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CONTENTS

FEATURES IN THIS ISSUE

EASTERN PROMISE 10
In this 'Venue in Focus' feature, we take a look at China's Hangzhou Olympic Sports Park, which includes an 80,000-seat stadium at its core.

TAILORING REGIONAL DESIGN 68
Katie McIntyre discusses the role of tailoring regional design to grow international content in the Asian marketplace with AECOM's JRJ Parrish and Populous' Andrew James.

BIDDING, HOSTING & MASTERPLANNING 74
Katie McIntyre gets the lowdown from two key industry players on how to successfully bid, host and masterplan for a major sporting event.

STATE-OF-THE-ART 78
Project Director, Ronnie Hurst, provides exclusive insights into how they are utilising BIM to successfully deliver the new Perth Stadium.

BAKU OLYMPIC STADIUM 82
In this 'Venue in Focus' feature, we explore the brand new 68,000-capacity Baku Olympic Stadium; the centrepiece of the inaugural European Games.

BOLD SLEEK DESIGN 90
In this 'Venue in Focus' feature, we analyse the proposed shared stadium for the NFL Chargers and Raiders, which boasts a sleek, smooth design that is uniquely L.A.

WEMBLEY'S WATCHMAN 94
In this Q&A, Simon Smith, Associate Director of Stadium Services at Wembley Stadium, explains his role, the challenges and how England's National Stadium is evolving.

TOP 5 INITIATIVES AND INNOVATIONS 96
We hear from a number of industry leaders on the Top 5 initiatives and technologies that can be employed to increase a venues number of event days and profitability.

PITCH MANAGEMENT 115
In this special roundtable, a number of industry experts provide insights regarding the key factors and considerations when following a Pitch Management Programme.

HVAC IN FOCUS 124
Modern, multiuse stadia and arenas offer many problems for designers and contractors when it comes to HVAC, as feature-writer, Steve Traiman, uncovers.

INNOVATIONS IN ROOFING: MATERIALS 130
Katie McIntyre reports on the latest innovations in roofing materials, with input from some key industry experts.

SEATING AS A REVENUE TOOL 158
Katie McIntyre illustrates how seating is a major component when it comes to revenue optimisation at sports venues.

WELCOME 8

ASSOCIATION NEWS

ESSMA SUMMIT 72

SOCCEREX 104

GREEN SPORTS ALLIANCE 122

ESSMA: COLUMN 155

FACILITY WATCH

FACILITY WATCH STADIUMS 14

NORTHERN HIGHLIGHT 20
The New Shell Place Recreation Centre is a Northern highlight for Alberta, as HOK's Michael Day explains.

TOMORROW'S TOGETHER 30
Populous' global design team discuss the initial findings of their year-long campaign to ascertain the future for sports and entertainment venues.

SKY'S THE LIMIT 32
Star Events report on how their rigging systems are being utilised at Beijing's Mastercard Center & Shantou Sports Park.

Cover: Hangzhou Olympic Sports Park. Courtesy: *NBBJ*

STADIA FOR PEOPLE 38
Arup's Paul Brislin and Chris Dite share their insights on why it is vital to create stadia as much for the people as for the athletes.

IMPACT & INSPIRATION 42
HKS Sports & Entertainment Group's Paul Hyett analyses the impact and inspiration of Frei Otto.

THE RISE OF THE FOOTBALL BUSINESS 45
Mott MacDonald's James Middling outlines the revenue based principles that can breathe new life into existing stadia.

RAISING THE BAR 46
Gensler Sports gives us a preview of the future home for the Los Angeles Football Club.

RLA REDEVELOPMENT 52
In this Q&A with Cox Architecture's Sports Director, Alastair Richardson, we hear insights on the AU$338m Rod Laver Arena.

FACILITY WATCH ARENAS 54

ENGINEERING FEAT 56
Walter P Moore's Justin Barton provides details on the new 10,000-seat First Tennessee Park.

UNDER COVER 59
We hear from Vector Foiltec as to how architects and engineers are using materials such as their Texlon ETFE.

OUT ON TOP 60
Mehler Texnologies explains how their fabrics were used to cover an area equivalent to 13 football pitches at Milan's Expo 2015.

TRANSFORMATIONAL DEVELOPMENTS 64
In this Q&A, KSS' Andy Simons shares his ideas on reworking existing venues, revenue maximisation and maintaining heritage.

PLAY

ESTO REPORTS 106
ESTO explains how they conducted a study to highlight the development of rugby and synthetic turf in France.

NEW HYBRID TECHNOLOGY 110
SIS Group unveils their groundbreaking new hybrid technology, SISGRASS.

COLLABORATION IS KEY 112
Dow explains how collaboration is key to ensure innovation in artificial turf systems.

EXPANDING INTO ASIA PACIFIC 114
Trocellen advises on how they are expanding their ProGame shock pads into Asia Pacific.

PRODUCTS & SERVICES

DYNAMIC SOUND 135
D.A.S. Audio gives the rundown on their loudspeaker, power amplification and audio processing equipment.

HITTING A HOME RUN 136
One Systems reports on how they have hit a home run at the Great American Ballpark.

WORLD'S LARGEST PLM INSTALL 138
A total of 157 Lab.Gruppen PLM series amplifiers were specified for BC Place Stadium.

FAN LOYALTY IS KEY TO SUCCESS 140
SKIDATA outlines how engendering fan loyalty is key to a sports venue's success.

TRANSFORM & PROTECT 143
Douce Hydro highlights how their revolutionary 'lift & skid' system transforms France's 50,000-seat Stade Pierre Mauroy.

LET THERE BE LIGHT 144
Musco outlines how it is bringing lighting innovation to the world's top sporting events and venues.

MISSION POSSIBLE 146
Dallmeier reveals how Eintracht Stadium has been exclusively fitted out with their video equipment.

SPECTATOR SAFETY 148
In this Q&A, we hear from three of Preformed Markings' recent customers on their experiences of working with the company.

SAFETY & SECURITY IN FOCUS 150
Malcolm Tarbitt of the International Centre for Sport Security (ICSS) provides insights on venue safety and security.

SEEING IS BELIEVING 152
Danny Wilson at Manchester City FC's Etihad Stadium explains the reasoning behind the stadium's recent transformation.

SITTING COMFORTABLY 154
Stechert illustrates how their specialist knowledge of sports venue seating design and manufacture is paying dividends.

SPACE OPTIMISER 156
Skyfold outlines their acoustic space management solutions, which can provide venues with additional revenue streams.

ADVERTISERS' INDEX/NEXT ISSUE 162

FLIP OVER... 163

For the Stadia & Arena Asia Pacific 2015 Show Guide which covers the last 21 pages of this issue.

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Over the past few months, we have witnessed China's re-emergence as one of the world's top sporting events host nations; with the country being awarded the **2022 Winter Olympics** and the **2019 FIBA Basketball World Cup for Men**. A Chinese bid for the **2022 Asian Games** has been also been declared and many are predicting a **FIFA World Cup** bid to follow.

Just as China is re-emerging as a powerhouse, so is Asia Pacific, with the region to host the **2018 Winter Olympics**, **2018 Commonwealth Games**, **2019 Rugby World Cup** and **2020 Summer Olympic**s. All of which has led to a surge in sports venue developments. One such project (featured on p10), is the **Hangzhou Olympic Sports Park**; the centrepiece of which will be an 80,000-seat stadium.

This June also saw the hosting of the inaugural **European Games**; the showpiece for which was the **Baku Olympic Stadium** (featured on p82).

With Building Information Modelling (BIM) currently a 'hot topic' in sports venue design, Ronnie Hurst, Project Director on the new **Perth Stadium**, shares exclusive insights regarding the use of this new technology (p78).

With all this activity in Asia Pacific, it's apt that the second edition of our 'live' event, **Stadia & Arena Asia Pacific**, will be held at the **Singapore Sports Hub** this September, 28-30, where 50+ industry-elite speakers will provide their insights on all aspects of sports venue design, build, management, operation, fit-out and technology. Find out more in the **Stadia & Arena Asia Pacific 2015 Show Guide** which covers the last 21 pages of this issue.

It just leaves me to say, I am looking forward to being kept updated with all your latest venue development news and I hope to meet many of you at the **Soccerex Global Convention** and **FSB**, as well as at our own **Stadia & Arena Asia Pacific** event.

I hope you enjoy reading this issue!



Katie L McIntyre
Publication Director & Editor
PanStadia & Arena Management Magazine

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EASTERN PROMISE

Katie McIntyre outlines the Hangzhou Olympic Sports Park that is nearing completion in the Chinese city of Hangzhou, which will feature an 80,000-seat stadium at its core that is currently the largest stadium planned for construction in China for the next ten years.

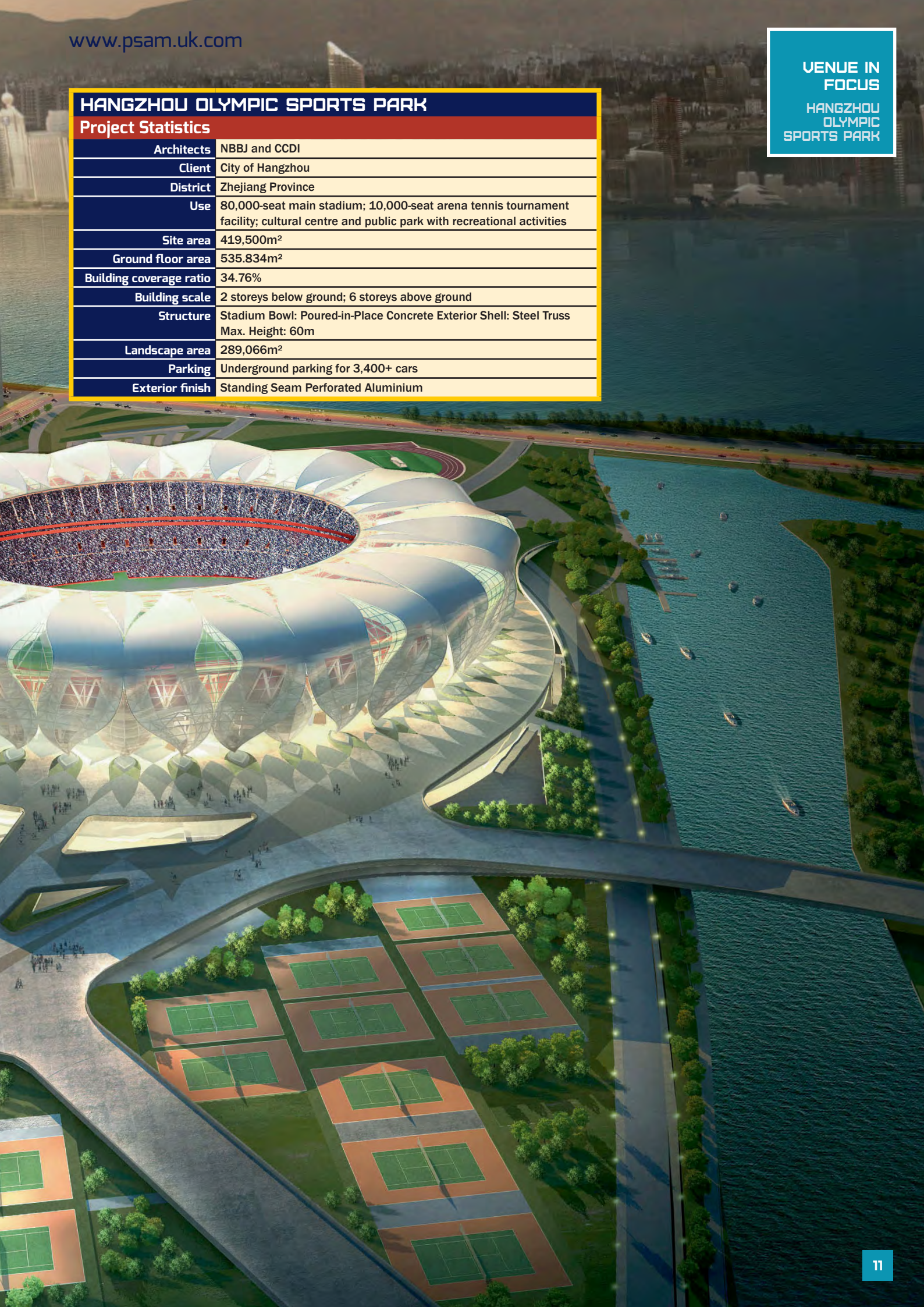
Like many cities in China, Hangzhou has been undergoing rapid urban change. While the city centre had historically developed around the West Lake area, opportunities for industry and commerce have shifted the city's expansion towards the Qian Tang riverfront. New construction has tripled the city's size in the past ten years, creating an eclectic, hypermodern architectural fabric that is powerful in scale. »



HANGZHOU OLYMPIC SPORTS PARK

Project Statistics

Architects	NBBJ and CCDI
Client	City of Hangzhou
District	Zhejiang Province
Use	80,000-seat main stadium; 10,000-seat arena tennis tournament facility; cultural centre and public park with recreational activities
Site area	419,500m²
Ground floor area	535.834m²
Building coverage ratio	34.76%
Building scale	2 storeys below ground; 6 storeys above ground
Structure	Stadium Bowl: Poured-in-Place Concrete Exterior Shell: Steel Truss Max. Height: 60m
Landscape area	289,066m²
Parking	Underground parking for 3,400+ cars
Exterior finish	Standing Seam Perforated Aluminium



Currently in the final construction stages, situated in the middle on the city, on the Qian Tang riverfront, opposite the new Central Business District, is the **Hangzhou Olympic Sports Park**; a vibrant, pedestrian-centric recreation development that is a design collaboration between **NBBJ** and **CCDI**.

Balancing the long-term commercial viability of the sports development, the park creates picturesque and sustainable public spaces that redefine sustainable design excellence in sports facilities, while also retaining the importance of circulation.

DESIGN GOALS

"The design goal for the Hangzhou Olympic Sports Park is to create an iconic, timeless, leading sports facility that reflects the characteristics of Hangzhou and the Qianjiang River," said Secretary Gaupin Wang, who was the Party Secretary of Hangzhou in 2010.

Encompassing approximately 420,000m^2, the sports park creates lush, picturesque and sustainable public spaces that are often elusive in the newly constructed urban context. Drawing conceptually from the nearby river delta, the flowing forms of the landscape are the principal means of organising the site, defining circulation and concentrating activities.

The site plan is designed to create a pedestrian experience that weaves together sports and commercial programs, while forming a clear path of circulation between two planned major transportation hubs on the east and west ends.

In section, the site is composed of three layers of activity. An above-grade platform defines the 'sports boulevard', which links together the programs such as the main stadium and tennis tournament facilities. On the ground level, pathways, gardens and plazas form a network of public recreation activities designed for alternative and extreme sports. Sunken spaces and courtyards lead to an extensive below-grade retail facility containing boutique stores, restaurants and a multiplex cinema.

CENTREPIECE: MAIN STADIUM

The primary architectural element on the site is an 80,000-seat stadium. The Olympic-sized facility will be the premier sports venue for the city and is currently the largest stadium planned for construction in China for the next ten years.

The **Main Stadium** is intended to host major national and international events, such as the China National Games, Asian Games (the Chinese Olympic Committee recently confirmed that the city has submitted an official bid to host the 2022 Asian Games) and possibly even a future Olympic bid. The facility will also host regular football club play and it is understood that the city will be bidding for several other international events in the coming years.

Commenting on the Main Stadium's planned long-term use, Hu Xiaoming, design director of CCDI's Sports Division, said: ***"The issue is not about how to sustain a large stadium commercially between games, but is about how a massive stadium can lead a 2,000,000m^2 mixed-use commercial program in a green park setting, form a future urban centre and redefine a new lifestyle. Our design provides what is exactly needed to support that agenda."***

The stadium's exterior geometry draws from the flora found on the banks of Hangzhou's West Lake to create a powerful and unique image along the Qian Tang riverfront. The stadium bowl program and structure are coordinated with the exterior shell to create a unique concourse and circulation experience.

In regards to the stadium's exterior design, NBBJ Partner, Robert Mankin, AIA LEEP AP, advised: ***"Hangzhou is considered one of the most scenic cities in China, and its West Lake is renowned for its beauty and unique foliage. The stadium draws upon this beauty by using the indigenous water lily of the West Lake as its conceptual inspiration, and then interpreting that into a series of modular 'petal' structures that gracefully surround the stadium.***

"Many stadiums have attempted to emulate flowers, but the Hangzhou Main Stadium is unique in how it reinterprets the lily into an elegant and timeless architecture that has deep cultural relevance to Hangzhou, yet points boldly toward its future as an international city."

The seating bowl has been carefully designed to provide a sense of intimacy for large events, yet will remain open on the north end to reveal a view to the Yangtze riverfront, to connect the sporting events to the city.

Within the bowl, there are four quadrants – in a nod to the heritage of Beijing's famous **Worker's Stadium** – of bold colour, which in turn dissolve into the roof structure. The architects advised that this approach is intended to create a sense of neighbourhoods within the bowl, and to better orient the fans as they move through the stadium.

An extensive hospitality level comprised of private luxury suites and flexible open club spaces is also planned, within which there will be a variety of spaces that can be used simultaneously for major international events (with a high number of VIPs), but also selectively used during non-event times.

The design of the interior draws from contemporary hospitality spaces and uses a variety of bold colours to relate spaces to the seating bowl within, and appeal to the growing cosmopolitan tastes of Hangzhou.



HANGZHOU SPORTS PARK: DESIGN COMPUTATION

As worldwide demand for steel increases – by no less than 78% in the last decade alone – so has the cost, which has skyrocketed 217% since 2007.

"That's why NBBJ used parametric design to cut waste while creating functionality and form. Our designers leveraged advanced parametric scripts and modelling techniques to develop and optimise the exterior shell of the Hangzhou stadium. The steel shell and concrete bowl systems were coordinated and linked for stability and optimized steel use. Because the model was parametric, design changes could be made with an extremely short turnaround, eliminating the "build-test-discard" method common in traditional modelling," explained NBBJ's Mankin.

The parametric model was used as the basis for cross-disciplinary collaboration with engineers and material consultants. The engineers and consultants could use the design team's output directly for performing their specialised design and analysis operations.

The close communication between disciplines enabled the design team to ensure quality control and also find opportunities for further optimisation. The end result being that NBBJ achieved a 67% steel saving over similar arenas, like the famed Bird's Nest and Beijing National Stadium.



TENNIS CENTRE

The **Tennis Centre** is intended to be the counterpoint to the Main Stadium within the Sports Park. It will feature several scales of spectator venues, support buildings and practice courts, and will be capable of hosting major international ATP events.

The anchor of the Tennis Centre will be the 10,000-seat Main Court, the exterior of which will complement the elegance of the Main Stadium design, but takes on a more turbine-like form inspired by the motion of a tennis match. The Main Court will feature a unique rotating retractable roof, which will enable the venue to be flexible for finals matches in any weather conditions, as well as offering provision for additional concert and entertainment uses.

The main stadium, commercial/retail centre and the tennis centre are all currently under construction, with completion slated for late 2015. ■

FACILITY WATCH



STADIUMS
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AUSTRALIA

Adelaide: Coopers Stadium

Various proposals for soccer stadium of Adelaide United (Chairman Dario Fontanarosa). Adelaide Entertainment Corporation has proposed ETFE roof and link to the Oval, creating a sports precinct to bid for the Commonwealth Games. Interim enhancements could involve increasing pitch size and capacity.

Capacity	25,000 (17,000)
Cost	A$75m

Brookvale, NSW: Brookvale Oval

Proposed new home of NRL team Manly Sea Eagles to resist urge to move to Allianz Stadium. Community consultation process. Development of land on Pittwater Road for commercial and residential. Owner: Warringah Council.

Capacity	23,000

Cairns: Rectangular Stadium

Study commissioned from Coffey Sport and Leisure. Owner: Cairns Regional Council.

Capacity	20,000
Cost	A$66m

Canberra Stadium

Crumbling home of the ACT Brumbies and Canberra Raiders. Maintenance costs of A$2m per annum. Naming rights in prospect and then new under cover multi-purpose stadium in Civic for Raiders, Brumbies, soccer, concerts, conferences, netball and basketball. Expandable to 45,000 for any future World Cup bid.

Capacity	25,000-35,000
Completion	2020

Fremantle Oval Precinct

Development to maximise community use and commercial exploitation for Fremantle Football Club, South Fremantle Football Club, the Western Australian Department of Sport and Recreation, and the AFL. Masterplan: Coffey Commercial Advisory, Cox Architects, WT Partnership.

Geelong: Simonds Stadium

Phase 4 of redevelopment for home of Geelong Football Club. Finance: State ($70m). Additional funding sought from city and AFL Alternative training venue for Cats.

Cost	A$90m
Capacity	36,000+
Completion	2017

Gold Coast City: Carrara Stadium

Commonwealth Games 2018: athletics competition and the opening and closing ceremonies. Capacity will be temporarily increased from 25,000 to 40,000. A new warm-up track will also be constructed. Owner/operator: Stadiums Queensland.

Capacity	40,000

Darwin: TIO Stadium

Proposal by AFLNT (Chief Executive Tony Frawley) for upgrade of TIO Stadium at Marrara Sporting Complex. Expanded main grandstand, portable stands on the scoreboard side, kitchen and dining facilities, new changerooms and resurfacing. Designs and feasibility study (A$50,000) completed for submission to the Federal and Northern Territory Governments

Cost	A$80m



New Perth Stadium

Perth: New Perth Stadium

Five tiers. Bronze façade uses anodised aluminium. LED lighting for home team colours by night. A multi-purpose stadium and sports precinct located on the Burswood Peninsula as part of a Peninsula wide transformation. Request for proposals out with operators - appointment expected early 2016. First concrete poured in May 2015 - 2,300 piles. Workforce: 5,700. A State Government of Western Australia committed project, with backing of Western Australia Premier Colin Barnett. The design - conceived by Cox Architecture, HKS Architects, Arup and Hassell Studio - was revealed in July 2014 by Premier and Minister for Sports and Recreation – **www.perthstadium.com.au/winning-new-perth-stadium-design-revealed** – East-west orientation. Field: 165m x 130m, roof covers 85% of seats. The widest range of seating and hospitality options of any stadia in Australia. Premium facilities: Field Club – a terrace at field level with the ability to view the home team warming up – an Australian first; Coaches Club – patrons positioned adjacent to the home team coaches box; Sky View Lounge and a range of other function spaces to maximise views of Perth. Procurement: Public Procurement Process (PPP) for the Design, Build, Finance and Maintain (DBFM) contract. The State Government finalised the contract with WESTADIUM consortium (led by Brookfield Financial, Brookfield Multiplex and John Laing) in July 2014. Can accommodate AFL, rugby union and league, soccer, cricket and entertainment events. Project Director: Ronnie Hurst.VenuesWest appointed as Governance Agency. It will oversee the selection of the stadium's operator, which will establish agreements with end-users. Physical pre-construction works are complete. Formwork and concrete: CASC (A$30m). Steel: Civmec (A$73m). The associated transport infrastructure budget is A$339.2m.

Capacity	60,000 (expandable to 70,000)
Cost	A$820.7m (sport precinct +A$81.7m)
Completion	2018



Hangzhou Olympic Sports Park

Rockhampton, Queensland: NRL Stadium

Central Queensland Stadium committee set up to consider sites and manage licensing and approvals stages. Project is dependent on the success of the region in getting its own NRL team. Stadium and 1,000-seat convention centre. Jobs: 425 (operational). Developer: Capricorn Enterprises (CEO Mary Carroll). Architect: Populous. Finance: State Government.

Capacity	20,000
Cost	A$130-150m
Completion	2016

Sydney: Allianz Stadium

Naming rights deal is helping fund upgrade to Sydney Football Ground. Proposed level-one deck to connect to the eastern and western stands, forming a continuous upper bowl to provide extra seats at the goal ends. Developer: Sydney and Cricket and Sportsground Trust.

Capacity	60,000 (55,000)

Sydney: Blacktown Olympic Park (BOP)

Proposed upgrade to host a new AFL franchise in western Sydney. 170 metre by 150 metre main oval with a second practice field and ancillary facilities.

Capacity	10,000 (current)

Sydney: ANZ Stadium

Masterplan for upgrade of former Olympic Stadium. Operator: STADIUM Australia Operations Pty Ltd (ANZ Stadium Managing Director Daryl Kerry). Contractor: Laing O'Rourke. Architect: BVN Donovan Hill. Engineer: Arup. Vision includes a retractable roof, reconfiguration of the Stadium's lower seating bowl to improve spectator viewing and playing field dimensions - bringing spectators as close as five metres to the field of play at the northern and southern ends of the Stadium through the installation of moveable grandstands and creating a perfect rectangle for rugby league, rugby union and football; increasing the eastern and western boundaries to provide longer straight-hit boundaries in cricket and a more traditional oval shape for AFL. New and refurbished player and spectator facilities including restaurants, bars, terraces and eateries. Development of the precinct outside the Stadium, which is expected to include new precinct bars, cafes and restaurants for Stadium patrons to enjoy before and after events.

Capacity	80,000
Capacity	A$350m
Completion	2018

Tasmania, Bellerive: Blundstone Arena

Cricket stadium upgrade for ICC World Cup and to host AFL games in winter. Main work completed, final works completing for 2015 season. New entrance and stand on eastern side. Enhanced function facilities. Elite training and gym. Owner: Cricket Tasmania (CE David Johnston). Architects: Suters and ARTAS. Finance: $15m Cricket Australia, $15m Tasmanian government.

Capacity	20,000
Cost	A$30m
Completion	mid 2015

Townsville, Queensland: Townsville Stadium

New stadium for North Queensland Cowboys (Chief Executive Peter Jourdain). City and NRL keen but finance gap needs filling. Queensland Government funding ($100m) committed for the stadium and a combined entertainment centre.

Capacity	25,000-30,000
Cost	A$300m
Completion	2020

CAMBODIA

Phnom Penh: Morodok Techno National Stadium



Centrepiece of the 2023 Cambodia SEA Games, in multi-purpose sports complex on the outskirts of Phnom Penh in Prek Phnov. Complex also houses Olympic swimming pool, outdoor football pitch, running track, tennis courts and dormitories for athletes. Finance: $100m donation from the Chinese government.

Capacity	60,000
Cost	$100m
Completion	2021

CHINA

Hangzhou Olympic Sports Park

80,000-seat stadium plus open space, walking trails, a tennis facility, retail space, community playing fields and an extreme sports area. Area: 400,000m^2. Architects: NBBJ and CCDI.

Completion	mid 2015

Hong Kong: Kai Tak multi-purpose

Proposed stadium at heart of 24 hectare sports hub as part of redevelopment of airport site. Preconstruction funding approved. Office, commercial and retail space, public recreation and smaller sports ground (5,000) and indoor arena (4,000) also on site. Finance: public.

Capacity	50,000
Cost	HK$23bn
Completion	2020

Shantou: Shantou University Sports Park



Basketball arena (6,278), a natatorium with Olympic-sized swimming pool, a conference centre, sport and fitness training facilities, a flexible grand conference hall, a 200-room boutique hotel and an underground car park. The entire structure covered by a roof garden fully accessible to pedestrians and with dramatic views of the campus and surrounding countryside. Area: 60,000m^2. Building area: 52,000m^2. Architect: MANICA Architecture. Finance: Li Ka Shing Foundation of Hong Kong.

Capacity	6,278
Cost	RMB560m
Completion	2016

Suzhou: Multi-purpose stadium

Main stadium, one of five facilities on a single campus – stadium, sports and entertainment arena, an international-standard swimming complex, an athletics track and training centre. Plus retail mall and hotel. Developer: Suzhou Industrial Park Sports Industry Development Co. Ltd (SIPSID). Building services, energy planning and LEED green building consultancy services: Mott MacDonald.

Capacity	45,000
Completion	2017

Wuhan: Tennis Center

For WTA open that debuted in 2014 in older roofless stadium. Birds-nest style with retractable roof and expanded facilities for players and officials. Suites: 25.

Capacity	15,000
Completion	August 2015

Guangdong, Zhuhai: Tennis Center

For WTA Elite Trophy 2015-2019. Centre court and pro facilities in first phase. Match courts: 6. Training courts: 12. Architect: Populous.

Capacity	5,000 (centre court), 1,000 (secondary)
Cost	US$84m
Completion	October 2015

FIJI

Waila City Rugby Stadium

Housing project masterplan with infrastructure and leisure, including a rugby stadium. Construction spans a decade. The Housing Authority has advertised for expressions of interest from development consortiums.

Capacity	25,000
Cost	A$1bn

GOA

Panaji: Campai Football Stadium

Soccer stadium construction to commence from September 2015. Expected to be tendered by the end of June. Developer: Goa State Urban Development Agency (GSUDA). Four-floor main stand building to FIFA standards, with a boat-shaped roof. The height of the stadium will be 40 cms above the current ground level to sustain any sea water level rise in the future. Office for Goa Football Association. VIP: 200. Temporary: 4,500. Turf: natural.

Capacity	4,000
Cost	Rs 40 crores
Completion	2016

INDIA

Greater Noida Cricket Stadium

In construction near the F1 GP track. Uttar Pradesh Cricket Association are committed to playing matches. Suggestion of increase eventually to 100,000 capacity. Contractor: ATS Group.

Capacity	50,000
Completion	2016

Hindustan, Solan, Chail: Cricket stadium

Preparing detailed project report for construction of a cricket stadium (international standards).

Jammu and Kashmir Cricket Stadium

International standard cricket stadium on land donated by government to Kashmir Cricket Association (JKCA). Finance: Board of Control for Cricket in India (BCCI).

Kochi: Ambedkar Stadium

Renovation. Pitch: synthetic (Limonta). Owner: Kerala Football Association. Staged improvements include floodlights.

Cost	Rs 30 crore

Kozhikode: EMS Corporation Stadium

Floodlights, media rooms and dressing rooms for players and officials and facilities for CCTV. New main grandstand: 3,000. VVIP lounge: 200, a VIP lounge. Finance: city and National Games Secretariat. Parking: 800. Commercial space in the first floor: 3,768 sq m. Proposal for a multiplex theatre. Architect R K Remesh.

Cost	Rs 31 crore

Lucknow Cricket Stadium

International cricket stadium and cricket academy project to be developed on a public-private-partnership model. Residential and commercial as main part of development. Owner: Lucknow Development Authority (LDA). Consultants: Innovest Advisory Services Pvt, Uttarakhand Infrastructure Development Company and Infrastructure Development Finance Company Ltd. Area: 60 acres.

Cost	Rs 400 crore

Mumbai: Motorsport venue

Multipurpose race circuit and regeneration project. Feasibility study underway. Project team: Capita Symonds, Populous, Delhi Integrated Multi Modal Transit System (DIMTS).

Punjab: Shahbaz Park & Sports Stadium

Main stadium and community sports facilities.

Surat: Multipurpose Stadium

Client: Surat Municipal Corporation (SMC). Consultants: Tata Consulting Engineers, Micon Engineers, Kothari Associates.

Cost	Rs 100 crore
Completion	2016

INDONESIA

Borneo: Balikpapan Stadium

New home base of Balikpapan's football team Persiba, which plays in Super League Indonesia.

Capacity	40,000
Completion	2016

Jakarta: BMW Stadium

In Papanggo subdistrict in North Jakarta. Area: 30 hectares. Finance: Jakarta provincial budget. Developer: Jakarta Sports And Youth Department. Design and build: Empat. Land acquisition under way.

Capacity	50,000
Cost	US$105m
Completion	2016

JAPAN

Osaka: Gamba Osaka Stadium

Soccer stadium for one of the original J. League members south of its current home Expo Stadium, in the Expo Commemoration Park. Community facilities and role as emergency evacuation centre. Finance: club fundraising from sponsor companies. Construction: Takenaka Corp. Operator Gamba.

Capacity	40,000
Cost	¥14 billion
Completion	Autumn 2015

Tokyo: Kasumigaoka National Stadium

Organisers are to run a new international competition to achieve a more affordable design. The first competion was won by Zaha Hadid Architects, but was ruled out in July 2015. In 2014 around 40,000 Japanese sports fans made the pilgrimage to bid a fond Sayonara to the national stadium. Demolition of the stadium started in July 2014 and completed in May 2015. Construction was scheduled to begin in October 2015, now adjusted to some time in 2016. It will not now be used for the 2019 Rugby World Cup, but will host the Opening and Closing Ceremonies, athletics, football and rugby competitions for the 2020 Olympic and Paralympic Games. Debate continues over design and capacity. Ambition to incorporate green technologies. Owner: Japan Sports Council. Area: 290,000m^2.

Capacity	80,000
Cost	US$1,470.857m
Completion	2019

Ariake Tennis Park

Some permanent, some temporary stadiums. Legacy: temporary parts will be re-used for community and schools sport. Capacity main stadium 10,000, stadium2 5,000, stadium3 3,000 (legacy 1,000), stadium4 2,500 (legacy 0).

