TEKLA® Structures

Structures that Score

Impressive Stadiums – Modeled with Tekla Structures

TEKLA Structures

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New Wembley Stadium, London UK

Building facts:

- Project owner: Wembley National Stadium Ltd.
- Detailer: Oakwood Engineering
- General contractor: Multiplex Constructions (UK) Ltd.
- Construction company: Cleveland Bridge Ltd/Hollandia

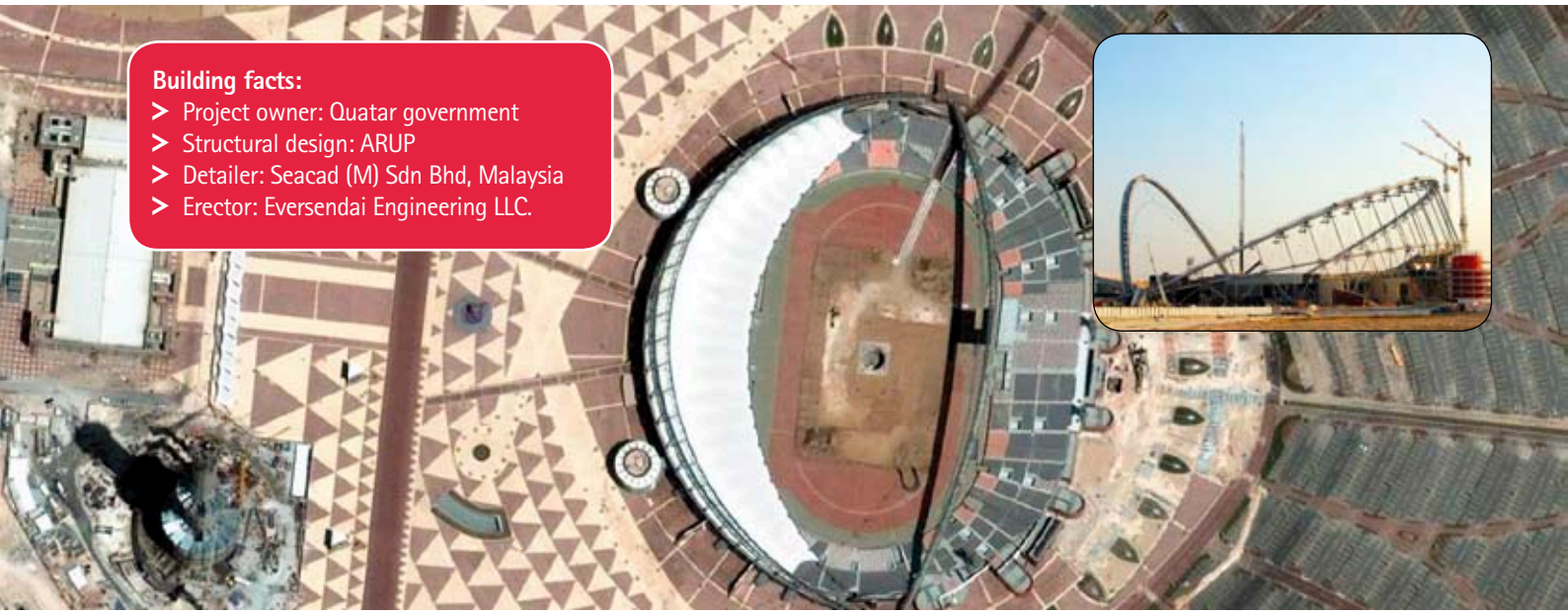
When built, the new Wembley Stadium will be the tallest stadium in the world, and with a seating capacity of 90,000 it will also be the 2nd largest stadium in Europe and the world's largest football (soccer) stadium. 215,000 tons of concrete and 24,000 tons of steel will be used in the construction of the new stadium. The foundations of the new stadium will be up to 35 meters deep. The arch, which is pitched at 112 degrees, weighs 1,750 tons with a 315 meter (1,033 feet) span and supports the world's biggest single span roof. It obviates the need for pillars, which could obscure attendants' views, and supports 5,000 tons of the roof structure. The southern roof can be retracted to allow air and light onto the pitch and can also be retracted to prevent shadows falling on the pitch, which improves TV pictures. New Wembley Stadium is the world's only stadium to sport an aircraft warning beacon.

