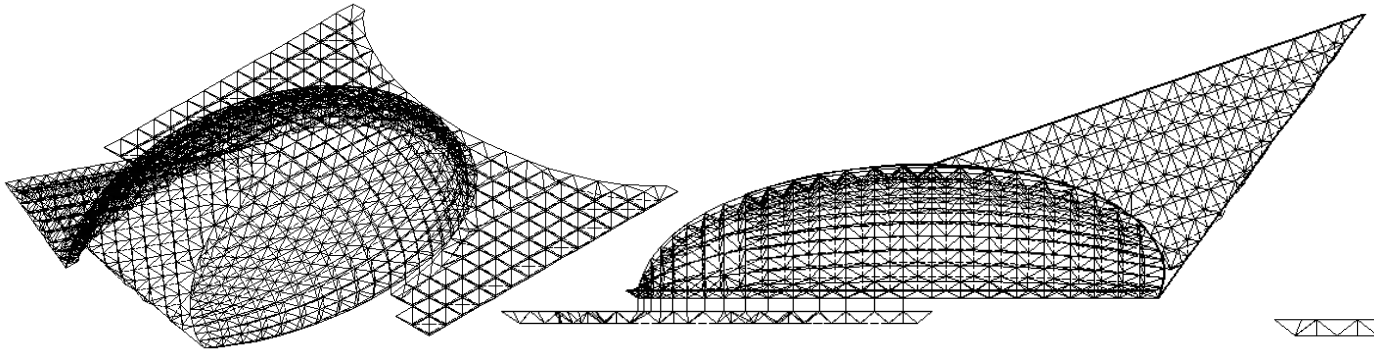
The structural elements are two only: Nodes and Trusses

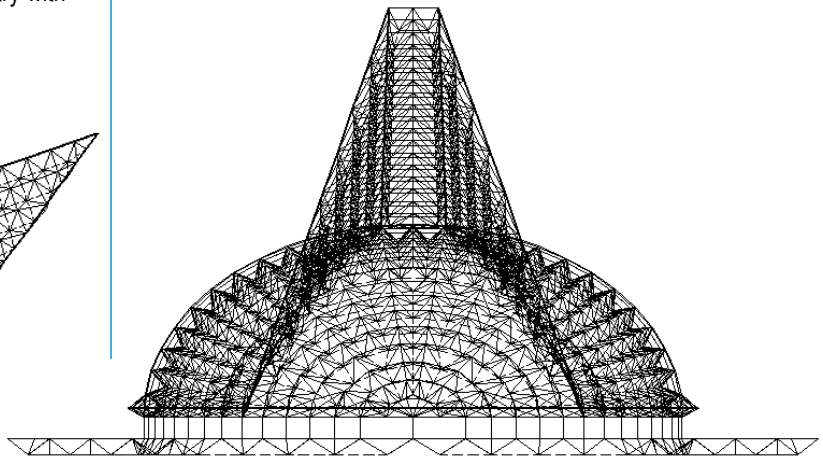
**Design Service:** Final structural design

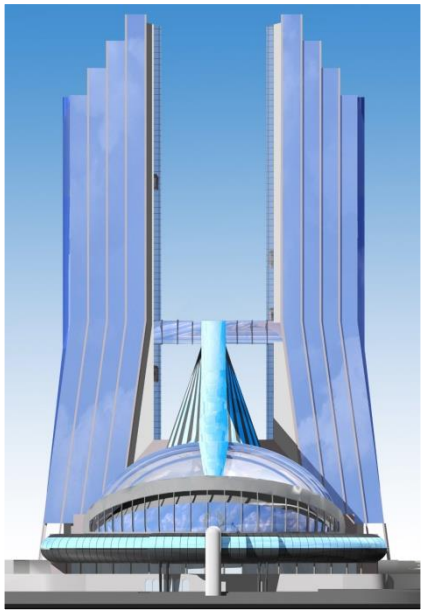
**Client:** Gazprom Mosca

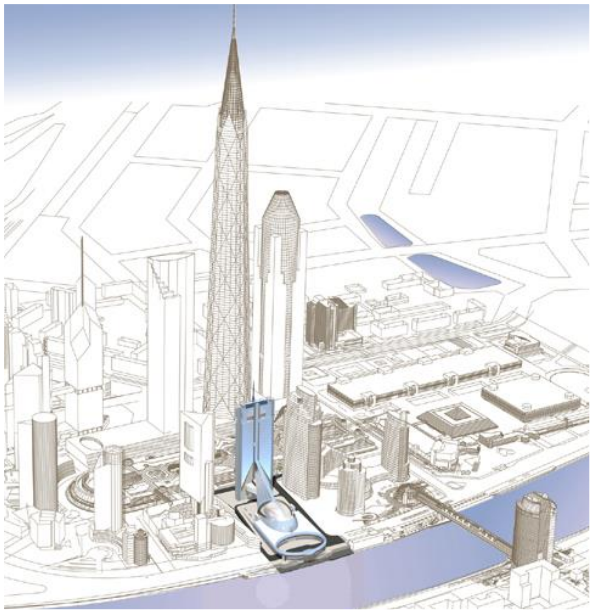
**Year:** 2001

**Structural works budget:** € 180'760'000









# Athens – Olympic Airways Hangar

## DESCRIPTION

The main hangar structure is made by couples of connected 300m length steel truss beams, each 9.1m, supported in the transversal direction by steel RSH beams. The parabolic geometry of the extrados of the main beams allows a better rainwater outflow.

Main beams together with vertical and horizontal bracing system allow to get a spatial frame, stable even out of its own plane.

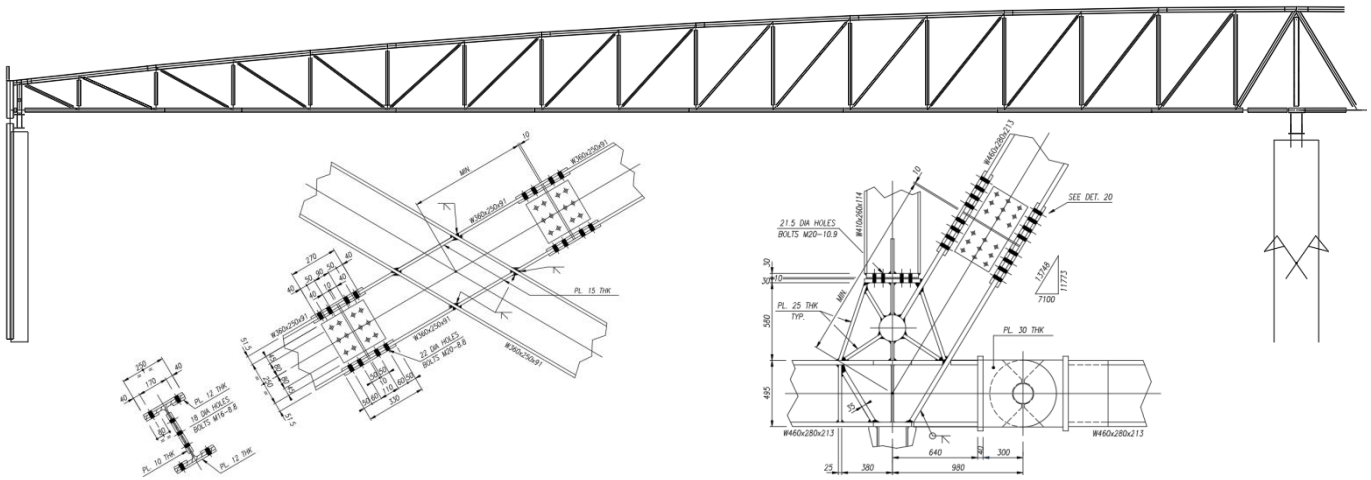
The five main frames that composed the main structural system are laterally stabilized by RHS reinforced concrete columns.