Capacity	20,500, legacy 3,500 (total)
Cost	US$66.754m

Dream Island Archery Field

Tokyo 2020: archery. Legacy: integrated into the parkland surroundings, to host national and international archery competition events. Owner: Tokyo Metropolitan Government.

Capacity	7,000
Cost	US$15.84m

Musashino Forest Sport Centre

Under construction in the Tama district of Western Tokyo. Tokyo 2020: modern pentathlon. Owner: Tokyo Metropolitan Government. Legacy: sports, concerts and other cultural events.

Capacity	8,000, legacy 6,600
Cost	US$282.857m
Completion	2016

Sea Forest Waterway

Tokyo 2020: rowing and canoe-kayak (sprint). Legacy: rowing and canoe competition plus leisure. Construction of additional permanent structures required.

Capacity	24,000 (10,000 seated), legacy 2,000
Cost	US$78.069m

Seaside Park Hockey Stadium

Newly built in Ohi Seaside Park. Tokyo 2020: hockey. Legacy: remodelled as a hockey stadium with 4,000 capacity. Owner: Tokyo Metropolitan Government

Capacity	10,000 (legacy 4,000); stadium 25,000
Cost	US$28.286m

MALAYSIA

Nilai: Velodrome

Indoor velodrome to be built by youth and sports ministry.

Cost	US$24m

NEW ZEALAND

Dunedin: University Oval

Proposed enlargement of the playing area of the Dunedin ground for Otago Cricket (Chief Executive Ross Dykes) and to make it a test venue. Owner: Dunedin City Council.

Capacity	6,500 (3,500)

PAKISTAN

Islamabad: Benazir Bhutto Stadium

Cricket Stadium in construction after delay over environmental concerns as the land is in the National Park Area at Shakarparian. Land lease: CDA (30% of stadium income). Developer/operator: Pakistan Cricket Board. Area: 35 acres. Area: 35 acres.

Capacity	50,000

Peshawar Soccer Stadium

Proposed stadium with central government support.

Cost	Rs30m

PHILIPPINES

Manila Football Stadium

Home for national soccer team. Location to be decided. Owner: Philippine Sports Commission (PSC). Funding: annual operating costs FIFA.

Capacity	75,000
Cost	P300m

TONGA

Nuku'alota: National Stadium

Upgrade ahead of the 2019 Pacific Games. New Zealand-funded feasibility study and design.

Capacity	5,000
Cost	$NZ2m

EMEA

ALGERIA

Algiers: Baraki Stadium

Soccer stadium, including practice facilities. VIP hospitality areas, conference rooms and offices. Architect: Atelier Tom Sheehan & Partners (ATSP). Developer: Wilaya. Manager: DJSL. Engineers: GLI, DVVD, Designer: ABDI, QS: AD economist. Contractors: CRCEG (China).

Cost	€100m (overall €210m)

Oran Stadium

Main stadium plus athletics stadium (5,000), swimming complex, arena (3,000), tennis stadium, velodrome, outdoor fields, schools and 4-star hotel. Main stadium sits in natural contours of former quarry. Single level access to two terraces. Architect: ATSP. Developer: DJSL (Oran). Construction manager: DLEP. Engineers: GLI, DVVD. QS: AD economist. Contractors: MCC (China).

Cost	€261m (€98m for main stadium)
Completion	2015

AUSTRIA

Vienna: Allianz Stadium

New stadium for SK Rapid Vienna. On the site of the old Gerhard-Hanappi Stadium, which fans helped demolish at invitation of the club. Footprint rotated 90 degrees so that side stands are on west and east sides. Club will play their fixtures at an alternative venue while the facility is being constructed. Naming rights: The Allianz Group Austria. Overall predicted revenues: €3.6m annually. Construction: Stabag.

Capacity	28,000
Cost	€53m
Completion	2016

Vienna: Generali Arena

Upgrade for Austria Wien's soccer stadium. VIP lounges: 38. Temporary move to Ernst Happel Stadion.

Capacity	17,500
Cost	€48m
Completion	summer 2018

AZERBAIJAN

Dalga: National Team Stadium

Base for national team, financed by AFFA.

Capacity	6,000

FC Gabala Stadium

Stadium, training base (5 natural, 1 synthetic pitches) and Academy of Football Administration (education). Area: 7 hectares.

Capacity	15,000

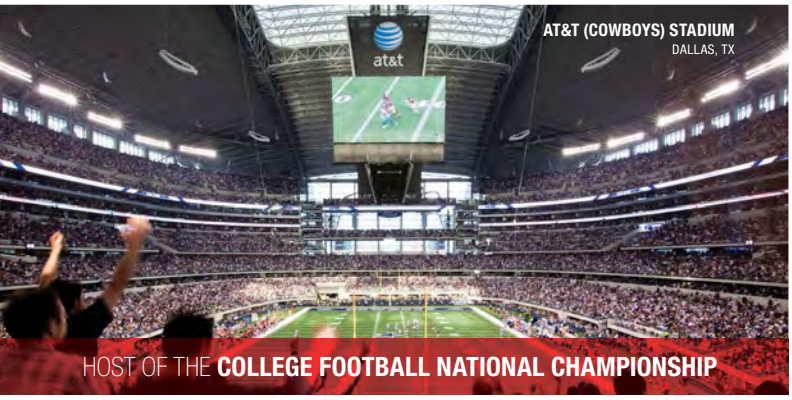
BELARUS

Minsk: Dinamo Stadium

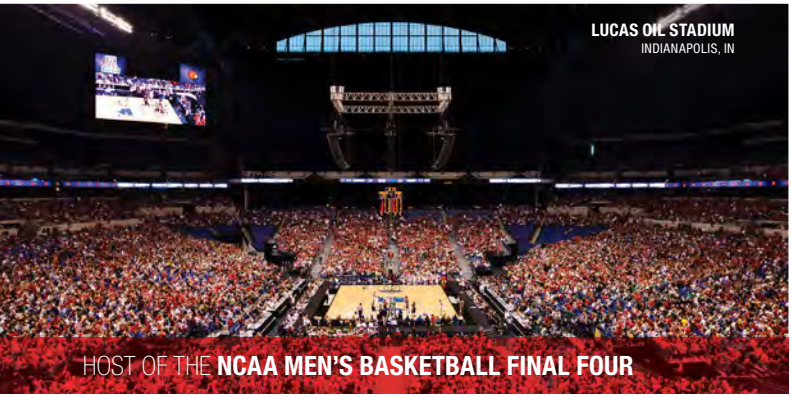
Reworking as large track-and-field complex to obtain category 1 IAAF certification. Olympic elements retained. Auxiliary stadium with warm-up ground, a sector for hammer, javelin and discus throwing along with dressing rooms and climbing wall. Perimeter will be covered with structures made of light materials. Turf: natural. New lighting, press centre, a physical culture complex, a medical centre, dressing rooms and halls for boxing, weightlifting and sports games. Catering facilities such as retail outlets, bars, cafes and restaurants as well as parking lots, including for buses, will be constructed. Backs bid to host the 2019 European Olympic Youth Festival. Design: Minskproject. Developer: Tourism Department of the Minsk City Hall.

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BELGIUM

Brussels: Eurostadium

The Board of the City of Brussels selected the preferred candidate for the design and build; negotiations under way, aiming for contract June 2015. The chosen company will build, finance and operate the stadium. RSC Anderlecht and the Royal Belgian Football Association will rent the stadium. For Euro 2020. Tenants: RSC Anderlecht + KBVB/URBSFA (Royal Belgian Football Association; Red Devils, Belgian National Team). Developer: Brussels, Royal Belgian Football Association and RSC Anderlecht. Architect: Jaspers-Eyers Architects. Design and build preferred candidate: BAM-Ghelamco consortium.

Capacity	62,613
Cost	€314m
Completion	2018

Liege: Stade Maurice Dufasne

Corner filling to add 7,000 capacity at the home of Standard Liège. Possible car park.

Capacity	+7,000
Completion	2018

BULGARIA

Plovdiv: Botev Plovdiv FC Stadium

Work on Botev Plovdiv's renovated soccer stadium (Hristo Botev) halted after financial issues surrounding problems with Corporate Commercial Bank AD (owner Tsvetan Vasilev). Restarted. Concession owner: Botev Plovdiv (35 years).

Cost	€10m
Completion	2015

Sofia: National Stadium

Long-term commitment confirmed by Bulgarian Sports Minister Mariana Georgieva. Possible host of Euro 2020 games. Bulgarian Football Union, Bulgarian club Slavia and German investment company IFS have signed a preliminary agreement. On the site of Slavia's stadium. Volleyball and basketball facilities. Replaces Vasil Levski national stadium which will now be used for athletics only.

Capacity	40,000
Cost	€40m

REPUBLIC OF CONGO

Brazzaville: All-Africa Games Stadium

Main stadium for 50th anniversary of All-Africa Games. Architect: PTW. Site also has 10,000-seat arena and 2,000-seat aquatics centre.

Capacity	60,000
Cost	US$500m
Completion	September 2015

CROATIA

Croatia: Kantrida Stadium

New-build stadium for HNK Rijeka on same site.

Capacity	14,000
Completion	July 2016

EIRE/REPUBLIC OF IRELAND

Bohemians Stadium

Stadium for Bohemians after sale of Dalymount Park. Developer: Andorey Developments.

Capacity	10,000

Bryanstown: Drogheda Stadium

Proposed for Drogheda United (Vincent Hoey). Uncertainty over land allocation and rival alternatives.

Capacity	10,000

Cork: Páirc Uí Chaoimh Stadium

GAA stadium upgrade as part of Marina Park (€67m). Roofs on both stands, new dressing rooms, pre-match warm-up area, medical facilities, restaurants, meeting and conference rooms, media facilities and a museum as well as new and additional turnstiles. Developer: Cork County Board. Project manager: Malachy Walsh and Partners. Architect: Scott Tallon Walker. GAA centre of excellence, next to the stadium, full-size all-weather pitch, new gymnasium, dressing rooms, video, performance assessment and rehab facilities. Community access.

Capacity	45,000
Cost	€22m
Completion	2016

Dublin: RDS Arena

International design competition won by Dublin-based Newenham Mulligan Architects and London-based Grimshaw Architects. Five designs anonymously shortlisted, with the winner chosen by a five-person expert jury. RDS, with Leinster Rugby, will work to complete the design that will host professional rugby matches, equestrian sports, music concerts and other sporting opportunities. Six-month time frame until choice of concept architect. Client: RDS (Chief Executive Michael Duffy). Tenants: Leinster Rugby (Chief Executive Mick Dawson), RDS Dublin Horse Show. Finance: applying for government grant, seeking naming rights deal.

Capacity	25,000 (18,500)
Cost	€35m (€20m)
Completion	2019

Limerick FC

Medium-term plan to build new stadium for Eircom League team playing at Hogan Park.

Capacity	7,000

ENGLAND

Barrow: Barrow Building Society Stadium

Five-year plan from owner Mark Casson to redevelop the Barrow AFC's stadium. New stands on the Popular Side (currently a terrace), the Main Stand (seats and standing) and the Steelworks/Crossbar End (standing) sections of the ground. New fan, corporate and hospitality facilities. Architect choice by mid-December. Previously planned ground improvements, including the floodlights and Crossbar building, will be completed.

Cost	£10m
Completion	2018 (start 2015)

Basingstoke Town FC Stadium

Proposed relocation to land at Old Common (owned by council), with all-weather training (£500,000) and community facilities. On hold until autumn 2015. Other sites ruled out by council officers. Finance: sale of existing Camrose ground.

Cost	£10m

Bath: Recreation Ground

Design for new Rec Stadium being readied to go to planning permission application. 150th anniversary in 2015. East Stand will remain temporary. West Stand, North Terrace and Clubhouse will be demolished and redeveloped to improve facilities. The team's brief is to incorporate the space within the existing footprint. Design team: Wilkinson Eyre Architects, engineering consultants Buro Happold, environmental design firm Nicholas Pearson Associates, law firm Withy King, Boyer Planning and project management specialist Capita Symonds.

Boston: Boston United Stadium

Community stadium as part of The Quadrant. Developer: Chestnut Homes. Architect: WMA Architects and Planners. Planning permission granted. All-weather 3G pitch, educational facilities, conference and banqueting facilities; a café; education and community facilities; meeting rooms for hire; sports hall attached to stadium. Specifications to Football League standards.

Capacity	5,000

Bournemouth: Goldsands Stadium

AFC Bournemouth looking to expand by 4,000 by filling in the corners of the stadium. First stage to 15,000.

Capacity	18,000

Bristol: Ashton Gate Stadium

Four phase development of the stadium is underway. Ground share between Bristol City FC and Bristol Rugby Club. A new DESSO Grassmaster pitch with undersoil heating has been installed, the Wedlock Stand demolished and the replacement stand due to open summer 2015. Phase 2 - modification of Dolman Stand seating deck, concourse and roof extension Jan - Jul 2015. Phase 3, the demolition of Williams Stand begins in May 2015 with the new stand completed by summer 2016 at which point the internal refurbishment of the Atyeo Stand will complete the development.
The new stadium will include sports bar, museum, 18 hospitality boxes, over 1250 restaurant covers as well as new conference and exhibition facilities. Hospitality technology: Verteda. Construction: Barr.

Capacity	27,000 (21,500)
Cost	£45m
Completion	2016

Bristol: UWE Stadium

For Bristol Rovers FC. To be built on land leased from the University of the West of England at its Frenchay campus. Council permission received. Supporters' club bar, shop, banqueting and hospitality suite, convenience store, crèche, gym, jogging track, teaching area (19,000ft^2). Facilities available to university on non-matchdays. Possible share with Bristol RUFC. Parking: 1,270. Finance: Sale of old Memorial Stadium to Sainsburys supermarket approved by council. Funding: private.

Capacity	21,700
Cost	£40m
Completion	2016

Cambridge Community Stadium

Proposed community stadium for Cambridge United, Cambridge City and Cambridge Rugby Club. Site under discussion. Feasibility study: Cambridgeshire Horizons.

Capacity	10,000
Cost	£12-£16m

Carlisle United Stadium

City council's ten-year business plan proposed to include town centre stadium. Club and council in discussions. Update on out of town stadium and shopping centre at Kingsmoor Park.

Capacity	12,000

Castleford Tigers Stadium

Stadium for Rugby Super League Club Castleford Tigers (CE Steve Gill) as part of £135m Five Towns Park regeneration project in former coalfields area in West Yorkshire. Adjacent to Junction 32 of the M62. Replaces Wheldon Road ground, which opened in 1926. Planning application with Wakefield Metropolitan District Council. Designed to meet Super League requirements, the purpose-built stadium will provide administration, changing facilities, restaurants and hospitality areas, with a mixture of both seating and standing terraces. Developers: Lateral Property Group (MD Philip Lunn), Wakefield MDC and the Tigers. Main contractor: GMI Construction Group plc.

Capacity	10,000
Completion	2017

Cheltenham Racecourse

New 6,500-capacity stand in place of the circa 1920s 'A&R' stand. State-of-the-art new grandstand alongside Cheltenham's existing main grandstand to include new annual members' facilities, general public viewing areas, private boxes, a Super Club and the Royal Box. Elevated walkways to ease mobility for customers and provide a multi-tiered 'amphitheatre' experience around the parade ring. The current royal box, which was built in 1952, and 55 other boxes, which were built in the 1920s and 1930s, will be demolished. The plans have been approved by Cheltenham Borough Council. Developer: Jockey Club. Funding: successful retail bond open to the public £25m. Construction: Kier. Engineer: Furness.

Capacity	21,700
Cost	£45m
Completion	Spring 2016

Exeter: St James Park



Public consultation under way before planning application for a partial development of Exeter City Football Club's St James Park, including demolition and rebuilding of the Stagecoach Family Stand on the Well Street side of the ground. Relocation of and improvements to the player and referee changing facilities beneath the main stand. Significant improvements to other parts of the ground including the replacement and enhancement of the toilet facilities for the Big Bank Stand. Enabling development of approximately 320 student beds. Commercial partner: Yelverton Properties

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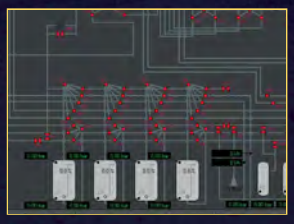


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Credit: *Layla Underwood*

NORTHERN HIGHLIGHT

The new Shell Place Recreation Centre is a Northern highlight for Alberta. Its flexible, inclusive design has enabled a fast-growing Alberta community to expand its athletic, recreational and social opportunities, while continuing to transform its identity, as HOK's Micheal Day explains.

Shell Place, the US$ 127m addition to the 450,000sqft Suncor Community Leisure Centre at MacDonald Island Park in Fort McMurray, Alberta, has created one of Canada's best recreation, leisure and social centres.

Over the past decade, Fort McMurray's population has nearly doubled to more than 70,000 people. Its location near the Athabasca oil sands makes it one of the country's hubs for oil production.

Designed by global design, architecture, engineering and planning firm **HOK** and Edmonton-based **Architecture Tkalcic Bengert**, the significant Shell Place expansion provides for new amenities and acts as the heart of this fast-growing community. The flexible design accommodates year-round sports, recreation and entertainment activities on a single footprint.

The project comprises a multipurpose stadium and outdoor performance venue, a baseball and softball tournament complex, and several indoor and outdoor activity areas. Since opening in June 2015, the venue has hosted the Canadian Football League, the North American Soccer League and minor league baseball and football games, as well as a series of A-list concert performances and community events.

SMS EQUIPMENT STADIUM CENTREPIECE

The centrepiece of Shell Place is the new sports and performance complex, which includes **SMS Equipment Stadium** that can comfortably hold crowds from 5,000 to 20,000 people, and **CNOOC Nexen Stage**. An iconic, 45ft-tall, tensile membrane canopy inspired by the region's undulating northern lights and snow drifts creates a focal point for the complex. Situated at one end of the stadium, CNOOC Nexen Stage uses this canopy structure as a dramatic backdrop.

At the other end of the stadium is a ballpark complex, featuring a 2,300-seat baseball stadium with a berm and party zone areas that increase capacity to 5,500 fans, and four additional turf softball diamonds.

The design team incorporated input from a wide range of stakeholders, including First Nations representatives. Community outreach meetings helped the team translate diverse needs into a plan that accommodates multiple uses within each space.

A PLACE FOR THE COMMUNITY

In response to the desire expressed by community members to maximise their exposure to sun – and made possible by the low sun angles in this latitude – the plan orients the ballpark complex to the southwest. This orientation allows for the sharing of interior space beneath the combined third-base/end zone stands. It also provides views past the tree line toward Fort McMurray.

Along the south side, between the new facility and the Athabasca and Clearwater rivers, the Total Aboriginal Interpretive Walking Trail celebrates the beauty of the boreal forest and offers another health and wellness option.

Shell Place's connecting spine houses new amenities, including an indoor turf field house and a four-court badminton centre. Also included in the development is a shared space for social-profit organisations that provide essential community services.

Shell Place is poised to catalyse a major societal shift in the community. By serving the needs of a diverse population, the multipurpose complex will advance Fort McMurray's transformation from a transient, worker-oriented base to a more permanent, family-oriented community. ■

Micheal Day is a vice president and senior project manager in **HOK's** Sports + Recreation + Entertainment practice.

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Forest Green Rovers Stadium



Public consultation on plans for a new stadium at Junction 13 of the M5 for English National League side. Part of a 100-acre sports and green technology centre called 'Eco Park' to include training fields, 4G pitches, multi-disciplinary sporting area, as well as a sports science hub.

Capacity	5,000 (expandable to 10,000)

Fylde: Football stadium

Stadium for AFC Fylde (chairman David Haythornthwaite), plus sports and science park on 32-acre site close to M55. Main stand of 2,000 capacity and with executive boxes and function room. Supermarket and and other leisure. Go-ahead from national planning unit. Planning consent given by Fylde Council. Developer: Mill Farm Ventures. Planning: PWA. Architect: Frank Whittle Partnership (FWP). Construction: Warden Construction.

Capacity	6,000
Cost	£18m
Completion	2016

Gillingham FC Stadium

Proposed stadium and training facilities for 40 acres at Mill Hill about a mile from the existing stadium in Redfern Avenue. Also be suitable for rugby and concerts. Club (chairman Paul Scally) working with Medway Council and has applied for permission to carry out a scoping assessment of the site, ahead of a more detailed assessment of the scheme's environmental impact. Finance: supermarket, residential development.

Capacity	24,000

Grimsby: Grimsby Town FC Stadium

Grimsby Town FC (Club Director John Fenty) is looking again at building a new stadium, this time on land off Peaks Parkway on the edge of the town. Public consultation events in February/March. Club is emphasising plans to avoid disruption of residential area.

Capacity	12-14,000
Cost	£22m

Leeds: Headingley Stadium

Yorkshire County Cricket Club's 20-year masterplan. Installation of floodlights and the rebuilding of the North/South Stand, adjoining the rugby ground. This will become the centrepiece of the project. Phase One: Erection of four permanent floodlight pylons. Phase Two: Rebuild the North/South Stand in conjunction with Leeds Rugby to incorporate a three-tiered seating area to accommodate 5,060 seats, enhance corporate facilities and new permanent concession units. Phase Three: To incorporate an additional 915 seats in the upper tier of the North East Stand. Phase Four: The development of a new pavilion in the North West area of the stadium, which will be built on five levels and is to include state-of-the-art corporate facilities, new dressing rooms, a Members' Long Room, plus the creation of a main entrance to the stadium on Kirkstall Lane. Phase Five: The erection of a translucent cantilever roof to cover the White Rose Stand on the western side of the ground. Phase Six: Landscaping on the White Rose Stand and North East stand concourses.

Capacity	20,000

Herne Hill: Velodrome Pavilion

Planning approval received. Area: 275m². Owner: Herne Hill Velodrome Trust. Architect: Hopkins Architects.

Cost	£1.75m
Completion	2016

Keighley: Cougar Park

First phase is to rebuild the 1930s main stand. Second phase is modern changing rooms and redevelopment of the gym, education facilities and function suites. Synthetic training pitch with floodlighting (£0.4m). Planning awarded by Bradford Council. Finance being put together. Architect: Riverside Design Studio Architects.

Cost	£1.6m

Leicester: Welford Road

New stand with tapered roof to replace ageing Clubhouse end. New offices and hospitality suite. Disabled seats: 62. Architect: AFL.

Capacity	26,000 (+3,000)
Completion	2015

Liverpool: Anfield Stadium

Upgrade of main stand (+8,500) and Anfield Road stand (+4,800). Planning permission for main stand obtained. Club and council working together on avenue and plaza through Stanley Park. New podium and cloister for Hillsborough Memorial. Architect: KSS. Planning: Turley. Construction: Carillion. Steel: Severfield.

Capacity	58,800 (+13,300)
Cost	£150m
Completion	2016

Liverpool: Everton Stadium

Everton FC (Chief Executive Robert Elstone) is working with Liverpool City Council to progress a stadium and regeneration opportunity at Walton Hall Park. The council and the club are working with Liverpool Mutual Homes (LMH) and Everton in the Community to develop ideas for the site in collaboration with the local community. This could lead to a formal planning application being lodged in the next 12 months. Finance: led by Everton FC but club cautious over taking on debt.

Capacity	50,000

London: Craven Cottage Stadium

Riverside stand rebuild to open up river walk, add spectator facilities, taking advantage of river views and passing trade, and increase capacity. Planning permission received. River works licence obtained from Port of London Authority. Architect: KSS.

Capacity	30,000 (25,000)

London: Lionel Road Stadium. Brentford

New community stadium for Brentford FC (Chairman Cliff Crown) after sale of Griffin Park to residential homes builder (Regen). Council, London major and GLA permission received. Land purchase hold-up. For both soccer and possibly rugby (London Welsh). Architect: AFL. Development partner: Willmott Dixon.

Capacity	20,000
Cost	£70m
Completion	2017

London: Lords Cricket Ground

MCC decided to develop Lords in the existing footprint. Begins Warner Stand in 2014, completes in 2027 with Compton and Edrich stands. Warner stand: planning permission received - 2,922-seats, match control facility, bars, restaurant (135) overlooking the ground. Roof: transparent insulated tensile fabric, supported on cantilevering American White Oak glulam beams. Resiting of Nursery Ground, new main entrance, pavilion extension, new banqueting and staff space, food 'street' and subterranean car-parking, access routes, waste management, catering and storage. Second phase plans going to planning permission, replacing Tavern and Allen Stands, a new Thomas Lord Building, new Tavern pub and internal reorganisation of spaces. Grace Gates opened up and back of house traffic moved undergound. Funding: MCC resources and borrowing. Architect: Populous. (Philip Johnson). Construction: BAM. *Separate project:* refurbishment of the J P Morgan Media Center (cost £4m (US$6.2m)) for the 2017 season when Lord's will host the ICC Women's Cricket World Cup Final. Modernisation of spaces, technology and sightlines. Architect: David Miller Architects. Project Manager: Gardiner Theobold.

Capacity	32,000 (29,500)
Cost	£180-200m
Completion	2022 (seoond phase) 2027 (entire)

London: Old Oak Common QPR Stadium

Greater London Authority is drawing up plans for long-term development of Old Oak Common.Multipurpose stadium proposed as part of a major regeneration project in the Old Oak area in West London. Public consultation process begun in 2014 and report produced. The scheme has the provisional title of New Queens Park. Developement partner: Stadium Capital Developments. Masterplanner: Farrells. Architects: CZWG and Populous. Project manager: EC Harris. Planning advisor: Savills. Land agent: Anthony Green & Spencer.

Capacity	40,000

London, QE Park: Olympic Stadium

Conversion to multi-use stadium following 2012 Olympics. Reconfiguring roof (84m spa, 45,000m²) to complete by spring 2015 for Rugby World Cup. Retractable seating solution on all four sides. UEFA category 4 football Stadium. Installing hospitality and VIP facilities. Operator: E20 Stadium Partnership (London Legacy Development Corporation and London Newham Council). Tenants: West Ham (Ian Tompkins), 99-year lease, annual rental £2m; UK Athletics; Newham residents. Finance: West Ham £15m, Newham £40m, UK government £60m. Roof contractor: Balfour Beatty (£41m). Cable specialist: PFEIFER. Electrical and plumbing: Imtech G&H (£25m). Roof preparatory work: Carey's (£1.5m). Construction: Balfour Beatty (£113m). Steel construction management: ProSteel Engineering. Operator: VINCI. Hospitality: Delaware North.

Capacity	54,000 (soccer), 71,000 (cricket), 74,000 (athletics), 90,000 (concerts)
Cost	£186m (£150m, £100m)
Completion	2015

London, Chelsea: Stamford Bridge

Chelsea seeking to expand in absence of new ground. Footprint surounded by cemetry and railway. Study into expansion amidst new precinct reportedly commissioned. Consulting: Herzog & de Meuron, Lifschutz Davidson Sandilands.

Capacity	60,000

London: Tottenham Hotspur Stadium



Planning permission received for proposed new stadium. Spurs working with Haringey council to get optimum development for club and community. Single tier end stand with 17,000 capacity will be biggest in UK soccer. Fully retractable pitch with second layer playing surface to NFL standards. Tottenham Experience, visitors cenre and arrivals hub, museum (incorporating Grade II listed Warmington House), cinema megastore, ticket office and cafe. Basement for parking, plant and storage. Leisure facilities, public space, supermarket and housing near current White Hart Lane site. Success in latest legal battle over Compulsory Purchasing Order for the remaining land on the site. Two-phase construction with works during both season and close season, maintaining capacity. One year out at another stadium in 2017-18. Planning: Savills. Architect: Populous. Heritage architect: Donald Insall Associates. Project manager: AYH Arcadis (Paul Mitchell). Engineer: Buro Happold. Contractor (civil, engineering, structure): M Anderson Construction (£50m).

Capacity	61,000
Cost	£400m
Completion	2018

Macclesfield: Town Stadium

The stadium links a regeneration plan in South Macclesfield with residential, retail and employment facilities. Approved by Cheshire East cabinet. Planned as zero carbon by incorporation of sustainable energy sources at the design stage.

Manchester: Belle Vue
Under construction new speedway stadium for Aces and National Speedway Academy, next door to greyhound stadium. Expandable for major champs. Sports village (architect AFL) with National Basketball Performance Centre - 3 courts, one of which is 2,000-capacity show court to FIBA standards, hockey pitch and community facilities, sports health research institute. Public consultation took place in summer 2014.

Capacity	7,000 (1,842 seated in grandstand)
Cost	£7.3m (£6m)
Completion	2016

Manchester: Etihad Stadium (main)
Testing ahead of 2016 Premiership season. Planning permission was given after successful public consultation phase for the expansion of the North and South Stands to increase matchday capacity. South Stand first, adding 6,000 seats (54,000) then North Stand. Additional matchday jobs: 110. Architect: Populous. Construction: Laing O'Rourke.

Capacity	62,170 (47,670)

Northampton: Franklins Gardens
North Stand plans approved. Land preparations in 2014, full construction in summer 2015. Barwell Stand replaces 60-year old Sturtridge Pavilion. Ground floor public bar and two floors of hospitality suites and boxes. New control room and first-aid room. Extension of media facilities around the ground. Contractor: Buckingham.

Capacity	15,500 (+1,926)
Cost	£5.5m
Completion	2015

Northampton: Sixfields
Planning approved and groundbreaking carried out for New East Stand on soccer stadium, home of Northampton Town FC. Executive boxes, improved concessions. Conference centre and gym. These latter will be shared by a 100-room hotel to be built at a later date, attached to the stand, and designed to bring non-matchday revenue to the club. Athletics club sited next to stadium moving to Moulton Sports. Developers: The County Group (COO Simon Patnick), Northampton Town Football Club and Northampton Borough Council. Construction: Buckingham.

Capacity	+2,000 (total 8,500)
Completion	2015

Northfleet: PHB Stadium
Upgrade for Ebbsfleet United FC at Stonebridge Road. Replace wooden main stand, which is now unsafe. Commercial and operational facilities. Improved external areas and access. Planning application with Gravesham council. Architect: Alexander Sedgeley. Project manager: Faithorn Farrell Timms. Structural engineer: Marks Heeley. Services engineer: Crofton Design.

Capacity	6,000 (2,000 seated)
Cost	£8m (main grandstand £3.5m)
Completion	2016

Plymouth: South Stand Grandstand
Planning approved for new stand at Argyle's stadium but enabling project of cinema not approved. Chairman James Brent is working on a new way of funding.

Cost	£10m

Scunthorpe: Iron Arena
Masterplan issued for out of town football and leisure development on a site near the Scunthorpe United's present Glanford Park ground. All-seater stadium with club and executive facilities, a gym, office space and areas for commercial development as well as a club venue and supporters' bar. A sweeping curve on the main stand designed by FWP is enhanced by a striking truss which pays homage to Scunthorpe's steelwork history. Plan also includes a 120-bed hotel, a multi-use indoor arena, community sports pitches, indoor and outdoor crown green bowling facilities and a potential transport interchange hub with a new rail station. Architect: Frank Whittle Partnership (FWP).

Capacity	12,000
Cost	£25m
Completion	2016

Sheffield: Olympic Legacy Park Stadium
On the Don Valley Stadium site. Tenant team: Sheffield Eagles RLFC (Chairman Ian Swire). Main stand (capacity 2,500) will have a 50-bed hotel, restaurant and hospitality facilities along one side of the ground, and there are plans to develop joint facilities with Sheffield's second University Technical College (UTC) within the stadium complex. Pitch: synthetic - capable of supporting Super League, Rugby Union Premiership and international level, school and UTC. Also in the Park will be an Advanced Wellbeing Research Centre (AWRC) and clinical facilities run by the National Centre for Sport and Exercise Medicine (NCSEM). The Olympic Legacy Park project leader: Richard Caborn. Executive Director for Strategic Planning and Business Development: Andrew Cropley. Sheffield Eagles Director of Community, Development and Education: Ian Anniss. Finance: mixture of private and public (regional growth fund, council),

Cost	£6m
Completion	2016

Swindon: Abbey Stadium
New speedway stadium to be built adjacent to existing site. Designed with broadcasters in mind. Owner: Gaming International (CE Clarke Osbourne). Detailed planning complete, on site by mid 2015.

Completion	2016

Taunton: County Ground
New Somerset Pavilion. Raised and covered seating behind the bowler's arm. Meets specifications for holding one-day internationals. Canopy roof, potential for solar panels. Flexible central room at first floor level for corporate use as well as press box use for international matches. Suites: 5. Café-bistro area with access from the main car park and concourse areas for use during match and non-match days. Media Centre with excellent views across the ground. Rooftop terrace area used for corporate entertainment and also an excellent vantage point for TV cameras. Owner: Somerset CCC (Chief Executive Guy Lavender). Demolition of old pavilion will complete in December.