Joensuu Arena, *Joensuu, Finland*

Building facts:
- Project owner: City of Joensuu
- Contractor: YIT
- Designers: PRO-ARK INSTAKON and FMC
- Other companies involved: Late-Rakenteet Oy, Finnforest, Protan Oy, Rannila Steel Oy

Joensuu Arena is the biggest wooden building in Europe. In addition to versatile possibilities of physical activity, it caters for conventions, trade fairs, concerts, and various mass events. The building is situated by a fast-flowing river and a clear-watered lake near to all central services. At its best, Joensuu Arena has a capacity for up to 10,000 persons. The geometry of the building is so demanding that without a 3D solution it would have been nearly impossible to create the subassemblies. The project was free of design errors and included an animated visualization model for site management. On site, all pieces fitted together with no need for re-fabrication.

Khalifa Olympic Stadium, *Doha, Qatar*

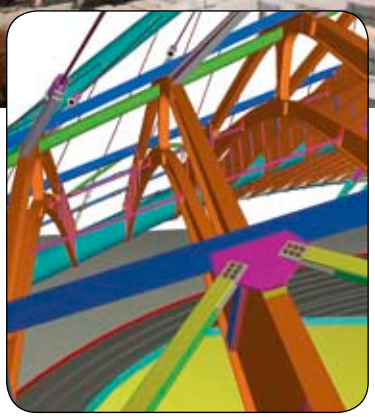


Building facts:
- Project owner: Quatar government
- Structural design: ARUP
- Detailer: Seacad (M) Sdn Bhd, Malaysia
- Erector: Eversendai Engineering LLC.

Khalifa Stadium was originally opened in 1976, but extensive rebuilding for the hosting of the 15th Asian Games 2006 has more than doubled its size and effectively created a brand new stadium. It is a one of its kind structure, designed by ARUP and built/erected by Eversendai Engineering LLC. As well as increasing the seating capacity from 20,000 to 50,000, a new roof has been built over the western side, counterbalanced by a spectacular arch to the east. The canopy above the spectators is suspended from the main arch structure, as is the lighting arch to support the floodlights and sound system. Modeling the structure was especially complex as all the cables needed to be modeled in both a stressed and unstressed condition with corresponding connections. Khalifa was modeled with Tekla Structures by Seacad in Malaysia.

Olympic Velodrome, *Athens, Greece*

Building facts:
- Project owner: Aktor S.A.
- Architectural design: Santiago Calatrava
- Structure implementation: Metal Constructions of Greece SA (METKA)
- Detailing and drawings: Unison Engineering & Consultants GmbH (Germany)



