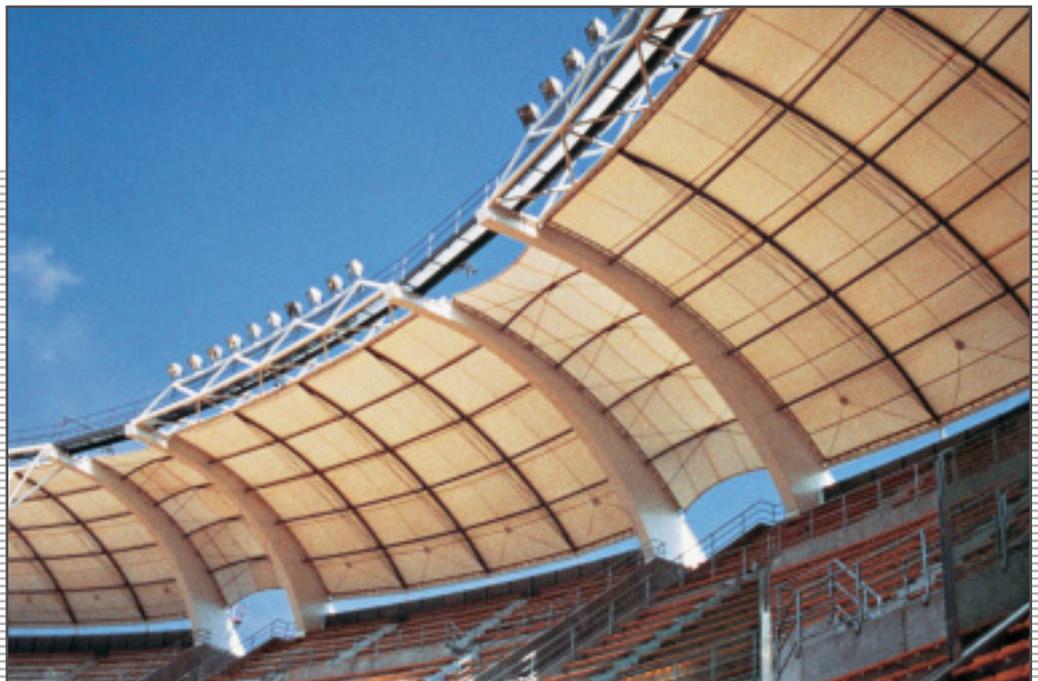
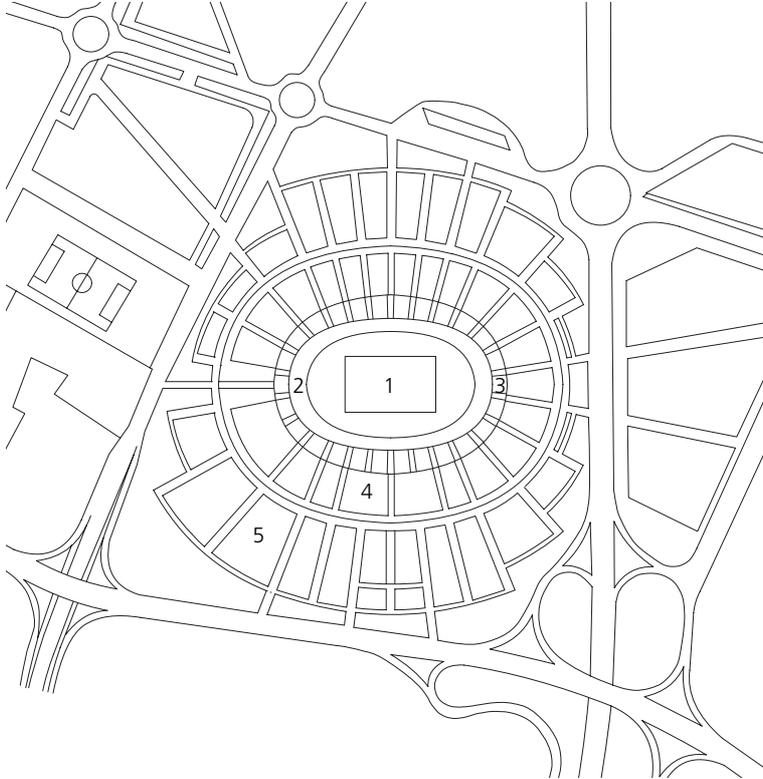


