Stadiums

June 2006



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Herzog & de Meuron's cushiony chameleon glows with rival teams' colors

By Tracy Metz

Architect Jacques Herzog has called soccer public opera on a grand scale. Surely that makes the Allianz Arena, which he and Pierre de Meuron designed for the city of Munich, a stage on which high drama unfolds. Its nickname, "Ring of Fire," has an epic quality reminiscent of Wagner or Tolkien—and, just like Alberich's or Frodo's ring, the stadium is so luminous, tactile, and enchanting, one can hardly resist reaching out to touch it.



© Duccio Malagamba

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To see the people and products behind this project click on 'people & products.'

In the fall of 2001, Munich residents voted enthusiastically to have the arena built—to the tune of \$360 million for 66,000 seats—as a new home for the city's two rival soccer teams, the Bayern and the 1860s. The stadium is meant to serve not only as a sports venue but also as a commercially viable "geschäftshaus" (business center). It contains 106 skyboxes that businesses rent for \$100,000 to \$300,000 a year.

Despite its international stature, Herzog & de Meuron entered the competition for the design with Alpine Bau, a German construction firm. This move linked the fate of the firm's scheme to the contractor's ability not only to build the arena, but Alpine's skill at convincing the city and soccer teams that it could be built at all—something that was not immediately apparent, given the building's oval shape (in which almost no two cross sections are the same), its cantilevered steel roof, and its novel skin.

From a distance, the building's skin resembles blown glass, but up close, the arena reveals itself to be covered in plastic cushions made of ethylenetetrafluoroethylene (ETFE) foil a mere 0.2 millimeters thick, inflated by a constant stream of warm air. No two of the 2,784 diamond-shaped cushions are alike—each fits in one spot and one spot only, a feat of mass customization made possible thanks to computer modeling—and their installation required the talents of 35 mountain climbers.

The cushions are illuminated by 5,344 lamps. On game nights, depending on which team is playing, the entire building glows: red for the Bayern, blue for the 1860s—and sometimes white, when the arena hosts Germany's national squad. All other evenings, it alternates between the colors on half-hour intervals.

Herzog & de Meuron designed the arena's approach as a public procession, befitting a stage of high drama. An underground parking garage, containing spaces for 9,800 cars and 350 buses (making it the largest in Europe), serves as a podium: an artificial grassy hill to heighten the procession. Exiting the garage, crowds mix with people coming from a nearby train station, then wend their way along meandering asphalt paths toward their destination—a stream of devotees coming together in this most contemporary of urban monuments to witness an ancient ritual of combat.



Formal name of Project:

Allianz Arena

Location: Herzog & de Meuron

Gross square footage: 404,723 sq. ft.

Total project cost: \$360 million

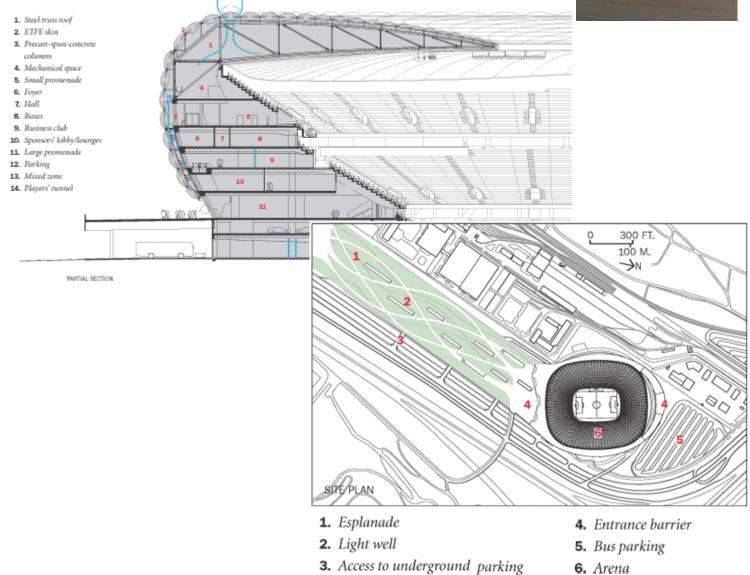
Client:

Allianz Arena - München Stadion GmbH

Architect:

Herzog & de Meuron





Stockton Arena Stockton, Calif. 360 Architecture

Arena anchors downtown revitalization

The city of Stockton, Calif., hopes that its new arena will anchor urban revitalization and act as a beacon for the cultural viability of central California's San Joaquin Valley. It was constructed in 2005 as part of a larger redevelopment scheme—including a ballpark and a hotel—that is transforming a vacant industrial site at the western edge of the central business district, adjacent to McLeod Lake and a waterfront park. The city asked 360 architecture to design an arena that would create strong visual connections to the downtown area and the esplanade.