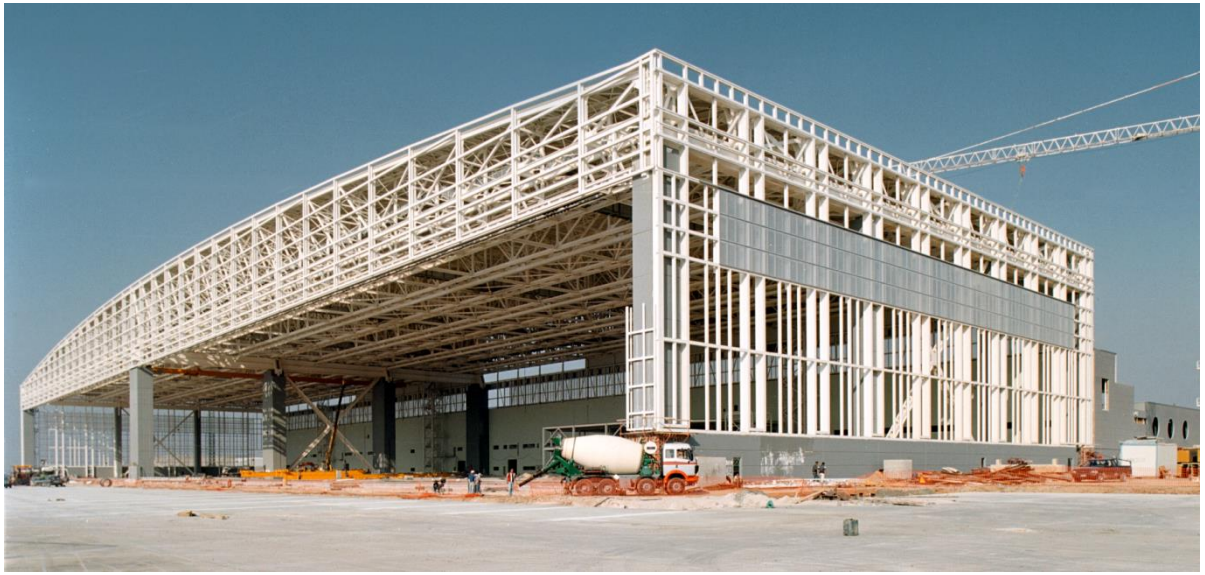
**Design Service:** Tender, preliminar and final structural design

**Client:** Tecnodomiki

**Year:** 2000

**Project budget:** € 20’000’000



# Venice – Marco Polo Stadium

## DESCRIPTION

Marco Polo Stadium covers a 42'000mq area with retractable roof structure. The main structural system is made by:

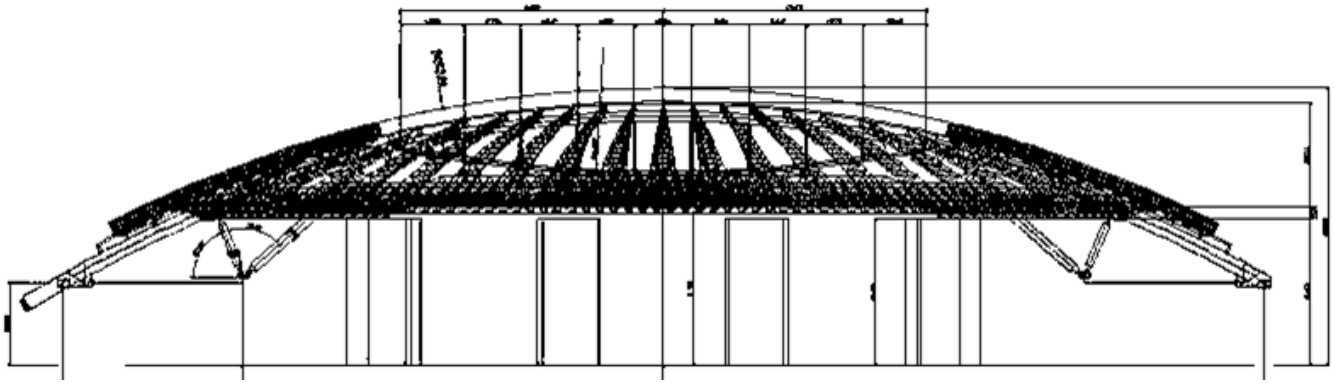
- Huge span main longitudinal arches (that are the main bearing structure of the system);
- Lateral grandstands cover, which cover the grandstands area, even the external edge and the longitudinal arch. These are truss beams with a circular arrangement, with radial warping.;
- Central cover with panels. There can be two panels types: mixed or movable (corresponding to the field area 90x110m). These structures are spatial trusses with H profiles. The "driving mechanism" to allow a retractable movement has been proper designed and dimensioned.
- Membrane cover panels.

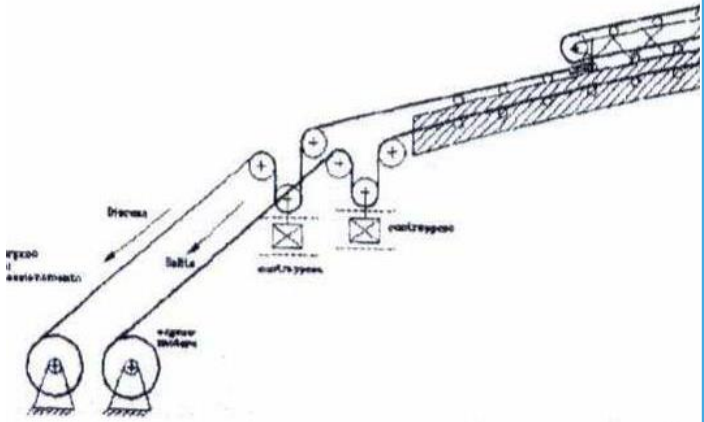
**Design Service:** Tender structural design

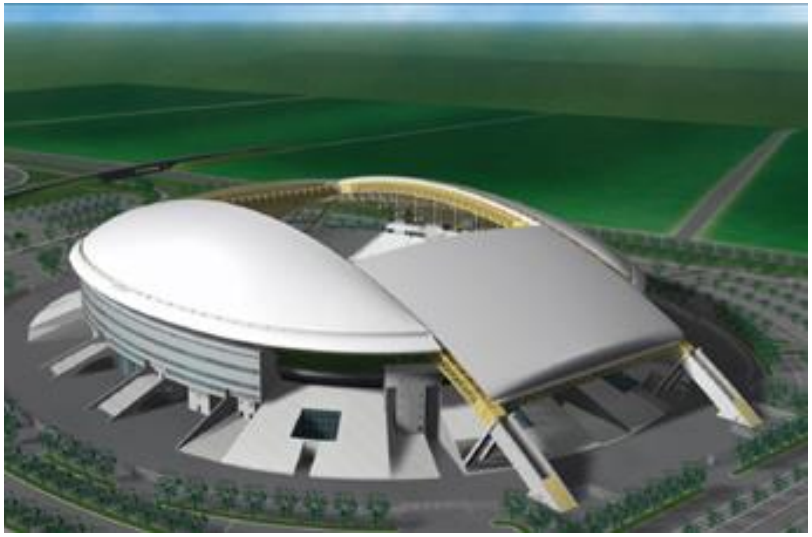
**Client:** Impresa Mazzi S.p.a.