Capacity	1,300
Cost	£3.8m
Completion	2015

Truro Stadium
Stadium given planning permission. At Langarth, Threemilestone, near Truro for soccer and rugby. Main grandstand (4,200) and temporary. Pitch: synthetic. Conference centre (200), offices and restaurant. Tenants: Cornish Pirates (Chairman Ian Connell), Truro City Football Club, Truro and Penwith College (£2m), Cornwall College and the Royal Cornwall Hospital. Council no longer offering funds. Enabling project of supermarket also given planning permission. Feasibility study: Gardiner & Theobald LLP. Developers: Inox Group (MD Rob Saltmarsh), Henry Boot Developments (Julian Painter).

Capacity	6,000 (10,000 concerts)
Cost	£14m

Wakefield Trinity Stadium
Stadium for the Rugby League Wildcats and 100-acre business park near Stanley. Previous project was referred to the UK Secretary of State, which was a blow to receiving a Super League licence. Developer: Yorkcourt Properties.

Capacity	12,000
Cost	£19m

Wimbledon AFC Stadium
New stadium for AFC Wimbledon on their old Plough Lane ground (now Greyhound Stadium). House buyer to take over current site. Planning application to be submitted after endorsement of Merton Council's proposed designation of the site. Phased construction anticipated. A squash/fitness club with contemporary training facilities. Developer: AFC WImbledon (Chief Executive, Erik Samuelson), Greyhound Racing Authority Acquisition Ltd and Galliard Homes. Parking: 330 car + cycle parking.

Capacity	11,000 (expandable to 20,000)
Cost	£16m

Wimbledon, AELTC: No.1 Court
Retractable roof covering entire playing surface. Improvement of public facilities, 15 new hospitality suites on a completely remodelled level, catering facilities, commentary boxes and improved seating. New landscaped entrance plaza and views over the outer courts. Developer: All England Lawn Tennis Club (AELTC). Architects: KSS. Mechanical Engineers: M-E Engineers. Structural Engineers: Thornton Tomasetti.

Capacity	12,000
Completion	2019

Worcester City FC Stadium
Plans with City of Worcester for approval of multipurpose stadium at Perdiswell Sports Centre site. Pitch: synthetic. Standing and covered stands. Community use and pool. Club playing at Aggborough, home of Kidderminster in the meantime.

Capacity	4,130
Completion	2015

Workington Stadium
Proposed stadium for Workington soccer and rugby league and possibly a speedway. Requires council funding from sale of land.

Cost	£12m

York Community Stadium
All-seater for York City FC (Jason McGill) and York Athletics Club. York City Knights Rugby League Club now on board. Combined with community sports facilities, university athetics, swimming pool. Partners (York Teaching Hospital NHS Foundation Trust, York St John University, Be Independent (CIC) and Explore York Libraries and Archives Ltd) will make use of the building on non-matchdays. Project manager: Tim Atkins. Council has approved extra £4m funding. Detailed planning application. Developer/operator: Greenwich Leisure Ltd (Chris Symons). Construction: ISG.

Capacity	8,000
Cost	£41m
Completion	autumn 2016

ETHIOPIA

Addis Ababa: National Stadium
Tender out for contractor. Area: 67,000m². Coffee bean shaped 'Adey Abeba' stadium and sports village. First design dropped. Athletics track, aquatics centre, residential village, sports halls, arenas, retail and commercial zones, and the headquarters of the Federal Sport Commission. Modern ticketing and access control. Developer: Federal Sports Commission. Finance: national government. Design: MH Engineering Plc (GM Mesele Halle).

Capacity	60,000
Cost	US$100m
Completion	2016

FINLAND

Helsinki: Olympic Stadium
Renovation and expansion. Widening of track, roofing over stands, new infrastructure. Work must be monitored by Finnish National Board of Antiquities to ensure preservation. Structural engineering: Sweco.

Cost	€2m
Completion	2018

FRANCE

Dijon: Stade Gaston-Gérard
Reconstruction of three-storey east stand (5,112). Loges capacity: 204. Architect: Jean Guervilly, Sarl Herve Regnault.

Capacity	20,000
Cost	€18.27m
Completion	2017

Evry-Essonne: National Rugby Stadium
Proposal for national stadium on site 25km south of Paris. Permission granted to purchase the development site. Competitive dialogue opened for build and maintain contract. Developer: French Rugby Federation (FFR). Retractable roof and removable pitch. Architects: Populous and Ateliers 2/3/4. Events: 17-20.

Capacity	82,000
Cost	€600m
Completion	2017

Lens: Stade Felix Bollaert
Major renovation under way. Roof, pitch and seats removed. New upper tier in the Lepagnot. Will host EURO 2016 matches. Owner: City of Lens. Operator: Racing Club de Lens.

Capacity	38,223
Cost	€111.2m
Completion	end of 2015

Lyon: Stade des Lumières
Roof going on. 50-acre development for soccer club Olympique Lyonnais, with training centre and two hotels. Will be a host venue for EURO 2016 matches. In Decines-Charpieu area of city. Octagonal stadium will have transparent roof. Developer: OL Group (director general Patrick Iliou). OL Group and Vinci are negotiating contract for construction/operation. Marketing partner: SportFive (10-year deal). Events: 30-35. Parking: 7,000. Architect: Populous.

Capacity	57,628
Completion	2015

Nancy: Stade Marcel Picot
Major renovation planned as part of preparation to host EURO 2016 games but stadium not included so work uncertain. Owner: Community of Grand Nancy. Operator: AS Nancy Lorraine.

Capacity	31,973
Cost	€60m

Paris: Arena 92 Stadium
Rugby stadium for Racing Métro 92 in Nanterre in the western suburbs of Paris. Has secured funding. Spectators 5m from the touchline. Includes office accommodation. Turf: synthetic. Transport: 80% public. Multipurpose for concerts (38-tonne truck door). Jobs: 500. Architect: Christian de Portzamparc (competition winner). Sound design: Jean-Paul Lamoureux. Conference rooms (100-500), clubs, restaurants. Loges: 100. Business seats: 3,000. Technology: e-ticketing, RFID and Bluetooth access control, TV network, Wi-Fi, smart purse. Developer: Racing Arena. Engineering: Egis. Construction: Vinci.

Capacity	32,000 (rugby), 41,000 (concerts)
Cost	€351m
Completion	2016

Paris: Parc des Princes
Major renovation under way as part of preparation to host EURO 2016 games. PSG wants new stadium to be 60,000 capacity. Possibly lowering pitch. New business suites. Owner: City of Paris. Operator: SESE.

Capacity	60,000 (40,058)
Cost	€70-90m
Completion	2015

Paris: Roland Garros
Enlarging, modernising and rethinking of the historic Roland Garros site at Porte d'Auteuil. French Tennis Federation chose to stick with Roland Garros. Area: 35 acres. Courts: 35 outside. New 5,000-seat stadium and a new press centre. Main Philippe Chatrier court will be redesigned and feature a retractable roof.

Cost	€273m
Completion	2016

Rennes: Stade de Villejean
Athletics stadium under construction on campus of Universitaire de Villejean. Architect: Chabanne et Partenaires. Finance: Le Département d'Ille-et-Vilaine €5.5m, CNDS (Centre National de Développement du Sport) €2m, La Région Bretagne €3m, Rennes Métropole et la Ville de Rennes €1.5m.

Capacity	1,000
Cost	€12m
Completion	2015

Strasbourg: Stade de la Meinau
Major renovation planned as part of preparations to host EURO 2016 games (although the city is not on the shortlist). Owner: Community of Strasbourg. Operator: Community of Strasbourg.

Capacity	36,645
Cost	€160m

Toulouse: Stadium Municipal
Major renovation coming to a close as part of preparations to host EURO 2016 matches. City chosen as reserve. Owner: City of Toulouse.

Capacity	37,050
Cost	€56m
Completion	2015

GERMANY

Chemnitz: Stadion an der Gellerstrasse
For FC Chemnitzer. Demolition of old stadium, construction of modern soccer stadium with catering, office and retail. Architect: agn Niederberghaus & Partner (Stefan Nixdorf). Construction: BAM Sports.

Capacity	14,070 (7,900 seated)
Cost	€23m
Completion	4th quarter 2015

Erfurt: Multi-purpose Stadium


New main building, three new stands and a new roof. Owner: City of Erfurt. Operator: Erfurt GmbH (city, SWE Stadtwerke Erfurt GmbH and Messe Erfurt GmbH). Tenant: FC Rot-Weiß Erfurt. Meetings: 1,600m^2 (1300). Disabled: 40 wheelchairs, 10 seats for blind. Business seats: 1244. VIP: 346. Loges: 15 (5 convertible to meetings 40-100). Press conference room. Area: 8,200m^2. Architect: HPP/Köster GmbH. Finance: state €33.3m.

Capacity	18,559 (7,581 standing)
Cost	€39.1m
Completion	July 2016

Freiburg: SC Freiburg stadium
Proposed by city council in Wolfswinkel. City to vote on project. Operation: SC Freiburg. Finance: public, including infrastructure.

Capacity	35,000
Cost	€70m
Completion	2018

Hanover: Eilenriedestadions 96
Training centre for youth teams. New covered stands at historic stadium. Two natural and two artificial turf fields. Architect: Schulze & Partner.

Capacity	5,000
Cost	€15m
Completion	2017

Leipzig: Red Bull Arena expansion
Capacity increase to meet growing demand.

Capacity	55,000 (currently 44,345)

Munich: TSV 1860 Munich Stadium
Discussion taking place about separate stadium (head of stadium committee Christian Waggershauser). Club is looking at location in the Olympic Park.

Capacity	30-35,000

Regensburg: Continental Arena
New soccer stadium for SSV Jahn, a third division club. Naming rights: Euro 200,000 (5 years). Four grandstands visually pulled together by red facade. Architect: agn Niederberghaus & Partner (Stefan Nixdorf). Design and build: BAM Sports.

Capacity	24,000

Saarbrucken: Ludwig Park Stadium
Planning under way to update home stadium of FC Saarbrücken to DFL standards. Three-storey main stand. Loges: 10. Business Club: 635m^2. VIP terrace: 170m^2. Alternative stadium required from January 2016. Architect: GMP. Structural engineer: Schlaich Bergermann. ME: Paul GmbH. Transport: WSV/PCE.

Capacity	20,400
Completion	2017

Zwickau FC Stadium
One main stand for soccer. Architect: ARC. Contractor sought.

Capacity	10,049
Cost	€18m
Completion	2016

GHANA

Cape Coast Stadium
Facilities including athletics track, two football fields with natural turf, two outdoor basketball courts, handball court, tennis court, boxing training field, gymnasium, athletes' hostel, LED screen and audio system. Contractor: Jiang Xi International (China).

Capacity	15,000
Cost	US$30m (financed with a Chinese grant)
Completion	September 2015

GIBRALTAR

Europa Point Football Stadium
Proposed national football stadium, UEFA Category four, at the southernmost point of Europe. Also for tourism, retail and community. Project public exhibition and presented to the Development and Planning Commission. UEFA support because Victoria Stadium is unsuitable for competitive international football. Next: environmental impact assessment. Architect: RFA Fenwich Ibribarren.

Capacity	10,000

GREECE

Athens: AEK Athens Stadium
Proposed temple 'Ayia Sophia' of football and of greek sport according to AEK owner Demetri Melissanidi. At the site of its old stadium at Nea Filadelfia, north of Athens city centre. AEK obliged to develop park as part of deal to use land. Planning also requires construction 4m below street level - height 17.9m. Environment, Energy and Climate Change ministry funding local infrastructure upgrade. Home for AEK and New Philadelphia teams. UEFA 4-star. Religious-leaning architecture, grand central entrance; four corner towers hold up a fabric roof. Two tiers. Club seats: 1200. Suites: 40. Underground parking: 400-500. Parking lot: 250. Area 65,000m^2. Finance: €20m Attica Regional Authority; €50,000 Ecumenical Patriarchate of Constantinople (symbolic).

Capacity	32,500-34,000
Cost	€65m
Completion	2016

HUNGARY

Budapest: National Stadium
Inside the walls of Ferenc Puskas stadium. Track removed to provide space for updated spectator facilities. Athletics, swimming and velodrome next door.

Capacity	65,000
Cost	€300m
Completion	2017

Miskolc: Diósgyöri VTK Stadium
Soccer stadium on current site, to include a new centre of excellence for youth players. DVTK MD Tamas Szabo.

Capacity	15,000
Cost	US$27m
Completion	2016

IRAQ

Al Diwaniyah: Al Sunbula Stadium
Main stadium plus hotel 3 floors (75 rooms), indoor hall (2,500) secondary stadium (2,000) and training field. Area: 250,000m^2. Client: Ministry of Youth & Sport. Architect: Bahadir Kul Architects. Construction: Renaissance Construction.

Capacity	30,000
Cost	US$100m
Completion	2016

Al-Samawah: Al-Samawah Olympic Stadium
FIFA standard soccer stadium. Design and construction management: Hill International (US$2.2m). Developer: Ministry of Youth and Sports.

Capacity	20,000
Cost	IQD 70.9bn (US$61m)
Completion	2016

Baghdad: Al Risafa Sports Stadium
New soccer stadium in Al Sadr City to FIFA standards. Owner: Ministry of Youth and Sports. Project management: Hill International (IQD3.3-3.8m).

Capacity	30,000
Cost	IQD116bn (US$100m)
Completion	2016

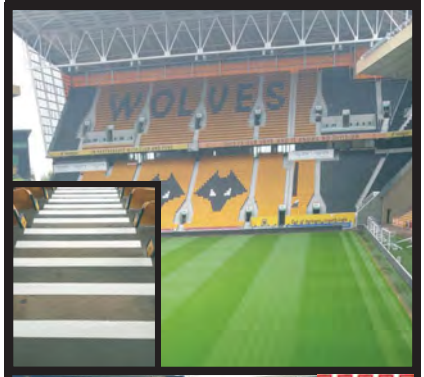
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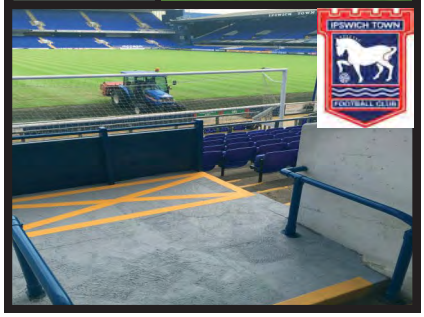
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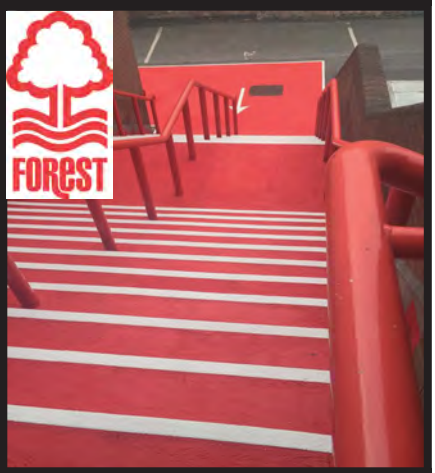
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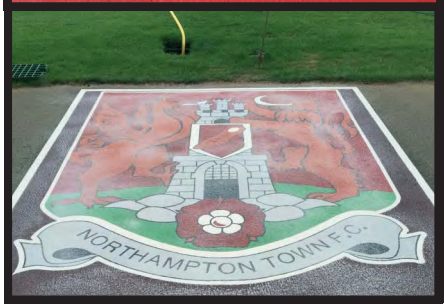
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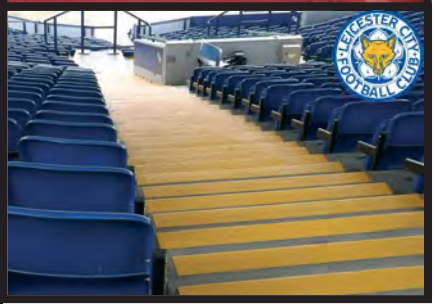
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Basrah: Al-Menaa Stadium
Football stadium with practice facilities. Roof: PTFE tensile membrane cable type with outer compression ring. Owner: Iraq Ministry of Youth and Sports. Design/build: Anwar Soura/360 Architecture. Structural design/skin: Thornton Tomasetti.

Capacity	30,000
Cost	US$86m
Completion	2015

Karbala Olympic Stadium
Muted colours and texture to blend with the surrounding mosques and houses. 73 arcades represent the number of martyrs killed in the Karbala tragedy. Two-layer translucent skin allows air to circulate through the concourse. Client: Ministry of Youth. Architect: Bahdir kul architects.

Capacity	30,000
Completion	2015

Najaf Stadium
Football stadium. Landscaping to connect the stadium to the city. Passive cooling towers. Owner: Iraq Ministry of Youth and Sports. Construction: Anwar Soura General Contracting. Architect: 360 Architecture.

Capacity	30,000
Cost	US$83.75m
Completion	2015

ITALY

Bergamo: Stadio Atleti Azzurri d'Italia
Renovation plan for Serie A soccer club Atalanta. Architect: Mauro Piantelli. Phased renovation starting with the Creberg stand - improved access for disabled supporters. Removal of the glass separating the supporters from the playing field. Finance: Atalanta $2.4m-$2.6m, city the rest.

Capacity	22,000
Cost	$3.8m

Florence: Fiorentina Stadium
Club working with city to develop plan for new stadium.

Milan: AC Milan Stadium
Proposed as part of redevelopment of the Portello area. 7-days a week stadium, hotel, sports college, restaurants, children's playground, green areas, community spaces. Planned in collaboration with the Milan Polytechnic Architecture Department. Encouraging travel by public transport. Visually consistent with city scape - height won't exceed 30m from ground level, 10m underground. Minimise noise escape. Jobs: 500. Design: Arup.

Capacity	48,000
Cost	€330m
Completion	2018

Milan: Internazionale Stadium
Proposed new stadium as part of investment from a Chinese consortium. Developer: China Railway Construction Corporation.

Completion	2017

Naples: San Paolo Stadium
Napoli has decided to stay at San Paolo and upgrade with city's help. Napoli will gain ownership rights (99 years) so that it can exploit the stadium commercially. Development of Fuorigrotta area around the stadium for non-matchday events and services. Napoli museum.

Rome, Tor di Valle: Stadio della Roma
A brand new stadium and training centre in Tor di Valle in southwest Rome for the football team AS Roma. Anchors entertainment district Roma Village. Possible sponsorship deal with Etihad Airways. 14,800-seat detached section behind one of the goals for the hard-core "ultra" supporters, replacing the Curva Sud from the Stadio Olimpico. Floating stone facade reminiscent of Colosseum. Polycarbonate roof. Super premium lower bowl club: 600. Luxury boxes, plus commercial areas and training grounds outside the stadium. Green: carbon neutral. Transport: 50% public. Currently the club rents the city's Stadio Olimpico for its home matches. The new stadium will be developed and managed by Italian real estate firm Grupo ParsItalia. Finance: naming rights, sponsors and priority seating, bank loans and equity. Feasibility 2013, approval 2014, build 2015. Project manager: Eurnova (Luca Parnasi). Architect: Dan Meis.

Capacity	52,500 (expandable to 60,000)
Cost	€210m (overall project €1.5bn)
Completion	2017

Turin: Stadio Filadelfia
Park and soccer stadium for Fondazione Torino Calcio. Refurb of stadium that was Torino's home from 1926 until 1963 and then training. Five design and build companies in the frame. Architect: Studio Zoppini Associati. Area: 26,500m².

Capacity	3,600
Cost	€23m
Completion	October 2016

Udine: Stadio Friuli
Major redevelopment of home of Udinese soccer club – granted a 99 lease by council – to provide better fan experience. Removal of athletics track. New lounges and restaurants. Funding secured (Istituto per il Credito Sportivo). Reduced capacity (7,000) during construction.

Capacity	25,000 (41,000)
Cost	€40m
Completion	July 2015

KAZAKHSTAN

Aktobe FC Stadium
For football club FC Aktobe to replace 13,500-seat Aktobe Central Stadium, Design and feasibility study for UEFA category four stadium under way, for a planned construction start in 2016.

Capacity	32,000
Completion	2017

KENYA

Manga Nyamira County Stadium
Soccer and athletics stadium. Partners sought.

Capacity	30,000
Cost	Sh63m

LIBYA

Tripoli: National Stadium
One of the stadiums due to host the African Cup of Nations in 2017. Two venues are planned for the capital Tripoli. In addition to the National Stadium, the project includes an indoor pool, a multi-purpose arena and Family Sportsworld. The complex, which is being built around a circular basin of approx. 500m diameter, is designed with a symbolism focusing on the number 3 in deference to the historic genius loci, as represented by the city's name (tri-polis = city of three). Architect: GMP - Volkwin Marg and Hubert Nienhoff. Associate Partners: Hans-Joachim Paap, Jochen Köhn. Structural design (outline design): Werner Sobek Ingenieure, Stuttgart. Structural design (scheme and detailed design): Schlaich Bergermann und partner, Stuttgart. Services engineering (outline design): Bechtold Ingenieurgesellschaft mbH, Berlin. Project commissioned by: Masterplan Libya, Tripolis, Kronberg. Client: Lidco – Libyan Investment and Development Co. Tripolis. General contractor: Porr Libya.

Capacity	71,000
Completion	2016

LITHUANIA

Vilnius: National Stadium
Ministry of Finance given the job of reviving national stadium project. Financial aid sought from EU.

Cost	€50m

LUXEMBOURG

Luxembourg National Football Stadium
Football stadium in Kockelscheuer. Finance: City of Luxembourg and the state. Master plan April 2015, preliminary design September 2015, final plan January 2016, final project June 2016, construction early 2017. Architects: gmp, Beng Architectes Associés.

Capacity	9,600
Cost	€58m
Completion	2018

MALAWI

Blantyre: Bingu National Stadium
Publicly-funded modern stadium with help from Chinese construction companies.

Capacity	40,000
Cost	US$70m
Completion	December 2015

MOROCCO

Tangier: City of Sports
City of Sports complex under construction with tennis compound, Olympic swimming pools, multi sports halls, hotels and a football stadium.

Cost	£44m

NETHERLANDS

Rotterdam, Nieuw Stadion
A new home for Feyenoord FC. Panel of experts had recommended the Feyenoord Founders Consortium (FFC) - BAM, AM and Siemens - as design/build partner, however the parties could not reach agreement and FFC has withdrawn. Club quoted as having no plan B. The project foresees the current stadium as the basis of a roofed stadium capable of hosting non-football events. with retractable roof. Business/Club seats: 6,300. Skyboxes/suites: 90. Underground parking: 1,500. Any work will need to be planned as a staged construction without disrupting the tenant team. Related developments include transport infrastructure and DOCK sport and leisure and residential. Start: 2016.

Capacity	70,000
Cost	€313m
Completion	2018

NIGERIA

Minna: Minna Stadium
Developer: Niger State Government (Commissioner for Sports Daniel Shashere).

Capacity	10,000 (expandable to 15,000)
Cost	N2.4bn
Completion	2015

NORTHERN IRELAND

Belfast: Casement Park
Conversion to all-seater stadium for Gaelic sport and Ulster rugby. Floodlights, premium and corporate facilities and other amenities. Finance: NI Government and the Gaelic Athletic Association (GAA). Construction: Heron Buckingham joint venture.

Capacity	38,000
Cost	£100m

Belfast: Cliftonville Stadium
Redevelopment to provide more community facilities for Irish League club. Planning application submitted by Community Interest Company. First phase to replace the Main Stand at Solitude.

Cost	£4m

Derry: Brandywell Stadium
Stadium for Derry City FC with 3,600 seat stand along the Lone Moor Road side. Replaces existing uncovered seated area and the old Glentoran Stand. New changing and treatment facilities. Turf: synthetic 4G. Showgrounds area to be revamped with new greyhound track, bookmaking, spectator and kennel facilities. Demolition and redevelopment of Brandywell Sports Centre. Tenants: Ballymoor FC, Oak Leaf boxing and the Over the Hill Club. Funding: city council, regional funds.

Capacity	6,000
Cost	£8.8m
Completion	2016

Belfast: Glentoran Stadium
Glentoran Chairman Terence Brannigan looking to move club away from the Oval, possibly to the Blanchflower Stadium site.

Capacity	8,000
Cost	£10m

AECOM

THIS IS FOREVER



Once the adrenaline rush of an Olympic and Paralympic Games has subsided, what comes next? After Rio 2016, the city's Olympic Park will be transformed into a new community, with a school, new homes and a centre of sporting excellence. AECOM is helping to create a lasting legacy for Rio.

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TOMORROW'S TOGETHER





Chris Paterson *Greg Sherlock* *Paul Shakespeare*

Over the last 9 months, Populous' global design team has come together to discuss the future of sports and entertainment venues – how they will generate revenue, how technology is shaping design and what a truly multi-functional, 365-day-a-year facility will look like in the future.

Through a series of global design charrettes, **Populous'** Chris Paterson (Australia), Greg Sherlock (USA) and Paul Shakespeare (UK) have tackled the biggest and most detailed challenges that face the modern sports experience – everything from ticket lines to community integration. As the project continues, leading to a final unveiling of what 'Tomorrow's Together' could look and feel like at Stadia & Arena Asia Pacific 2015, one thing is clear: the venues of the future will always be about drawing people together.

With television rights deals increasing exponentially, and more sophisticated broadcasting options shaping the at-home and in-stadium experiences, how can we address this evolution through design?



"Across Europe, there are challenges related to revenue within various leagues and teams – resulting in the Premier League (soccer) and other top-level leagues having more wealth and more sophisticated broadcasting deals," said Paul Shakespeare in Populous' London office. *"And we see, much like the US and Australia, the at-home broadcast experience getting more advanced with each passing year, resulting in real challenges for our clients and designers to maintain momentum in getting supporters into the venues."*



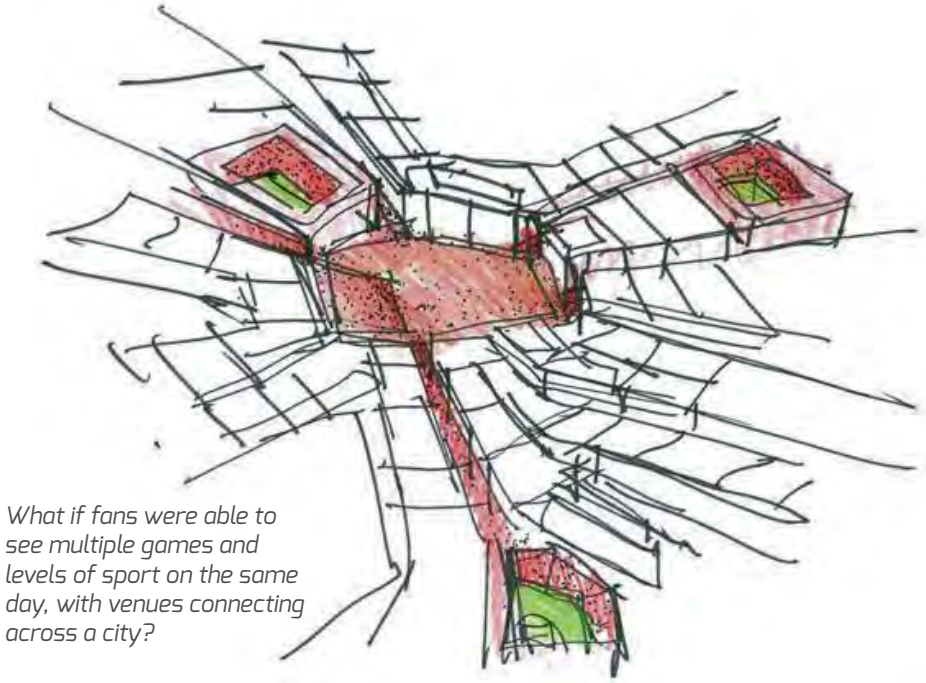
Greg Sherlock, in Populous' US Kansas City office, agrees. *"Exactly. It's a balancing act for us, maintaining the value of the in-stadium experience, while also improving the broadcast experience.*

"The solutions for this range from integrating more sophisticated camera technology that allows for viewing control by the fan, to designing a 'stadium inside a stadium'. As clubs continue to become more global, what if we created clubs in different cities that simulate the in-stadium experience for global fans?"



From his base in Brisbane, Australia, Chris Paterson suggested that the solution might actually be in going one further, designing buildings that can be controlled by the fans themselves. He offered: *"What if fans were able to affect the live event, in real time? We would design the infrastructure to allow for this, and fans could take charge digitally.*

We're already seeing similar ideas in Formula E motor racing, where fans can vote for how much energy boost a driver receives. Perhaps there are ways to control the light, the roof, perhaps even the wind and rain that either team experiences in a stadium. The potential for this kind of interactive control is really exciting, bringing fans closer to what's happening on the field. Designs could also be adapted regionally to suit audiences, and the surrounding built environment."



What if fans were able to see multiple games and levels of sport on the same day, with venues connecting across a city?

How will future arena and stadium designs better connect to the urban fabric and surrounding community?

All the regions acknowledged that mixed-use development and connectivity to the urban fabric is already critical within venue design, and will only become ever more important. Projects like the Atlanta Braves' new ballpark, **SunTrust Park**, are addressing this by creating an entirely new mixed-use development around the facility, while other stadiums, like Tottenham Hotspur's planned new stadium, will build a new relationship with the local community with new and pre-existing development.



"Our experience has shown us that connectivity to the urban fabric isn't an option, it's a necessity. Stadiums are already incorporating hotels, shopping centres, retail and arenas within them," said Paul. *"The west stand in a stadium is often bigger and the scale is ideal for this type of development to be integrated into the design."*



"We could really start fulfilling and evaluating the needs of the city with our stadium designs," echoed Greg.

"We could create a building that addresses different uses and transforms and blends into the city grid in a new way. Imagine if we move a box office or ticket office a block away from the venue. There becomes a more organic, interconnected expansion of buildings that creates activity all year-round."



Chris agreed, but proposed a different way of looking at things: *"There are really two ways to look at it – we can imagine, like Greg and Paul said, that the stadium gets smaller and blends further into the existing city, or, I can imagine that the stadium could become so big it accommodates all the requirements a city may have, functioning over multiple city grids."*



"Connectivity to the urban fabric isn't an option, it's a necessity." *Future stadia and venues could become almost seamlessly integrated into the city grid; this artist's impression shows a proposed venue in the Middle East.*

With increasing competition in the entertainment industry for fans, their money and time, what unique amenities and revenue generation opportunities exist that aren't currently being implemented?

The simple answer is that, as Chris suggested previously, the boundaries between spectating and playing may be more likely to blend in the future and there will be a drive toward a more interconnected experience. As the popularity of e-sports continues, the designers believe that there may well be something that more traditional sports could learn from their model.



"In e-sports, everything is perfectly controlled. The reality is, as fans, we want to try to do everything we can to impact the game. We cheer and scream and try to create a home-field advantage," said Chris. *"There may be opportunities to generate revenue by letting fans officially impact the game itself. I really think we should ask ourselves 'how do we create a bit of chaos in order to keep the environment interesting and dynamic?'"*



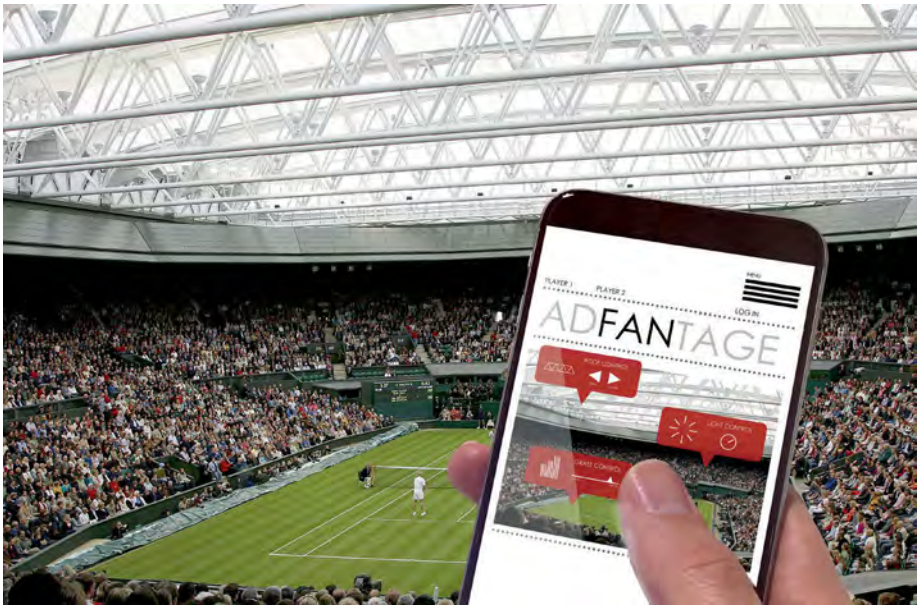
Greg explained that some of this may be accomplished by inviting virtual fans into the venue, or connecting across venues. *"I think we need to create greater engagement with fans who aren't in the stadium. On the flip side, I could also see advantages of elongating the in-stadium experience with different levels of play happening at three interconnected stadiums at once, similar to current global events. What if we designed our venues so you could view multiple levels of sport in one place, or multiple leagues? How interesting would that be?"*



Paul echoed that thought. *"There is value in generating revenue by connecting multiple venues and better integrating those experiences into the urban core. We have to blend the stadium or ballpark or arena seamlessly with its surroundings so there are true residual effects."*

Whatever the future holds for stadium design, it's clear that people must always stay at the heart. ■

Spectators could control the game environment and influence the effect on the players and teams by taking advantage of smart stadium technology such as moving roofs and moving facades through in-stadium apps.