The new arena is home to local hockey, indoor football, and indoor soccer teams, and also hosts a variety of other special events. In addition to seating for 10,500 people in the main arena, the building's program includes 24 suites, administrative offices, dividable meeting rooms, a club lounge and exterior balcony, concert configuration and rigging, a team store, four locker rooms, and support services.



© Ed LaCasse

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To see the people and products behind this project click on 'people & products.'

Design elements and building materials respect Stockton's maritime heritage although the city is some 75 miles inland, it is connected to the Pacific Ocean by a deepwater canal—as well as Stockton's role as an agricultural and industrial center. Generous glazing reveals activity within the building and establishes a visual connection to the city. A sail-like canvas of tensile fabric shrouds the seating bowl, canting toward the ceiling and piercing the roof plane above like the prow of a ship expressed in exterior metal panels. An exposed concourse leads to the meeting rooms, where a curved wooden form projects outward through the glazing that flanks the north entry, gently guiding patrons through the main lobby.

The arena's design is warm, inviting and friendly, while serving to increase the community's quality of life and provide flexible opportunities for assembly, sport, recreation, culture, arts, and education. It reflects a significant revitalization of Stockton's waterfront and stands as a commitment to the community's future.

Formal name of Project:

Stockton Arena

Location: Stockton, Calif.

Gross square footage: 247,000 sq. ft.

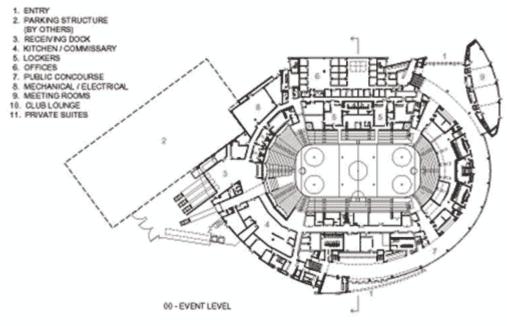
Total project cost: \$65 million

Client: City of Stockton, California

Architect: 360 Architecture 2020 Baltimore, Suite 400 Kansas City, MO 64108 816-472-3360 tel. 816-472-2100 fax <u>360architects.com</u>







1. ENTRY

- 2. PARKING STRUCTURE
- (BY OTHERS)
- 3. RECEIVING DOCK
- 4. KITCHEN / COMMISSARY
- 5. LOCKERS
- 6. OFFICES
- 7. PUBLIC CONCOURSE
- 8. MECHANICAL / ELECTRICAL 9. MEETING ROOMS
- 10. CLUB LOUNGE
- 11. PRIVATE SUITES



TRANSVERSE SECTION

OAKA, Olympic Stadium and Olympic Park

Athens, Greece Santiago Calatrava

Santiago Calatrava makes a gigantic structure seem weightless and creates a telegenic national symbol in the process

By Sam Lubell and Joann Gonchar, AIA

With about 3.9 billion people watching the 2004 Athens Olympic Games, the Olympic Stadium was, for two weeks in August, likely the most widely televised building in the world. The global exposure gave Greece, host of the first modern Olympic Games in 1896, and a country that has experienced new political stability and increasing prosperity in recent decades, a chance to demonstrate its growing prominence in Europe. Therefore, the stadium needed to serve as a dynamic symbol, not only for the games, but for Greece as a whole.



© Alan Karchme

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To see the people and products behind this project click on 'people & products.'

The Greek Ministry of Culture chose Spanish architect Santiago Calatrava, FAIA. His assignment was to transform—with the addition of a roof—a fairly conventional 75,000-seat open-air stadium built in 1979. The new roof was to provide shading and a signature element visible miles away. In addition to being the site of the lavish opening and closing ceremonies, the stadium hosted track and field events and soccer games.