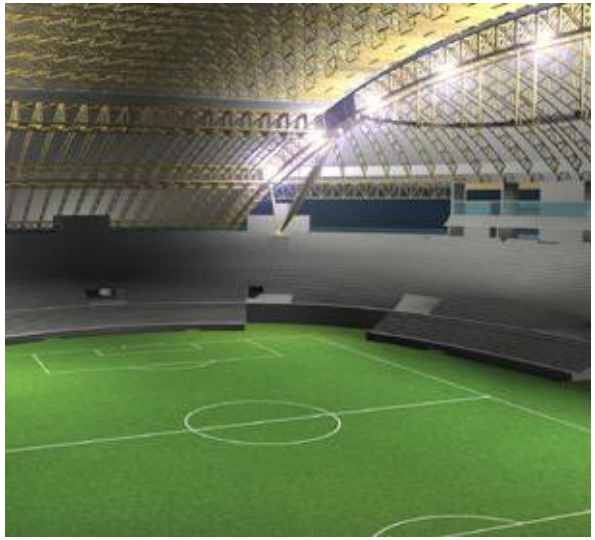
**Year:** 1999

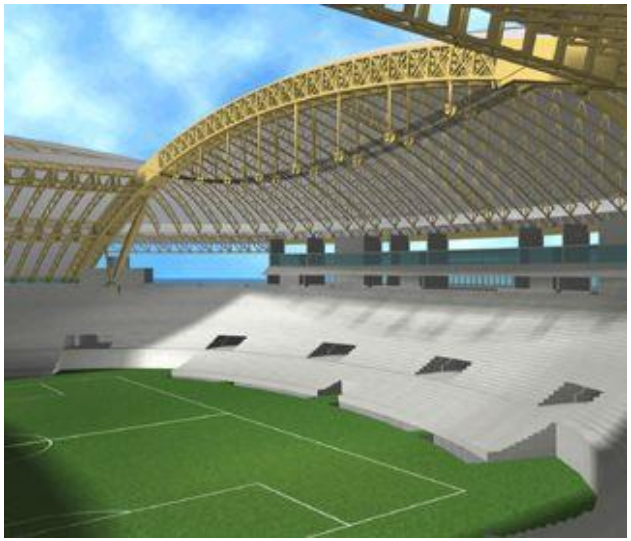
**Structural works budget:** € 61'974'827











# Treviso – Velodrome

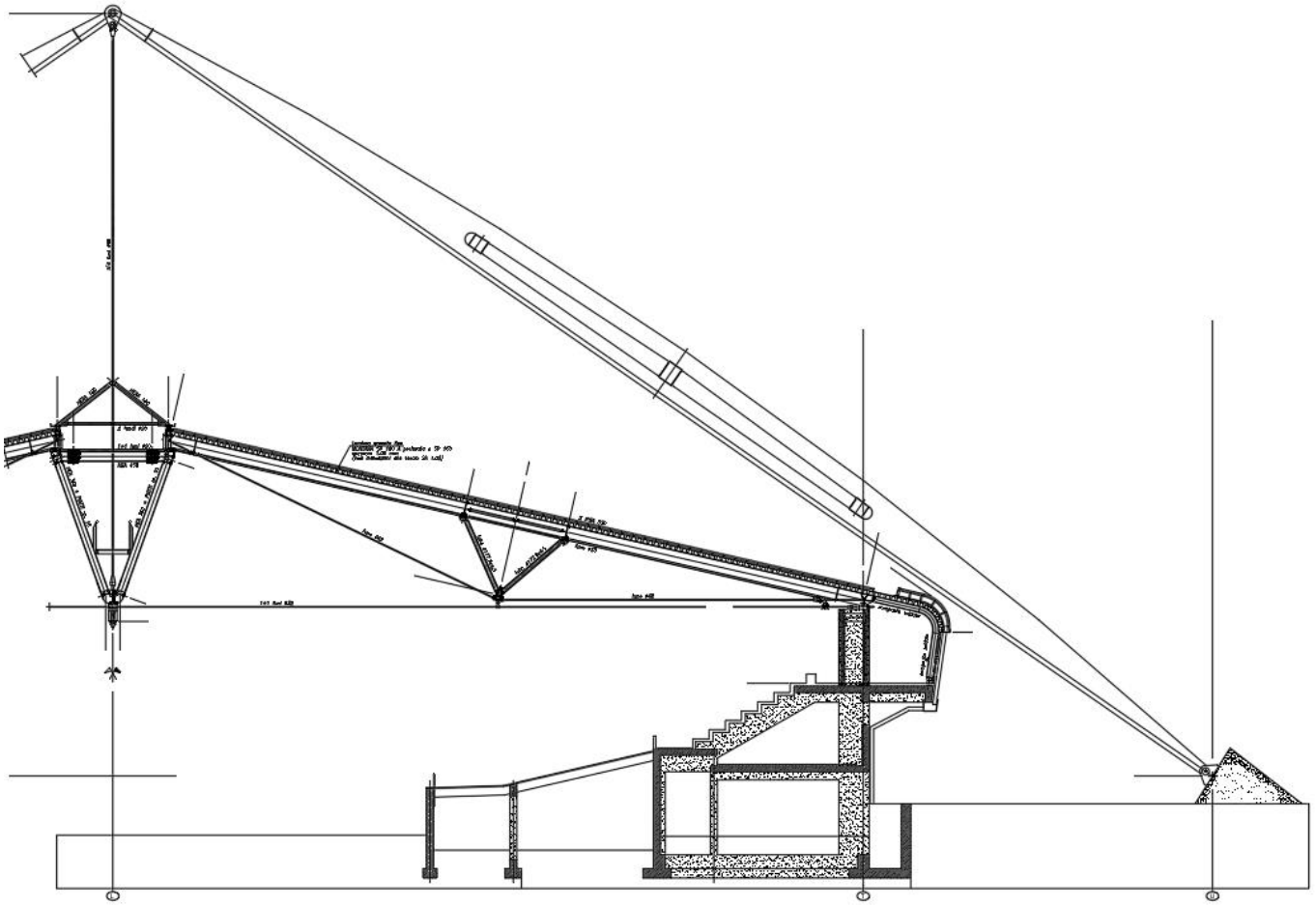
## DESCRIPTION

This 125m x 64.40m and 17m height building has a roof cover main structure made by two steel tubular variable cross section tripods far such to get an arch with three hinges and no –push.

The tripods hang with a tie high resistance cable at the apex a suspended spatial truss beam.

The 30m length reinforced secondary (each 6m) beams are connected to the external concrete structures and supported by the longitudinal truss beam.

The roof structure is supported along the edges on concrete transversal frames that follow the same pitch of the secondary beams.

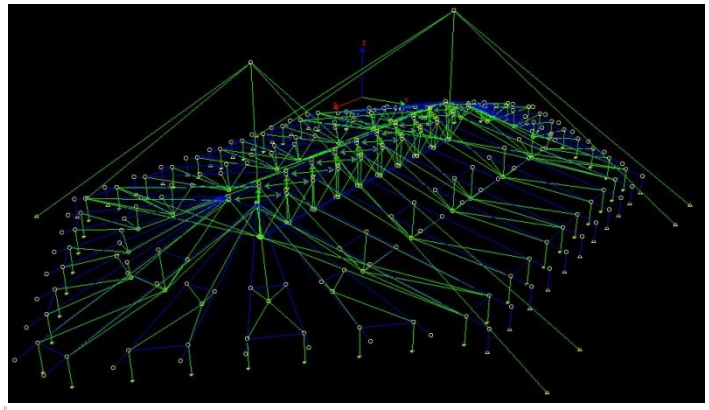


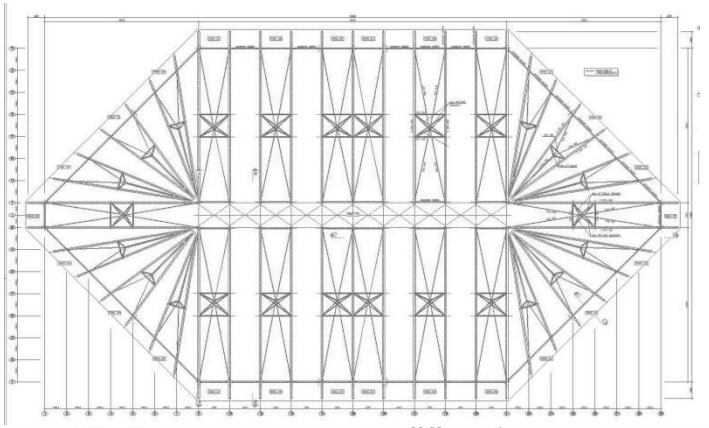
**Design Service:** Final structural desing

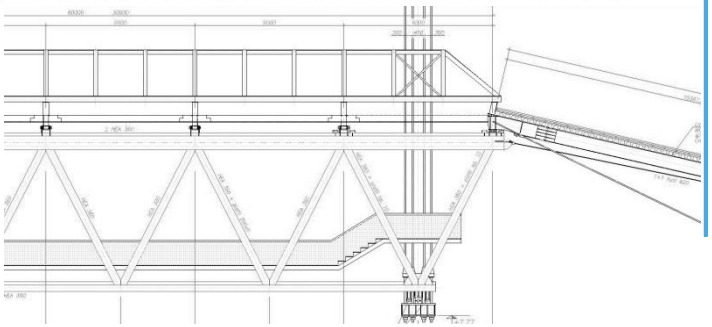
**Client:** CONI

**Year:** 1999

**Structural works budget:** € 10'330'000







# Ohita – Stadium

## DESCRIPTION

This unconventional retractable roof design has been developed in order to allow a multi-purpose sport hall. Football fields are usually “open” and not often fully closed (in limit climatic conditions, only). This retractable roof has been designed in order to use it even in the “open” configuration, using it as the cover of the outside space for exhibitions or social events.