For more information about the Tomorrow's Together project being carried out between **Populous** and ***PS&AM***, visit: **www.populous.com/venuesofthefuture** or join the conversation on Twitter at: **#venuesofthefuture**

SKY'S THE LIMIT

Star Events outlines how their rigging systems are being utilised at Beijing's Mastercard Center and Shantou University's Sports Park.



Roger Barrett

The focus on sporting and event infrastructure in China has been intense in recent years and far beyond the hackneyed Western association of dour state apparatus.

Star Events' mothergrid at the **Mastercard Center**, Beijing is a perfect shop window for the company's competence and innovation, it even featured as part of the city's submission to the **IOC** that won Beijing the **2022 Winter Olympics**.

"Coupled with new relationships we are making with major Chinese construction companies, we are now seeing venue designers being tasked with creating roofs that simplify installing a mothergrid, with the attendant cost reductions," says Star Events' Special Projects Director, Roger Barrett. ***"Rigging in China is still very much something that production crews do as a pre-requisite to their normal jobs, so mothergrids really work for them."***

SHANTOU UNIVERSITY (STU) SPORTS PARK

STU's Sports Park is the most recent arena project to come on stream in China. There, a late decision to take the space from sports-specific to fully multi-purpose ramped up the pressure to find a system capable of accommodating the modern production gamut in the roof.

Star Events' Shanghai operational base fielded an early call, on the back of the company's input to Mastercard Center.

"Star's commitment to China, the constant availability of its staff to meet with the various stakeholders, and its globally-recognised expertise in event rigging were all key factors in the award of this contract," advises STU Sports Park General Manager, Greg Turner.

With the roof already designed for sports use, Star's first step was to assess the options so the client could make informed choices about a greater reach.

"We worked on a fairly conventional stage end grid," Barrett explains. ***"The client liked the design so much they asked us to look at another one that would enable full, central in-the-round shows, which are much more popular in China than in the West."***

SQUARE DONUT MOTHERGRID

In common with most sports arenas, there is a huge central screen and scoreboard system at **Shantou Sports Park**, so Star created a 'square donut' mothergrid, with the screen in the centre. The two elements are close enough to be operated as one huge grid that covers the majority of the floor area.

The later decision to fly 35 of the latest Christie 4k45 projectors for full 360 degree projection saw Star Events put a run of trusses around the perimeters of the main grids, except at the stage end where it flies the projectors through the mothergrid.

The Shantou grids can lift and hold over 70 tons of production without the need for any secondary 'safeties'. To enable that, the company has had to design a range of 'super-spreaders' located within the roof void to get the points in the right place for the mothergrid itself.

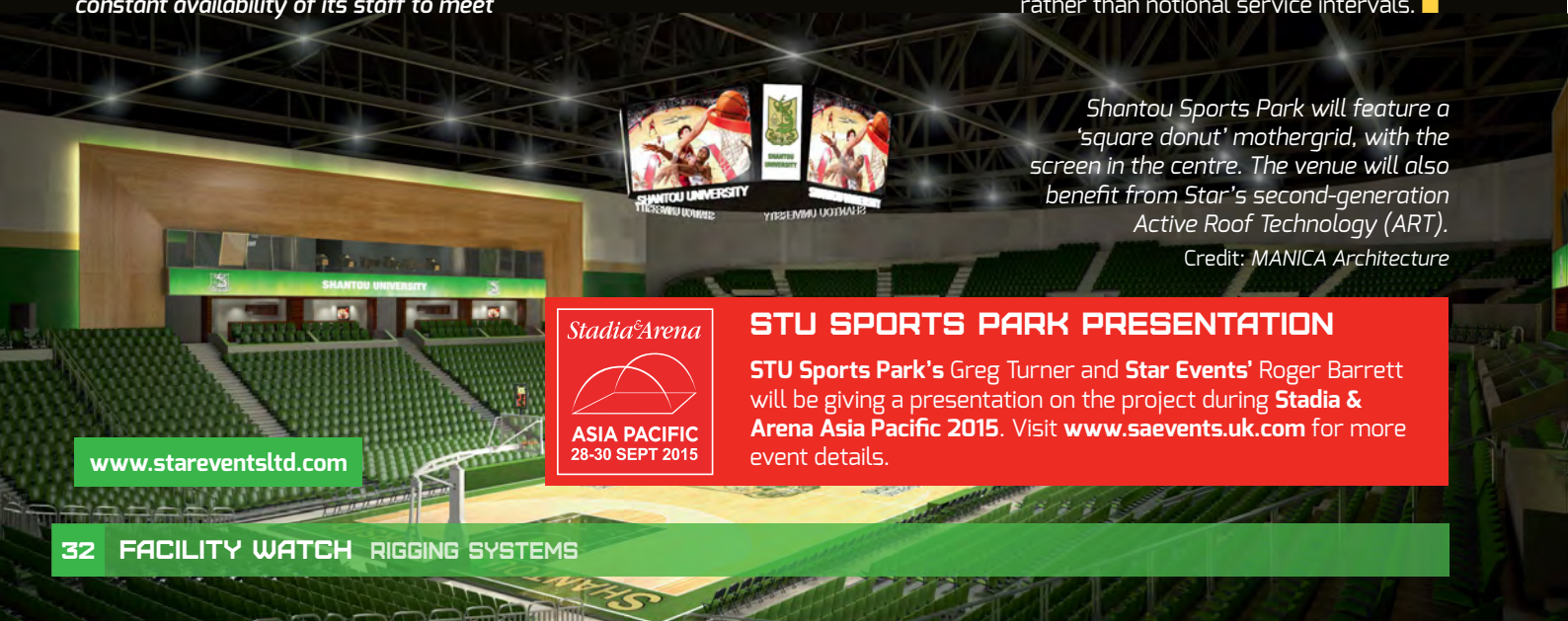
"That makes it by far and away the most complex installation that we have designed, with over 700m of our heavy duty steel mega-truss deployed," confirms Barrett.

ACTIVE ROOF TECHNOLOGY (ART)

Introduced last summer, after extensive testing, Star Events' second-generation Active Roof Technology (ART) monitors every production point rigged to a stage/arena roof, ensuring the show stays safely in step with the structure's load capacity, and it's proving to be an invaluable asset for contracts in China.

"At Shantou University Sports Park, we have had to push the roof to its limits to get the capacity the client wants and that has required extensive cooperation with the state-run Guangzhou Design Institute, which was persuaded to let us use virtually all of the available capacity because we could demonstrate that ART guarantees no overloads," Barrett concludes. ***"So ART gave the project the go-ahead."***

Once up and running, the venue gets the full commercial benefit of much faster turnarounds and knowing exactly what is going on in real-time regarding rigging weight distribution. As with the installation in Beijing, constant monitoring and remote diagnostics enables Star Events to tailor service and maintenance to the realities of the use rather than notional service intervals. ■



Shantou Sports Park will feature a 'square donut' mothergrid, with the screen in the centre. The venue will also benefit from Star's second-generation Active Roof Technology (ART).

Credit: *MANICA Architecture*

www.stareventsltd.com

Stadia&Arena ASIA PACIFIC 28-30 SEPT 2015

STU SPORTS PARK PRESENTATION

STU Sports Park's Greg Turner and **Star Events'** Roger Barrett will be giving a presentation on the project during **Stadia & Arena Asia Pacific 2015**. Visit **www.saevents.uk.com** for more event details.

Belfast: Windsor Park Stadium

Redevelopment of Northern Ireland's National Football Stadium as well as Ravenhill Rugby Ground and the GAA's Casement Park, £110m set aside for the three building projects through the department of Culture, Arts and Leisure. Architect: Hamilton Architects. Planning : RPS. Client: Irish FA (President Jim Shaw). Funding: £25.2m government funds. A new leisure complex will now be incorporated into the new Windsor Park stadium development. Works include: demolition of the south stand, replacement of the south and east stands with newly constructed stands to provide greater enclosure, refurbishment of the west and north stands, replacement of high mast flood lights with lower level lighting, integrated at stadium roof height, new headquarters for the Irish Football Association, conference and community facilities.

Capacity	18,000
Cost	£29.2m
Completion	2016

OMAN

North A'Sharqiyah: A'Rustaq Sports Complex

Public facilities and football stadium.

Capacity	12,000

South Al Batinah: Al Sa'ada Sports Complex

Expansion of complex and doubling of current stadium's capacity.

Capacity	18,000

Musandam: Khasab Sports Complex

International standard football stadium, hockey, tennis, covered pool (800), gymnasium (1100).

Capacity	17,000

POLAND

Chorzow: Ruch Chorzow Stadium

New stadium for Ruch Chorzow soccer team. First phase in early 2017 with 4,500 seats. Architect: GMT. Finance: public.

Capacity	16,000
Cost	PLN 60m (€14.5m)
Completion	2020

Lodz : Widzew Lodz Stadium

Soccer stadium for Widzew Lodz, which is designed to boost matchday attendances. Municipal authorities ran tender. Construction: PRM Mosty Lodz (PLN29m).

Capacity	18,000 (17,200)
Cost	€35m
Completion	2016

QATAR

Al Khor City: Al Bayt Stadium

Initial works underway on stadium and precinct. Design is based on a traditional black and white Qatari nomad tent. Possible semi-final venue for the 2022 FIFA World Cup. A modular design includes an upper tier of removable seats. Retail spaces and restaurants will sit alongside landscaped paths for use by local residents and there will be dedicated women-only facilities within the complex. Green: energy-efficiency and green building materials, with renewable energy to power the venue. Owner: Supreme Committee for Delivery & Legacy and the Aspire Zone Foundation. Construction: Salini Impreglio JV with Galfar and Cimolai ($770m construction, $57m ongoing operation and maintenance).

Capacity	32,000 (70,000 for World Cup)
Completion	September 2018

Al Rayyan Stadium

Host venue for the 2022 FIFA World Cup on the site of Al Rayyan Sports Club's existing stadium, Ahmed Bin Ali Stadium. Ornate façade is a contemporary take on traditional Naquish patterns specific to Qatari culture. Green: recycling old stadium materials, renewable energy, lightweight building design, careful selection of materials, and energy and water efficiency measures. Aiming for GSAS and LEED. Developer: Supreme Committee for Delivery & Legacy. Consultant: AECOM. Lead Design Consultant: Ramboll. Architect: Pattern Design (Dipesh Patel).

Capacity	21,000 (40,000 for World Cup)
Completion	2019

Al Wakrah Stadium

Soccer stadium 15km south of Doha for the 2022 FIFA World Cup™. Upper tiers will be removed after the World Cup. Area (precinct): 586,000m². Sports centre & community hub. Green: renewable energy & structural design efficiency; targetting GSAS and LEED certification. Developer: Qatar 2022 Supreme Committee (Hassan Al Thawadi, Secretary General). Project manager: KEO. Design consultant: AECOM. Architect: AECOM and Zaha Hadid Architects. Programme manager: CH2M Hill. Enabling works: HBK Contracting Co.

Capacity	40,000 (World Cup) 20,000 (legacy)

Doha: Sport City Stadium

Design draws inspiration from traditional Arab tents. A retractable roof, partly retractable pitch and retractable stands for multi-use after hosting 2022 FIFA World Cup.

Capacity	47,560

Foundation Stadium

Soccer stadium for FIFA World Cup™ 2022. Plus swimming pool and indoor pavilion on same site. Green: photovoltaic and solar thermal panels. Aiming for LEED Gold. Design consultant: RFA Fenwick Iribarren.

Capacity	26,000 (40,000 for World Cup)
Completion	2018

Khalifa International Stadium

Refurb for 2022 World Cup. Also 3-2-1 Qatar Olympic and Sports Museum. New building that will be added to the stadium's east wing, and which will contain food courts, shops, multi-purpose rooms, VIP lounges and a health centre. Roof: tensile membrane (Birdair). Roof installation: Taiyo Middle East. Project manager: Projacs. Design consultant: Dar Al-Handasah.

Capacity	40,000

Lusail City: Lusail Stadium

Largest venue for the 2022 FIFA World Cup Qatar and the site of the opening ceremony and the Final. Open-air pitch that can be cooled to an optimal 26 degrees Celsius using cooled and shaded spectator stands and state-of-the-art green technologies. Owner: The Supreme Committee for Delivery & Legacy. Architect: Foster + Partners (design competition). Consultants: ARUP, Populous.

Capacity	80,000

ROMANIA

FC Botosani Stadium

New stadium proposed for Liga I club. City support in seeking funding.

Capacity	11,000
Cost	€18m

Bucharest: Ion Oblemenco Stadium

Replacement of Craiova's stadium to create UEFA 4-star venue. The two-tier concept design includes Club/VIP seating. Roof form inspired by Brancusi work Miss Pogany. Architectural lighting for night impact. Area: 56,900m². Green: photovoltaics, ground source heating/cooling. Fencing arena in grandstand. Training ground with athletics (5,000) on same complex. Soft and hard landscaping of complex. Architect: DICO si Tiganas .

Capacity	30,000
Cost	€50m
Completion	2016

Bucharest: Dinamo Stadium

To replace Stefan cel Mare stadium, possibly to host Euro 2020 games. Developer: Dinamo Bucharest (chief executive Elisabeta Lipa).

Capacity	30,000

Targu Jiu: Targu Jiu Stadium



New-build home for CS Pandurii Târgu Jiu on old stadium site. Stadium, hotel rooms, conference rooms and a car park. Area: 37,500m². Architect: DICO si Tiganas.

Capacity	15,000
Cost	€20m

RUSSIA

Kaliningrad Stadium

One of the twelve stadiums to be used for the FIFA World Cup™ 2018. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	35,000
Cost	£320m
Completion	2015

Kazan Stadium

One of the twelve stadiums to be used for the FIFA World Cup 2018, all of which require construction or refurbishment. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	45,000
Cost	£320m
Completion	2015

Krasnodar: FC Krasnodar Stadium

For soccer team next to Youth Academy. Circular exterior. Option to close roof opening. Architect: GMP. Construction: ESTA. Pitch: SIS Pitches

Capacity	36,000
Cost	US$290m
Completion	2015

Krasnodar: FC Kuban Stadium

Stadium for soccer team but capable of staging other events including rugby. Angled roof to retain noise. On podium with surrounding landscaped parking. Envelope design influenced by Russian artist and architect El Lissitsky. Plates of solid and perforated metal peel away from the bowl. Facade material: TECU Gold. Architect: AFL Architects, Tecnion, Syntesis Rus.

Capacity	45,000

Moscow: Luzhniki Stadium

Renovation under way. Tear up and start again to create a new stadium. Construction manager: Big Sports Arena Luzhniki (Moscow Department of Construction). Will host opener and final of FIFA World Cup 2018.

Capacity	81-88,000
Cost	US$550m
Completion	2017

Moscow: VTB Arena

Stadium and arena combination on site of Dynamo stadium, designed to retain historic elements of Petrovsky park. Also two levels of retail and one of parking. Developer: Dynamo Mangement Company. Architects: MANICA Architecture and SpeeCH. Construction: Codest International (US$707m).

Capacity	27,000 (stadium)
Completion	2017

Moscow: PFC CSKA Stadium

Two-tier soccer stadium with large corner towers. Main facilities grouped at one end.

Capacity	30,000 (stadium)
Completion	2015

Nizhny Novgorod: Volga Arena

For 2018 FIFA World Cup. Developer: Town (planning department Alexander Bodrievsky). Prime Ministerial decree signed. Tenant team: FC Volga Nizhny Novgorod, moving from Lokomotiv Central Stadium (17,850). Stands will have gas infrared heaters. Green: BREEAM standard (Jones Lang Lasalle). Developer: Ministry of sport. Technical construction arm: Sport Engineering. Construction: Stoitransgaz (Director Vadim Gurinov).

Capacity	35,000 sport
Cost	19bn rubles (US$388m)
Completion	September 2017

Saint Petersburg: Saint Petersburg Arena

New home for Zenit on Krestovsky Island, north west of the city. 'Space ship' facade taking shape. For 2018 FIFA World Cup. Will be only Eastern European stadium with a removable field and sliding roof to allow it to host sporting or cultural events in all conditions. Government cash in question after criticism of project. Height: 75m. Diameter: 289m. Area: 287,000m². Commercial: 50,000m². Architect: Kisho Kurokawa. Construction: Transstroy. Glazing (120,000m2): AGC.

Capacity	68,000 sport, 77,000 concerts
Cost	US$1.1bn
Completion	2016

Rostov am Don Stadium

One of the twelve stadiums to be used for the FIFA World Cup 2018, all of which require construction or refurbishment. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	45,000
Cost	US$320m
Completion	December 2017

LEYARD SPORT DIVISION

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For DLP displays, there are visible differences in brightness between modules, which influences the video effect.



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Rich Multimedia Intefrace
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Samara Soccer Stadium
Groundbreaking ceremony 21 July attended by Russian President Vladimir Putin. Located in Radiotsentr (Radio Centre) region in the north of the city. Cosmos theme featured throughout (area is heart of Russia's aviation and space industries). Tenant: Krylia Sovetov (Wings of the Soviets) football club. One of the 12 stadiums to be used for the FIFA World Cup 2018. Green: BREEAM standard (Jones Lang Lasalle). Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	45,000
Cost	US$320m
Completion	summer 2017

Saransk Stadium


New stadium for FC Mordovia Saransk, recently promoted to the Premier League, on the eastern edge of the small city of Saransk. One of the twelve stadiums to be used for the FIFA World Cup 2018, all of which require construction or refurbishment. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	28,000 (45,000 for World Cup)
Cost	US$320m
Completion	2016

Sochi: Fischt Stadium
Conversion from Winter Olympics mode to be one of the twelve stadiums to be used for the FIFA World Cup 2018. Roof removed. Additional tiers and sports infrastructure to be added. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	45,000
Cost	US$100m
Completion	2015

Vladikavkaz: Alania Stadium
Soccer stadium for Spartak club (President Valery Gazzayev). Design build: Murad Kader (Turkey).

Capacity	32,000
Cost	Rubles 300m
Completion	2015

Vladivostok Stadium
Proposed soccer stadium as part of sports and leisure development by local authority.

Capacity	16,000

Volgograd: Arena-Pobeda Stadium
One of the twelve stadiums to be used for the FIFA World Cup 2018, all of which require construction or refurbishment. On site of Central Stadium. Part of sports complex. Basketball to be added. Green: BREEAM standard (Jones Lang Lasalle). Developer: Ministry of sport. Technical construction arm: Sport Engineering. Construction: Stoitransgaz (Director Vadim Gurinov).

Capacity	45,000
Cost	15-20bn rubles (US$431-575m)
Completion	2016

Yekaterinburg Stadium
One of the twelve stadiums to be used for the FIFA World Cup 2018, all of which require construction or refurbishment. Developer: Ministry of sport. Technical construction arm: Sport Engineering.

Capacity	35,000
Cost	US$320m
Completion	2015

SCOTLAND

Aberdeen Community Stadium
Club and council worked on outline plans for community stadium at Loirston Loch near Cove (King's Links rejected). Feasibility study conducted (£600,000). Council go-ahead granted and minister agreed. Stadium with offices, hotel, retail, training facilities for club and community. Finance: sale of Pitodrie stadium for development, council contribution, grants, naming rights. Construction: Barr Construction (preferred bidder). Consultant: Gardiner & Theobald. Architect: Miller Partnership.

Capacity	21,000
Cost	£38m
Completion	2017

Dumbarton: Community Stadium
For Dumbarton Football Club at Young's Farm, which is bounded by the River Leven to the east, the A82 to the north and a railway line to the west. Hospitality and dedicated training facilities, plus additional playing pitches for community use and car parking. Non-football related uses could include gym/leisure facilities, a hotel, conferencing facilities, a restaurant, a shop and offices.

Capacity	4,000 (1,000 standing)

East Kilbride Stadium
Proposal by East Kilbride Community Trust (EKCT) to build a multi-million pound stadium. Location could be South Lanarkshire Council-owned site at Langlands West.

Edinburgh: Academicals Rugby Club
Edinburgh Academicals Rugby Club, the second oldest club in the UK, has confirmed that it will build its new facility in Stockbridge, Edinburgh. It will contain conference facilities and a rugby museum, with associated retail. Planning agreed 2013, S75 with City of Edinburgh Council 2014. Planning permission granted. Finalising design and layout, researching best practice, setting leasing arrangements, applying for building warrants, Architect: Michael Laird Architects. Jobs: 100.

Capacity	5,000 (2,500 seated)
Cost	£8m
Completion	2015

Paisley: St Mirren FC
New in Ferguslie area. Seeking buyer of Love Street ground.

Capacity	10,000

SLOVAKIA

Bratislava: National Stadium
Public/private partnership lost private investor. Government recruiting advisor. International tender for design and construction of UEFA standard stadium to play internationals. Finance: government subsidy.

Capacity	35,000
Cost	€40-45m

Kosice: MFK Kosice Stadium
New soccer stadium for Fortuna Liga club. Area: 60,000m^2. Operating company: Kosice 85%, club 15%. Funding: city, state (€4m).

Capacity	9,080
Cost	€15m
Completion	2017

SOUTH AFRICA

Krugersdorp: Amakhosi Stadium
Proposed new stadium for Kaizer Chiefs. Developer: Lefika.

Capacity	55,000
Completion	R1.2bn

SPAIN

Barcelona: Camp Nou Stadium
Super upgrade for Barcelona's Catalan home voted for by club members in April. The project has some similarities to a previous Foster+Partners design. Stadium specialist consultants: ISG, AEG, ICON Venue Group and Ryder Levett Bucknall. As well as a reconfigured spectator bowl, there will be a new ring of boxes and restaurants overlooking the pitch, along with 'superboxes' and other VIP services between the first and second tiers. The quality of the VIP services will be vastly improved both in terms of quantity and quality (3,500 new seats would create a total of 5,700 luxury seats).

Capacity	106,000
Cost	€600m

Gran Canaria Stadium
Athletic track out and lower bowl remodelled to improve sightlines and get soccer crowd closer to the action. Staged works. Owner: Cabildo of Gran Canaria.

Capacity	33,070 (+1,820)
Cost	€3m
Completion	2016

Madrid: Estadio La Peineta
Multi-business stadium with local transport (metro) links. Tenant and operator: Atletico Madrid. Club moving out of Vicente Calderon. Area: 85,000m^2. Suites: 94 (1,500). Developer: City of Madrid. Architect: Cruz y Ortiz. Construction: Fomento de Construcciones y Contratas.

Capacity	70,000
Cost	US$270m
Completion	2016

Madrid: Santiago Bernebeu
Remodelling for Real Madrid. Club currently working with lawmakers on getting permission to build. Architect: GMP Architects and L35 Ribas (winners of the 'International Tender for Architectural Ideas for the remodelling of the Santiago Bernabéu'). New skin, retail mall and sliding roof. Planning permission sought. Funding: commercial sponsorship (International Petroleum Investment Co.).

Mallorca: Iberostar Estadi
Removal of athletics track, reconfiguration of pitch and seating at home of Real Mallorca.

Completion	2016

San Sebastian: Estadio Anoeta
Four-phase upgrade while continuing to operate. Removal of athletics track and new roof, followed by grandstand rebuilds.

Capacity	32,000
Cost	€40m
Completion	2016

Sevilla: Estadio Ramón Sánchez Pizjuán
Modernisation over two years for Sevilla FC. Redesign of the entrance area, new seats, concrete treatment, new scoreboards and floodlights, improved facilities for players and disabled supporters.

Completion	2017

Valencia CF Stadium
Valencia Foundation has sold a stake to Meriton Holdings (Peter Lim) so a scaled back version of the stadium may now go ahead once other club debtors are satisfied. Abandonment and demolition is an option. Half finished and on hold since 2008 after financial difficulties of club. Three-tier (22,000 bottom tier, 18,000 middle, 25,000 upper) soccer stadium in NE Valencia. Architects: Reid Fenwick Associates. Engineer: Arup Sport. Mestalla stadium to be sold to property developers.

Capacity	65,000 (75,000)
Cost	€200m (€300m)

SWAZILAND

Siteki Soccer Stadium
Developer: National Football Association of Swaziland (NFAS). NFAS reported that it is trying to secure a title deed for the construction of a stadium in the Shiselweni region.

SWEDEN

Helsingborg: City Stadium
Project to rebuild the Olympia soccer stadium. Project manager: Karnfastigheter (Catharina Branden). Construction: Peab AB (US$44.4m).

Cost	US$140m
Completion	mid-2017

SWITZERLAND

Lausanne Football Stadium
Rectangular Tuilliere Lausanne stadium as part of larger redevelopment in north of city. Training areas, restaurant and media. Architects: MLZD and Sollberger Boegli.

Capacity	12,000
Cost	€70m
Completion	2019

Zurich football stadium
Proposed soccer-dedicated stadium. Possible standing area. Developer: city.

Capacity	16,000 (international), 20,000 (domestic)
Cost	Sfr150m
Completion	2017

TANZANIA

Dar-es-Salaam: National Stadium
Contractor: Beijing Construction Engineering Group Co Ltd.

Capacity	60,000
Cost	US$54.6m

Kaunda Stadium

Capacity	40,000
Cost	US$20m
Completion	June 2015

TURKEY

Adana: Adana Stadium
For soccer club Adanaspor. Suites: 49 (552). Club seats: 992. Media seats: 178. Officials seats: 196. Funding: public.

Capacity	36,117
Cost	TL 107m
Completion	2016

Antalya Stadium
Soccer stadium. Area: 85,000m². Construction: Akay.

Capacity	33,000
Completion	quarter 4 2015

Gaziantep: Gaziantepspor Stadium
Soccer stadium. Area: 120,000m². Restaurants: 3. Parking: 18,000.

Capacity	33,200
Cost	TL 110m
Completion	2016

Istanbul: Vodafone Stadium
New stadium for Besiktas soccer team on site of existing facility by the Bosphorus. Convention and cultural centre. Build-operate-transfer model. Business seats: 2,150. Sky boxes: 147 (1,847). Pitch: Grassmaster. Roof: Fibreglass membrane. Network: Cisco. Naming rights: Vodafone.

Capacity	43,903
Cost	€120m
Completion	2016

Trabzonspor: Akyazi Stadium
Replaces Huseyin Avni Aker stadium. Built on artificially created land on the shore of the Black Sea.

Capacity	42,000
Completion	2016

UNITED ARAB EMIRATES

Abu Dhabi Stadium
Developer Mubada has prequalified five companies to build a new sports stadium with retractable roof as part of the Capital City District development next to Khalifa City.

Capacity	65,000
Cost	US$1bn

Dubai: Al Wasl Sports Club
Proposed upgrade to become air-conditioned stadium. Developer: Dubai Sports Council.

Capacity	25,000

WALES

Aberystwith Town FC Stadium
Plans for stadium 80 flats along the river side of the ground. New 550-seat stand, clubhouse, ancillary rooms, community facilities, dedicated youth centre. Finance: Tai Ceredigion housing association. Turf: synthetic (£400,000).

Cost	£13m

Ebbw Vale: Circuit of Wales
Work beginning on motorsport circuit with a green theme. Council positive but Welsh parliament involved. Funding: Public/private partnership. £2m loan from Welsh government so far. 3.5 mile track for all kinds of auto sport, hotel, retail and commercial. Developer: Heads of the Valleys Development Company. Construction (preliminary): FCC and Alun Griffiths Contractors.

Cost	£280m
Capacity	15,000

Newport: Dragons Stadium
New stadium on site of Rodney Parade going through planning permission. Includes an 84-room hotel, 105 student flats, restaurant, conference facilities, offices and public gym. Architect: S&P. Planning: RPS. Cost consultant: Gleeds. Transport: Pinnacle. Boxes: 20.

Capacity	15,000
Cost	£40m

ZIMBABWE

Southern Province: Livingstone Stadium
Soccer stadium and community sport facilities.

Capacity	30,000
Completion	2015

Tsholotsho Stadium
Football stadium for Tsholotsho FC who are playing temporarily at White City during the first half of the Castle Lager Premier Soccer League season.

Completion	2015

Victoria Falls Cricket Ground
Local council has granted planning approval for a stadium near the iconic site to become country's third international Test ground. Also home for domestic side Matabeleland Tuskers and open for touring teams to practise.

Capacity	4,000+

AMERICAS

ARGENTINA

Buenos Aires: Mary Teran de Weiss Stadium
Redevelopment of tennis stadium with retractable roof. In Parque Roca.

Capacity	14,000

BRAZIL

Rio de Janeiro: Olympic Stadium
Temporary capacity update of 2007 Pan-American Games stadium for Olympic athletics.

Capacity	60,000 (45,000)

Rio de Janeiro: Olympic Hockey Centre
Two stadiums in Deodoro zone..

Capacity	10,000 (centre 1), 5,000 (centre 2)

Rio de Janeiro: Olympic Tennis Centre
Developer: City of Rio de Janeiro. Tender out for construction and operation of the 2016 Barra da Tijuca Olympic Park Tennis Centre. Legacy: Olympic Training Centre for high-performance athletes, the main sporting legacy of Rio's Olympic Games to Brazil and to the city. Finance: Federal Government. Construction: R$139,9m permanent, R$29,7m temporary, R$13,1m dismantling of temporary structures, operations and maintenance of the Tennis Centre before, during and after the Games until May 2017. Eight permanent courts and eight temporary. Main court 10,000, temporary 5,000, 3,000. 13 outdoor courts, seven with 250 seats each (six permanent).

Capacity	20,000
Cost	R$182.7m
Completion	2015

CANADA

Elk Stadium
Stadium planned near the partially built promenade mall. With up to 20 adjacent fields for tournament use. Feasibility study under way. Developer: Elk Grove City Council.

Cost	C$100m

Montreal: Baseball Project
Study funded by a group comprised of the Board of Trade of Metropolitan Montreal (BTMM), the Montreal Baseball Project (MBP), EY and BCF LLP. Costed as $500m to buy team and $500m for an open-air ballpark.

Capacity	36,000
Cost	C$500m

Regina, Saskatchewan: Mosaic Stadium
Open air stadium for Roughriders. (Dome stadium ($430m) was subject of feasibility study by Stadium Consultants International and Global Spectrum ($1m) but rejected. WS Atkins, Pattern Design Architects and P3A supplied early designs. On the Evraz Place grounds west of the existing Mosaic Stadium. Design work continues. Expandable capacity. Keystone project and the first of three phases of the Regina Revitalization Initiative. Transparent roof, general admission lounge, 68% of seats in sunken lower bowl. Funding: province $80m, city $73m, team $25m (with help from 12 founding partners), loan from province $100m. Construction manager: PCL Construction Management Inc. (Construction and Finance Team Lead); HKS Sports & Entertainment (Lead Design Engineer and Sports Architect); B+H Architects (Architect of Record); and TD Securities (Financial Advisor).

Capacity	33,000 (expandable to 40,000)
Cost	C$278.2m
Completion	2017

Toronto: BMO Field
Upgrade for municipal stadium that hosts international soccer and rugby. Maple Leaf Sports and Entertainment (MLSE) scheme approved by city council. Finance: city C$10m, MLSE C$95, C$20 sought from other government bodies. Naming rights available from 2017. First phase to May 2015 now completed: 8,400 new seats in the East grandstands, additional washrooms and concession stands. New suites, private clubs and the expansion of the Rogers Club, as well as a new concourse on the second level connecting the stadium. Larger HD video board in North end. Designed to take temporary seating system of 10,000 (40,000). The second phase to May 2016 will see the addition of a full-size canopy covering all seats with the exception of the North grandstand and a new sound and lighting system. An optional third phase will enable BMO Field to accommodate CFL. Project manager: ICON Venue Group. Architect: Gensler. Construction: PCL Construction.

Capacity	30,000 +8,400
Cost	C$120m
Completion	2016 (option May 2017)

GRENADA

St George's: National Stadium
Under construction for athletics and football. Next to cricket ground. Funding: Chinese government. Construction: CCCC (China).

Capacity	7,000
Cost	US$31.49m
Completion	August 2015

HAITI

Phoenix Stadium
First ever professional soccer stadium in Haiti. Operator: Foundation L'Athletique D'Haiti (FLADH). Developer: Delos Living (Morad Fareed).

Capacity	12,000
Cost	US$5m

MEXICO

Juarez: Tricentenario Stadium
Downtown ballpark for Juárez Indios, with scoreboard and retail. Area: 503,000ft².

Capacity	13,500
Cost	US$10.3m

Mexico City: Chivas de Guadalajara Stadium
New soccer stadium with family-friendly facilities. Construction: ICA.

