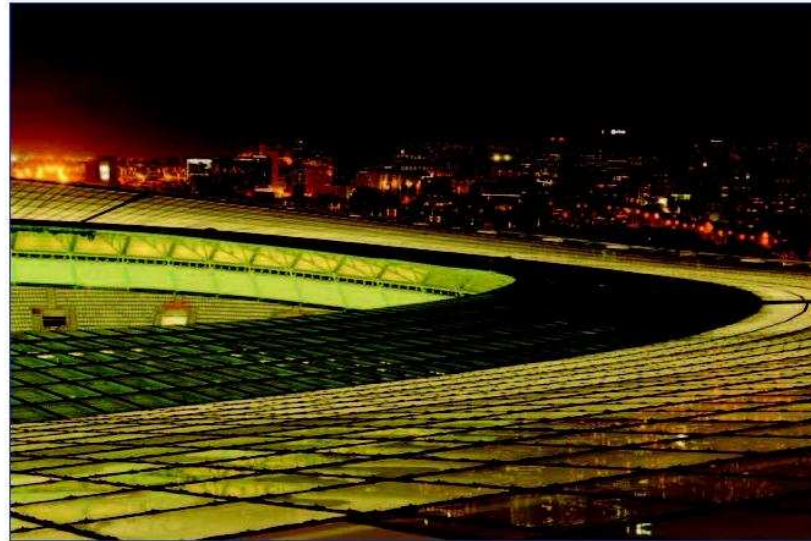


Cape Town Stadium is Steel Awards 2010 Overall Winner

In a year in which some of the most outstanding entries since the inception of the Steel Awards were received, Cape Town Stadium has been named the overall winner of Steel Awards 2010



The judges said that this was a magnificent structure with some of the best steelwork they have ever seen. "The execution of the steelwork, some of it fabricated locally and some of it imported, is testimony to the genius of this team, which comprised engineers, fabricators and contractors from all round the globe in a collaboration of which they and the whole country can be proud," they said.

They added that this project has been an eye-opener to the excellence that can be achieved in the industry with lasting benefits for local industry generally. "The transfer of knowledge and skills will play a significant role in future projects," they said. "In particular, the use of lighter steel structures - slender members and cable structures - will manifest itself more in our industry.

Cape Town Stadium, situated between Table Mountain and Table Bay blends into the contrasting and world renowned landscape of Cape Town CBD, Table Mountain, Signal Hill and the Atlantic Ocean. Its unique location and curved and undulating silhouette,

gives the stadium the look of a sculptural object making it one of the most elegant and beautiful stadiums in the country, if not the world.

Designed for both football and rugby, the stadium, with its inclined seating in an interior specially designed to give 68 000 spectators the best possible views, has a unique atmosphere of 'closeness and excitement'. This atmosphere is substantially enhanced - like with most modern stadiums - by the magnificent roof structure.

According to the judges, steel was the only feasible material for the construction of the roof elements. "The tolerances that had to be achieved within the steelwork to support the rooftop glass panes would have been impossible with any other material."

To achieve the ambitious free-span requirements of 58m, which includes a cantilever section of 14m, a lightweight suspended steel structure was adopted. Covering an astounding 37 000m² and weighing a total of 4 500 tons, it is the largest glass-covered roof in Southern Africa.



The cable structure with the integrated steel compression ring along the outer edge is a spoke-and-wheel system design. These systems, in one form or another, are often employed for stadium roofs and last year's overall winner, the Moses Mabhida Stadium in Durban, is a prime example.

The compression ring is made up of 72 welded box-section beams, bolted together at their endplates. To perfectly marry adjacent endplates at the correct inclination, they had to be machined. After four consecutive segments were completed off-site, the pieces were trial-assembled to guarantee a perfect fit and orientation in space, before delivery to site.

The hoisting of the cable structure followed the compression ring. A network of pre-manufactured cables was laid out on the concrete bowl of the stadium and lifted into final position by hydraulic jacking. This suspended structure forms the support platform for the trusses, girders and glass cladding. The 72 trusses totalling 1640 tons and made up of individual fabricated box sections were assembled on site. The glass panes covering the roof structure were individually placed on the steel grid in a free-floating manner in order to withstand the notorious Cape winds that cause the roof to rise or fall by approximately 1m.

From a fabrication point of view, the project team's submission notes that during the planning phase extraordinary attention was given to the fast and efficient handling and assembling of all the various components on site and the quality control systems that would have to be in place, since the different components were coming from all over the world. The cantilever trusses were fabricated in two pieces, the truss in a single piece with its raking leg separate. The truss was fabricated in one piece and transported to site where the raking leg was welded to it. The cantilever trusses connect directly to the tangential truss (tension ring).

Each radial truss generally consists of 13 pieces, 3 pieces making up the top chord and 10 pieces for the internal lacing with a cable making up the bottom chord. At one end, the truss connected to the compression ring, and at the other, to the tangential truss (at the tension ring).

According to the project team the tangential truss, whose main piece is the king post (vertical) as all the other elements connect to it, was by far the most difficult to fabricate.

One of South Africa's leading steelwork contractors, DSE, noted that the stadium was a complex structural project and was certainly 'one of the most intricate steelwork structures ever produced in their workshop'.

The judges said that a project of this magnitude has extreme architectural and engineering demands all of which were met in the most professional manner. "The Cape Town Stadium, the 'diva' of Cape Town, as it has been dubbed, is an outstanding work which showed both this country and the world that South Africa has the skills to match and even surpass the best in the world. It is truly deserving of the 'overall winner' award.

PROJECT TEAM

DEVELOPER/ OWNER: City of Cape Town
ARCHITECTS:

Stadium Architects Joint Venture
GMP International Architects & Designers GmbH (lead concept architects)
Louis Karol Architects (lead managing architects)
POINT Architects & Urban Designers (lead integration architects)

STRUCTURAL ENGINEERS:

Green Point Stadium 2010 Structural Engineers JV
Roof and Facade: BKS (Pty) Ltd.

Schlaich Bergermann und Partner (Stuttgart)
Stadium & Podium: BKS (Pty) Ltd.
ILISO Consulting (Pty) Ltd.
Goba (Pty) Ltd.

Henry Fagan and Partners
KFD Wilkinson

Arcus Gibb

QUANTITY SURVEYORS:

Cape Town Stadium QS Association
Davis Langdon
MLC

Abakali Quantity Surveyors

H&P Quantity Surveyors

PROJECT MANAGERS:

Green Point Stadium 2010 Project Managers

MDA Projects (Pty) Ltd

BKS (pty) Ltd

Ariya Projects

NOA

MAIN CONTRACTOR: Murray & Roberts IWBHO JV

SELECTED ROOF SUB-CONTRACTOR:

Pfeifer Seil - und Hebeteknik GmbH for the Birdair | Pfeifer JV

SUB-CONTRACTOR TO THE SELECTED

ROOF SUB-CONTRACTOR:

Roof Truss Steelwork Contractor: DSE Structural Engineers & Contractors

for Pfeifer Seil - und Hebeteknik GmbH

Compression Ring Steelwork Contractor: ABJ Engineering & Contracting

Company (KSC)

Purlins Steelwork Contractor: Mazor Steel (Pty) Ltd

OTHER STEELWORK CONTRACTORS:

Balustrade Beams: Union Steel

Facade Steel: Mostostal Hightex Joint Venture