The main structure is made by two 300m span arches over the linear grandstands. The fixed part of the structure is get by using transversal beams and grandstands structures.

The intermediate 110m length retractable zone is made by spatial trusses covered by PTFE membrane.

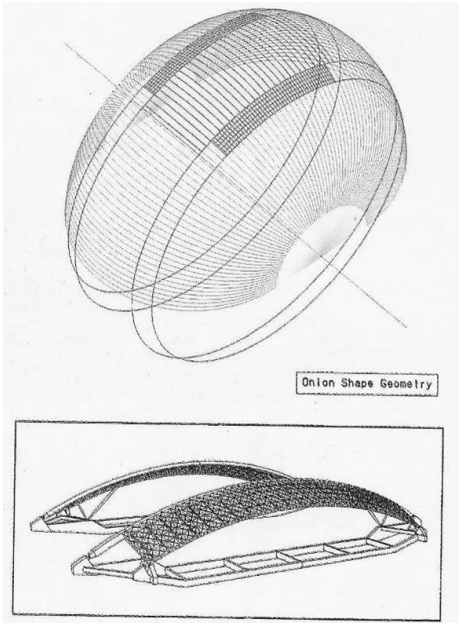
The designed movement system is *rack and pinion* type, with proper security systems (*locking devices*).

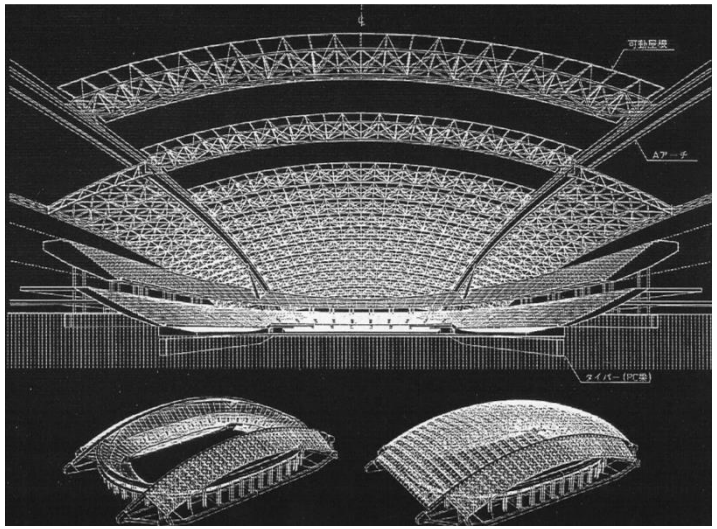
**Design Service:** Tender structural design

**Client:** Kajima Corporation Ohita Giappone

**Year:** 1998

**Project budget:** € 119’334’218



# Pesaro – Sport Arena

## DESCRIPTION

The multi-purpose sport arena is mainly aim to host concerts, music events and sport events, both thanks the acoustical optimization behaviour.

The main structural system for the Sport Arena in Pesaro is a double layer spatial truss arranged in order to have a mean surface with positive total curvature. The structural system is made by the following sub-systems:

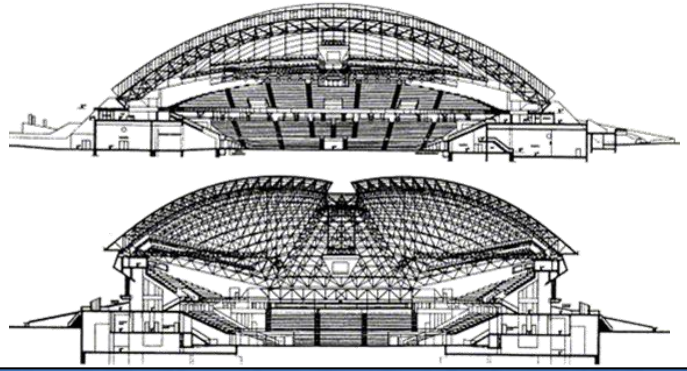
- Central spatial truss arch with variable span from 110m to 22m;
- Transversal truss beams at both arch sides, whose shape is defined by two arches with same centre and radius;
- Stabilizing system for roof structure pretensioning with a group of stabilizing cables at beams extrados.

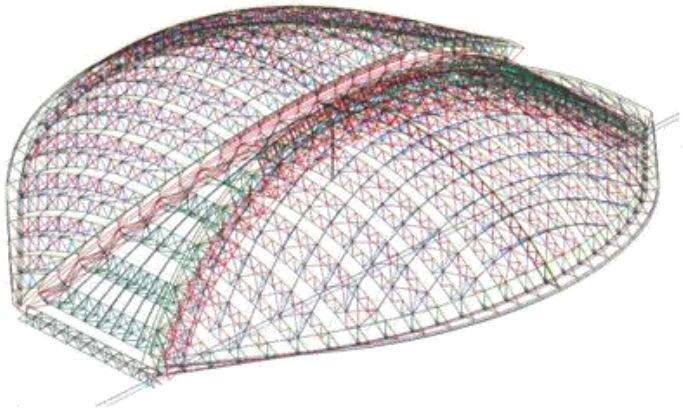
**Design Service:** Roof tender, preliminar and final structural design

**Client:** Pesaro Municipality

**Year:** 1997 - 1999

**Project budget:** € 22'210'000





# Livorno – Sport Arena

## DESCRIPTION

The roof cover structure is made by 24 meridian arches arranged with radial symmetry at constant pitch, with an angle at the center of 15° (in plan) and 6 parallel arches arranged each 8°. The mean cover surface is almost a spherical cap with 70m radius and 29m deflection.

At 14m level from reference level 0.00 a prestressed cable ring made by 3 high resistance steel 42mm diameter cables has been provided

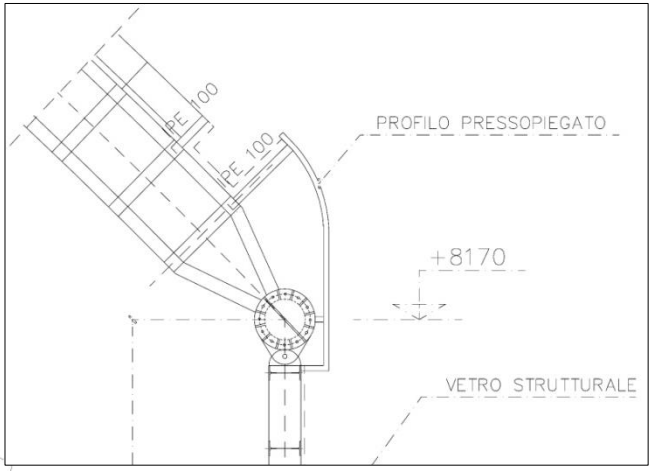
The arches are directly supported by the foundation and restrained by cylindrical hinges made by steel.