Besides designing the \$350 million main stadium, Calatrava was in charge of unifying and reorganizing the surrounding 250-acre Olympic Sports Complex, which already contained some sports facilities. Although Athens was selected as host city in 1997, political, legal, and bureaucratic obstacles prevented award of the design contract until October 2001, leaving less than three years to design and build the complex. Calatrava saw his main role as that of urban planner. "It is a small city—a city of sports," he says of the complex, located in Marousi, a northern suburb of Athens. To give the site cohesion, he established a central pedestrian route linking the stadium and an existing velodrome, for which he also designed a new roof. He also created a Plaza of Nations, a curved, amphitheaterlike gathering place; the Agora, a modular, light-steel-vaulted structure defining the plaza's northern perimeter; the Wall of Nations, an 856-foot-long kinetic screen; as well as entrance canopies, pools, and tree-lined walkways.

The stadium roof is this composition's most striking element. Calatrava topped the stadium with a pair of 997-foot-long steel, and polycarbonate-clad, "leaves," which join at a single point at each end of the field. Each leaf is composed of a 236-foot-tall arch attached by cables to a lower torque tube, which in turn supports a series of transverse ribs. The new structure touches the ground at only four points—at massive "shoes," more than 21 feet tall and 36 feet long, where the upper arch and torque tube merge.

Formal name of Project:

OAKA, Olympic Stadium and Olympic Park Location: Athens, Greece Gross square footage: 1.374 million sq. ft. Total project cost: \$350 million **Client:** Ministry of Culture, Greece Architect: Santiago Calatrava Llc Parkring 11 8002 Zurich, Switzerland Phone +41-44-204 50 00 Fax +41-44-204 50 01 www.calatrava.com

Ice Hockey Stadium

Turin, Italy Arata Isozaki & Associates

Arata Isozaki's ice hockey stadium in turin promotes flexibility and urban regeneration with an ethereal design

By Paul Bennett

Turin, Italy, was ecstatic on being selected host city for the 2006 Winter Olympic Games—until it realized that the only place to hold this event was in a forgotten industrial zone on the southwest edge of town. Although a few interesting remnants of 1930s-era Fascist architecture littered the site, including a municipal stadium and the Torre Maratona, a 147-foot-high Art Deco tower built to signal the stadium, it was mainly a no-man's-land hardly a place to accommodate and thrill large crowds, or advertise Turin to the world.

Arata Isozaki won the competition to redesign the entire 43-acre area, including the construction of a new 15,000-seat ice hockey arena, a landscaped plaza, and, initially, the renovation of the existing municipal stadium to serve as a venue for opening and closing ceremonies. This element was later farmed out to an Italian contractor. The Olympics committee wanted something eye-catching and identifiable for the games, while the city needed a building that could easily adapt to different uses in the future.



© Alessandra Chemollo

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To see the people and products behind this project click on 'people & products.'

Isozaki looked to the past for inspiration: specifically, the Palau St. Jordi sports palace, which he designed for the 1992 Summer Olympics in Barcelona. Like that space, the ice hockey arena in Turin was designed to be completely transformable. The three sections of seats at each end—constructed as light, steel-framed apparatuses with plastic panels and polymer seats—roll out of the way to create a spacious empty hall, whose defining feature becomes an enormous fiberglass-and-sheet-metal roof. Some 450,000 square feet, it rests on a mere eight steel pylons pushed out to the edge. With steel trusses painted gray, and fitted with skylights and gymnasium lights, the warehouselike roof appears to float over the arena.

At the same time that Isozaki was thinking about future concerts and conventions taking place here, he needed to make sure that the space was unmistakably suited for Olympic ice hockey competitions. During the master planning and competition phase, he decided that his arena shouldn't be any higher than the existing stadium. The entire footprint was excavated to a depth of 23 feet. Most of the subterranean space is staging area for storage, locker rooms, VIP lounges, and the like. But in the center, the arena drops down with four stands of seats and a rink in the middle. The rink can be completely dismantled, and the stands can be pulled back into a 3-foot-deep cavity at the edge of the space—a nifty operation in which the polymer seats flip down, en masse, to create a huge, open space under the entire roof for large-scale conventions and industrial shows. Glass wraps the entire ground floor, while white plastic panels cover concrete interior walls. Along with the restrained gray-to-white color scheme and the 15,000 clear polymer seats, you almost think you are standing in a large igloo.