San Nicola Stadium, Bari, Italy



SAN NICOLA STADIUM, BARI, ITALY

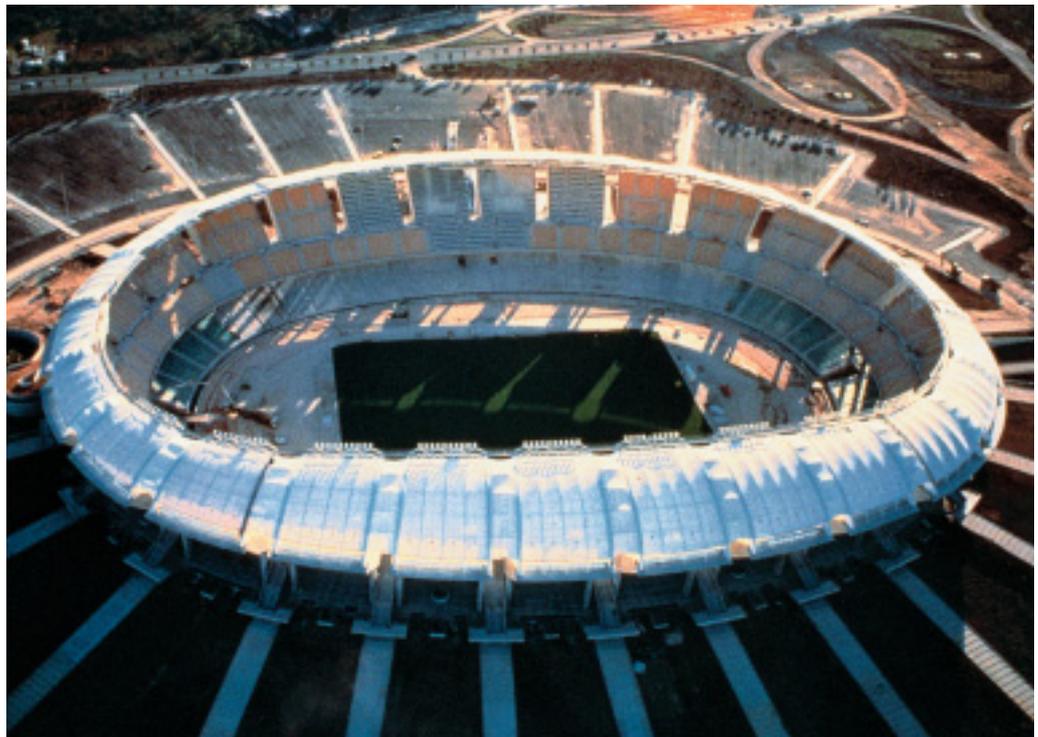


The football stadium in Bari, located on the south-eastern outskirts of the city, was built for the World Cup in 1990. The outline of its tiered seating and roof is visible from afar in the flat plains of Apulia. Broad open spaces immediately around the stadium emphasise its monumental architecture by contrasting with it. In building the 60,000-seater stadium, security concerns ranked alongside aesthetic and functional considerations. Design was to play a role in minimising the potential for crowd trouble.

Site plan scale 1:10,000

- 1 Football pitch
- 2 Seating
- 3 Stadium roof
- 4 Concourse
- 5 Parking

From the air the division of the stadium into 26 segments is clearly seen (construction photo).



The stadium is made up of a radial system with 26 axes, each axis corresponding to an entrance. The lower tiers of seating are sunk into the ground, like an amphitheatre. The main communication corridor, which runs between this lower section and the seating above, is a continuation of the space outside the stadium, thus ensuring maximum transparency between the outside of the arena and the pitch below.

The upper part of the tiered seating is raised above ground level and constructed of 312 sickle-shaped precast reinforced concrete compound units. Underneath this section are ancillary rooms, service facilities, players' dressing rooms and warm-up halls; in an emergency the entrances to these areas can be used as additional exits.