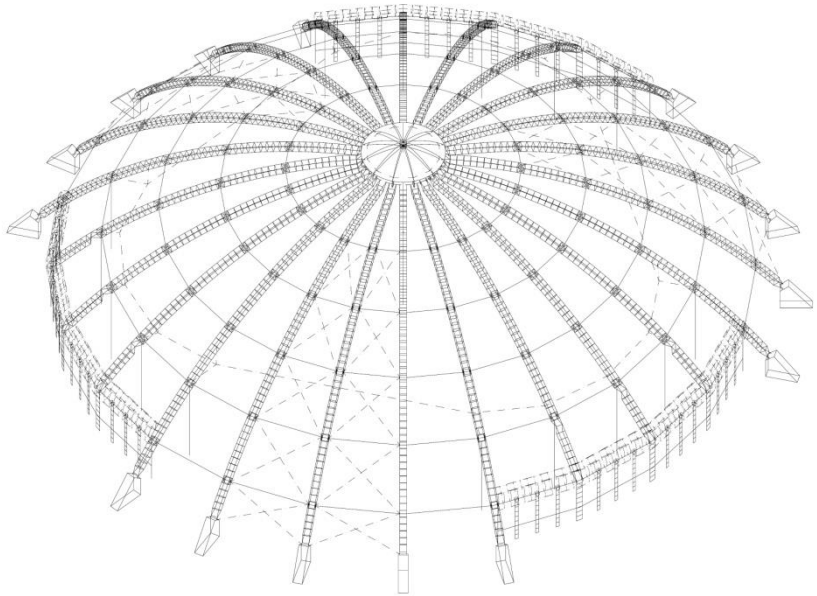
The cover is a composite system of zinc-coated and painted corrugated steel sheets, such to overcome (without any secondary beam system) the 12m spans between the arches.

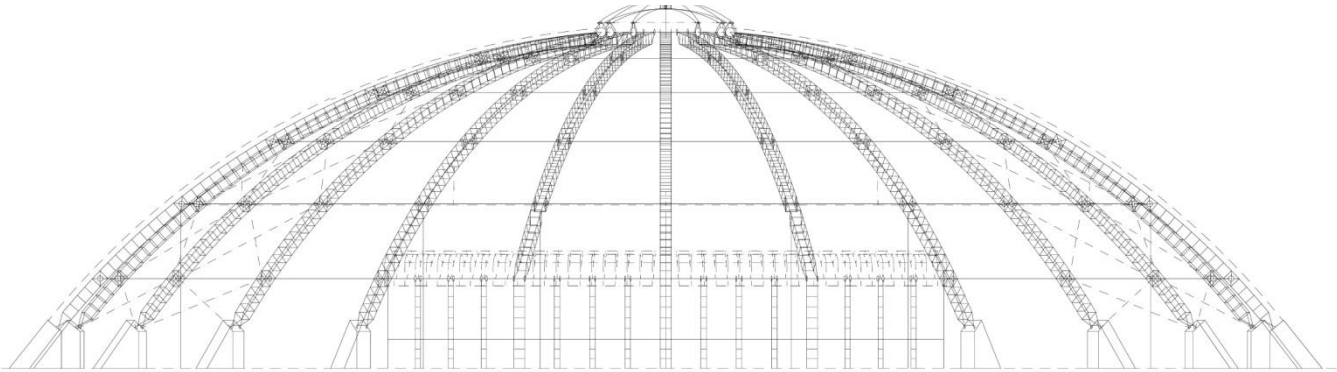
**Design Service:** Tender structural design

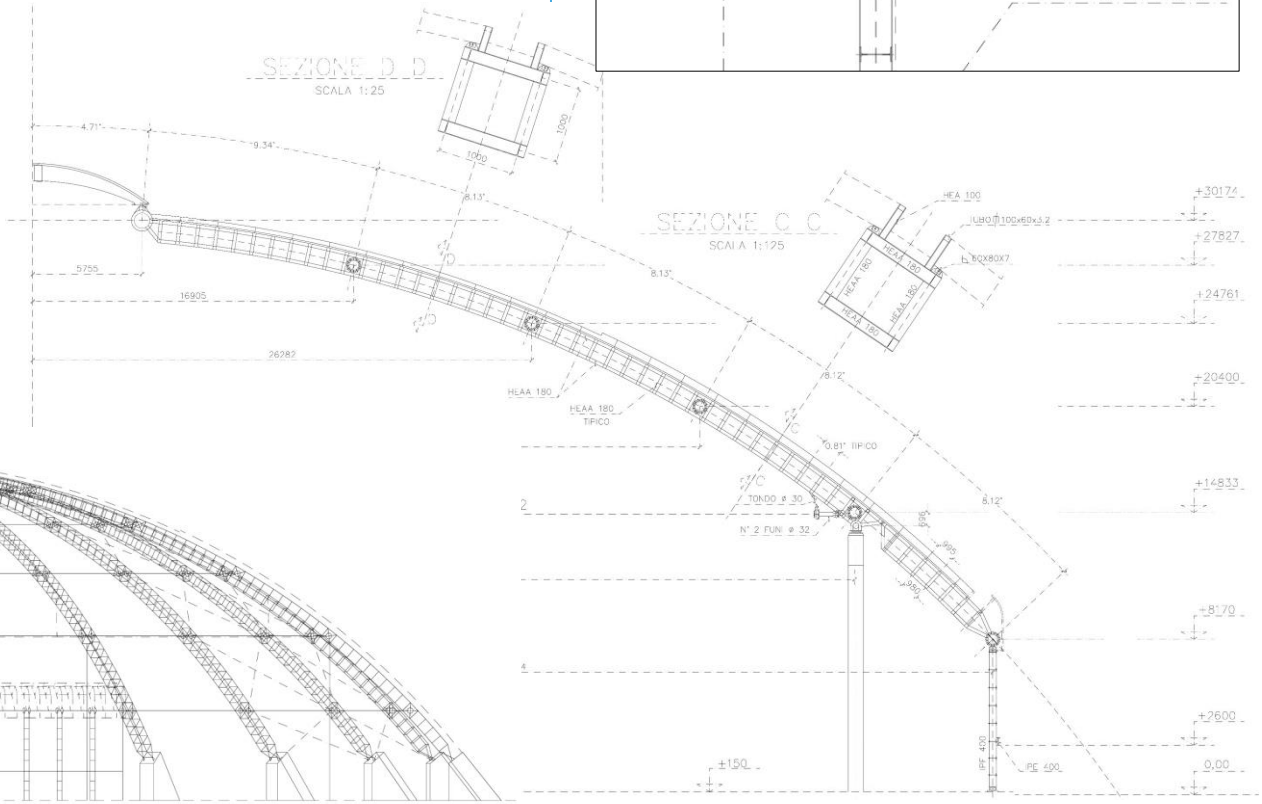
**Client:** Comune di Livorno

**Year:** 1997







# Pisa –Tower of Pisa cable stayed support system

## DESCRIPTION

This work has been provided by the Committee for strengthening and reliability of Tower of Pisa