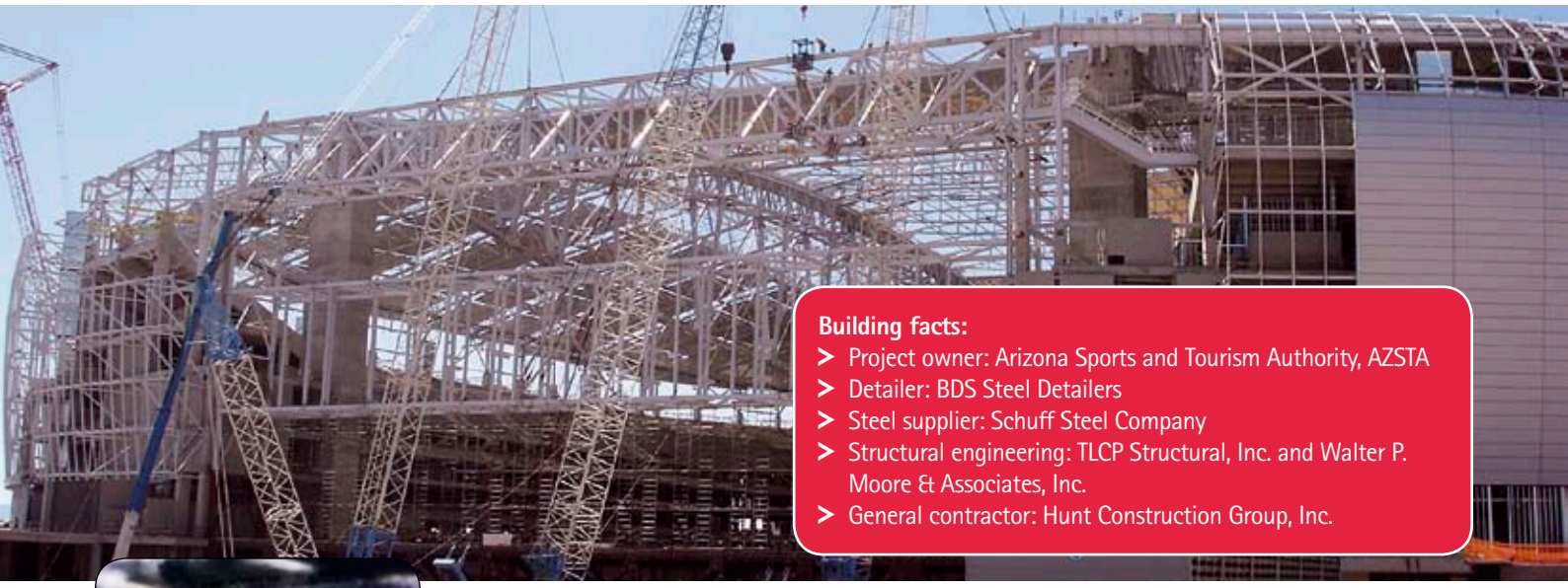
Many of today's most impressive steel structures have one thing in common: they have been made possible by today's most advanced 3D modeling technology. This has played an important role in giving a face-lift to the center of Olympic Games 2004, the Athens Olympic Sports Complex. It has won worldwide recognition for its beauty and execution. The light and bold architecture, only possible in steel, embodies the values and spirit of the Olympic movement. The roof structure comprises 26,000 parts. The design's extremely complex geometry and the sheer volume of data made the design work very challenging. All of the parts are different and practically none connect in an orthogonal way. The detailing work was accomplished in 3D with Tekla Structures for Steel Detailing.

Foshan Stadium, *Foshan, Guangdong, China*

Building facts:
- Project owner: Foshan Stadium Construction Company
- Detailer: Shanghai Tongqing Technology Co Ltd.
- Number of drawings: about 4000 assembly and single part drawings
- Design: Kunio Watanabe Design Group (Japan)
- Fabricator and erector: Jiangsu Hu Ning Steel Structure Co, Ltd.

The new Foshan stadium resembles three bright pearls on the ground. It is mainly made of steel with some concrete on the foundation. In addition to serving as a games arena, the stadium will be open to citizens for daily sports exercise. The steel structure was finished in July 2006, and the whole building will be ready early in 2007. Since the structure is very complicated, it would have been almost impossible to get the project done with 2D software. Using 3D modeling, the detailers could see the structures on their computer, avoiding collisions during the erection. The multi-user capability helped detailers to co-operate and review each other's models up-to-date. The detailing schedule was tight but was finished in time with Tekla Structures.