Formal name of Project:

Ice Hockey Stadium Location: Turin, Italy Gross square footage: 462,332 sq. ft. Total project cost: \$116.3 million Client: Agenzia Torino 2006 Architect: Arata Isozaki & Associates

DaeGu World Cup Stadium

DaeGu, Korea IIIA (Idea Image Institute of Architects)

City enters the world stage with an iconic new stadium

Hosting a World Cup soccer match can catapult a city onto the international stage. DaeGu, South Korea, hoped for such a result when it bagged the right to host a few matches of the 2002 championship. For the occasion, the city built a new stadium and inaugurated direct flight service to Osaka, Japan—both of which would continue serving the city afterwards as a means of encouraging broader development.

Stadiums are not economical propositions. These large-scale creations are expensive to build and to maintain so they cannot simply be empty containers. Thus, in working on this project, the Idea Image Institute of Architects (IIIA) kept several watchwords in mind: multi-purpose flexibility, functionality, convenience, security, economy, creativity, and symbolism.

Concrete and steel form the stadium's superstructure, while aluminum panels and granite clad its façades. The roof, which covers roughly threequarters of the seating sections, is comprised of PTFE: a composite fiberglass fabric stretched across steel framing. Divided into two sail-like



© IIIA

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To see the people and products behind this project click on 'people & products.'

sections that swell and billow like waves above the stands, the stadium's roof satisfies IIIA's desire to create a symbol on the skyline.

With seating for 66,000 people, and a total possible capacity of 70,000 people, the DaeGu Stadium is the largest stadium in Korea and, among Asian stadiums, second only to Japan's Yokohama International Stadium. Since the 2002 World Cup, the building has hosted the Universiade, a competition for Korea's collegiate athletes, and other sports competitions—proving that it is not just a soccer stadium.

Formal name of Project:

DaeGu World Cup Stadium

Location: DaeGu, Korea

Gross square footage:

1,544,544 sq. ft.

Total project cost: \$185 million

Client: DaeGu Metropolitan City

Architect:

IIIA (Idea Image Institute of Architects) 4th FI., Changjeon-Dong, Mapo-Gu, 121-880, Seoul, Korea 82-2-325-9872 tel. 82-2-325-5692 fax www.ideaimage.com

San Diego Padres Ballpark/Petco Park

San Diego Antoine Predock Architect

Stone canyons and garden terraces ring this ballpark

Located a few blocks south of San Diego's historic Gaslamp Quarter, the Padres baseball team's new home serves as a civic meeting place and focus for future development of the city's downtown. It also completes the connection between Balboa Park, in the heart of the city, and San Diego Bay, acting as a grand terminus on the waterfront. Architect Antoine Predock, FAIA, conceived of the building as a series of terraced gardens and canyon-like circulation spaces, all feeding into the playing field.

Rather than locate the stadium's requisite administrative offices, concessions, and lounges underneath the grandstands as is often done in sports venues, Predock moved these program elements to the building's exterior—carving out space for an open-air, inner concourse. The back of the seating bowl is light and skeletal, which allows natural light and breezes to pass through it and creates visual links from the concourse through to the playing field.



© Timothy Hursley

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To see the people and products behind this project click on 'people & products.'

A series of terraced "garden buildings" ring the other side of the concourse and are connected to the grandstands by a series of bridges. As visitors

circulate horizontally along the concourse of terraces, the canyon-like space opens to reveal views of the skyline. Additional garden terraces, on the exterior of the building, face the Pacific Ocean and mountains surrounding the city. Bougainvillea and jasmine plants spill over trellises that shelter outdoor dining areas. The color of the stone terraces recalls the tones of the local soil and cliffs at Torrey Pines.

Six ceremonial entry gates lead into the ballpark. The north gate, closest to the Gaslamp Quarter, links to a city park one block distant. Picnic Hill and other grassy slopes in the park allow fans to sit on the ground under eucalyptus trees, picnic, and watch the game. Geographically, visitors might be coming from the nearby Gaslamp Quarter, or from as far away as Tijuana, Mexico, but as they approach the ballpark, paths filter into either the outfield park or various public plazas. Palm courts, jacaranda trees, and water elements then lead fans through the concourse.

Formal name of Project:

San Diego Padres Ballpark/Petco Park

Location: San Diego

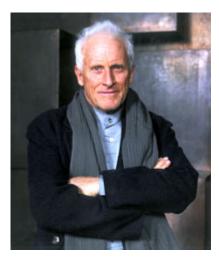
Gross square footage: 1.3 million sq. ft.