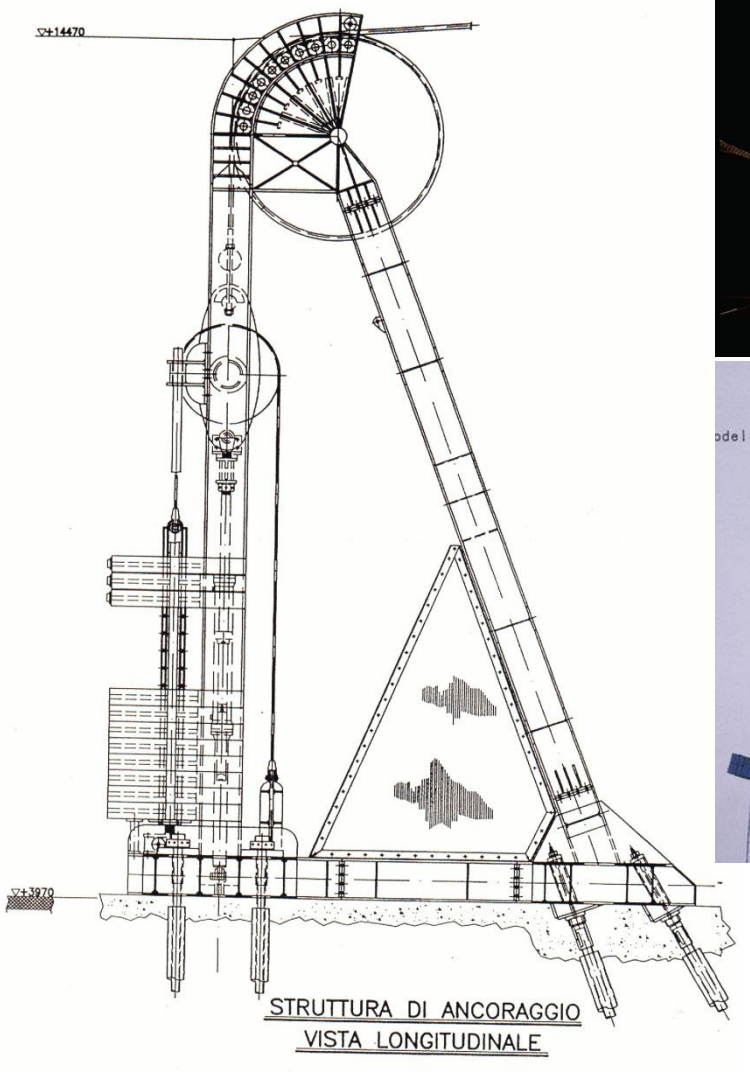
The high resistance steel cables are arranged according to tensile-structure at opposite curvatures. These cables can transmit to the tower a 1600kN maximum strength, got from the system made by lead dead weight and oleopneumatic actuators, balanced with nitrogen to guarantee the force. The force inside the stays is transferred to the tower using the tower nucleus as deferment saddle with cables that allows to distribute the tensile forces leading to very low values of contact pressure for the external wall.

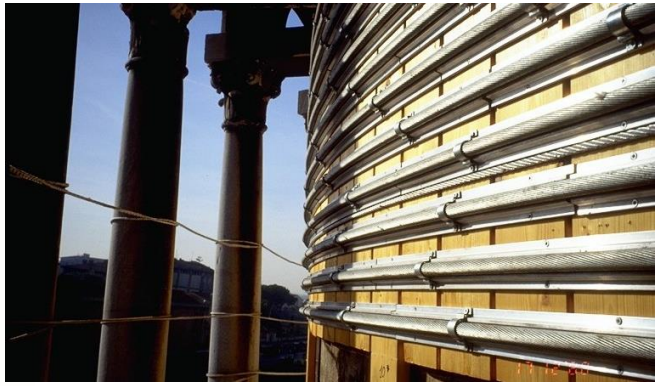
**Design Service:** Tender, preliminar and final structural design

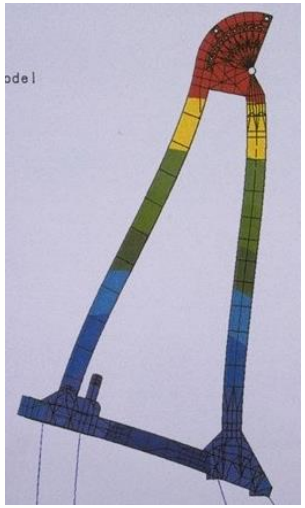
**Client:** Consorzio di progettazione della torre di Pisa

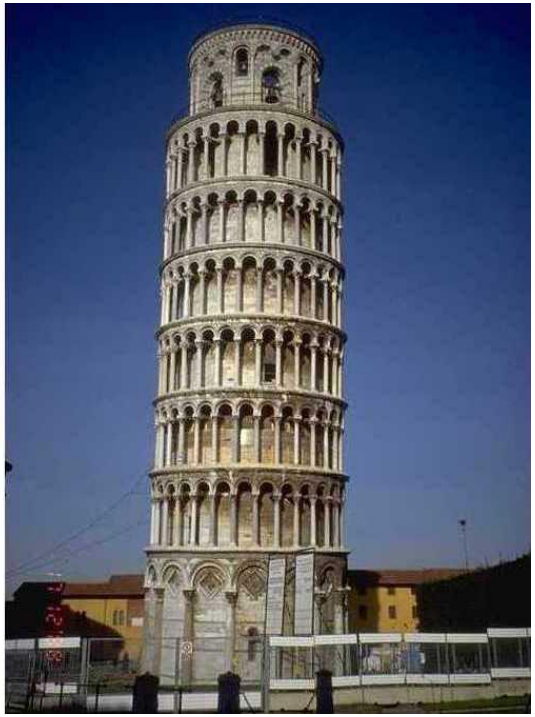
**Yaer:** 1996

**Project budget:** € 1’810’000







# Salonicco –Thermis Olympic Complex

## DESCRIPTION

The main structural system are:

- Main Sport Hall roof cover;
- Training Hall roof cover;
- Retractable pavement.

The main structure is made by a system of steel cables, that splits the building in two symmetrical parts giving an uniform dynamic behaviour to the entire building. The two sub-structures are made by huge anchorage concrete blocks and a group of cables trusses. The transversal beams are supported by concrete structures outside, while they are suspended to the central tensile-structure with a special pendulum. The structural roof system is made by a longitudinal system of prestressed cables and cover sheets.

The Training Hall roof cover is made by a double layer steel structure supported by cables.

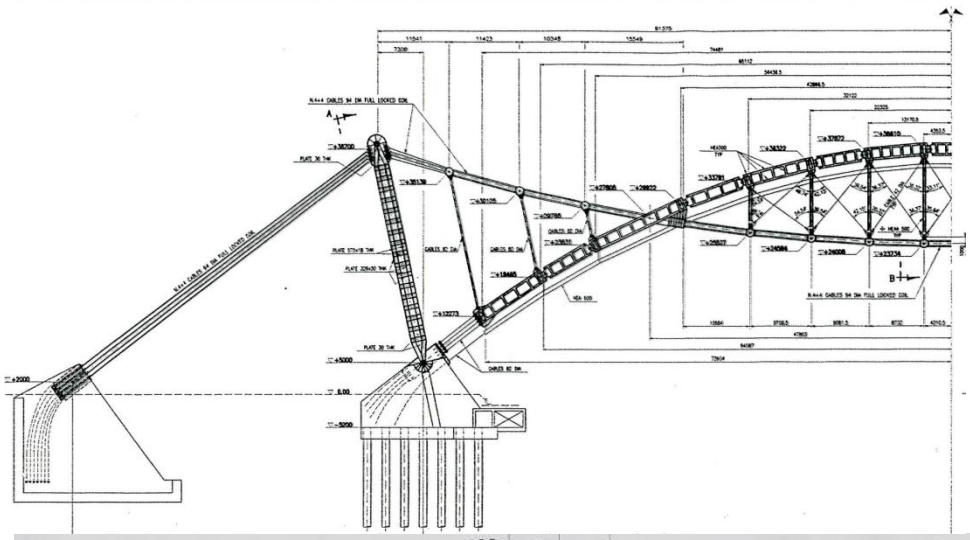
The pavement, moved by a special system of hydraulic jacks, can assume a double vertical place to face every spectators need in each sport discipline.