Capacity	45,000
Cost	833m peso, US$76.3m

Mexico City: Los Diablos Rojos Ballpark
In Magdalena Mixhuca sports complex. Steel and PTFE roof structure resembling devil trident. Architet: JAHN, ADG (Alonso de Garay). Green: passive systems, water use reduction.

Capacity	16,000 (13,000 seats, 3,000 berm)
Completion	2017

URUGUAY

Montevideo: Penarol Stadium
Soccer stadium near Ruta 102 about 7km from the Aeropuerto Internacional de Carrasco. Finance: suites sale and loan

Capacity	40,000
Cost	US$40m
Completion	2016

UNITED STATES OF AMERICA

AL: Birmingham Dome
Downtown dome stadium with convention space. Developer: BJCC Board of Authority (Executive Director Jack Fields). Architect: Populous plus local architect.

Capacity	57,500 (expandable 70,000)
Cost	US$550m (Finance: city $66m)

STADIA FOR PEOPLE

Paul Brislin, Director, Arup Sport Venue Design and Chris Dite, Associate Director, Arup Sport Venue Design, share their insights on why it is so vital to create stadia as much for the people, as for the athletes.



The Singapore Sports Hub has hosted over 100 sporting and lifestyle events since opening, and attracted over a million visitors.
Credit: *Poh Yu Khing*

www.arupassociates.com

Arup's focus is equally stadia for people, as much as excellent fields of play. Sustainable stadia are stadia that make people want to be there – and keep coming back, because every aspect of their experience was exciting. Surveys suggest 57% of people would rather watch at home than go to game. But we believe that the magic of match day can always beat the box. The most important issue is to extend the magic of the game to all aspects of the stadium experience – and to make it accessible to all.

We've conducted eye-opening surveys that tell us intensification of fan experience is fundamental. Naturally we have developed a range of bowl software to deliver perfect sport environments but software and logic aren't always the answer: it's about understanding the alchemy that makes a venue and enhances user experience: acoustics; lighting; information; entertainment. The focus may be the thrill of gladiatorial battle on the field of play but a stadium bowl has so many ways more to create an explosive communal event than good c-values. So we constantly ask: how are we shaping bowl and roof form to intensify acoustics? How are house and sport lighting, venue sound and information controllable to be an integral part of match atmosphere and architectural design?

It's exciting to be part of Arup's uniquely multidisciplinary sports environment, where we workshop experiences between our digital, urban planning, sport architecture, acoustic and structural teams. There is a wonderful design energy created from this interplay.

ENHANCING THE BOWL EXPERIENCE

Right now, we're assessing acoustic impact on stadium atmosphere. Using sounds obtained at existing stadia, we are able to model these to establish the impact bowl and roof architecture has on the acoustic environment and measure this against the best current venues. Similarly, we see that good seating and good views are key to fans. We have set our own design into production with a major seating manufacturer.

Hugely significant is intensification of atmosphere and entertainment through all forms of digital media, inside and outside the stadium. A generational shift is taking place: a FIFA 15™ generation of young fans, hungry for multiple platforms of information on their phones and screens. Equally, stadia are filled with tweeters, uploaders, fact generators, creating a massive new fan base, sharing their emotions, creating memories and inspiring thousands more fans to attend future matches. If the media are the new VIP, the fans are the new media. We challenge ourselves to create the best integrated network infrastructure to make these dreams possible.

THERE IS A WORLD OUTSIDE THE BOWL

Here too we are focused on people: not only communities, but individuals. It's fundamental to understand the tribes and the clans that make up the fan base, right down to the family unit; and then respond by providing all groups with F&B and entertainment that they can identify with, so that no group is alienated and there is a price point for everyone. Even at the lowest pricing points, we believe that there should be free water, free mobile charging, places to relax, as exemplified by exceptionally successful events such as **Indian Wells** in the United States, which has the highest footfall and return rate in world tennis. Encouraging longer dwell times has multiple benefits: decreased logistical pressure on peak exit and entry rates of flow, increased enjoyment, fan return rate and spend. An exponential benefit for all, from stadium owner to fan.

Outside the stadium, we look for a strong form to generate a sense of identity. A distinctive environment is a place to create powerful memories. It's is not just venue form that is important: it is the landscape environment too, and the possibility of multiple associated sporting venues, such as seen at the **Singapore Sports Hub**. Flexibility and diversity create legacy.

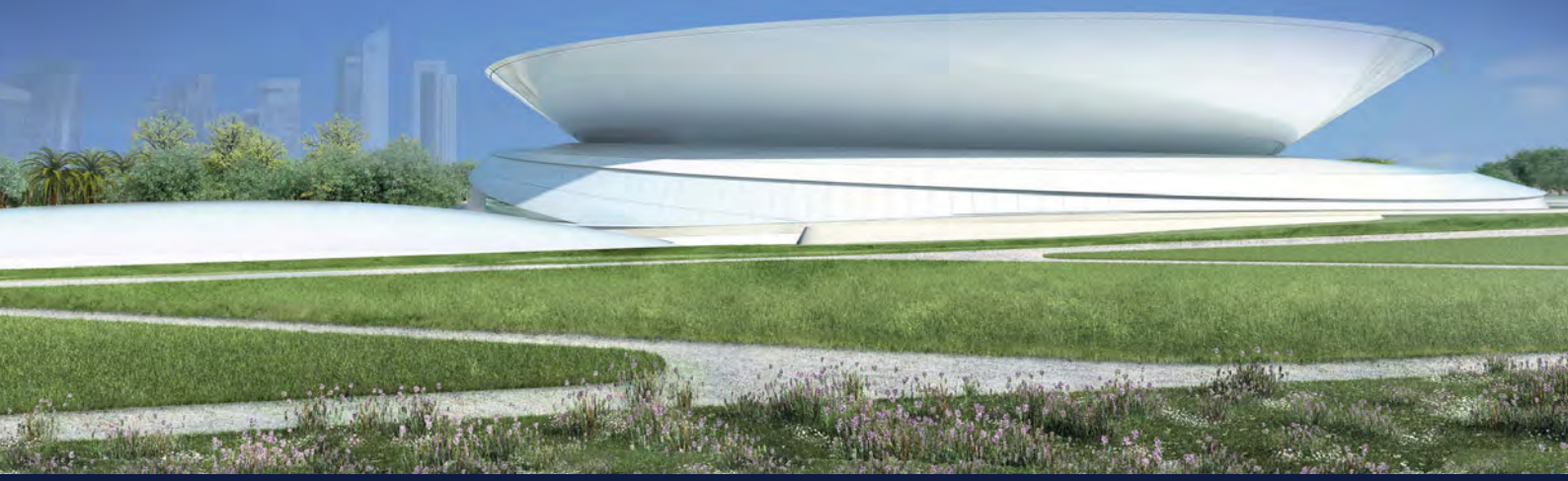
"Since the Sports Hub opened its doors, it's hosted over 100 sporting and lifestyle events, and attracted over a million visitors in less than a year, and has shown us the spectrum of events that the complex is capable of staging," commented the Singaporean Minister for Culture, Community and Youth.

A million people have visited the Singapore stadium, not just to take part in the games: but as an everyday part of their life. For us, this is a real signifier of success: a stadium that is part of the community, enjoyed by all. This is why our focus is holistic, on maximisation of atmosphere, extending the period of enjoyment, and enhancing all aspects of the game; to create venues that are as much places for people as they are theatres for champions. ■

STADIA FOR PEOPLE
THEATRES FOR CHAMPIONS



We believe that every stadium should generate an enduring legacy for the countries, communities and people in whose heart it is located.
And every stadium must be a theatre for champions.



ARUP ASSOCIATES | ARUP Sport Venue Design

London | Milan | Doha | Singapore | Shanghai | Shenzhen

Architect of the Year Awards 2014
Sports and Leisure Architect of the Year

World Architecture Festival

Singapore Sports Hub
World Architecture Festival Winner, Sports Category 2014

AL, Birmingham: University of Alabama Stadium

New horseshoe-shaped, on-campus football stadium with a downtown view, for UAB Hornets (Athletics Director Brian Mackin). Capacity: 27,511 (seats), 2,500 (lawn end zone). Suites: 33. Loge boxes: 24 (4). Parking for 300. Finance: $60m bonds, $15m donations.

Cost	US$75m

AL, Troy: Veterans Memorial Stadium

Renovations in north end zone to improve offering to athlete students. Athletic director John Hartwell. 10-14 suites, a new locker room, coaches offices, equipment room, weight room, administration offices, meeting rooms, video and technology areas, recruiting lounges, an academic centre.

Cost	US$25-28m
Completion	2015

AL, Tuscaloosa: Sewell-Thomas Stadium

Renovation and expansion of ballpark for University of Alabama. New locker rooms, a weight room and an indoor batting facility. New seating, a revamped concourse, skyboxes and club lounges, press box. Finance: $15m revenue bonds, $27.6m foundation/ gifts. Architect: Davis Architects Inc. Area: 129,000ft^2.

Cost	US$42.6m ($30m)
Completion	November 2015

AZ, Phoenix: Sun Devil Stadium

Redevelopment for home of Arizona State University sport. “Double Inferno” upgraded student section, enhanced seating and legroom, more restrooms and concession options, technological upgrades, improved air and traffic flow through the venue, a connection to the surrounding landscape, additional premium seating options, and a new video board and sound system. Phase 1: new student section in the south end zone, permanent stadium seating, student section in the north end zone. Removal of loge structure in the southwest corner and demolition of the upper deck of the northeast end zone. Phase 2: work on east and north sides. Phase 3: work on the west side and on the Student Athletics Facility. Architect: Gould Evans and HNTB. Construction: Hunt/Sundt Construction. Finance: real estate project University Athletics Facilities District.

Cost	US$300m (est)
Completion	2017

CA, Fresno: Bulldog Stadium



Renovation plans for Bulldog Stadium that will transcend the 35-year-old facility into a new era for Fresno State Athletics (Director of Athletics Jim Bartko). Improve all amenities, enhance the fan experience. Access tunnels built into the berm and a cross-sectional concourse at the midpoint of the bowl, doubling of restrooms and concessions, extra suites, club seats, loge areas, sponsorship displays and the possibility of naming rights, new press box and a new two-story football facility in the south end zone with a HD video board on top + ribbon boards. Phased construction. Architect: AECOM Sports.

Completion	2017

CA, Indian Wells Tennis Garden: Stadium 3

Proposed stadium to include a tennis museum that would be open to the public 10 months a year.

Capacity	4,500-5,000

CA, Los Angeles: Inglewood NFL Stadium

Proposed by Stan Kroenke, the owner of the St. Louis Rams, on the former site of Hollywood Park racetrack and casino. City council has approved. Demolition has begun. Developers: Stockbridge Capital Group (Terry Fancher). City of Champions Revitalization. Project to develop 300 acres for shopping mall, office, hotel, residential, entertainment/performance venue and a NFL stadium. See St. Louis.

Capacity	80,000
Completion	2018

CA, Los Angeles: LAFC Stadium



Downtown soccer stadium for the newest MLS team (and most expensive franchise), Los Angeles Football Club (LAFC) at the site of the Sports Arena in Exposition Park. Approval sought from approval from the Coliseum Commission and LA City Council. Restaurants, offices, a conference center and a soccer museum. Area: 100,000ft2. Annual economic activity: $129m. Architect: Gensler.

Capacity	22,000
Cost	US$250m
Completion	2018

CA, Los Angeles (Industry): NFL Stadium

Proposed new NFL stadium at the 60/57 freeway junction. Nestles into hillside, with all suites and VIP areas on one side and integrated into the adjacent retail promenade. Multisport, 365 day venue. Green: LEED certification. Suites: 175. Developer and finance: Majestic Realty Architects: Aedas, Populous.

Capacity	75,000-80,000
Cost	US$800m

CA, Oakland: Cisco Field

Proposed stadium for MLB team to replace McAfee Coliseum. Planning on site in suburban Fremont purchased from Cisco. City looking at other land parcels, possible environmental impact report for a proposed 39,000-seat ballpark near Jack London Square. Architect: HOK (formerly 360 Architecture) and Gensler.

Capacity	32,000-36,000
Cost	US$300-$400m

CA: Sacramento Republic FC Stadium

Construction of soccer stadium under way at Cal Expo that will house Sacramento Republic FC. 4,500 season tickets sold. MLS ambitions.

Capacity	8,000
Cost	US$3m
Completion	2015

CA, San Diego: Chargers Stadium

New NFL stadium on city-owned site in Mission Valley. The stadium would be home to the Chargers, the San Diego State Aztecs, the Holiday and Poinsettia Bowls, various concerts and music festivals, and other special events. San Diego paying for consultants to take project to environmental study. Funding: $200m NFL, $300m Chargers, $173m bonds secured by future rent from the Chargers, county and city taxpayers $121million each (30 years), sale of 166-acre Qualcomm Stadium site ($225m). Surcharges $111m (30 years), personal seat licences $120m, sports venue rent increases $43m (30 years). Focus sharpened by imminent change in Los Angeles NFL market. Chargers officials have met with a stadium task force created by San Diego Mayor Kevin Faulconer. They have also teamed with Oakland Athletic franchise to propose joint stadium in Carson if individual stadiums should fall through. Architect: MEIS.

Cost	US$1.1bn
Completion	2020

CO, Boulder: CU Athletics Facilities

Upgrade to athletic department facilities (Dal Ward Athletic Center and the CU Recreation Center), including the stadium.

Cost	U$143m

CO, Fort Collins: CSU football stadium

Privately funded replacement of the 32,500-seat Hughes Stadium for Colorado State University. Funding must reach halfway before a start can be made. Stadium planning/visioning committee formed (Rick George, athletic director; Amy Parsons, vice president for University Operations). Traffic planning: Kimley Horn and Associates (Dave Bradford director of CSU Parking Services). Multipurpose sports facility. Classroom space: 55,000ft^2. Finance: donations, bonds. Project Manager: Icon Venue Group. Construction: Mortenson Construction. Architectural consultant: Populous.

Capacity	43,000 potential
Cost	US$220m ($226.5m)
Completion	2017

CT: Hartford Ballpark

Groundbreaking mid February for AA minor league ballpark on Main Street to house the Rock Cats in downtown and to propel economic regeneration. After public consultation the city sought proposals from developers interested in building the ballpark as well as other retail and residential development. City donating land. Suites: 18. Two party decks, two picnic areas. Upkeep: US$250,000 fund and $150,000 annual. Rent: $100,000 pa. Finance: bond sale (total to pay $117m to 2042). Owner: Stadium Authority. Developer: Centerplan Construction (part of DoNo Hartford LLC). Overall project cost $350m.

Capacity	6,000
Cost	US$56m
Completion	March 2016

CT: Uconn Basketball Development Center

Will be built on the site of the old Memorial Stadium. Will serve as a practice and development facility. Funding: $24m raised so far.

Capacity	43,000 potential
Cost	US$32m
Completion	2015

DC, Washington: DC United Stadium

Public private partnership (30 years) to build stadium for soccer team DC United (COO Tom Hunt) in the Buzzard Point area. MLS team has been looking for a number of years. Land acquisition under way ($89m). Finance: half team, half city. Complex land deal. Environmental study under way. Architect: Populous.

Capacity	20-25,000
Cost	US$150m
Completion	2017-18

FL: Daytona International Speedway

Daytona Rising project to transform mile long grandstand. Suites: 31. Club seats: 520. Rest rooms: 1,891. Escalators: 40. Fibre optic: 151 miles. Screens: 1,611. Owner: International Speedway Corporation. Architect: Rossetti. Construction: Barton Malow.

Capacity	101,500
Completion	January 2016

FL, Fort Myers: Lee County Sports Complex

Renovation to Hammond Stadium and Lee County Sports Complex, spring training home of the Twins and home of Florida State League affiliate Fort Myers Miracle. Architect: Populous. Two phases, one year each. New player development academy, renovations to clubhouse, new playing fields, 350 degree boardwalk and concourse for Hammond. New parking lot. Phase 2 includes expanded concourses, improved concessions and restrooms, clubhouse expansion, premium seating, store, group seating, press box improvements. Construction: Manhattan Twins Joint Venture.

Capacity	9,300 (8,000)

FL, Gainsvile: Florida State Indoor Facility

Practice facility for Gators football, avoiding abandonment due to weather. Training rooms, equipment storage, camera platforms (3). Pitch: synthetic. Roll-up doors give access to new outdoor training pitches (natural turf). Redesign for entrance to baseball stadium and practice facility. Athletics Director: Jeremy Foley. Architect: Davis Architects. Contractor: Brasfield & Gorrie.

Cost	US$15m
Completion	September 2015

FL, Miami: Dolphin Stadium

Renovation to host marquee events. Financial deal with Miami-Dade for bonus payments to Dyork olphins for hosting big events (20 years). Canopy to shade fans, new seats, new video boards, concourse and concession improvements.

Cost	US$350m
Completion	2016

Miami Marine Stadium

Campaign to reinstate historic, city-owned structure damaged in 1992 hurricane. City commission considering plans.

Miami MLS Soccer Stadium

The proposed soccer stadium would see MLS back in Miami. Initital PortMiami scheme rejected. In discussion with Miami University about a joint project. Three other sites are being considered: land abutting Marlins Park, the preferred alternative - mayor seeking permisson to begin formal discussions. Other possible sites: an industrial parcel adjacent to Miami International Airport's auto-rental and mass-transit hub; and by Florida International University at Tamiami Park. Developer: David Beckham group (Beckham exercising option on MLS franchise, Simon Fuller). Finance: private. Architects: Arquitectonica (Principal Bernardo Fort-Brescia) and HOK.

FL: Orlando Soccer Stadium



MLS expansion, a new soccer-specific stadium for Orlando City SC, that plays in the Citrus Bowl). Third largest in MLS, 360-degree lower bowl, three-stand upper tier, bar in scoreboard, midfield club lounge. Plans for pregame fan zone. Transport: public. Team took over finance and full ownership after city finance was delayed. City contributing land. Finance: Orlando City SC. Waste service: Waste Pro. Construction manager: Barton Malow. Architect: Populous. Club seats: 5,000. Suites: 31 (300). Area: 290,000ft² (120,000 bowl).

Capacity	25,500
Cost	US$155m
Completion	Summer 2016

FL, St. Petersburg: Carillon Ballpark

Proposed by developer CityScape (Darryl LeClair) for Tampa Bay Rays. Club noncommittal. Offices as part of stadium structure. Part of retail and residential development. Retractable or fixed transparent roof options. ETFE roof and wall. Consultants: HKS and Hunt Construction.

Capacity	35,000
Cost	US$577m (retractable), US$548m (fixed)

GA, Atlanta: Mercedes-Benz Stadium

Octagonal retractable-roof stadium downtown for the NFL Atlanta Falcons and MLS debut team (first game 2017). Replaces Georgia Dome. Premium seating and other amenities to drive revenue. Screen: 62,000ft². Developer: Georgia World Congress Authority. Operator: AMB Sports and Entertainment. General Manager: Scott Jenkins. Costs: design services $73m, systems and equipment $71m, preconstruction $102m, construction $948m. Funding: hotel tax $200m, NFL $200m, personal seat licenses, Falcons. In a deal making its way through government channels, $50m in stadium-related infrastructure improvements are included. The Arthur M. Blank Family Foundation has pledged $15m to be invested in the communities surrounding the stadium – Vine City, English Avenue and Castleberry; and that is being matched by another $15m from Invest Atlanta's Westside Tax Allocation District. (The Westside TAD currently has $53m). Study: Populous. Architects: HOK, Goode Van Slyke Architecture, Stanley Beaman & Sears, tvsdesign. Food and beverage: Levy Restaurants. Geotechnical construction: Hayward Baker.

Capacity	60,000 (expandable to 80,000)
Cost	US$1.2bn
Completion	2017

GA, Cobb County: SunTrust Park

Major League Baseball stadium and integrated mixed-use development at the northwest intersection of I-75 and I-285. Broke ground September 2014. The Braves will develop the remaining parcels surrounding the stadium, crafting a world-class entertainment district featuring retail, restaurants and hotel options. Plans call for the stadium to be owned by the Cobb-Marietta Coliseum and Exhibit Hall Authority, which also owns the Cobb Galleria Centre and Cobb Energy Performing Arts Centre. Ballpark nestles into hillside, trees around parking. Intimate configuration with higher percentage of seats close to field than any other MLB ballpark. Mini-field kids' zone. Chop House restaurant looks out to events plaza and field. Aircon on every level. Roof: 90ft. Owner's rep: Heery. Architect: Populous. Construction manager: American Builders 2017 (JV between Brasfield & Gorie, Mortenson, Barton Malow and New South Construction). Braves' project manager: Jones Lasalle. Owner's rep: Heery International ($1.5m).

Capacity	41,500
Cost	US$672m
Completion	2017

GA: Augusta Stadium

Voters will decide on riverfront ballpark for Augusta Greenjackets plus retail, food & beverage, meeting spaces, office, hotel, residential, and parking. Requires transfer of public land. Part of $183m Project Jackson development. Feasibility study: Rosser International, CSL International. Developer: Greenstone Properties. Contractor: Brasfield & Gorrie LLC.

Cost	US$38.7m
Completion	2016

IA, Iowa City: Kinnick Stadium

Improvements to north stands at the University of Iowa. New suites, restroom upgrades and expanded food options in the north end zone - not been upgraded since 1983. Finance: city.

Completion	2016

IL, Chicago: Wrigley Field

Cubs to upgrade player facilities, add a big screen in left field and an ad screen in right field. Main screen: 5,700ft². Hotel development across street but no connecting bridge. City council approval gained as first step in getting full planning permission. Four phases to upgrade club houses, concourses, suites and retail. Architect: VOA Associates. Consulting architect: DAIQ Architects and Harboe Architects. Contractor Pepper Construction. Owners' rep: ICON Venue Group., Structural engineer: Thornton Tomasetti. Steel: David Architectural Metals, Lenex Steel and Byus Fabricators. ME: ESD. AV consultant: WJHW. F&B: Levy Restaurants.

Capacity	42,495
Cost	US$575m
Completion	2019

IL, Woodstock: Lakewood Sportsplex

Proposed minor league ballpark for McHenry County K-Nines. City providing land for a stadium. Finance: Private investors now sought. Developer: Equity One Sports Development.

Cost	US$40m

IN: Indianapolis Motor Speedway

Proposed new grandstands and possibility of floodlighting. Seeking public funding.

Cost	US$100m

IN: Indianapolis Soccer Stadium

Proposed soccer stadium for Indy Eleven. Multipurpose ambitions. Team seeks tax dollar help in the form of bonds paid for by an event tax. Proposal going to vote in senate. Currently plays at Carroll Stadium at IUPUI.

Cost	18,500
Cost	US$87m

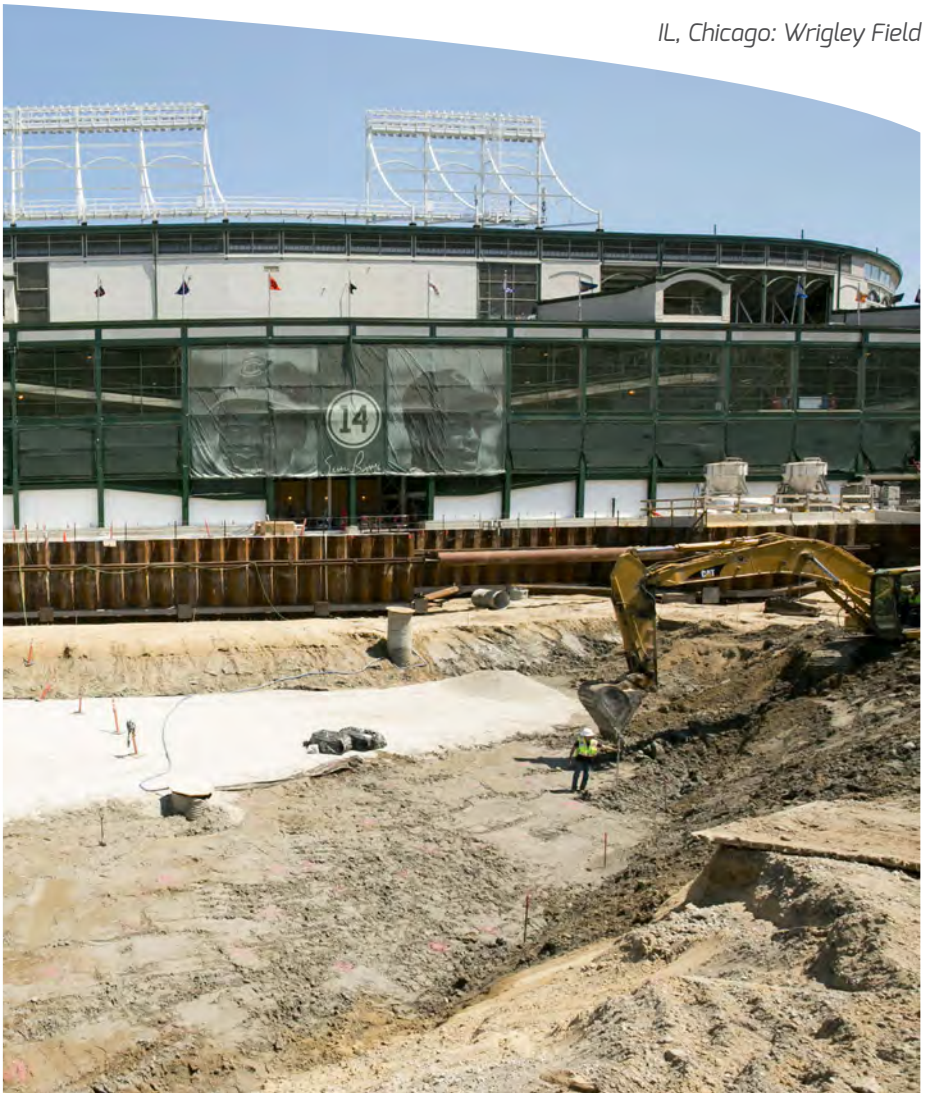
IN, South Bend: Notre Dame Stadium

Campus Crossroads Project is three buildings (750,000ft²) that will surround the Stadium. The vision is to group community facilities and to beautify the stadium's facade. The 33-month construction will begin after the conclusion of the 2014 football season. The project is designed so that new premium seating (3,000 to 4,000 additional club seats) will help fund the project. Rebuild of the field from base. Turf: Fieldturf. In-stadium broadcast infrastructure and possibly big screens.

Cost	US$400m
Completion	summer 2017

KA, Lawrence: Memorial Stadium

Proposed renovation of Memorial Stadium for Jayhawks' football. Consulting: HNTB. Track can be removed after building of $39m complex in west Lawrence for soccer, softball and track and field.



IL, Chicago: Wrigley Field

IMPACT & INSPIRATION

Paul Hyett, Principal at HKS Sports & Entertainment Group, analyses the impact and inspiration of Frei Paul Otto on modern day architecture and engineering.



The Frei Otto-designed Olympiastadion, home of FC Bayern.

Frei Paul Otto died last March at the age of 89. What is incredible, when considering his place amongst the truly great names in architecture and engineering, is not so much the contribution that he made in terms of creating a whole new language and form for buildings but that he did it before the breathtaking breakthroughs in IT and computer modelling, which all of us now take for granted and which have so utterly transformed the world of the designer.

Just look at the roof of **Olympiastadion** (pictured), home of FC Bayern. This stadium was originally built for the Munich Olympics way back in 1972; an event so sadly marred and overshadowed by the attack that saw 11 athletes murdered by Black September terrorists.

Think, those of you who can remember, to what an architect's office looked like, and was like, back then... Drawing boards; 'T' Squares and Set-Squares; perhaps a few 'drawing machines' and 'parallel motions'; the almost inevitable smell of stale ashtrays and, liberally scattered across the tables and plan-chests, slide-rules and those new 'fangled' electronic calculators in wild abundance. And of course a good sprinkling of angle-poise lamps.

The point here is that when Frei Otto conceived his wonderful free-flowing forms, explored their natural beauty and potential, and developed their unique architecture in its purest simplicity, he was operating without modern computer-aided drawing and calculation 'support'.

THEN & NOW

Metaphorically, those light years ago, he was at the sharp edge of innovation in terms of the equipment available to him by today's standards. Where we can now set up a complete, albeit, virtual model from which we can run 'fly throughs' that comprise a thousand, nay ten thousand images, every one of the renderings created within the studios of Frei Otto and Günter Behnisch were drawn by hand. Drawing was then a hugely expensive and time consuming process so this inevitably led to much less imagery being produced in order to explore and 'settle' form: The imagination simply had to work all the harder to 'fill in the gaps'.

Computer models now allow the designer to 'travel' around an architectural form in order to analyse it from every angle and incorporating the surrounding context within the virtual model allows the architect to assess how the proposal will relate to its setting. Such processes also enable the architect to instantaneously understand how light and shadow interact both externally and within. Put simply, computer technology has provided an invaluable tool for the rapid exploration of form and the pursuit of economic efficiencies.

INNOVATOR

Frei Otto's work, particularly at Munich, has had an immense impact on generations of the world's finest architects, and through them on many of the world's most impressive sports facilities. In this respect, if he didn't actually change the course of architecture, he certainly opened up a complete new avenue in terms of genre. Quite simply, he is the father of the modern tensile structure.

But beyond this, his work has triggered another whole territory of exploration and that is the bolder and clearer use of structure. Some would agree that he was by instinct as much an engineer as an architect and in this respect stadiums – especially their roofs – offered Frei Otto immense opportunities for the use of structure, clearly visible and expressed in all its glory, as an architectural device for ordering and organising the building.

Building Services can be used in this way as well – for example the 5 pairs of enormous air shafts – boldly coloured – that run along the west side of the plaza outside the **Pompidou Centre**.

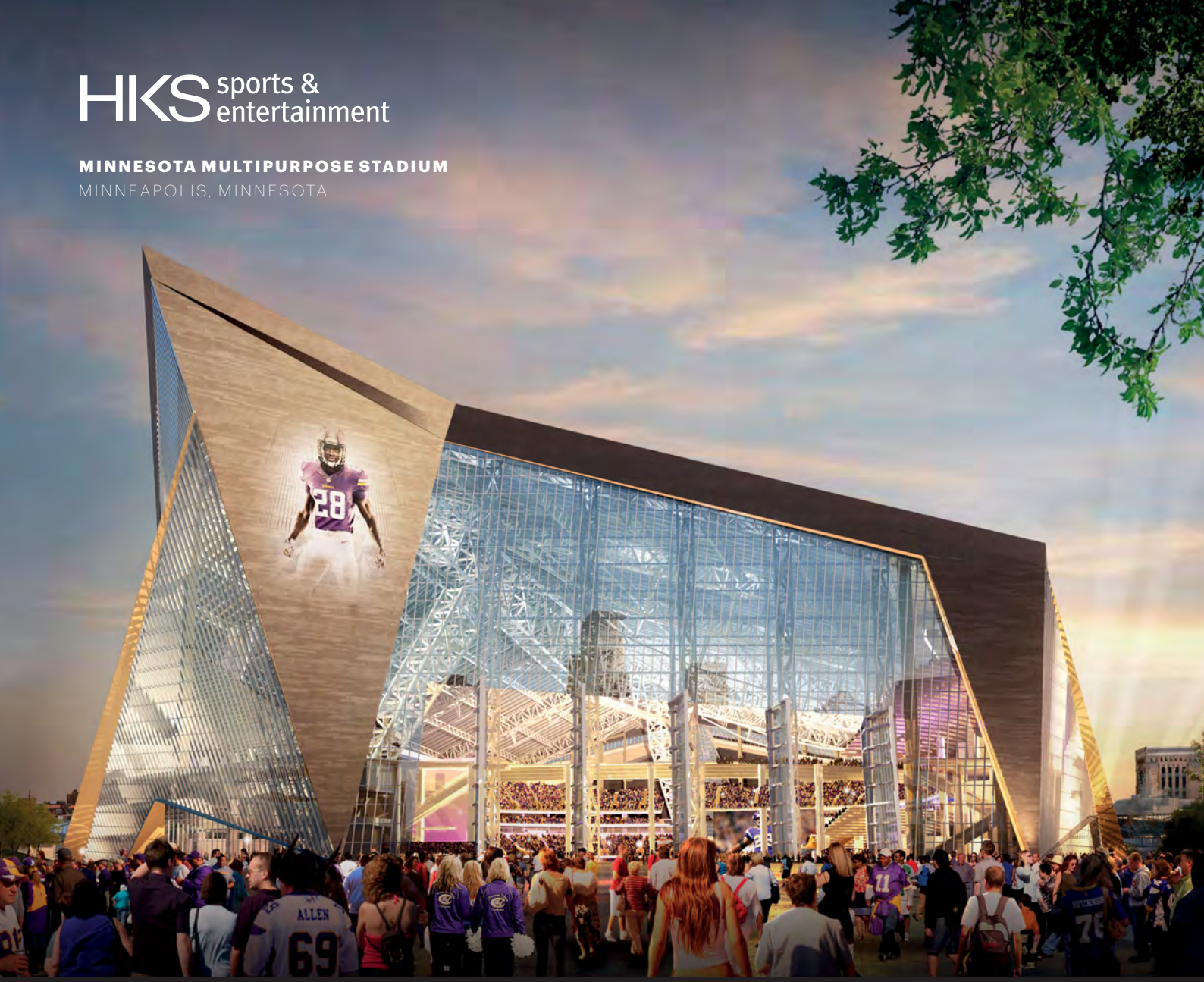
For too long, as we made the journey from load bearing structures to framed buildings, architects seemed to divest themselves of interest in structural elements and services: Think of the wonderful 'exhaust' structures (chimneys!) that adorned our city roof structures of old.