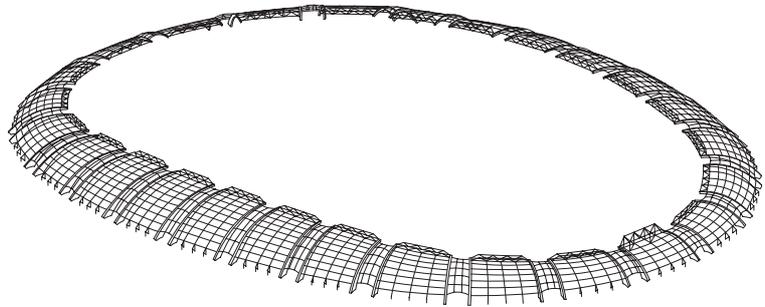
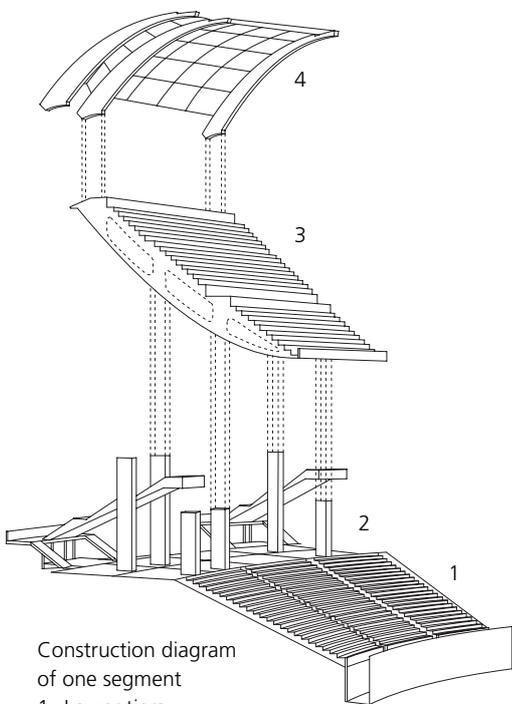


Diagram of the roof support structure

130 tonnes of tubular stainless steel, up to 25 metres in length, went into the support frame for the Teflon-coated fibreglass roof covering.

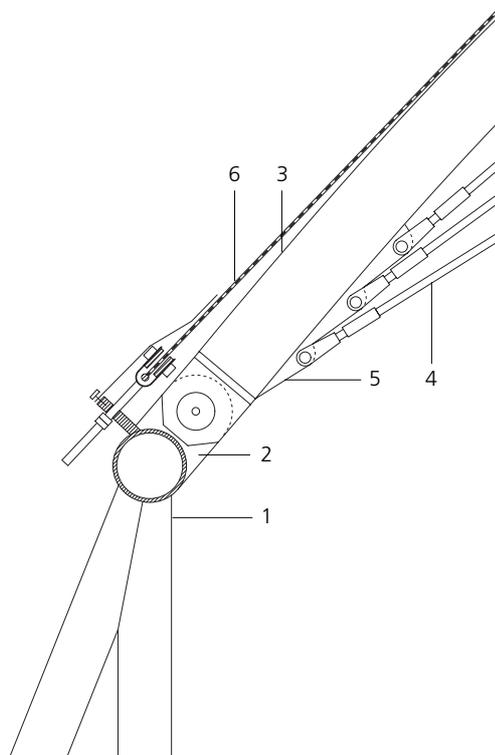
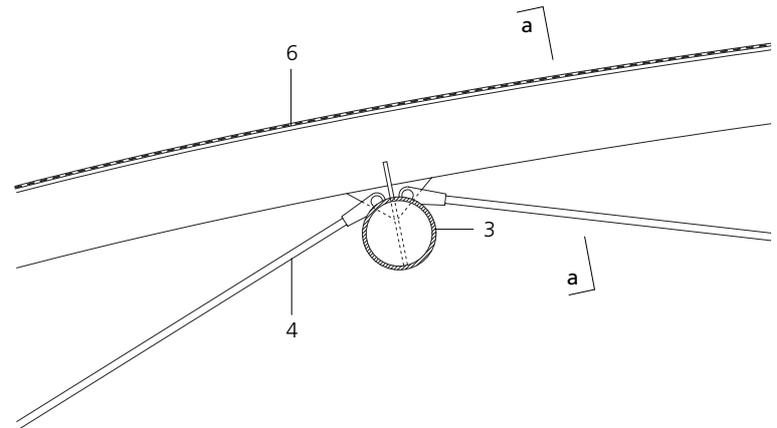
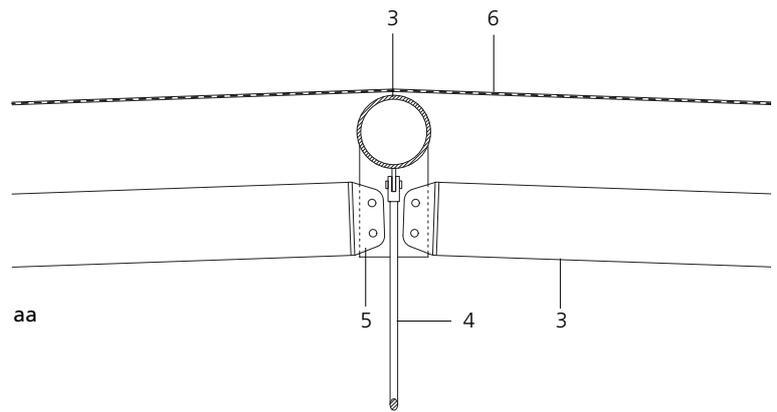