Total project cost: \$410 million

Client: San Diego Padres

Architect:

Antoine Predock Architect PC 300 12th Street NW Albuquerque, NM 87102 505-843-7390 tel. 505-243-6254 fax predock.com



Antoine Predock, FAIA

Nanjing Sports Park

Nanjing, China HOK Sport

Sports Park creates new urban district

The Nanjing Sports Park forms the centerpiece of a new downtown precinct development in the ancient city of Nanjing, in China's Jiangsu province. Globally, there are many examples of how sports facilities help to revitalize communities and urban districts—but this project exemplifies a new way of thinking that uses sports facilities to create an entire district from scratch.

Situated on a riverfront site, the Nanjing Sports Park includes the stadium, an indoor sports arena, aquatic center, tennis center, as well as baseball and softball parks. HOK Sport master planned the entire site and designed all of the buildings. Its concept for the master plan was to create a "people's place" for Nanjing's citizens: a dynamic, adventurous space that provides opportunities for both passive and active recreation.



© Patrick Bingham-Hall

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To see the people and products behind

this project click on 'people & products.'

A 60,000-seat stadium forms the Sports Park's centerpiece. Its toroidalshaped roof, which covers 95 percent of the seats, is suspended from

two red, arcing superstructures that form an instant landmark on the skyline. The roofing is comprised of a translucent polycarbonate material that reduces shadows on the playing field while maintaining an overall feeling of light and openness.

Open spaces and built forms respect the landscape and respond to it. Parkland comprises 35 percent of the complex and, in the remaining areas, sports buildings are grouped closely together. All facilities within the sports complex are linked together, enabling greater efficiency for major events and everyday use alike. The project was constructed in time for the opening of the Tenth China National Games in October 2005.

Formal name of Project:

Nanjing Sports Park

Location: Nanjing, China

Gross square footage:

1,207,043 sq. ft.

Total project cost: 287.3\$ million

Client:

Jiangsu State Government, China

Architect:

HOK Sport Ground Floor, 418 Adelaide Street Brisbane, QLD 4000 Australia 61-7-3839-9155 tel. 61-7-3839-9188 fax www.hoksve.com

Gottlieb Daimler Stadium

Stuttgart, Germany 'asp' Architekten Stuttgart

A stadium's ongoing transformation raises it to world-class standards

Originally constructed in 1933, the Gottlieb Daimler Stadium has undergone several transformations since: for World Cup soccer championship in 1974; for the World Athletics Championships in 1993; and, during the past few years, to prepare the stadium for the 2006 FIFA World Cup. It is now the centerpiece of NeckarPark, a 136-acre recreation area along the banks of the Neckar river. The park contains several other leisure and entertainment facilities, including a 15,000-seat sport and concert venue, and a 6,500-seat hockey arena, both also designed by 'asp' Architekten.

The stadium's 366,000-square-foot roof was added in the early 1990s. Designed by Schlaich, Bergermann & Partner, it was the first use of a translucent PVC membrane suspended by a spoked-wheel framework: a roofing system now commonplace in many soccer stadiums worldwide, which can shelter spectators while still allowing a tremendous amount of light to reach the playing field.



© Manfred Storck

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To see the people and products behind this project click on 'people & products.'

Renovations in 1999 added a new deck of seating to one of the stadium's two main click on 'people & proc grandstands. Asp was engaged for a renovation in 2004 to rebuild the opposite grandstand, add an extra deck to it, and bring the stadium's perimeter and technical infrastructure up to World Cup standards. Program requirements included new catering facilities, additional restrooms, new locker rooms, and storage.

The interior of the new grandstand houses a five-level building that serves as the load-bearing structure for a new 2,150-seat upper deck: literally and figuratively, it serves as the keystone of Gottlieb-Daimler-Stadium. A new food-court improves visitor convenience, while the ticketing area was completely revamped to create separate entrances for local fans as well as visitors from out of town. The stadium now seats a total of 56,000 people.

Formal name of Project:

Gottlieb Daimler Stadium

Location: Stuttgart, Germany

Gross square footage:

136,700 sq. ft.

Total project cost: \$64.8 million

Client: City of Stuttgart

Architect:

'asp' Architekten Stuttgart Arat – Siegel – Schust Herdweg 64 D-70174 Stuttgart, Germany 49-711-223-38-0 tel. 49-711-223-38-88 fax <u>asp-stuttgart.de</u>



Photo © Dietmar Strauss

AWD-Arena Hanover, Germany Schulitz + Partner Architekten

Composite roofing helps this stadium's grass stay greener

Originally called the Niedersachsen, the AWD-Arena first opened in 1954. The city of Hanover, Germany, reconstructed and rechristened the building in pursuit of hosting the 2006 FIFA World Cup Championship. But the city, and the two soccer teams that call the arena home, put a green twist on the 45,000-seat stadium.