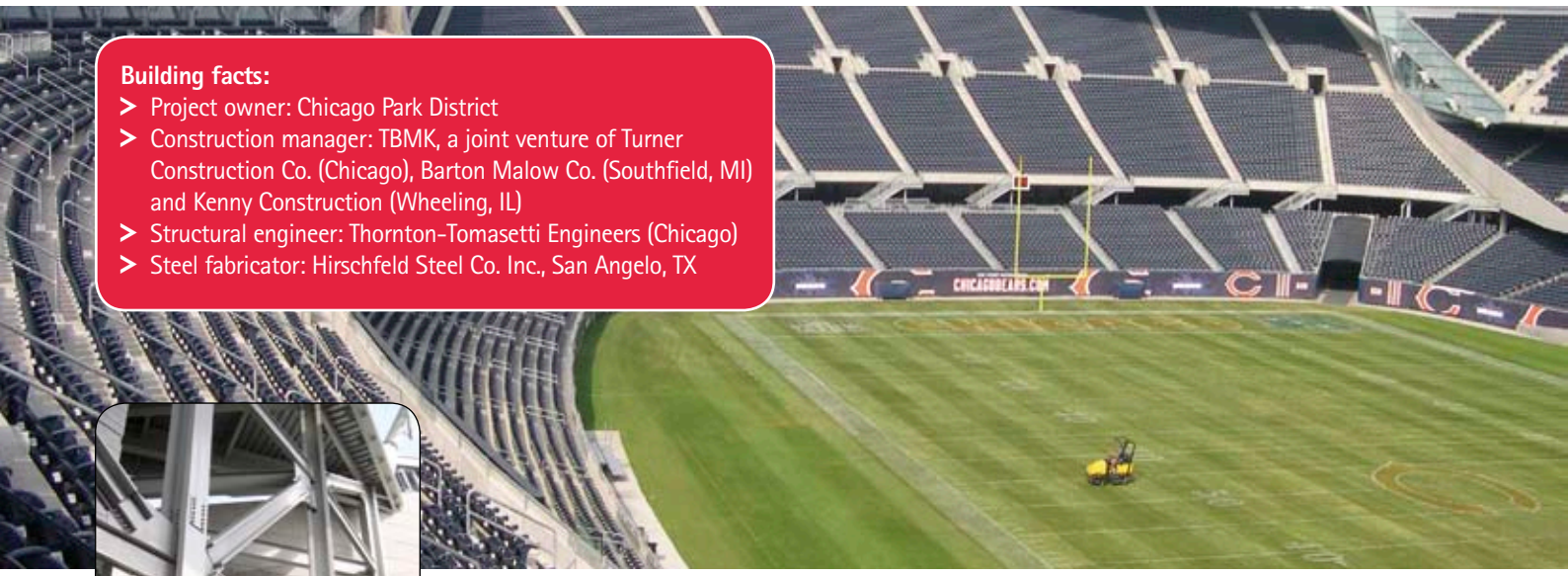
University of Phoenix Stadium, Glendale, USA



Building facts:
- Project owner: Arizona Sports and Tourism Authority, AZSTA
- Detailer: BDS Steel Detailers
- Steel supplier: Schuff Steel Company
- Structural engineering: TLCP Structural, Inc. and Walter P. Moore & Associates, Inc.
- General contractor: Hunt Construction Group, Inc.

Formally known as Cardinals Stadium, the University of Phoenix Stadium is home for the National Football League's Arizona Cardinals and the host of the 2008 Super Bowl. This multi-purpose indoor stadium has a retractable roof and roll-out natural grass playing field. The 73,000 seat capacity facility encompasses 1.7 million square feet. Tekla Structures' multi-user function allowed the use of optimum number of detailers in the project. The advanced 3D rendering facilities enabled communicating effectively between all project parties. The filtering and reporting tools along with close tolerance clash checking ability were the Tekla Structures functions that made the most impact in this project.