In contrast, Frei Otto's work not only broke completely new ground in terms of generating innovative architectural forms and language, he re-kindled interest in structure as a delightful 'tool' in the designer's armoury.

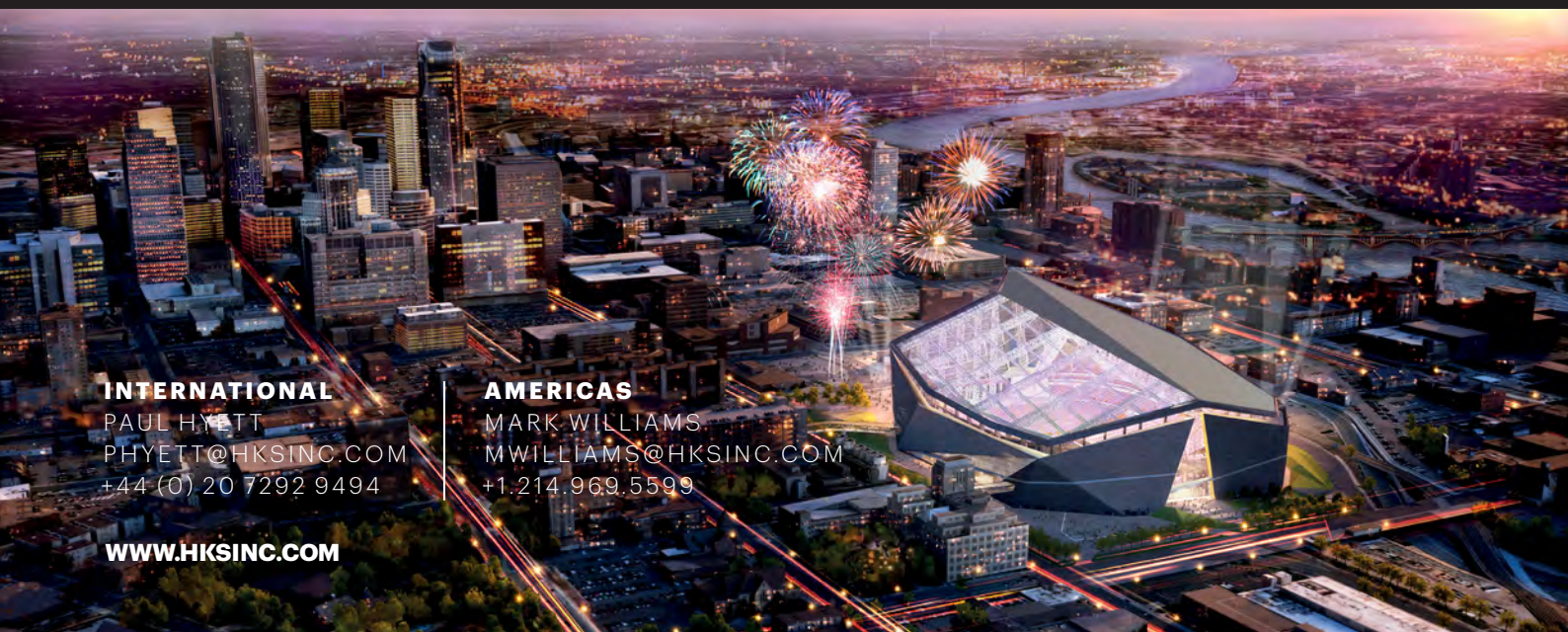
In some ways it is sad that Frei Otto was not born 50 years later: He would have achieved even more with the tools and equipment that we take for granted today. Or put another way: What a pity the IT revolution didn't come a few decades earlier. ■

HKS sports & entertainment

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KA, Manhattan: Snyder Family Stadium

Overhaul to the north end of football stadium at Kansas State University. New Vanier Football Complex. Third major enhancement in recent years. New locker room, weight room, video room and meeting areas, as well as coaches offices. Link between northwest and northeast ends. New video boards in northwest and northeast corners. Fan deck, new restrooms and a wider concourse. Architect: Populous. Construction: Mortenson, GE Johnson Construction

Cost	US$65m
Completion	Summer 2015

KY, Lexington: Commonwealth Stadium

Renovations at University of Kentucky with a Kentucky feel, using Kentucky limestone and reclaimed barn wood. New decorative exterior and landscaping. Concourses widened, new restrooms and concessions. New premium seating options on the south side, including clubs at the field level and mezzanine level plus new loge boxes. A new training table for student-athletes will be housed in the hospitality areas, which will be available to the Big Blue Nation as rentable spaces for special events outside of game days. Sideline suite level atop the south stands - approximately 20 luxury suites. A press box will be above the suite level with areas for media seating, television and radio broadcasts and additional VIP seating. New game-day locker room, training room and multi-purpose recruiting room in the east end zone. On game day, the Wildcats will run on the field from under the east end zone seating area which will be the new student seating section. Athletics Director: Mitch Barnhart. Funding: bonds, possible state support, fund-raising. Construction in two phases. Consultants: IMG College, International Stadia Group, Lexington Center Corp. Architect: Ross Tarrant Architects and HNTB (Gerardo Prado). Construction ($89m): Skanska USA Building (80%) and Congleton-Hacker.

Capacity	61,000
Cost	US$110m
Completion	September 2015

KY, Louisville: Dr. Mark & Cindy Lynn Stadium

For men's and women's soccer programmes. Located on campus parallel with Interstate 65 between the Swain Student Activities Center and Papa John's Cardinal Stadium. Identical locker rooms for each team, coaches' offices and a sports medicine training room. Training Center: 15,500ft². Press/Suite Area: 1,450ft².

Capacity	5,300
Cost	US$18.5m
Completion	2015

LA, Lafayette: UoL Ballpark

Renovation for University of Louisiana M.L. "Tigue" Moore Field. Athletic director: Scott Farmer. Architect: Abell + Crozier + Davis, DLR Group. Also on campus: new sports plaza behind the south end of Cajun Field, renovation of the Academic Center, proposed improvements at Earl K. Long Gym and the Culotta Tennis Center and a new basketball practice facility.

Cost	$10m

LA, New Orleans: Behrman Soccer/ Rugby Complex

Initially delayed, the project has started up again. 5 NCAA-regulation sized fields, one serving as a competition field.

Capacity	9,000 (4,200)
Cost	US$12.8m
Completion	Summer 2015

MA: Malden Ballpark

Proposed ballpark for minor league team (Atlantic League). Developer purchasing land parcels. Artificial turf and winter bubble to cap the surface and for community use in off-season. Developer: Boston Field of Dreams (Alexander Bok). Preconstruction: Turner Construction.

Capacity	6,000
Cost	US$30–$35m
Completion	2016

MD: Baltimore Soccer Stadium

Maryland Stadium Authority investigating market for a MLS team with feasibility study ($100,000). 42-acre waterfront site identified.

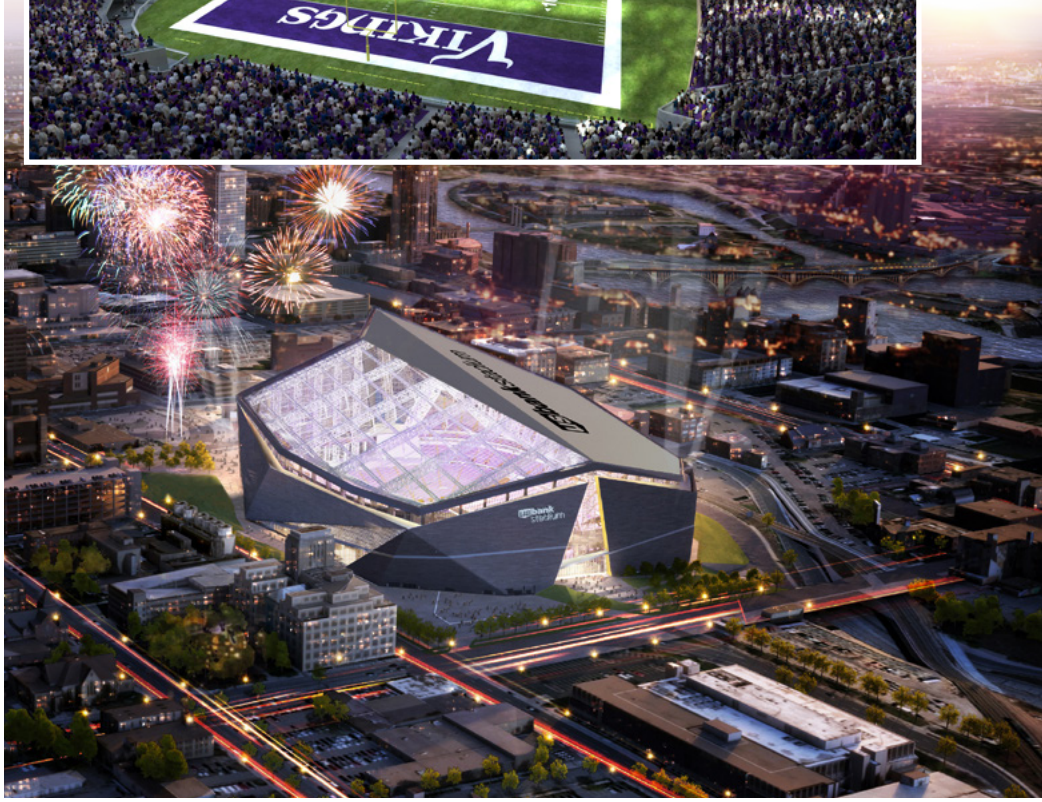
Capacity	17,000-20,000

MD: Hagerstown Ballpark

Proposed new downtown ballpark to replace 80-year-old Municipal Stadium, home of the Hagerstown Suns. Deadlines for decision have come and gone. Plan B awaited. Funding: county and city $16m. Study: Ripken Design.

Cost	US$30m
Completion	2016





US Bank Stadium and inset (above)

MD: Salisbury Sea Gull Stadium

For Sea Gulls football team at Salisbury University. Year-round locker room facilities for football, women's lacrosse, field hockey and men's lacrosse. The renovations will also add bathrooms, an athletic training clinic, ticket booths, concession stands and storage.

Capacity	4,800
Cost	US$19m
Completion	2015

MI, Minneapolis: US Bank Stadium

Football stadium to host Superbowl 2018. All concrete poured. Peak construction work will be 1,200 workers in summer 2015. Next to Metrodome site, where Vikings played since 1992. Retractable roof rejected in favour of largest ETFE roof in the world for an outdoor experience inside. Finance voted through by senate. Option to bring MLS team to the stadium. Other possible events include state high school football and soccer championships, amateur sports and concerts. Team playing at TCF Bank Stadium in interim ($250,000 per game). Spaces for shops, restaurants, NFL team museum and Hall of Fame. Escalators: 33. TVs: 2,000. Owner: Minnesota Sports Facilities Commission. Architect: HKS ($34m). Contractor/construction manager at risk: Mortenson or Hunt and Kraus-Anderson; finalists in stadium authority competition ($690m). Envelope design: Studio Five Architects. Envelope manufacturer: AMG Architectural Glass and Glazing ($27m). Funding: Vikings $566m, state $348m, city $150m. Operating costs: city and team. Suites: 150. Club seats: 7,500.

Capacity	65,000 (expandable to 72,000)
Cost	US$1.076bn (US$977m)
Completion	2016

MI, Minneapolis: University Athletics Village

University of Minnesota Center for Excellence, which will house academic, leadership and nutrition centers, a Football Performance Center, Football Indoor Practice Facility and a Basketball Development Center. Finance: private (US$70m). Architect: BWBR Architects. Director of athletics: Norwood Teague. Area: 340,000ft². Construction: Mortenson.

Cost	US$190m

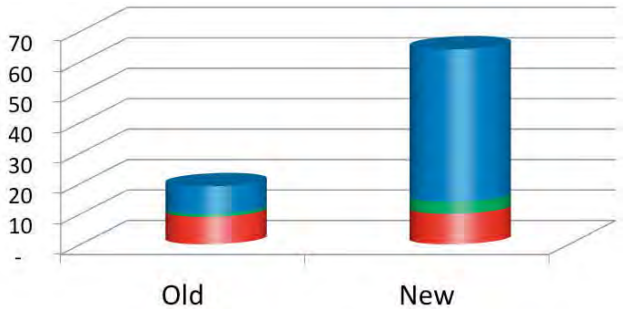
MI, Biloxi Baseball Stadium

Minor league baseball stadium along U.S. 90. City working with Beau Rivage casino, Southern League and team ownership who are importing a team for 2015 season. Operator: MGM Resorts International. Finance: $15m Mississippi Department of Environmental Quality, Council $21m. Advisor: Johnson Consulting. Architect: Dale Parters. Parking garage: $5.4m. Construction: WG Yates & Sons ($29.13m).

Capacity	6,000
Cost	US$36m
Completion	Summer 2015

THE RISE OF THE FOOTBALL BUSINESS

James Middling, Global Head of Sport & Events at Mott MacDonald, outlines the revenue based design principles that can breathe new life into existing stadia.



Mott MacDonald has been helping deliver some of the world's most successful and iconic stadiums for the last 70 years. This longevity has seen a number of trends come and go in the business of sport, however one that has been quietly growing in stature is the business case behind the delivery of sports stadia.

During the 1960's, **Mott MacDonald** designed a number of world-class stadia for which design records were set – such as the stadium boasting one of the longest cantilevered upper tiers in the world – all for the princely construction cost of GBP£10 per seat. Stepping forward to the noughties, and new stadia have opened at a cost of approximately GBP£8,000 per seat; 800 times more expensive in the 40 or so years in-between. Inflation accounts only for part of this increase, so what is the real story behind this price hike?

Over the last 40 years, football in the UK has gone from strength to strength, and the revenue generated has exponentially increased. The English Premier League is now the most followed sports league in the world, attracting huge interest in the sport and financial benefit to England. Many of the country's stadia are the most iconic on the planet and are also some of the most economically successful. Was this by chance?

REVENUE BASED DESIGN

New stadia tend to be much larger than their predecessors, in some cases having a footprint almost twice the size, to provide the world-leading hospitality and facilities required to generate the significant additional revenues. They comprise many more bars, restaurants and refreshment service points. In fact, nearly 10,500 seated meals can be served at any one event at some grounds, soft drink dispensers can pour 30,000 cups in a little over 10 minutes, and approximately 40,000 pints of beer can be served during half-time at a sports event.

In some instances, new pitches can be 4m lower than the previous pitch and are enhanced by **Desso** technology, which combines synthetic and real grass to strengthen the surface. This system provides a consistently high standard of playing surface and makes venues multiuse and capable of hosting music as well as sporting events. Pitches can be covered with specially designed protective panels for concerts, which can create space for up to 25,000 fans to stand.

Some stadia owners wish to replicate existing stadiums when upgrading them to modern day standards. This can be done at a lower cost, however it will only deliver similar revenues to the existing stadium. Mott MacDonald has worked with numerous clients' commercial teams to investigate facilities that could be incorporated into a stadium to deliver significant additional revenue. The ideas that generate their own positive business case can then be incorporated into the design and those that don't can be shelved. For example, a moving roof that could completely enclose the stadium might not be justified due to planning restrictions on the number of events held in any given year over a 30,000-capacity. The incorporation of world-leading, revenue generating design features has significantly improved the total revenue generated by new stadia compared to their predecessors.

Major UK national stadia continue to have the largest and most successful long-term contracted high value memberships of any entertainment venues in the world. They have a massive gross revenue stream, largely due to the continued investment in improving facilities, whether that be in retail, hospitality or technology.

APPLYING THE LESSONS LEARNED TO EXISTING STADIA

Across the globe there are numerous examples of highly successful stadia with a fervent fan base that have very modest hospitality facilities and limited disposable income to invest in significant stadium upgrades.

Mott MacDonald is now applying these revenue based design principles pioneered on previous projects to older existing venues across the UK, Europe and Australia. Working with the world's leading corporate marketing and hospitality companies, the consultancy has developed stadia schemes to introduce new corporate lounges, sponsored zones, hospitality boxes, naming rights façade wraps and exciting new catering and retail concessions that create significant additional revenue, and breathe new life into these ageing stadia at zero cost to the stadium owner through self-financing developments. This methodology uses non-intrusive initial design studies to establish the incremental business case for the appropriate revenue based design facilities and can be provided relatively quickly for very little upfront investment. Typically the new facilities provided pay for themselves within four years and provide an attractive investment opportunity to developers and a welcome lifeline for clubs seeking cost-effective stadium upgrades. ■

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RAISING THE BAR



Views from inside the stadium to the Downtown skyline and the 1984 Olympic torch of the Coliseum visually connect fans to the City.

www.gensler.com

Gensler Sports gives us a preview of the future home for the Los Angeles Football Club, and how this design will set the new standard for the world's game.

With the continued growth of soccer in North America, Major League Soccer's expansion team, the **Los Angeles Football Club**, is moving forward with building a new state-of-the-art soccer stadium in South Los Angeles. The 24-member ownership group includes sports and entertainment mogul Peter Guber, international businessmen Ruben Gnanalingam and Vincent Tan, Club President Tom Penn, U.S. soccer superstar Mia Hamm-Garciaparra, NBA legend Earvin Magic Johnson, MLB All-Star Nomar Garciaparra, and best-selling author and entrepreneur Tony Robbins, an accomplished group familiar with winning on multiple platforms across multiple industries. After an extensive selection process, the Los Angeles Football Club identified **Gensler Sports** as a like-minded partner to deliver and design a stadium with worldwide appeal as a sports and cultural destination that has the power to reshape and revitalise communities.

THE CHALLENGE

From the beginning, the Los Angeles Football Club understood that it was waging an uphill battle, competing with the **Los Angeles Galaxy**. Trying to establish a start-up in the market of your strongest competitor is not the easiest model for success and, with the Galaxy winning four of the last five MLS titles in Los Angeles already, this would be no easy fight for market share. Where other sports franchises have tried and failed, the Club is relying on both a connectivity to City and commitment to creating a dynamic soccer experience for their fans to supplant the Galaxy as "L.A.'s team".

CONNECTIVITY TO THE CITY

"The whole urban design aspect of this facility is really important," states Ron Turner, Global Director of **Gensler Sports**. ***"The Figueroa Corridor is one of the most important North-South connectors in the City. LAFC is building their brand around this and the Exposition Park site because of its connectivity to Downtown."*** This mirrors the sentiment of LAFC's Executive Chairman and Co-Owner, Peter Guber, who remarked that ***"if you want to be the City's team, you must be Downtown"***.

As a California landmark and host to numerous historic civic and sporting events, including two Olympic Games, Exposition Park was the perfect location. The new stadium for the Club will look to continue this rich heritage and become a catalyst for the revitalization of Exposition Park and the surrounding community. The stadium's dramatic design and siting will create a new landmark at the south end of the Figueroa 'sports' Corridor, an established arrangement of stadia, collaborative culture, education and business ventures along Figueroa Street that has contributed to Downtown revitalisation for the last decade. At an urban scale, the architectural and structural expression of the roof canopy will create a dynamic and iconic image for the City skyline. At a pedestrian scale, the building opens up to the surrounding streets and park, creating an active and welcoming environment. Much-needed retail, restaurant and museum amenities extend use beyond game day for fans and visitors. The new stadium will account for an estimated 1,200 new construction jobs and generate more than US$129m in new economic activity, creating over 1,800 permanent full-time jobs at the venue locally.

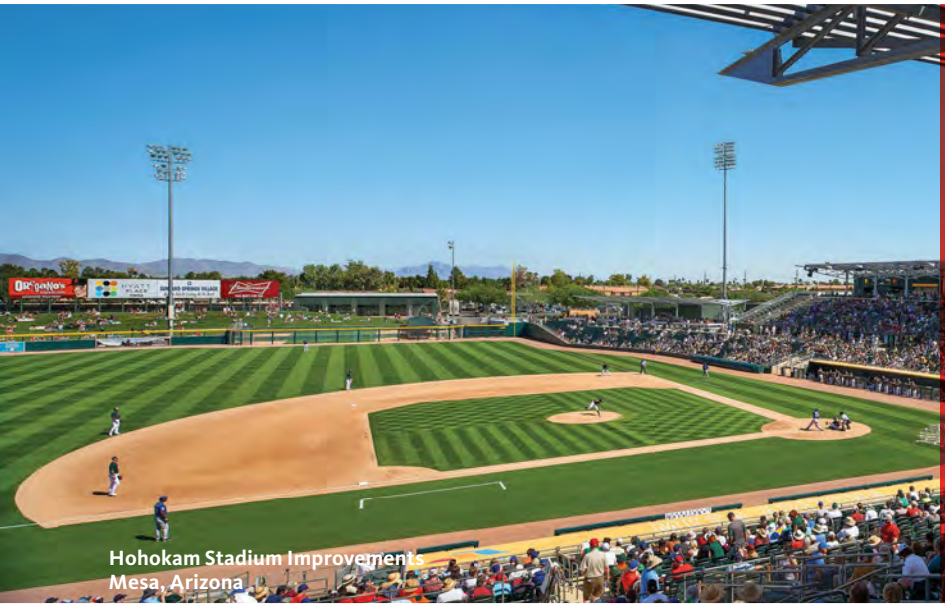
INTIMATE FAN EXPERIENCE

"Creating a special place for soccer in America with international appeal," was the charge to the design team by Club President and Co-Owner, Tom Penn. To optimise the fan experience, the approach to the Los Angeles Football Club starts with a focus on the field. A concerted effort is being made to get fans closer to the pitch, creating a greater sense of intimacy and engagement between fan and player. European-style grandstands, steeper and shorter distances between the first row and field, will capture a heighted experience for the 22,000 fans the stadium will accommodate. Special zones inside and outside of the stadium such as the 'stomping grounds' and the roof party deck will give a more social and layered game day experience from start to finish. From the plaza to the amenities to the stands, opportunities extend the experience and help a variety of fans tailor it to make it theirs.

"It is exciting to us to help this extraordinary owners group in developing the next paradigm in MLS stadia design. This project can be an icon and destination for the MLS and our City as well," says Turner. The Club's new stadium will be a place where fans, families and supporters create tradition and passion, making this benchmark facility a place you visit in L.A., both as a tourist and a fan. ■



LAFC,
Los Angeles, California



Hohokam Stadium Improvements
Mesa, Arizona

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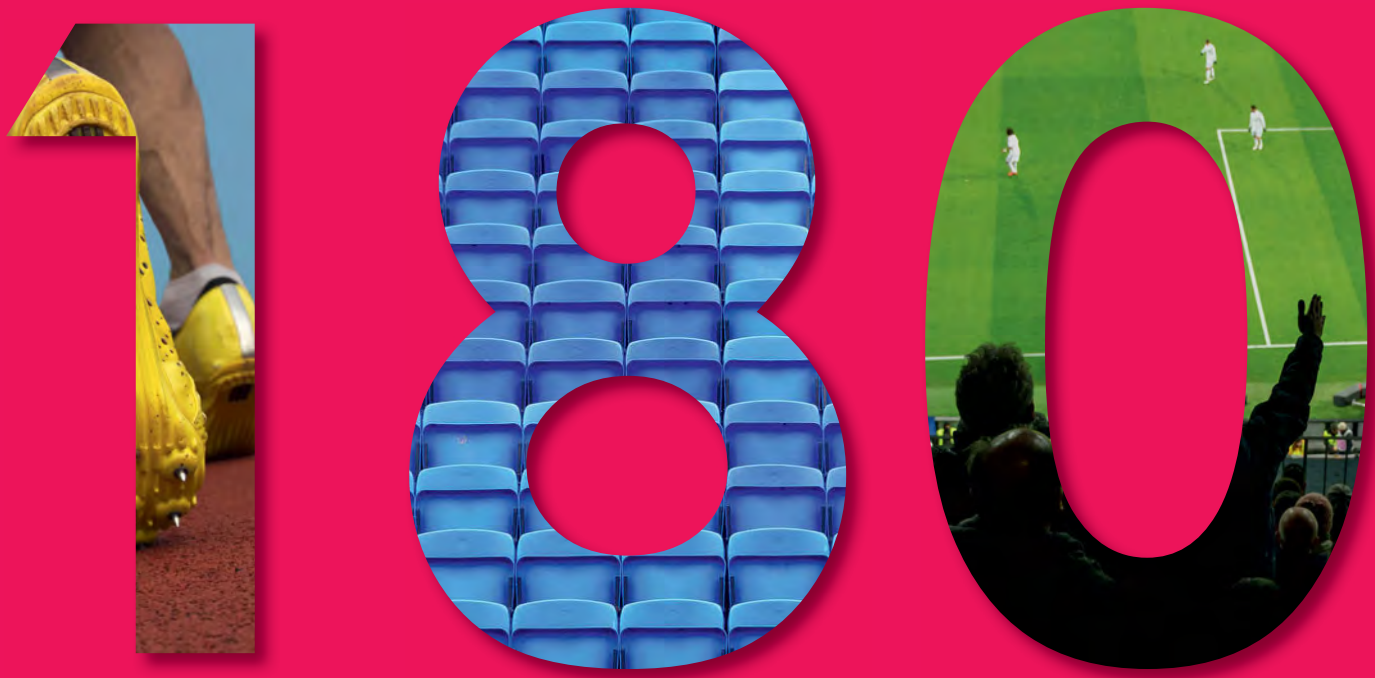
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MO, St. Louis: NFL Stadium

Open-air project to keep Rams in town. See Inglewood. Part of redevelopment of the north riverfront on a 90-plus acre site on the edge of the Mississippi River. Also capable of hosting FIFA soccer matches. Site acquisition and funding for the nearly US$1bn project have yet to be secured. Developer: St Louis Regional Convention and Sports Complex Authority. Working with NFL Taskforce. Construction team: HCKL Stadium Partners - Hunt Construction, Clayco, Kennedy Associates, and Legacy Building. Project management: Kwame Building. Consulting: Barrett Sports Group, Columbia Capital Management, Downtown Now!, FleishmanHillard, SMG. Finance: $400m public.

Capacity	64,000
Cost	US$900m-US$1bn
Completion	2017

MS, Jackson: JSU Dome

For Jackson State University to host football and basketball games, as well as concerts on campus. Sports Hall of Fame on first floor. Parking: 4,500. Finance: up to $75m state-issued bonds.

Capacity	50,000
Cost	US$200m

MS, Oxford: Vaught-Hemingway Stadium

Enclosure of north end zone and adding suites (30) and skyboxes on the south and west sides. Athletic department (Assistant Athletic Director Kyle Campbell) authorised by The University of Mississippi's College Board to hire AECOM Technology Corp. for $2.4 million to design the expansion. Finance: donations to Ole Miss' Forward Together athletics fundraising campaign. The university is also building a new basketball arena and plans to pay for the stadium expansion from the same campaign.

MS, Starkville: Polk-Dement Stadium

On existing Dudy Noble Field site for Mississippi State University baseball (athletics director Scott Stricklin). Open-air concourse with a two-tiered grandstand. Design team: Wier Boerner Allin Architecure, Populous, Janet Marie Smith. Finance: $20m donations, $20m ticket sales and premium seating. Skyboxes: 25. Left Field Lofts (1,000ft^2 apartments behind Left Field Lounge: 25. Left Field Lounge will have also have a walkway through the middle where those who do not know lounge owners can walk through and not block anyone's view. New locker rooms, training rooms, equipment rooms and potentially coaches' offices. Two main entrances: one behind home plate and one in right field with a large entry plaza. Additional and bigger concession areas and restrooms, both in the grandstand and outfield. HD video board, ribbon boards and field lighting.

Cost	US$40m

NC, Charlotte: American Memorial Stadium

Renovations to house the Charlotte Independence pro soccer team. Team may play in temporary 4,300-seat facility at Charlotte's Ramblewood Soccer Complex (Nussli Group).

Cost	US$4m
Completion	2016

NH, Hanover: Dartmouth College Memorial Field

Replacement of the 91-year-old west stands with an improved and accessible seating structure for the historic stadium. Preservation of the historic ivy-covered, brick façade. Director of Athletics and Recreation: Harry Sheehy. Wider aisles and concourses, handrails, modern restrooms, a premium chairback section on the 50-yard line, and accessible seating on three levels connected by an elevator. New press box accessible by elevator with upgraded technology for video streaming, television and radio broadcasts, and video scoreboard operation.

Capacity	11,000 (13,000)
Cost	$12.5m
Completion	2015

NH, Durham: Cowell Stadium

University of New Hampshire building new grandstand with about 3,500 new seats on the west side of the field. New bathrooms, concessions and a dedicated student section. Existing grandstand renovation and floodlights for the 2014 season. Finance: donations $5m, internal $20m.

Capacity	10,000 (6,500)
Cost	$25m
Completion	Winter 2015

NH, Durham: Wallace Wade Stadium

Duke University's board of trustees have approved upgrades. Playing field to be lowered to make room for new field-level seating. A later phase of renovations will replace the Finch-Yeager Building with a stadium press tower. Finance: donations.

Capacity	44,000 (33,940)
Cost	$15m
Completion	2016

NJ, Monmouth County: Kessler Field

A four-storey building behind the Monmouth stadium stands is planned. Restrooms, concession stands, Press box, scoreboard operations, broadcast booth and many other media uses. Finance: $11.25 private. Donors still required. Athletic Director Marilyn McNeil. Construction will start once funds are acquired.

Capacity	4,000
Cost	US$15m
Completion	2015/2016

NM, Portales: ENMU Football Stadium

Proposed replacement for 45-year old stadium. Funding: student vote on fee increase. Also for schools use and with City Manager's support.

Cost	US$18m

NV: Henderson Stadium District

Proposal for multi-phased project to include four venues – modest stadium, NBA arena, NFL stadium and ballpark – on federal land south of the M Resort in Henderson County, South Nevada. Feasibility study agreed. Developer: Las Vegas National Sports Complex (Christopher Milam).

Capacity	25,000
Cost	US$1.3bn

NV, Las Vegas: University of Nevada Stadium

UNLV investigating the need, size, cost and funding of an on-campus stadium. (Previous deal with Majestic fell through.) Consultant: Conventions Sports & Leisure International ($325,000). The stadium board has until 30 Sep to submit a report to state lawmakers on the venue's feasibility, scope and cost.

Capacity	60,000
Cost	US$500m (stadium) US$2bn (overall)

NV, Las Vegas Soccer Stadium

In downtown Symphony Park area to bring Major League Soccer (MLS) to Las Vegas. Voters will have their say. Developers: City of Las Vegas, The Cordish Companies and Findlay Sports & Entertainment. Council will vote on a binding proposal in December. Jobs: 1,200 (525 construction, 700 permanent). Finance: private 69%, public 31%. Depends on Findlay-Cordish partnership being awarded an MLS team. Owner: city. Operating costs: Findlay-Cordish partnership (30 years).

Capacity	24,000
Cost	US$200m

NY, New York: NTC Flushing Meadows

Retractable roof (PTFE) will be built on to the Arthur Ashe Stadium (22,547) at an estimated cost of $150m. Architect: Rossetti. Construction: Hunt. Roof: 210,000ft^2 PTFE membrane retractable roof. Support for the roof comes from eight columns on concrete bases, each supported by 20 piles driven 150-200-ft deep. The roof will close from two sides on glides in five to seven minutes. Roof cost: US$100m+. Roof supplier: Birdair. Structural steel: Canam-Heavy. Grandstand: SPS Terraces. Multi-year project to redevelop the Billie Jean King National Tennis Center (NTC). Developer: USTA. Two new stadiums, one to replace the Louis Armstrong Stadium in its current location and a Grandstand Stadium at the southwest corner of Flushing Meadows. New courts, walkway, parking and an elevated viewing platform that will provide better seating and viewing options for fans. Suites: 90. Restaurants: 5.

Capacity	+10,000
Cost	US$550m
Completion	2016-2018

NY, New York: Queens Soccer Stadium

New York City FC playing in Yankee Stadium while seeking to build a soccer-specific stadium in Queens or or Brooklyn. MLS Commissioner Don Garber has presented plans to build a 25,000-seat stadium at Flushing Meadows Corona Park. Designed to allow upgrade to 35,000. The plans call for parkland used for the project to replaced acre-for-acre. Jobs: 150 full-time, 700 part-time.

Capacity	25,000
Completion	2016 (starts)

NY, Elmont: Belmont Park Soccer Stadium

A proposed plan to the Empire State Development Corporation for a soccer stadium in the underused Belmont Park. Tenant team: New York Cosmos. Included in the proposal are plans for 9 new restaurants, 250,000 square feet of retail space and a 4.3-acre park. Construction jobs: 500. Full-time jobs: 3,000. Expected $200m annual revenue after build.