Construction diagram of one segment
 1 Lower tiers
 2 Entrance level
 3 Upper tiers
 4 Roof





The tubular stainless steel support frame is fitted between the cantilevered box girders.



Details of the support structure scale 1:20

- 1 Steel tube, 193,7 mm dia.
- 2 Connector plate steel, 20 mm
- 3 Stainless steel tube, 193.7 mm dia., 4-10 mm, grade 316L, surface 2B
- 4 Stainless steel tie bar, 20-25 mm dia., grade 316L, 4-10 mm
- 5 Stainless steel fixing plates grade 316L, 4-10 mm
- 6 Teflon-coated fibreglass membrane

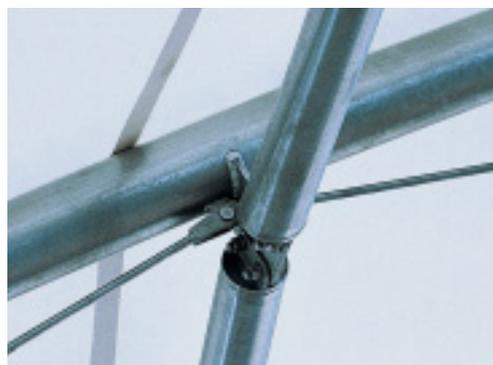
The Teflon-coated, light-permeable fibreglass roof membrane, vaults above the seating like a clam shell. Cantilevered out over the field, from the outermost point of each of the 26 tiered sections, are two curved, tapering steel box girders, varying in length between 14 m and 26 m. A trussed girder of tubular steel connects the outer ends of the main girders while also doubling as a maintenance walkway and a fixing point for the stadium lighting.

The space between the main girders is subdivided by three radially curved stainless steel tubes running between the outer trussed girder and a steel tube at the base point of the roof frame. Further stainless steel tubes span horizontally to complete the grid, which is cross-braced on the underside by stainless steel round bars.

Detail of the connection between the stainless steel tubes and the white-painted steel frame.



As stainless steel does not require cleaning or painting, any risk of damage to the sensitive fibreglass membrane through maintenance work is effectively removed.



Despite the size and reach of the cantilevered steel girders, the light-permeable roof structure retains a delicate, airy feel.



Night-time illumination adds an ethereal dimension to the stadium.

In almost all sports stadia, steel is the material chosen for the roof frame. Factors prompting this choice include prefabrication and rapid assembly on site, plus the option of designing free-spanning structures made up of a series of modules. For the support frame under the roofing membrane in Bari, however, only one material was considered: stainless steel. The cleaning and painting work necessary with any other material would have involved complete removal of the Teflon membrane, resulting in inevitable damage. One other benefit from the use of stainless steel is that, as it needs no pre-treatment after fabrication of the components, it was possible to considerably shorten the build time for the stadium.

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