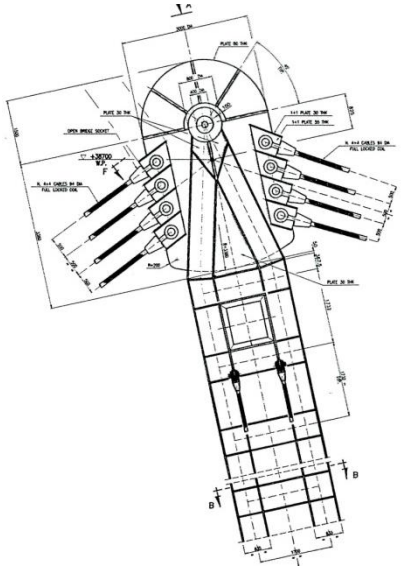
**Design Service:** Tender, preliminar and final structural design

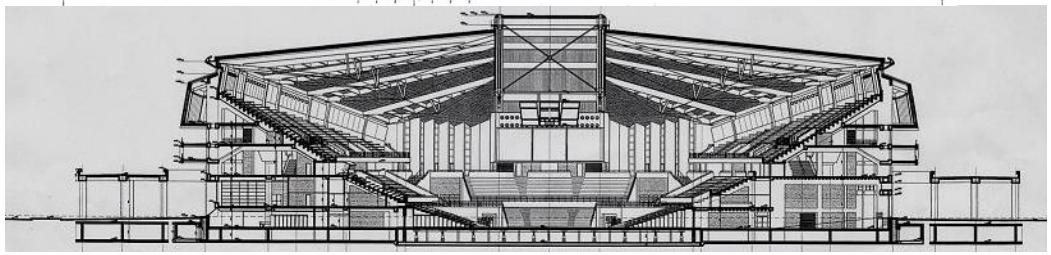
**Client:** G.G.A.

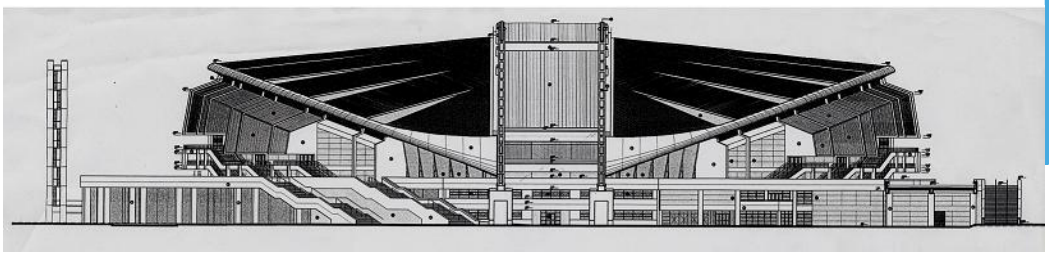
**Year:** 1995

**Project budget:** € 129’120’000









# Bologna – Pavilion 20

## DESCRIPTION

Pavilion 20 is a two storey building with 24mx24m column path and 64m long beams in roof structure.

The transversal 65m length reinforced beams are supported by the tower-comlumns at 21.45m level.

They are made by steel box beams (upper chord) got from 2 HEAA 900 and reinforced in the vertical plane with 6 zinc-coated 42mm diameter high resistance steel cables.

The vertical elements are made with HEAA280 steel section, arranged in the plane of the truss, with a V shape.

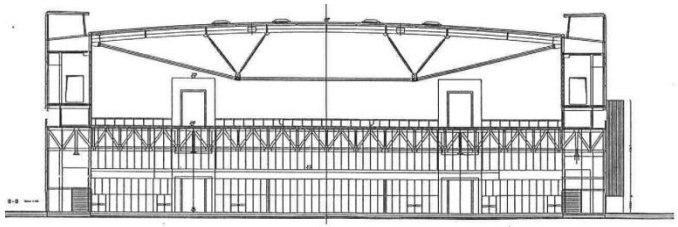
The total height of each truss is almost 10% of the net length of the beam itself, while the vertical elements distance is 24m.

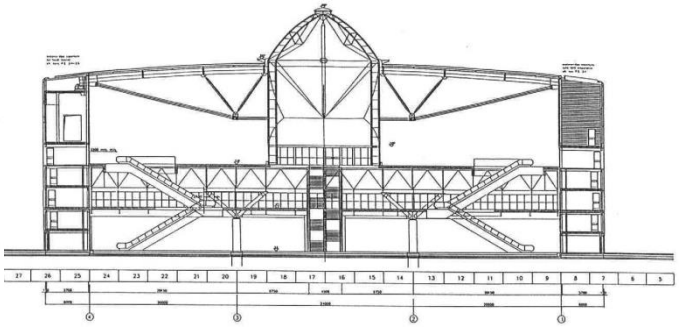
**Design Service:** Tender, preliminar and final structural design

**Client:** Fiera di Bologna

**Year:** 1995 - 1996

**Project budget:** € 28'405'129






# Ravenna – «Pala De Andrè» Sport Arena

## DESCRIPTION

The project cover a 100’000mq area with the sport arena and a two-storey building with all the services.

The 3320 seats arena covers a 33mx33m square area. Some tracks allow the stands to be movable through the outside, at the edge of the skating track: this technical solution allow to have a multi-purpose sport arena.

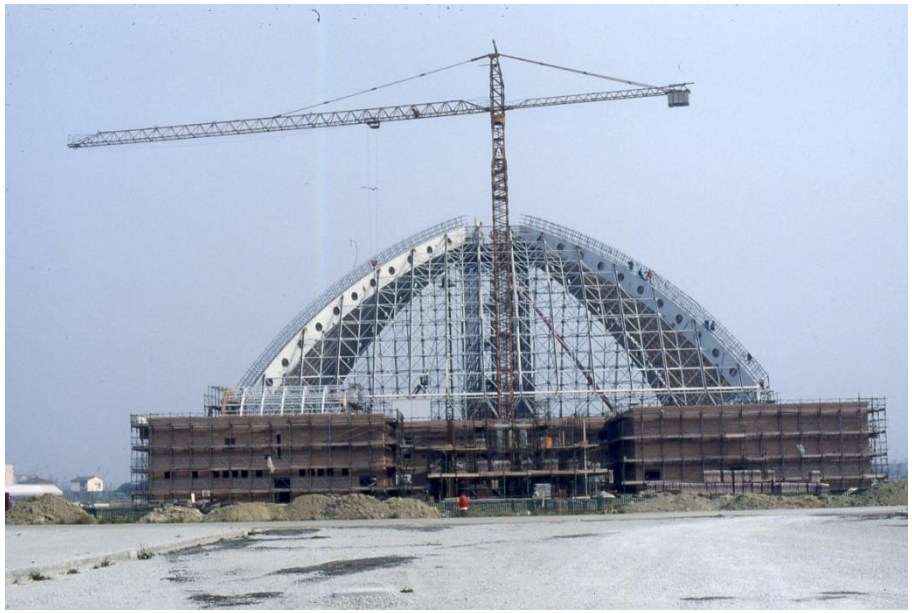
The dome pavilion structure with square base is made with box section steel ribs. It is a huge double layer spatial structure, whose shape is defined by 4 crossed cylindrical surfaces. This structure is made by CHS steel elements and welded connections. The entire structure is covered by PTFE and fibre glass membrane.

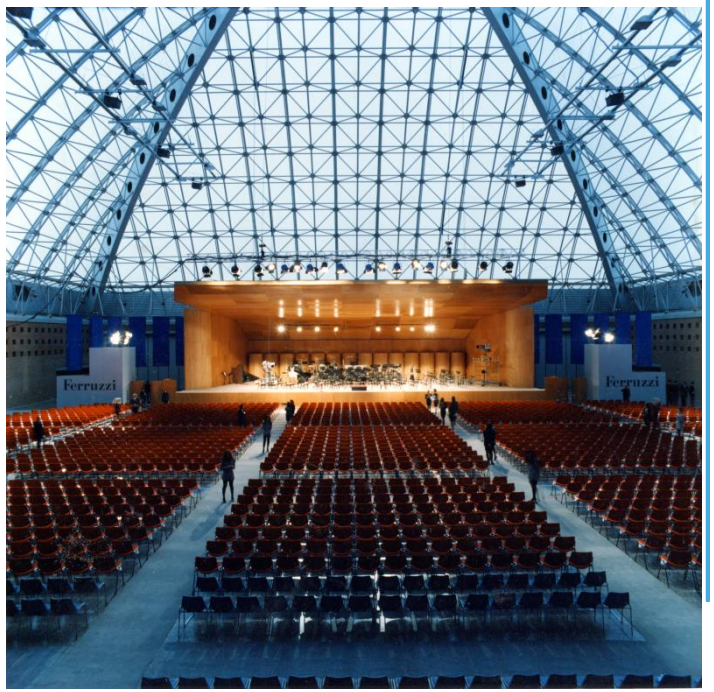
**Deisgn Service:** Final structural design

**Client:** Ferruzzi S.p.a.

**Year:** 1991

**Project budget:** € 3’620’000





# Turin – Delle Alpi Stadium

## DESCRIPTION

Delle Alpi Stadium is a three ring elliptical stadium.