Capacity	25,000
Cost	US$400m (privately funded)
Completion	Spring 2016

NY, Syracuse: University Stadium

Syracuse University task force continues to examine the potential for a new stadium to house its football and basketball teams. Studies on a stadium in the Kennedy Square area or on renovation of Carrier Dome. State funding would be required. Consultant: Irwin Raij.

Capacity	40,000
Cost	US$500m

OH, Akron: MLS Stadium

Proposed retail village and retractable-roof stadium for MLS expansion team. Developer: Wolstein Sports & Entertainment Group LLC (Paul Garofolo). Finance: $7m per year tobacco tax, Wolstein $100m.

Capacity	20,000-25,000
Cost	US$327m (stadium $110m-$165m)

OH, Cincinnati: Nippert Stadium

University of Cincinnati is fund raising for restoration of Nippert, home of Bearcats (playing in Paul Brown during construction). New press box, suites, scholarship club seats and loge boxes /patio suites. West and east concourses will have new restrooms and concessions. Skywalks to connect upper deck with gameday plaza. Finance: donations, premium seating. Construction: Turner Construction (Bob Grace).

Capacity	40,000 (35,000)
Cost	US$86m
Completion	August 2015

OH, Cleveland: FirstEnergy Stadium

Modernisation, with two new video boards in each end zone, new audio system. Increase in lower bowl's seating capacity and improved sightlines. Two new escalators. Dramatic graphics throughout the stadium, honouring current and former Browns. Improved general-admission concession areas, new hospitality and fan-engagement opportunities. Architect: Gensler. Construction: Turner Construction (Jason Jones, GM, Cleveland office).

Completion	Fall 2015

OK: Gaylord Family Oklahoma Memorial Stadium

Master plan update by Populous to provide roadmap for venue's success. Plans approved by Board of Regents. Stadium master plan subject to ongoing review. Brief includes team facilities, disability seating, press box, south end zone, seating. Suites: 22. Club seating: 1,976. Open-air loge boxes: 60. Development of Sooner brand. South-end zone connected to east and west, ADA space increase, +43 restrooms, +69 concessions, escalators, 16 moving stairways, 18 elevators. Expanded concourses, new west stadium concourse and technology. South end will house new team facilities. Screen: SoonerVision 8,750ft^2. Fan plazas: 46,000ft^2. Barry Swift Center +50,000ft^2 space. Weight room and high performance centre: 30,852ft^2. Finance: private ($117m bonds, $43m suite sales).

Capacity	84,000 (82,112)
Cost	US$160m
Completion	2016 (first phase)

OR, Eugene: Jane Sanders Stadium

University of Oregon softball's new home. Finance: donation (Robert Sanders). Architect: SRG. GM: Howard S. Wright.

Capacity	1,500
Cost	US$10m
Completion	2016

PA, Harrisburg: Skyline Sports Complex
Upgrade of player and public amenities in soccer stadium at the north end of City Island to help revitalise downtown Harrisburg. Also for rugby, lacrosse and field hockey, concerts and community-related activities. Tenant: City Islanders USL PRO team (CEO Eric Pettis). Consultants: R.S. Mowery, By Design Consultants and K&W. Finance: Redevelopment Assistance Capital $5m, team matching public funds. Stadium design tentatively set for August.

Capacity	5,000 (7,000 concerts)
Cost	US$14m
Completion	May 2017

PA, Reading: Ballpark
Ballpark for Reading Phillies to replace FirstEnergy Stadium as part of proposed RiverView at Reading development.

Cost	US$70m

RI: Providence: Pawsox Ballpark
New owners of Pawsox intend to take the Triple A franchise out of Pawtucket. Target site for new stadium is a piece of freed-up I-195 land near the intersection of Dyer and Dorrance streets in Providence. Plus parking garage ($10m). Concept design: DAIQ and Populous. Economic consultant: Brailsford & Dunlavey.

Capacity	10,000
Cost	US$70m

SC, Columbia: Spirit Communications Park
Columbia City Council voted to work with Hardball Capital to bring a minor league team to play in city-owned baseball stadium as part of the Bull Street development. Suites: 16. Club seats: 135. Club lounge: 7,000ft^2. Jobs: 35 full-time, 550 part-time. Finance: Hardball Capital $6m, city bonds $29m. City to earn % of naming rights, licensing fees and concession sales. Developer/operator: Hardball Capital (30-year deal). Construction manager: CCEB Venue Partners - Contract Construction, Construction Dynamics, EnviroAg Sciences, Barton Mallow. Architect: Populous.

Capacity	8,000 (14,000 concerts)
Cost	US$35m
Completion	2016

Columbia: Williams-Brice Stadium
New Spring-Brooks Plaza, new indoor and outdoor track facilities, and a new standalone soccer complex right outside Stone Stadium. Indoor football practice facility will be transformed to accommodate track. Staged completion 2015-2016.

Cost	US$32.5m
Completion	January 2016

SD, South Dakota State University Stadium
New stadium to replace Coughlin Alumni Stadium as home of Jackrabbit football. Phased construction of four sides. Fan facilities on three sides. Upper tiers offering suits with operable windows, lounge boxes outdoors and club area. Finance: donations and bond finance.

Capacity	19,300
Cost	US$60m
Completion	2016

SD, Madison: University of South Dakota Stadium
9-lane outdoor track and field complex, as well as new soccer fields (one competition and one practice). Part of general upgrade of athletics facilities, which includes training facilities. Could be ready to host the 2016 Summit League Outdoor Track & Field Championships in May 2016.

Completion	2016

TN, Johnson City: ETSU Football Stadium
The State Building Commission has approved a project to build a new football stadium for East Tennessee State University. Planning under way. Finance: student fees (first phase).

Capacity	10,000
Cost	US$18m

TX: Amarillo Ballpark
Property swap between Coca-Cola and Amarillo Economic Development Corp. likely to allow go-ahead on downtown baseball stadium/multipurpose event venue. City council has put off vote until November 2015. Developer: Local Government Corp. Original developer failed. Development partner and operator sought. Possible tenant/partner: Southern Independent Baseball.

Cost	US$30.3m
Completion	2017

TX, Prairie View: A&M University Stadium
New stadium will continue the design theme of the campus and function as a football field, soccer field, and concert space. Home Grandstand (9,000), away grandstand (6,000). 500 premium club seats, a Presidential Suite, an Athletic Director's Suite and ten luxury suites. The press level will have TV / radio broadcasting capabilities complete with booths for audio visual control, statistics, replay, print and digital media. Two-storey fieldhouse with sports medicine suite, four team meeting rooms, locker rooms for football, men's track, women's track, women's soccer, and officials; offices, support spaces, study halls and a conference room. Construction: PBK

Capacity	15,000 (expandable to 30,000)
Completion	June 2016

TX, Waco: The Clyde Hart Track and Field Stadium
On-campus track and field facility at Baylor University. Phase two includes 10,300ft^2 team building containing hydrotherapy pools, a training room, offices and meeting rooms, storage space and improved landscaping. Architect: Populous.

Capacity	5,000
Cost	US$18.1m
Completion	2015

TX, College Station: Kyle Field
Upgrade for Kyle Field at Texas A&M University. Design study and architect: Populous (Craig Kaufman). Sound canopies at east and west ends. Increased seating capacity, improved amenities - x2 concessions, x4 women's facilities, safety plan. Video board: 47x163ft. Expansion to 106,500-plus seats for next season but back at 102,500 after construction finishes. The stadium will be the largest in Texas and the SEC. Escalators (21) and lifts (13): KONE. Finance: $232m seat license revenue, $75m student ticket revenue and fees, $18m facilities access agreement, $125m gifts from 12th Man Foundation.

Capacity	102,500 (83,002)
Cost	US$485m
Completion	2015

TX, Frisco: The Star in Frisco, Texas
Doubling as HQ and training facility for Dallas Cowboys and community facility for Frisco. Indoor stadium and outdoor fields. Finance: Frisco city and various economic development bodies as part of 25-year deal. Cowboys will pay maintenance – $1.5m per year – and annual lease ($100K) and any cost overrun. Construction: Manhattan Construction. Architect and interiors: Gensler. Masterplan: O'Brien Architects. Property marketing: Lincoln Property Company of Dallas.

Capacity	12,000
Cost	US$115m
Completion	2016

TX, San Antonio: Alamadome
Upgrades to secure the 2018 NCAA Men's Final Four basketball championship. Expanded concourses, a new video wall system. Developer: Convention, Sports & Entertainment Facilities Department (Mike Sawaya). Finance: San Antonio City Council. Design/build: Turner Construction. Architects: Populous, Marmon Mok.

Cost	US$41m
Completion	2016

UT, Logan: Romney Stadium
Renovation for Utah State Athletics. Funding phase prior to construction. New premium seating, club amenities and press box structure on west side to include suites, club seats and loge boxes. The west concourse will also be renovated, including additional concession stands and public restrooms. East side could include additional concession offerings and restroom facilities along with enhanced fan traffic flow. New video boards on both the north and south ends, new public address system. The plan envisages an overall increase in capacity. Study: Conventions, Sports and Leisure International. Preliminary design: VCBO Architects.

UT, West Valley City: Real Monarchs Stadium
Real Salt Lake owner Dell Loy Hansen has signed a letter of intent with city manager Wayne Pyle. 60-day negotiating window. Work in tandem with Maverik Center. Hansen withdrew in February from deal for club and Utah State Fairpark to add a multi-use sports stadium to the fair park.

Capacity	8,000
Cost	US$20-23m
Completion	2016

VA, Fredericksburg
Porposed multi-purpose stadium in Celebrate Virginia South development. Aimed at sports tourism market and home to minor league baseball team. Artificial turf fields: 5. Parking: 1,800 ($7m). Developer: owners of the Hagerstown Suns and Diamond Nation. Architect: Pei Partnership Architects and HKS.

Capacity	4,750
Cost	US$29m

VA, Loudoun: Edelman Financial Field
Stadium for Loudoun Hounds in Atlantic League of Professional Baseball and Virginia Cavalry FC of the North America Soccer League. Developer: VIP Sports and Entertainment. Delayed by changes at developer.

Capacity	5,500
Completion	2016

VA: Potomac Nationals Ballpark
Proposed new ballpark for Potomac Nationals in Prince William County in I-95 corridor. Meanwhile $300,000 upgrade to current Pfitzner Stadium approved by Park Authority. Skyboxes: 14 (500). Architect: AECOM.

Capacity	7,000
Cost	US$25m
Completion	2016

VA, Richmond: Ballpark
Proposed development of minor league ballpark and a slavery and freedom heritage site as part of $200m Shockhoe Bottom development.

US VIRGIN ISLANDS

St. Croix: Paul E. Joseph Stadium
Demolishing the existing stadium (under way) and rebuilding pro baseball field and sports complex to include 750-seat Little League baseball field; associated lighting, a press box and other amenities; an entry plaza with ticket booths; restrooms; a concession building; an open pavilion; a locker and maintenance building; and a permanent St. Croix Christmas Carnival Village. Finance: V.I. Public Finance Authority $17.5m. Client: VI Dept of Sports, Parks and Recreation. Architect: Steven E. Hutchins. Design consultant: Populous. Design and build: General Engineering Corp.

Cost	US$20m
Capacity	3,500

VENEZUELA

Caracas: Estadio Nacional de Fútbol
On a hillside in Caracas providing views of the city to the north-east. Lightweight, brightly coloured bicycle wheel canopy roof. Architect: Rogers Stirk & Partners. Phase one of the project involves creating a masterplan for an area known as La Rinconada. The stadium will be built in the park alongside existing sports facilities, including a listed racecourse designed by Arthur Froehlich in 1959. Engineer: Arup. Roof: Schlaich bergermann und partner.

Completion	2016

Caracas: La Rinconada Stadium
Baseball stadium under construction in La Rinconada Park as first phase of a new public park master planned by Rogers Stirk Harbor + Partners. The park will include world-class sports venues, public plazas, and a hotel and convention center. Architect: Gensler

Capacity	36,000
Completion	2016

WEST INDIES

Jamaica, Clarendon: Herb McKenley Stadium
Work under way but Minister of Transport and Works seeking full finance. Nine-lane, all-weather running track, football field, basketball and netball courts.

Capacity	12,000
Cost	US$200m

Trinidad: Couva Velodrome
Indoor and outdoor tracks plus conference rooms, offices, a gym and a sports centre. 250 metre x 7 metre wood cycling track with embankment of 42 degrees to the International Cycle Union (UCI) standard Category 1. Hospitality suite boxes with private seats. Official /VIP / Media seats. Concessions outlets (food and beverages, merchandising). Ticket booths. Multipurpose room(s) for event organisers/ referees/judges and other officials. Massage room for athletes. Opposite the Ato Boldon Stadium. Will meet standard for World Championships. Developer: Ministry of Sport.

Capacity	2,500
Cost	TT$145-$200m
Completion	2015

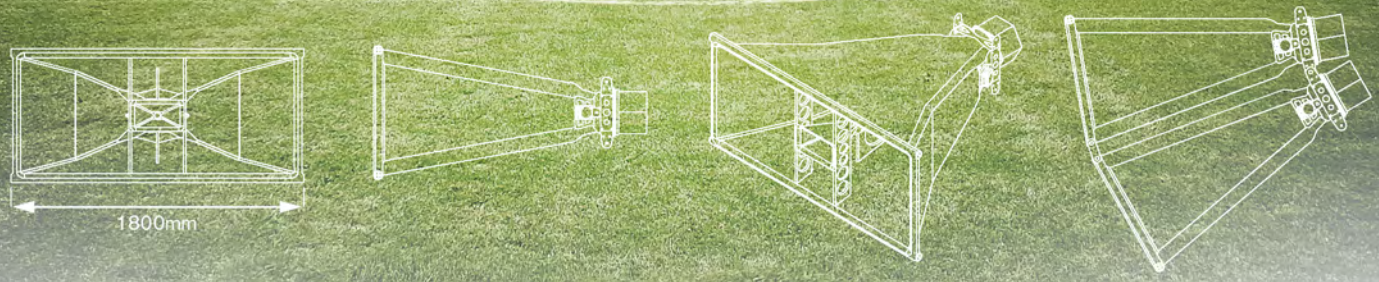
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WINNER PROSOUND AWARDS 2013

RLA REDEVELOPMENT

In this Q&A, Katie McIntyre gets insights from Cox Architecture's Sports Director, Alastair Richardson, on the AUD$338m Rod Laver Arena redevelopment.



Alastair Richardson

Rod Laver Arena (RLA) is the preeminent venue at **Melbourne Park**, hosting a range of events throughout the year and accommodating Centre Court during the **Australian Open**. It is the third most successful venue in the world by ticket revenue sales, and currently the sixth by attendance levels. (Note: These rankings do not include Australian Open attendance.)

The Melbourne & Olympic Parks precinct has pivotal importance to the city and the part it plays in Australia's National Sporting Identity.

The redevelopment of this 15,000-seat venue has a significant importance in maintaining and improving the iconic RLA's position and prestige as home to one of the world's most famous Grand Slam Tennis tournaments – The Australian Open – and an ever-increasing number of major events, conferences and performances.

REFURB TO MEET WORLD'S BEST STANDARDS

As part of a broader **Stage 2 Melbourne Park Redevelopment**, the AUD$338m RLA refurbishment is to meet world's best standards and ensure its ongoing viability as a Grand Slam and Major Events facility.

Cox Architecture have designed the plans that will improve existing facilities at the RLA and provide new state-of-the-art spaces that will serve Victorians for another 27 years.

The project will be delivered over the course of four years, with the first major construction works commencing in 2016, and all works scheduled to be completed in 2020.

Q&A WITH ALASTAIR RICHARDSON, SPORTS DIRECTOR, COX ACHITECTURE

When was Cox first approached about the RLA redevelopment and what were the main points of the design brief?

Cox Architecture were first co-authors of the **2010 Masterplan for Melbourne and Olympic Park** and at that time identified the need for a major refurbishment and upgrade of **Rod Laver Arena** to allow it to be maintained as the main court for the **Australian Open Tennis Tournament** and for it to continue as one of the premier entertainment arenas in the world.

The original masterplan was updated in 2014, as a part of the continued review of the precinct by the **Government of Victoria** and confirmed that Stage 2 of the masterplan would include the refurbishment and extension of Rod Laver Arena.

The Victorian Government, through **Major Projects Victoria**, requested proposals for the redevelopment through a tender process, which we were successful with our partners **HKS Architects, Robert Bird Group Engineers, Norman Disney Young Engineers and ME Design Engineers.**

The main points of the brief from the Government was the upgrading of the arena to respond to current day requirements in relation to player/performer facilities, patron comfort (amenities and food and beverage concessions), improvements to the back of house areas, development of new multiuse facilities that could provide enhanced player facilities during the Australian Open and new restaurants and bars for the rest of the year.

Underlying all of these requirements was the need to respect the originality and integrity of the existing Rod Laver Arena and retain its operations throughout any building works.

What were the key design drivers?

The key drivers for the project has been the modernising of Rod Laver Arena to contemporary standards for food and beverage (F&B) services, patron amenities and enhancing the patron, player and entertainer experience. This has been done within the context of retaining Rod Laver Arena as the predominant building in Melbourne Park and allowing it to be clearly articulated as such within the masterplan.

The design envisages new pods built to the north, south and east, which allow for the additional facilities, as well as allowing for new players facilities and restaurants.

Another key to the design has been the redevelopment of all of the players and entertainers areas on the ground floor and the improvement of back of house circulation to allow for improved operational efficiency at the venue.

What were the main challenges of the project?

The main challenge of the project has been the need to retain operations at the venue throughout the major refurbishment and redevelopment work. All work has to occur within a set period each year due to the Australian Open and also accommodate a full year entertainment schedule of concerts and sports.

Stadia&Arena ASIA PACIFIC 28-30 SEPT 2015

ROD LAVER ARENA REDEVELOPMENT IN FOCUS

Brian Morris, CEO, **Melbourne & Olympic Parks Trust**, alongside Phil Martin, Strategic Relationship Manager, **Cox Architecture**, will discuss this and other Australian projects during our 'live' event, **Stadia & Arena Asia Pacific 2015**.

In addition to these logistical issues, the design of the new facilities had to complement the existing Rod Laver Arena, a building that had become a landmark of Melbourne and the Australian Open.

Was it an easier or tougher job with Cox having been the Arena's original architect?

Rod Laver Arena was developed by Cox Architecture and **Peddle Thorpe Architects**, and opened to much acclaim in 1988. In many ways it was great to revisit a ground-breaking building we did 25 years ago. Rod Laver Arena, at the time of construction in 1988, was the first retractable roofed venue in the world and for many years set the benchmark for the centre courts of Grand Slam Tournaments, as well as being the preeminent entertainment arena in Melbourne.

Our ability to directly engage with Philip Cox, one the original architects of the Arena along with Peter Brooke **(PTW)** and develop the new additions into complimentary contemporary elements that fulfil our long standing ethos of structure, art, craft and nature has been a joy.

It has clearly shown how great sport buildings can have a continued life and can be upgraded to modern standards without having to be rebuilt.

How will the 'new' RLA differ from its predecessor? And what will be its key unique point/s?

Whilst Rod Laver Arena had provided excellent player and patrons facilities since its opening in 1988, it has recently fallen behind world benchmarks of major entertainment arenas and Grand Slam Centre Courts. In particular, fan expectations of amenities, concourse environments and F&B offerings has changed dramatically since its opening.

From a fan perspective, the new changes will be a marked contrast to the original venue and will bring Rod Laver Arena firmly into fans expectations of a modern, contemporary entertainment and sport arena.

The 'new' RLA places the patron at the forefront of the experience. New widened and improved concourse surround the venue and link the new entrances into the arena from the east, which will eventually under the masterplan connect to a new 'town square' at the heart of the precinct. New wheelchair-friendly access points between the concourse and the seating bowl have been installed to enhance accessibility for all within the venue. The new pods to the east, north and south provide new food courts, bars and restaurants that are designed to provide a holistic experience for fans before, during and after an event. What were once cramped and crowded player and performer facilities are now oasis' that respond to the individual needs of the patrons.

On top of this, the new additions have created an architecture that builds on the existing, complementing its purity, whilst providing a new contemporary identity that combines old and new.

From an operator perspective, new direct access to the arena floor has been provided through a dedicated loading area that is now segregated from the public, greatly improving the back of house operations and the event bump in/out operation. New quality performer/player facilities have been provided to enhance the experience for the performers who use the venue throughout the year.

How difficult is it to create a viable design for a multipurpose venue as opposed to one for a single-sport/ event facility?

Rod Laver Arena was the first truly multipurpose tennis-based arena. At no other Grand Slam has the centre court been designed from the outset as a multipurpose arena capable of hosting the specific demands of tennis with those of entertainment.

The new works associated with the redevelopment of Rod Laver Arena will further the venues flexibility, whilst not compromising the inherent viewing quality of the seating bowl for tennis, basketball, netball and concerts.

What types of future-proofing have been incorporated into the design?

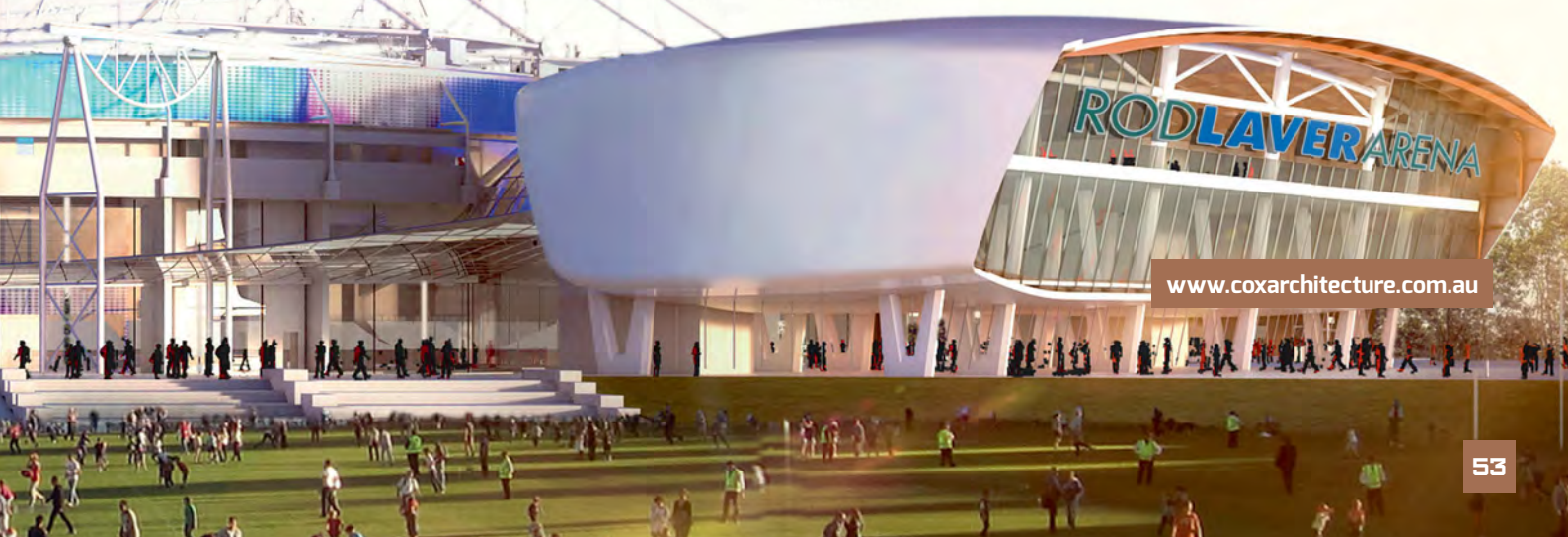
As part of the redevelopment, a key consideration was the upgrading of the roof support loads to provide easier access for concerts and entertainment. A new rigging truss capable of supporting 100 tonnes has been woven into the existing roof structure to provide future flexibility for all events.

Flexible seating configurations and new hospitality areas, including a floor patrons' food court and lounge, have been incorporated into the venue to provide greater product and event flexibility within the venue.

Were there any elements of your other arena/stadium projects that you incorporated into this project?

Each of our arena/sport projects builds on the experience of the last project we designed. An evolving factor that we have been addressing at all of our venues is the need to create crafted spaces that the public can socialise in.

We have been working closely on understanding changing demographics and patron expectations when attending sport or entertainment events. The realisation across the industry that 'fans want more' than merely viewing the event has shaped the support areas we are now developing. The rise of the informal social gathering at events rather than the formal has driven the development of new social orientated spaces within our venues that fans can call 'home'. ■



www.coxarchitecture.com.au

FACILITY WATCH

ARENAS

ASIA & AUSTRALASIA

AUSTRALIA

Brisbane: Queensland State Velodrome

Commonwealth Games 2018: track cycling. At the Sleeman Sports Complex in Brisbane beside the SuperX BMX track. International competition standard timber track and wet weather facilities, function room, café. Site: 20,000m². Building: 12,000m². Roof: 117m x 113m. Roof fabric: 10,000m². Structural steel: 745 tonnes. Architect: Cox Architecture. Client: Queensland Government. Managing contractor: Watpac. Track contractor: Sportbau Schurmann GmbH.

Capacity	1,500 (4,000 with temporary)
Cost	A$58m
Completion	2016

Canberra: AIS Arena

Revamp of indoor venue and breathe new life into the surrounding Bruce precinct to attract one-off events. New seating, windows, toilets and food services area. Out to tender.

Cost	A$10m
Completion	2016

Gold Coast: Convention and Exhibition Centre

Commonwealth Games 2018: netball in 5,000 seat capacity arena. Overlay works only. The International Broadcast Centre (IBC) and Main Press Centre (MPC) will also be located in this venue, forming the Main Media Centre. Owner: Department of Public Works.

Coomera Sport and Leisure Centre

Commonwealth Games 2018: gymnastics, basketball and netball. Outdoor courts, change rooms, administration and a café. Indoor courts: 9. Gym: 2,500m². for a dedicated gym. Area: 10,000m². Green: systems to minimise the use of light, power and water. Architect: BDA Architecture/ Peddle Thorp (Director Peter Brook).

Capacity	7,500 (temporary)
Cost	A$52m

Melbourne and Olympic Park

Stage two of the Melbourne & Olympic Park redevelopment, being financed by the State of Victoria (AUS$298m) and the Melbourne & Olympic Park Trust (AUS$40m). The project includes the refurbishment of Rod Laver Arena and a new 5,000-seat show arena. Phase 2 developments also include construction of footbridge over Batman Avenue and a new Administration & Media building. Construction on Stage 2 is expected to begin after the 2015 Australian Open. The Administration and Media Building open design EOI is available at: www.tenders.vic.gov.au

Cost	A$338m

Port Macquarie Indoor Stadium

New PCYC facility, three additional courts, a kiosk and spectator seating. Upgrades to supporting infrastructure and additional parking.

Cost	A$6m

Sydney: ICC Sydney Theatre

New venue to replace 28-year-old Sydney Entertainment Centre as part of redevelopment of Sydney International Convention and Entertainment Centre (SICEC). Linking to Tumbalong Park and Exhibition Centre. Developer: The Sydney Harbour Foreshore Authority. Concept plan: Cox Architecture (Nick Tyrrell).

Capacity	9,000
Completion	December 2016

CHINA

Beijing: National Speed Skating Stadium

Part of bid for the 2022 Winter Olympic Games and scheduled regardless of the result. West of the Olympic Park and south of the National Tennis Center. For both athletic training and public recreational use.

Capacity	12,000
Completion	2016

Shantou: Shantou University Sports Park

Basketball arena (6,278), a natatorium with Olympic-sized swimming pool, a conference centre, sport and fitness training facilities, a flexible grand conference hall, a 200-room boutique hotel and an underground car park. The entire structure covered by a roof garden fully accessible to pedestrians and with dramatic views of the campus and surrounding countryside. Area: 60,000m². Building area: 52,000m². Architect: MANICA Architecture. Finance: Li Ka Shing Foundation of Hong Kong.

Capacity	6,278
Cost	RMB560m
Completion	2016

Suzhou: Arena

Sports and entertainment arena. Developer: Suzhou Industrial Park Sports Industry Development Co. Ltd (SIPSID). Building services, energy planning and LEED green building consultancy services: Mott MacDonald. One of five facilities on a single campus.

Capacity	13,000
Completion	2017

HONG KONG

Hong Kong Arena

At the sports park being developed at the former Kai Tak airport site. Potential to hold events such as Sudirman Cup. Discussions around capacity, especially for badminton which attracts nearly 6,000 at Hong Kong Coliseum.

Capacity	4,000
Completion	2019

JAPAN

Tokyo: Olympic Aquatics Centre



Tokyo 2020: swimming, diving and synchronised swimming. Legacy as Tokyo Tatsumi International Swimming Centre. Owner: Tokyo Metropolitan Government.

Capacity	20,000, legacy 5,000
Cost	$363.189m

Ariake Arena

Part of the Waterfront sports area. Tokyo 2020: volleyball. Legacy: large gymnasium for national volleyball league, international competitions. Owner: Tokyo Metropolitan Government.

Capacity	15,000, legacy 12,700
Cost	$199.131m

Water Polo Arena

Temporary structure. Tokyo 2020: water polo.

Capacity	6,500

Youth Plaza Arenas A and B

Tokyo 2020: badminton, basketball. Legacy: large gymnasiums. Owner: Tokyo Metropolitan Government.

Capacity	A 7,000 (legacy 5,700); B 18,000 (legacy) 16,300
Cost	$411.84m

KOREA

Pyeongchang: Gangneung Curling Centre

Update construction for Winter Olympics 2018.

Capacity	3,500
Completion	October 2016

Pyeongchang: Gangneung Hockey Centre

New hockey stadium for Winter Olympics 2018.

Capacity	10,000
Completion	November 2016

Pyeongchang: Gangneung Ice Arena

New skating and short track facility for Winter Olympics 2018.

Capacity	12,000
Completion	November 2016

Pyeongchang: Gangneung Oval

New speed skating facility for Winter Olympics 2018.

Capacity	8,000
Completion	March 2016

Pyeongchang: Kwandong Hockey Centre

New hockey stadium for Winter Olympics 2018.

Capacity	6,000
Completion	October 2016

EMEA

BULGARIA

Ruse: Arena Ruse

Multipurpose arena for Danube town. Finance: Ruse Municipality BGN 18.88m, private BGN 36,97m.

Cost	BGN 55.86m
Completion	summer 2015

DENMARK

Copenhagen: Royal Arena



Multipurpose arena in Ørestad South. Plinth containing recreational spaces for urban setting, platform and semi-transparent top featuring terracotta fins. The European Commission checking state funding element is not against competition law. Planning and financial procurement: Davis Langdon, AECOM (James Clark) with IPW. Drawings with City Council for approval. 25 year operator lease available, no city subsidy. Operator: AEG Worldwide and Live Nation in the running. Green: BREEAM. Architects: 3XN, HKS. Engineers: Arup, ME Engineers. Landscaping: Planit. Area: 35,000m². Finance: City of Copenhagen and investment fund Realdania. Naming rights: Royal Unibrew.

Capacity	12,500 (sport), 15,000 (concert)
Cost	Dkr650m (Dkr200m)
Completion	Q3 2016

EIRE/REPUBLIC OF IRELAND

Cork: Concert Centre

An Bord Pleanala has granted planning permission for Cork concert centre on Albert Quay in Cork city centre. Developer Owen O'Callaghan. (Heineken Ireland and Bam have also proposed a concert venue on the site of the former Beamish brewery.) Area: 100,000ft². Jobs: 300 (construction), 40 (permanent), 150 (part-time).

Capacity	7,500 (5,000 seated)
Cost	€50m

Dublin: National Indoor Arena

National Indoor Athletics Training Centre, National Gymnastics Training Centre and National Indoor Training Centre, synthetic pitches catering for over 20 multi-disciplinary sports. Covered synthetic pitches with ancillary changing and conditioning facilities. Developer: National Sports Campus Development Authority (NSCDA). Design and build: Heron Buckingham JV and KSS.

Capacity	2,000
Completion	November 2016

ENGLAND

Blackpool: Ocean Arena

Blackpool council is seeking development partners to build an 'Ocean Arena' on the town's prime Central Station site. A super casino bid for the site collapsed in 2008.

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ENGINEERING FEAT

Walter P Moore's Justin Barton, P.E., S.E., provides insight on the new 10,000-seat First Tennessee Park.

First Tennessee Park is the new home of the Nashville Sounds, the AAA affiliate of the Oakland Athletics. The 10,000-seat, USD$47m ballpark opened on April 17, 2015 to rave reviews from fans and players. **Populous** served as the design architect with **Hastings Architecture Associates** as the architect of record (AOR). **Walter P Moore** served as the lead structural engineer for the ballpark and also created the steel connection design for the steel fabricator.