Soccer has historically been an outdoor game played on natural lawn. Economic pressure is beginning to change this. Fans demand to sit as close as possible to the action but they also want to be protected from the sun and rain. These two requests create a paradox: as stadium roofs get larger to cover fans, less sunlight reaches grass on the playing field. In redesigning the AWD-Arena, Schulitz + Partner Architekten overcame this challenge with a unique roof system.

The stadium's roof is made of two concentric sections: an opaque outer ring, comprised of a conventional steel structure and metal sheet decking, and a transparent inner ring of ETFE (Ethylene Tetrafluoroethylene) foil stretched over a pre-stressed steel cable system. The two roof segments are comprised of two separate structural systems and were constructed independently of one another:



© Schulitz + Partner

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To see the people and products behind this project click on 'people & products.'

the outer rings went up first, during the Bundesliga (the German Premiership games), while the inner rings, which are a tensegrity system suspended from an outer ring of masts, went up during the Bundesliga's summer break.

By using ETFE on the inner rings of this dual roof system, the architect solved the sunlight problem. A transparent material, ETFE features an ultra-violet light transmission rate of 95 percent, thus allowing the arena's grass playing field to grow naturally and avoiding the need to constantly replant it or move the entire field, as occurs in stadiums at Schalke, Germany, and Saporo, Japan. The AWD-Arena was the first stadium in which single-layer ETFE was implemented to encourage grass growth and, at nearly 110,000 square feet, it is the largest single-layer ETFE roof of its kind.

Formal name of Project:

AWD-Arena

Location: Hanover, Germany

Gross square footage: 419,793 sq. ft.

Total project cost: \$82.8 million

Client: Hannover 96 Arena GmbH + Co. KG

Architect:

Schulitz + Partner Architekten BDA Viewegstr. 26 38102 Braunschweig, Germany 49-0-531-220700 tel. 49-0-531-2207032 fax schulitz.de

Algarve Stadium Faro, Portugal HOK Sport

Dynamic roof symbolizes athleticism on the playing field below

The Algarve Stadium, part of a development known as the Parque das Cidades (Cities Park), was constructed for the Euro 2004 Football Championships. Situated on the São João da Venda in Esteval, between the cities of Faro and Loulé, the 34-acre complex will include an indoor sports arena, botanical gardens, and golf courses, as well as civic buildings and a hospital. It was jointly financed by both cities.

Although both the Farense and Louletano soccer squads call the Algarve Stadium home, HOK Sport designed the building to adapt for use by other sports, concerts, and conferences. The building's regular capacity is 30,300 people—of which 300 seats are for VIP's. This can scale up to 35,000 people or down to 22,000 people, thanks to removable seating at the building's south side and in the upper levels of its east and west sides. The stadium also has 30 luxury boxes that feature separate entrances, reserved parking, and access to an exclusive restaurant.



© Patrick Bingham-Hall

For more photos click on 'photos & drawings' above.

To see the people and products behind this project click on 'people & products.'

The stadium's twin sail-like roofs span the east and west sides of the building and cover two-thirds of the seating. Each one is comprised of four steel masts that rise 236 feet high and anchor 689-foot-long catenary cables. These cables, in turn, support transparent PVC fabric that billows upward in a dynamic movement that the architects say is

reflective of the athleticism displayed on the playing field below. The two largest seating sections, along the east and west sides of the stadium, are each four stories tall and swell upward to meet the roofs.

Located close to the Faro airport, Algarve Stadium features rail access to both Faro and Loulé and offers parking for 2,843 cars and 166 buses. The building also includes a conference center with meeting and seminar rooms, as well as a restaurant, located on the third floor of the west side of the building, that offers panoramic views of the surrounding countryside.

Formal name of Project:

Algarve Stadium

Location: Faro, Portugal

Gross square footage:

699,654 sq. ft.

Total project cost:

\$51.6 million

Client:

Societe Parque das Cidades, Estádio

Architect:

HOK Sport 14 Blades Court, Deodar Road London SW15 2NU, United Kingdom 44-208-874-7666 tel. 44-208-874-7470 fax www.hoksve.com