The main pylons hang the roof panels, connected by a 6 cable ring covering the main sides of the stadium. The grandstand cover is made by teflon, while its main structure is made by steel.

The roof structure is made by:

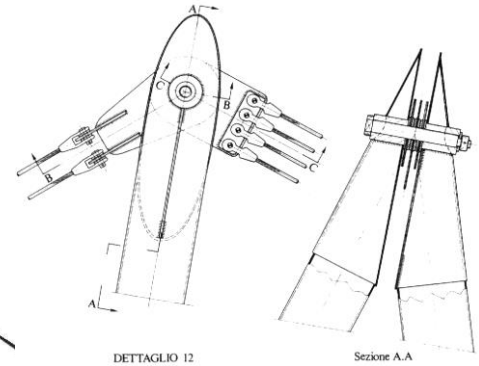
- Radial arrangement of planar tensile structures;
- Inner cable ring;
- Two cable nets on hyperbolic surfaces;
- External cable stayed anchorage system;
- Dead weight foundation system.

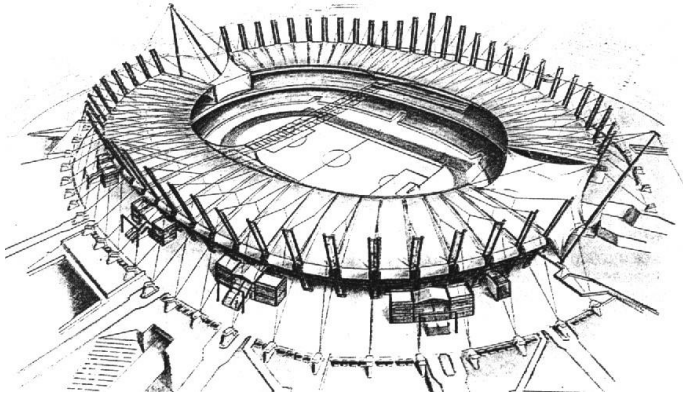
**Design Service:** Final structural and architectural roof design

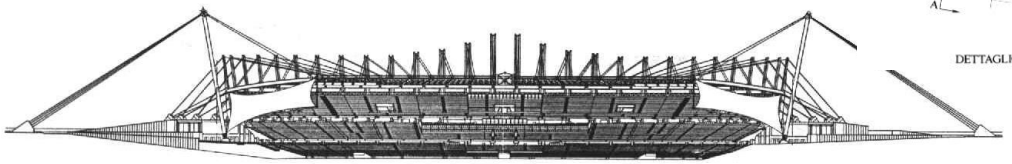
**Client:** Acqua Marcia S.p.a.

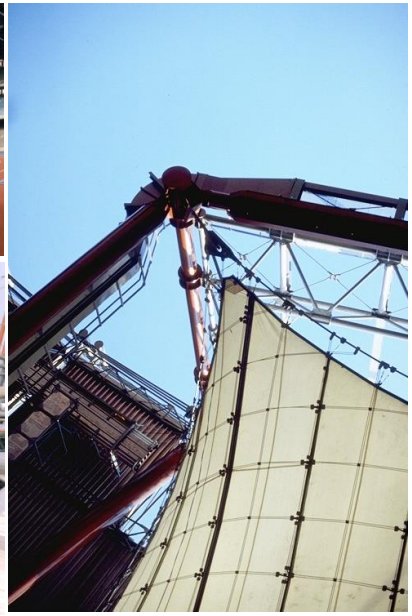
**Year:** 1990

**Project budget:** € 65'000'000







# Rome – Olympic Stadium Roof

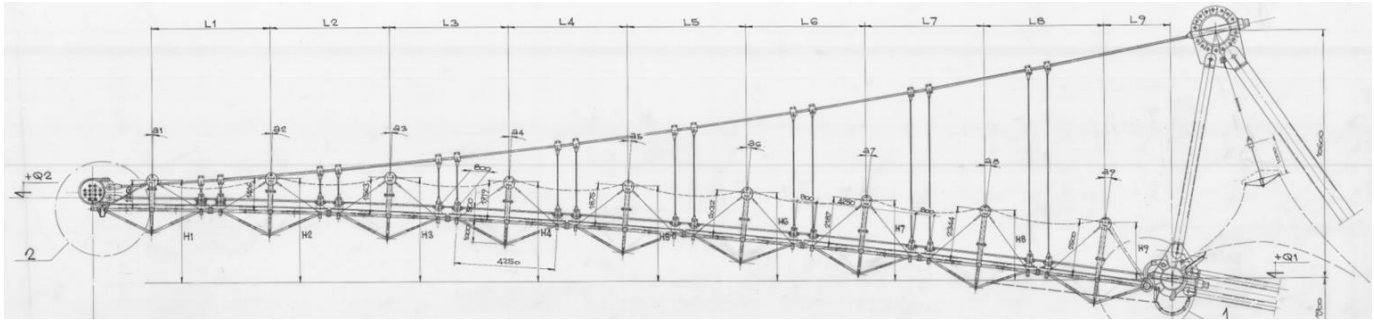
## DESCRIPTION

The tensile structure for the Olympic stadium roof system is made by a system of 88 planar radia tensile structures made by a bearing/stabiling cable and vertical stays, every 12m.

The cables are anchored in the outer part at the nodes of a spatial compression ring, while they are anchored inside to the tensile ring.

Depending on the stress and deformation status, planar tensile structures have been designed and split in two groups.

Secondary radial beams are also provided, made by truss beam, hanged at stabilizing cable level as simple support in order to bear the cover made by PTFE and fiber glass membrane.

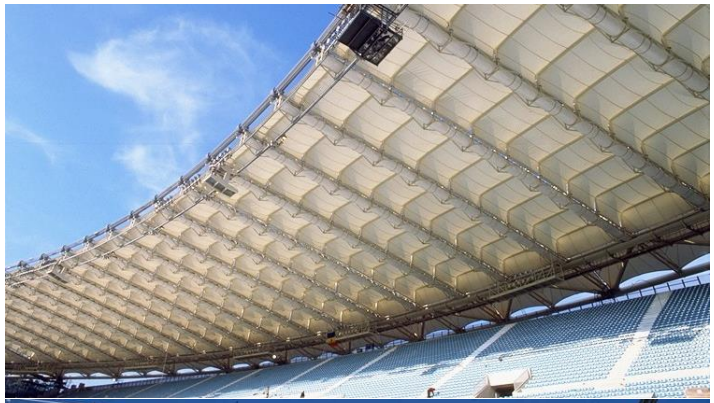



**Design Service:** Final structural and architectural design of the roof

**Client:** CONI - Roma

**Year:** 1990

**Project budget:** € 80'000'000



# Athens – Sport Hall

## DESCRIPTION

This 15'000 seats sport hall has a planar shape of a mirrored truncated cone; this geometry has been obtained after several studies and possible solutions to solve spectators visibility issues.

This circular 144m diameter building has a cover roof structure made by a double curvature tensile structure built up by a cable net with a 4m x 4m path, whose saddle surface has a total negative curvature, with a shape very near to a hyperbolic parboiloid.

The cables that support the 75mm height steel corrugated sheet are fixed to the annular edge box section prestressed concrete structure, that is supported by 32 prestressed concrete tripods.

**Design Service:** Final structural design of the roof

**Client:** Athletics Secretary-general

**Year:** 1983 - 1987

**Project budget:** € 3'000'000