Soldier Field, Chicago, USA



Building facts:
- Project owner: Chicago Park District
- Construction manager: TBMK, a joint venture of Turner Construction Co. (Chicago), Barton Malow Co. (Southfield, MI) and Kenny Construction (Wheeling, IL)
- Structural engineer: Thornton-Tomasetti Engineers (Chicago)
- Steel fabricator: Hirschfeld Steel Co. Inc., San Angelo, TX

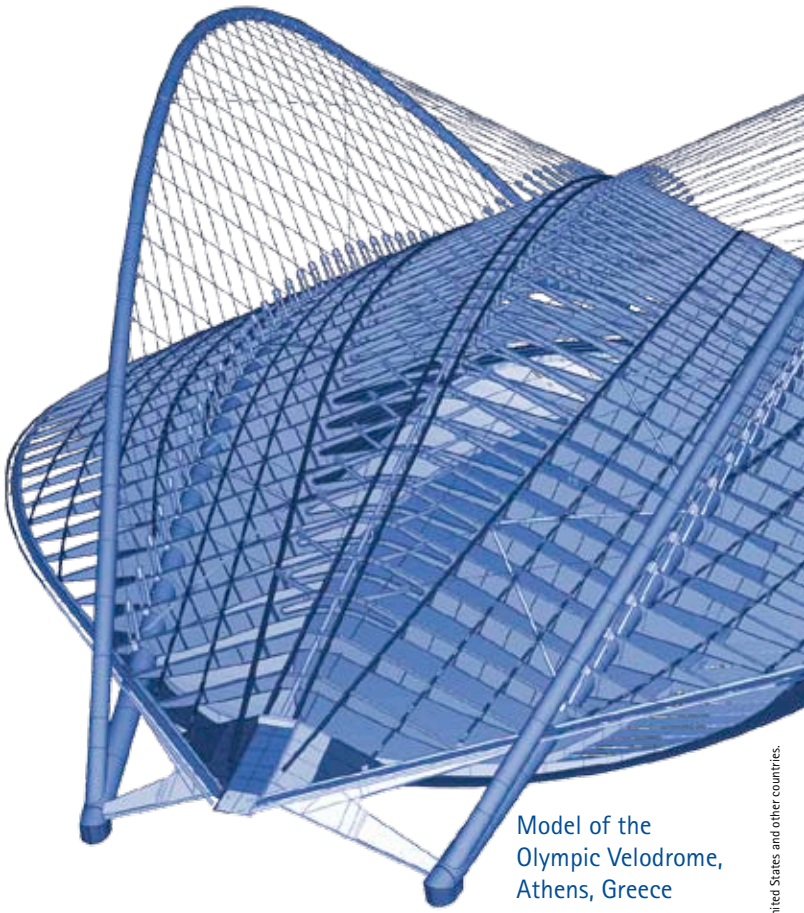
Soldier Field, home to the NFL's Chicago Bears, has long been revered as a great American sports palace and Armed Services monument. Built in 1924, the old stadium has now seen restoration of the historic colonnades and facade, and replacement of the seating bowl with a 61,500-seat sports and events facility. The new 1.4 million square-feet stadium was scheduled for completion in a record 20 months, even though a typical stadium requires 30 months or more. The use of Tekla Structures helped avert costly miscues from design to fabrication and installation. As an added benefit, the 3D geometry facilitated the design and assembly of the stadium's non-rectilinear panelized cladding system.

TEKLA STRUCTURES – INTELLIGENT 3D MODELING

Tekla Corporation in Brief:
Tekla is a leading international software company whose innovative software solutions make customers' core businesses more effective. Tekla's software products and related services are used mostly in building and construction, but also in energy distribution, defense, and by municipalities. Tekla Group's net sales in 2005 were 38 million euros. International operations account for 75% of net sales. Tekla was founded in 1966 and celebrates its 40th year in business in 2006.

TEKLA Structures

Tekla Structures software is the building information modeling (BIM) solution that can take any building project all the way from sales and conceptual design to detailing, manufacture, construction and beyond. Its innovative tools provide new possibilities to create an intelligent model of any size or complexity and to coordinate different materials with ease and precision. Tekla 3D models contain all the information required for the different construction phases of a project. Tekla Structures encompasses specialized configurations for structural engineers, steel detailers and fabricators, precast concrete detailers and manufacturers, as well as contractors. The software has thousands of users in more than 80 countries.



Model of the Olympic Velodrome, Athens, Greece

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