Designed as a clean and modern ballpark with fluid curves throughout, First Tennessee Park replaced the aging and outdated **Greer Stadium**, while also returning baseball to its historic home in Nashville. It was built on the same site as the original **Sulphur Dell Ballpark**, where Nashville teams played from 1870-1963.



First Tennessee Park, overlooking downtown Nashville, has accelerated growth in the surrounding area.

Justin Barton, P.E., S.E. is a principal and structural engineer at **Walter P Moore's** Kansas City office. He specializes in the design of sports stadia and arenas.

www.walterpmoore.com

STRUCTURAL SOLUTIONS

As is characteristic of many sports projects, this had an extremely fast delivery, an austere budget and numerous technical challenges. Walter P Moore developed structural solutions that enabled several complex architectural features, including:

An elevated club-level seating bowl extends 25ft over the lower bowl, bringing premium patrons even closer to the action. The city of Nashville and Populous specifically desired the seats to be supported on a "delicate and lacy" truss design that mimicked the look of the roof trusses from the original Sulphur Dell Park. To achieve this, Walter P Moore eliminated all gusset plates in the web members with tube shapes welded directly together. To speed up construction and avoid field welding, the trusses were designed and detailed to be shop fabricated, shipped and erected as an individual unit.

Curving and two-way slanted light standards atop the canopy were crucial to the desired architectural appearance. The light fixtures that extend 50ft above the roof (a total of 97ft above the playing field) are highly visible to pedestrians who circulate the neighbourhoods around the ballpark.

The scoreboard is a one-of-a-kind, guitar-shaped video board that honours Nashville as 'Music City USA' and serves as the signature element of the ballpark. Supported on just four columns, the overall board measures 178ft-wide and 60ft-tall. The main 68ft by 45ft guitar body is a full LED board with additional LED displays on the guitar head and each of the 'tuning knobs'.

The delivery team also created less glamorous, but equally vital features:

The project site is just three blocks from the Cumberland River. The architectural design depressed the lower bowl and service level below the 100-year flood level in an area that experiences frequent floods, including the historic 2010 flood. In addition to dugouts, batting cages and storage, four premium field-level suites located on the service level required additional protection.

Walter P Moore collaborated with the civil and plumbing engineer to tie the retaining/basement wall drainage into the field-level drainage system, which pumps water up to street level and into the city-wide storm water system. In a major flood event, pop-up relief valves located throughout the service-level slab relieve water uplift pressure.

The project site was located on an urban brownfield that no private developer would touch; a mix of various soils and historic buildings had been bulldozed and infilled. As a result, the seating bowl and on-grade structures for the main building span to grade beams that are supported on deep foundations. In partnership with the geotechnical engineer, Walter P Moore developed a structured seating bowl for the corners and outfield that could be supported on replaced soil in lieu of additional deep foundations.

TAKING THE LEAD

Working closely with the architect and contractor, Walter P Moore took the lead in setting the deliverable schedule. Four early construction packages were issued in two-week increments, allowing the project to proceed at a highly accelerated pace, going from the beginning of design development to opening day in just 440 days.

First Tennessee Park served as a catalyst and anchor for the redevelopment of the decaying urban neighbourhood of empty warehouses and surface parking lots between downtown Nashville and the near north neighbourhood of Germantown. In the area around the ballpark, 25 projects are already planned or under construction, including a new USD$160m Tennessee State Museum and a 300-unit luxury apartment complex.

Fans have continued to respond enthusiastically to the new stadium. At the all-star break, First Tennessee Park had increased fan attendance 60% from last season to an average of over 7,700 fans per game and 15 sell-outs to date. ■

Bristol Arena
Multipurpose arena on 'arena island' in Temple Quarter Enterprise Zone on site of old diesel depot. Part of city centre regeneration near Temple Meads station. RIBA international design competition winners: Populous, working with local architects Feilden Clegg Bradley Studios, BuroHappold Engineering and Vanguardia Consulting. Consultant: AECOM. Preliminary work: £250,000. Programme manager: Stuart Woods. The local enterprise partnership is working with the mayor to advance the project. Operator: SMG and Live Nation.

Capacity	12,000
Cost	£91m (£80m)
Completion	2017

Hull Venue



Super theatre style venue adjacent to Princes Quay in Hull City Centre. For concerts, conferences, family shows and exhibitions. The centre will include a large auditorium, exhibition space, conference auditorium, food and beverage outlets, break out spaces and a public realm to fully support all inclusive access. Part of wider retail development. Architect and Design Team Leader: AFL.

Capacity	3,500
Cost	£36.2m
Completion	2018

Leicester Community Sports Arena
For Leicester Riders basketball team (Director Kevin Routledge) on council-owned land on Charter Street, adjacent to Leicester College's Abbey Park campus. Operator: Community Sports Arena Ltd (125-year lease) Finance: city council £1.5m, Leicester College £0.5m, Leicestershire Enterprise Partnership £0.84m, Riders £0.36m. Jobs: 50.

Capacity	2,300
Cost	£4.2m
Completion	2016

Sheffield Community Arena
Future home of the Sheffield Sharks basketball team. Finance: private. Multipurpose for sport, culture and business. Courts: 3. See Olympic Park Stadium for more details about the Park.

Capacity	3,000

FINLAND

Tampere Central Arena
Multi-purpose to be built above the existing railroad track near the city's main railway station. Underground parking connected to Sori Bridge (700). Suites: 50. Conferenc area and restaurants: 2,500m^2. Integrated training for ice hockey teams. Architect: Daniel Libeskind. Wooden facades and turf roof. Owners: Ilves-Hockey, Tamhockey, Kirves Sijoitus Oy and Arena Holding Tampere Oy. Operator: Tampere Central Arena Ltd (Rikard Bjurström). Finance: Tampere City €22m, private €91m (€50m loans).

Capacity	12,000 (hockey), 15,000 (concert)
Cost	€124m (€95m) (plus €12.5m car park)
Completion	2017

FRANCE

Bordeaux Arena



Multipurpose hall. Developer: Communauté urbaine de Bordeaux (CUB). Build and operate consortium: Group Lagardère Unlimited, DV Construction, Rudy Ricciotti architects and Bouygues energy. Funding: City of Bordeaux.

Capacity	10,000
Cost	€49.2
Completion	2017

Cergy-Pointoise: Aren'ice
Designed to look like an iceberg this arena will host the future national ice hockey centre and headquarters of the French Federation (FFHG). Two rinks. Supports tennis, handball, basketball, boxing and cultural events. Architect: Chabanne & partners. Owner: Communauté d 'agglomération Cergy Pontoise. Design, construction, financing, maintenance and operation: UCPA group/CFA/FIDEPPP2 and COFELY. Area: 15 230 m^2.

Capacity	3,000 (hockey), 4,500 (concert)
Cost	€32m
Completion	2016

Dunkerque Arena
Two halls with combined 10,700 seats plus VIP seats and boxes. Walkways serving the stands, shopping and reception areas. Arena is designed to contribute to the development of the two clubs USDK handball and BCM Gravelines Dunkirk basketball. Architects: Chabanne and Partenaires, AvantPropos, AB + Architects. Design and construction: VINCI construction France (subsidiaries ADIM Nord Picardie, SOGEA CARONI and DUMEZ EPS). Operator: VINCI facilities.

Capacity	10,700
Cost	€112.4m
Completion	Autumn 2015

Lyon: Arena Villeurbanne-Lyon
Multipurpose arena for basketball tenant with Tony Parker academy on site. Public funding subject to political commitment. Owner negotiating with construction companies. Architect: Gensler (Ron Turner), Groupe-6. Operator: Global Spectrum Europe. Finance consultant: AMB Consult. Project manager: G2 Strategic. Owner: SPSM. Area: 39,300m^2. Loges: 180 places. Business seats: 1,420.

Capacity	8,500-13,300 (basketball/concert), 7,000-12,000 (hockey), 2,000-4,000 theatre)
Completion	2016

Paris: Bercy
Two phase upgrade for the well-known sports and concerts arena. Second phase under way. Director of Projet Bercy Arena 2015: Julien Collette. Improved crowd flow around the arena and better ability to stage different events. Wifi network. New street connections and new entrance hall of 2,000m^2. Corporate: 4,000m^2. Loges: 52. Architect: DWD Architectes et Ingenieurs.

Capacity	21,000 (17,000)
Cost	€110m
Completion	February 2016

GERMANY

Eisenbach: Werner Assmann Hall
Conversion of handball arena of SV Eisenach to meet Bundesliga standards. Grandstand on the north side.

Capacity	1,000
Cost	€5m
Completion	October 2016

Erlangen Sport Complex
Multi-functional gymnasium, bouldering/climbing facilities, office spaces and space for university sports science study. Owner: Stadt Erlangen Area: 19,000m^2 Architect: Schulitz Architects.

Capacity	3,000

Kassel: Multipurpose Arena
Feasibility study (euros 80,000) under way for arena to be home of German Bundesliga handball team MT Melsungen and boxing. Discussions on financing with town. Developer: Herbert Aukam. Area: 12,000m^2.

Capacity	7,500-10,000
Cost	€30m

Kaufbeuren: Eisstadion
Modelled after a block of ice, situated on the training ground of the Park Stadium. CCTV and an ammonia evaporation plant. Architect: asp.

Capacity	3,500
Cost	€22.5m
Completion	June 2017

Koblenz: CONLOG Arena
Upgrade menu list issued for ageing arena: seating €1.1m, floodlighting (€60,000-€200,000), a new video scoreboard (€250,000) and a new sound system (€250,000), space for seminars and conferences (€800,000).

Minden: Kampa Halle
Renovations or new arena options being investigated for home of handball team GWD Minden. Current hall needs fire safety upgrade.

Cost	€6m
Completion	2016

Selb: Netzsch Arena
Town is funding modernisation of home of VER Selb ice hockey club to meet safety standards by building two separate sets of facilities for home and away fans. Finance: Government of Upper Franconia/VER Selb ice hockey team.

Cost	€1.1m
Completion	2017

KAZAKHSTAN

Almaty: Ice Palace
Venue for 28th Winter Universiade 2017. Owner: Board of Construction.

Capacity	12,000
Cost	US$232m
Completion	October 2016

Almaty: Curling Arena
Venue for 28th Winter Universiade 2017. Owner: Board of Construction.

Capacity	3,000
Cost	US$127m
Completion	October 2016

ROMANIA

Constanta Arena
For tenant handball team HCM. Also on site: indoor Olympic pool (2,000), gymnasium (1,000), hotel, pedestrian plaza landscaping and water elements. Parking: 2,000. Area: 37,500m^2.

Capacity	10,500
Cost	€70m

RUSSIA

Nizhny Vovgorod Arena
Based on Minsk Arena (Belarus) design.

Capacity	15,000

SCOTLAND

Edinburgh: RHASS Arena
Proposed arena development as part of Royal Highland Agricultural Society for Scotland (RHASS – chief executive Ray Jones) move to Norton Park. Architect: Make. Design: Edaw.

Capacity	10,000
Cost	£275m (arena £50m+)

SPAIN

Barcelona: Palau Blaugrana
Multipurpose arena, including for Barcelona basketball club. Referendum amongst members in April. On current site of Miniestadi. Plus smaller pavilion and ice rink.

Capacity	10,000 (12,000 concerts)
Cost	€100m
Completion	2019

SWEDEN

Partille: Ice Arena
In central Partille, a flexible facility that can be adjusted for different events. Offices, conference rooms, a bowling alley and a restaurant. Area: 16,100m^2. Construction: Skanska.

Capacity	4,000
Cost	328m SEK
Completion	September 2016

Uppsala: Uppsala Arena
Multi-purpose arena, mainly for hockey tenant Almtuna IS. Request for interest in development issued. Competitive dialogue expected summer 2014. The European Commission checked that state funding element is not against competition law. Architect: Aros Arkitekter.

Capacity	8,000 (hockey), 10,000 (concert)
Cost	625m SEK ($97m)
Completion	2015

SWITZERLAND

Biel: Tissot Arena

Under construction. Double stadium plan for ice hockey and football with shared facilities and roof. Spaces for other ice sports, including curling. Design and build: HRS Hauser Rutishauser Suter AG.

Capacity	7,000
Cost	€50m
Completion	autumn 2015

Lucerne: Pilatus Arena

New arena for handball club HC Kriens. Multipurpose for volleyball, tennis and concerts. City to make land available. Developers: HC Kriens-Luzern. General contractor: Sarnen AG.

Capacity	4,000
Cost	€28m
Completion	2018

Zurich, Altstetten : Theatre of Dreams arena

Business plan for pure ice hockey arena after multipurpose ambitions dropped on cost grounds. Home for ZSC Lions. Finance: €33m private + city of Zurich.

Capacity	12,000
Cost	€146m
Completion	2018

UKRAINE

Kharkiv: Arena

In the ground but uncertainty around construction during political crisis in eastern Ukraine. A multi-functional sports arena, including spectator seating with mobile and fixed stands and VIP skyboxes, two halls for training and sports school. Sports: basketball, handball, volleyball, hockey, and martial arts. Variable capacities from 5,062-7,086. Also available for concerts and other public events. Exhibition space: 7,000m^2. Turnaround time: 10 hours. Seats, elevators, and entrance ramps for disabled people. Design based on the sports arena in Klaipeda (Lithuania). Developer VETEK GC entered into contract for development of arena construction documentation with COWI, a Lithuanian and Danish company. Designer: KTM 'MIR' company of Kharkiv.

Capacity	7,086 seats (basketball)
Cost	UAH 350m
Completion	2016

UNITED ARAB EMIRATES

Dubai: Meydan Arena

Part of Meydan One project. Arena at the base of the indoor ski-slope for live concerts, sports and theatrical. Outdoor leisure sport options.

Capacity	8,000

WALES

Cardiff: Ice Arena Wales

Dual ice pad, home for Cardiff Devils, as part of International Sports Village at Cardiff Bay. Area: 4,000m^2. Cardiff Council is supplying land to kick start the development. Developer: Greenbank Partnerships (development director Jonathan Smith). New operating company to be created by Greenbank (Operations Director Chris Hartrey). Construction: Kier.

Capacity	3,100
Cost	£200m (scheme) £16m (arena)
Completion	end of 2015

AMERICAS

BRAZIL

Rio: Olympics 2016 Handball Arena

Inside the Olympic Park in Barra da Tijuca, west zone of Rio de Janeiro. Comprehensive tendering process for architectural and engineering services has begun (£2.5m). Requires the implementation of 'nomadic architecture' so that the venue can be disassembled and its components used to build four schools, each with a 500-student capacity. Area: 35,000sqm. Will also host goalball. Cost breakdown: construction R$121.1m, operation R$6m, disassembly R$19.7m, assembly at schools R$31.2m. Funding: Federal Government. Developer: RIOURBE.

Capacity	12,000
Cost	R$ 178m
Completion	end 2015

Rio: Olympics 2016 Velodrome

Permanent venue. Legacy: Olympic Training Centre. Tender is for build and operate. Funding: central government. Also outdoor training velodrome. Project delivery: Rio Olympic Equipment Consortium, formed by the following companies: Arqhos Consultoria and Projetos LTDA, Arup do Brasil Consultoria LTDA, BlacBackheuserand LeonidioArquiteturaand CidadeS/C, Conen Consultoria and Engenharia LTDA and JLA Casagrande Serviços and Consultoria de Engenharia LTDA. Study: AECOM.

Capacity	5,000 (+800 temporary)
Cost	R$136.9m
Completion	2015

CANADA

Calgary Arena

Proposed new multi-purpose home in West Village district for Flames NHL team, to replace the Saddledome. Possible link with council-funded fieldhouse.

Conception Bay North, Newfoundland: Arena

New Multi-purpose facility in Harbour Grace. Single-pad NHL-size ice surface, community room and kitchen. Replaces S. W. Moores Memorial Stadium. Finance: provincial government $15m, Town of Harbour Grace $6m. Construction: Pomerleau.

Cost	$21m

Edmonton: Rogers Arena

Deal back on between city and owner of Oilers NHL team. Arena and recreation centre in 35-year deal. New home for the Oilers and office towers, apartments, a casino, shops and restaurants ($1bn). Escalators: 15. Elevators: 15. Centre-hung HD scoredboard. Concessions: one per 88 spectators. Community rink ($23m) and home ice for MacEwan University (1,000). Accessible seats (and equivalent facilities): 69. Public private partnership bid to replace Rexall Place, the third-oldest arena in the NHL. Optional community ice rink next door. City hiring architect and paying down loan with lease payments. Council has rezoned about 6.5 hectares for the arena and surrounding development. 52% of seats in lower bowl. Suites: 56.Mini Suites: 24. Club seats: 4,100. Loge seats: 1,116. Seat width: 19-22". Area: 1,110,900ft^2. Levels: 7. Height: 141ft. Concourse widths: 39ft (main), 18-19ft (upper). Green: LEED Silver (minimum). Developer, operator: Katz Group. Owner: City of Edmonton. Project manager: ICON Venue Group. Architect: HOK (formerly 360 Architecture). Construction: PCL Construction (Mike Staines). Operator: Oilers Entertainment Group. Finance: city $350m, provincial $100m. Lease payments $5.5m per annum, 30 years. Structural steel (9,000 tonnes, 10,000 pieces): Structal Heavy Steel.

Capacity	18,641 (hockey), 20,734 (concert)
Cost	C$480m (C$450m)
Completion	Autumn/Fall 2016

Fort McMurray, Alberta: Arena

Negotiations renewed on downtown Sports and Entertainment Centre project with the International Coliseums Company. Tenant: professional or major junior hockey team. Events: 70.

Capacity	6,000

Kitchener Arena

Kitchener Rangers interested in expanding Memorial Auditorium or building new arena. Preparing business plan and detailed development proposal. Architect: BBB Architects. Construction: Ball Construction.

Capacity	10,000 (extension)
Cost	C$44m

Peterborough Hockey Arena

Hockey arena to replace the aging Northcrest Arena with a multipurpose facility. Possible location: Morrow Park. Possibly to host Agricultural Society's annual Peterborough Exhibition. Two ice pads and support for community and college sports.

Cost	C$27m

PortsToronto Arena

PortsToronto to provide federally owned lands at the foot of Cherry St. for two rinks. Area: 75,000ft2. Build/operate developer sought. Working with the city and Waterfront Toronto to ensure the building fits the future vision of the area.

Completion	2018

Ottawa: RendezVous Arena

Arena for Ottawa Senators as part of proposed RendezVous development on Lebreton Flats. Community facility appropriate for market. Architect: Rossetti (Matt Rossetti). Developers: Senators and Windmill Development Group.

Quebec City: Videotron Centre

New arena in the hope of bringing back an NHL team and to replace Colisee arena 'relic'. Also for 2022 Olympic bid. 25-year deal with Quebecor Inc. to manage the facility and help pay for the city's C$187m share of the building cost – C$33m naming rights (C$63.5m if NHL team arrives), C$3.3-5m annual rent depending on tenant team. TV studio (C$40m) incorporated. Concourses open to the bowl. Lounge: 900. Loges: 100. Suites: 73 (lower), 7 (upper). Bunker suite: 1. Feasibility study: SNC Lavalin. Design team: Populous, ABCP Architecture and GLCRM & Associates, SNC-Lavalin, Thorton Tomasetti and M-E Engineers. Project manager: Genivar. General contractor: Pomerleau. Finance: mix of city (C$50m) and federal (state 45%). Area: 64,000ft^2.

Capacity	18,482 (hockey), 20,000 (concert)
Cost	C$400m
Completion	2016

Rothesay Arena

New arena attached to the existing facility (which will be turned into a fieldhouse).One ice surface, an indoor walking track and meeting rooms. Finance: all three levels of government

Cost	C$13m
Completion	Autumn/Fall 2015

Sudbury Arena

To replace old arena (1951).

Capacity	6,000
Cost	C$85m

COLOMBIA

Medellin: Velodrome

Velodrome for Institute of Sport and Recreation. Modular roof connects performance area with Park of the Wheels precinct public space. Modules encourage diversity of use between infrequent major sport events.

Cost	US$25m
Completion	December 2015

PERU

Peru, Lima: Coliseum of Lima

Volleyball arena at draft stage and feasibility. In the Villa Deportiva Nacional (VIDENA), the Pan American Sports Center for 2019 PanAmerican Games.

Capacity	10,000
Completion	Late 2016

UNITED STATES OF AMERICA

AK, Anchorage: UAA Arena

Proposed sports centre for the University of Alaska Anchorage. Possible tie-in with UAA Seawolf ice hockey to replace Sullivan Arena.

Cost	US$80m

AL, Tuscaloosa: Sewell-Thomas Stadium

Renovation and expansion of ballpark. New locker rooms, a weight room and an indoor batting facility. New seating, a revamped concourse, skyboxes and club lounges. Athletics Director: Bill Battle. Architect: Davis Architects Inc.

Cost	US$42.6m
Completion	2016

AZ: McKale Center

For University of Arizona. Enclosed concourses wrap around 36-year-old McKale Center in a proposed upgrade plan. Improved locker rooms, equipment rooms, showers, offices and lounge areas, concessions areas, bathrooms, air conditioning and premium seating. A new gift shop to be located at the south end of Cherry Avenue parking garage.

Cost	US$155m

CA, San Francisco: Warriors' Arena

New sports and entertainment center at Mission Bay as part of Golden State Warriors' (co-owners Joe Lacob and Peter Guber) plan to return to San Francisco. Retail: 100,000ft^2. Plazas: 3.2 acres. View deck with vistas to Bay. Office, biotech/lab space. Parking: 950. Bikes: 300. Finance: private. Updated design revealed. Lead Architect: David Manica of MANICA Architecture. Full details at: warriors.com/sf.

Capacity	18,064
Completion	2018

CA: Sacramento State University campus

Proposed expansion of University Union Well includes arena for ceremonies, concerts and special events.

Capacity	5,000-6,000
Cost	US$175m (overall)

UNDER COVER

Architects and engineers are using construction materials in new and imaginative ways to deliver the right environment for athletes and spectators in the stadium bowl.



Vector Foiltec materials were used for the roof at Baku's National Stadium, which was the centrepiece of the 2015 European Games.

Credit: *Getty Images*

www.vector-foiltec.com

From Doha to Minnesota, owners and operators of stadiums face the same challenges in very different weather climates: How do you provide outdoor sports facilities to entertain spectators while simultaneously keeping them protected and comfortable?

"It's a huge challenge to achieve both modern comforts for the spectators and outdoor conditions for footballers or soccer players who have grown up with and enjoy playing in extreme weather conditions," explains Edward Peck, Vice President Façade Engineering at **Thornton Tomasetti**.

Thornton Tomasetti has provided façade and roof engineering services to a number of stadium projects in regions with extreme weather conditions. In some projects, these stadiums have integrated Texlon ETFE into the roof and walls. ETFE is transparent and allows natural light into the spectator bowl through the roof, so that those inside are still connected with external conditions. Adding ventilation into the façade can add to the outdoor feel and transparent walls provide the spectators with views of the stadium's surroundings.

"In northern climates, extreme weather is a real concern," says Peck.

KEEPING THE FANS SAFE

A typical stadium must keep tens of thousands of people safe on game day. **Vector Foiltec** manufactures roof elements specifically for each project and has a long record of use in many building types in extreme weather regions. It was recently used to form the world's largest free-spanning dome structure for the **Singapore National Stadium** and it was used in the all-enclosing roof of **Forsyth Barr Stadium** in Dunedin, New Zealand, where natural rugby turf is able to grow due to the use of Texlon ETFE.

In hot climates, stadium owners also want the best of both worlds. The Singapore National Stadium's design incorporated Texlon ETFE to address the country's tropical climate. To achieve a venue capable of providing shade and protection, the architect designed a moving roof that could be fully opened or closed in just 20 minutes. Vector Foiltec used its engineering and foil expertise to design and install a strategically positioned system that reduces solar gain and provides shade.

"By using Texlon ETFE in a roof design we can control the huge spectrum of light transmission available by printing a frit pattern customised to the specific design conditions," explains Peck.

"By using different printed patterns to control the amount of light which comes into the spectator area, we can even cater for different groups of fans - some who want to avoid the sun and others who would rather have the sun on their backs."

"When we build a roof with a hole in the middle and on the sides, the players can play in the rain and sunshine, factors which they want in the game, but there is protection from the rain and sun for the spectators," adds Peck. ***"We need just enough shade but not so much that it feels like you are inside."***

DESIGNS OF THE FUTURE

Peck envisages stadium designs in the near future will react to changing weather conditions by deploying shade or transparency 'on demand', in a not dissimilar fashion to the opening and closing of fabric sails over the spectator areas of the **Colosseum** in ancient Rome.

"Stadiums and arenas may have deep layered skins made from different materials and able to react to the climate in real time. There may be an external ETFE façade and inner layers of curtain walling, movable blinds and other structures," says Peck. ***"Together, they will perform differently from when they are deployed in isolation."*** ■



Decumano
Copyright: *Taiyo*

OUT ON TOP

Mehler Texnologies reports on how their fabrics were used to cover an area equivalent to thirteen football pitches at Expo 2015.

Tensile construction was the favoured design feature at **Expo 2015** in Milan; the exposition may as well have been a showcase for fabric architecture.

DECUMANO

Of course it is challenging to be part of such an aspiring and huge project, which is visible from a distance of 400km. Besides the big conglomerations, a satellite is only able to see the Great Wall of China as a single building – in this sense the ephemeral structure of the fabric shading system in Milan competes with thousands of years' of old linear structure on the other side of the world. **Mehler Texnologies** provided the material for the huge sun shading systems of the Expo's paths.

The idea of the two axes was derived from the Roman concept of a town's grid, with decumano and the perpendicular cardo. These are typical features of roman town planning, which cannot only be seen in the grids of old roman towns in Italy, but also in Jerusalem, Damascus, for example.

As Milan gets quite hot during the summer, the Expo's designers decided to cover the two axes in a way that the old Romans would certainly have appreciated. Although it looks like the fabrics are only loosely fitted to the grid system, of course there was valuable engineering work to do at first. Nonetheless, it is good to see tensile structures in a way that seems natural – indeed a straightforward approach to this ephemeral structure.

Here, it is easy to imagine that there will be a second life for these fabrics after the Expo. Together with **Taiyo Europe**, the structure's manufacturer, Mehler Texnologies is speaking with NGO's organising shelters for refugees; as the structures follow a rather simple cutting pattern, it would be easy to recycle the material for tents.

Project details	
Name	Decumano, Cardo and Secondario
Location	Expo Milano 2015
Client (investor)	Expo Milano
Function of building	Shading for visitors
Type of Application of the membrane	Tensile roof
Year of construction	2015
Architects	Concept Architecure Massimo Majowiecki, Bologna
Multi-disciplinary engineering	Maffeis Engineering SpA
Tensile membrane contractor	Taiyo Europe
Supplier of the membrane material	Mehler Texnologies GmbH
Material	Valmex FR 1000 Mehatop F, Type II



Decumano
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FERRERO PAVILION

As 'Feeding the Planet - Energy for Life' was the theme for this year's Expo, Ferrero was present. In their pavilion, which was dedicated to the company's social initiatives, the fabrics of Mehler Texnologies added to the playful outlay of the structure. Here as well, recycling played a crucial role in the concept; with the Mehler fabrics being carefully dismantled after the show. (Ferrero plans to reuse all of the material in one of the educational centres of their Social Enterprise.)

Project details	
Name	Iranian Pavilion
Location	Expo Milano 2015
Client (investor)	Islamic Republic of Iran International Exhibitions Company (IIEC)
Function	Representation
Type of application of the membrane	Outside freeform sculpture
Year of Construction	2015
Architects	Kamran Safamanesh
Multi-disciplinary engineering, first phase	Rah Shahr Architectural
Consulting engineers, second phase	Italian studio RPA S.r.l
Tensile membrane contractor	Maffeis Engineering SpA
Supplier of the membrane material	Mehler Texnologies GmbH

IRANIAN PAVILION

The Iranian pavilion had the theme 'Global Sofreh, Iranian Culture', which was aimed at conveying God's blessing to the people all around the world. Old wisdom played another important role, as this is seen as the clue to solving the planet's feeding and energy challenges.

Tradition, sustainability and openness to diversity served as the three main themes of the Iranian pavilion designed for the Expo. The concept was prepared by a team led by local architect **Kamran Safamanesh**. The three themes are summarised by an object that conveys them all: The Sofreh; a square of fabric that identifies the set table, one of the most important objects for the culinary culture of Iran. The Pavilion's architecture was derived from this image in the form of an open structure, similar to a tent.

Mehler fabrics were once again chosen as the optimal means to build these features; they playfully joined in the pavilion's structure – and once again, visitors appreciated the shading functions. ■



www.mehler-texnologies.com

CA, Sacramento: Golden 1 Center

Entertainment & Sports Center (ESC) for Kings (President, Chris Granger) basketball (35 years) at Downtown Plaza. Demolition completed, with groundbreaking expected soon. See-through entrance and a silver exterior with diamond-shaped windows. Jobs: 11,000 (construction), 4,000 (permanent). City subsidy resurrected plans for a downtown arena, which NBA supported. Open concourses, several levels of suites and an atrium entrance with a view of the arena bowl from the street. Finance: city $233m +$32m land (+$21.9m pa), Kings $254m. Development of hotel, office tower and retail. Six outdoor digital billboards. Owner's representative and project manager: ICON Venue Group. Contractor: Turner Construction. Architect: AECOM.

Capacity	17,500
Cost	US$477m
Completion	fall 2016

CT, Hartford: XL Center

New multi-purpose arena. Either demolish and build new (+1,000 seats in the lower bowl and a better truck-loading area) or expand existing into area of atrium and exhibition hall. Developer: Capital Region Development Authority. Potential to be home to UConn Huskies men's and women's basketball and hockey teams. Architect: SCI Architects.

Cost	US$250m-US$500m

DC, Georgetown: John R. Thompson Jr. Athletics Center

Georgetown University's Board of Directors has approved the next phase of the project, now under construction (formal groundbreaking 12 September 2014). The four-storey, 144,000ft² building will be constructed adjacent to McDonough Arena. Facilities will include: practice courts, locker rooms, team meeting rooms, lounge areas, coaches' offices for men's and women's basketball, locker rooms for four additional varsity sports, weight-training and sports medicine rooms for all varsity athletes, the Student-Athlete Academic and Leadership Center, an auditorium and team meeting facilities for all varsity programs, as well as a new venue for the Georgetown Athletics Hall of Fame. Part of Georgetown's US$1.5bn "For Generations to Come" fundraising campaign (Director of Intercollegiate Athletics, Lee Reed).

Cost	US$62m
Completion	August 2016

DE, Smyrna: Delaware Sports & Ent Complex

Delaware University and Delaware Civic Center Corp are proposing $92.1m complex, to include a 14,829-seat football stadium and a 7,500-seat arena, which would house the DSU basketball teams. Finance package sought: $40m state bond, $11.6m private, $3.5m consortium. Management: Global Spectrum. Events: 155 per year including minor league hockey.

Capacity	14,829 (stadium) 7,500 (arena)
Cost	US$92.1m

FL, Fort Myers: Edison State College Student Activity Center

On campus at the corner of Summerlin Road and Cypress Lake Drive. Movable lower bleachers so the center can double as a three-court recreation center for students, and host concerts, performances, graduations and other large-scale events. Plans call for a weight and fitness center, locker rooms, concession stand, sky boxes, hospitality suite and offices for coaches and athletics department staff. A second phase includes a nearby 25,000ft² student union facility, a space for students to meet and socialise that's sorely lacking on campus. Area: 85,000ft². Architect George Flynn.

Capacity	3,500
Cost	US$20m
Completion	fall 2016

FL, Tampa Bay: Amalie Arena

Tampa Bay Lightning adding 160 loge seats at the north end, new concession stands, remodeled restrooms and a larger outdoor deck. Two club level lofts doubling to 80 people, rebuild stair tower in the northwest corner to allow access to the terrace level and the Bud Light Party Deck from the club level. Modernise locker rooms, performers and media spaces, IPTV, digital menu boards at concessions and a master system for controlling the arena's video monitors.

Cost	US$25m
Completion	2017

FL, Tampa Bay: Sun Dome

Renovation for 30-year-old home to USF basketball and concerts. Centre-hung scoreboard, concessions and restrooms in new concourse and club-levels. Finance: $8.5m cash and 20-year funding.

Capacity	10,000
Cost	US$35m

GA: Augusta Arena

The city's Coliseum Authority seeking support for a replacement to James Brown Arena. Seeking SPLOST funding.

Cost	US$110m

GA: Savannah Arena

City hiring a consultant to determine size and type of venue to build for approved $125m budget. The study will include a full project management plan to outline the general concept, project scope, site options, and also possible funding sources. Will replace 45-year old Savannah Civic Center.

IA, Iowa Arena

Arena and sports performance complex at Coralville's Iowa River Landing. Seeking $12m state assistance.

Capacity	7,000
Cost	$10m
Completion	2017

Mason City: Events Center

City Council supporting pre-application downtown redevelopment project *Our River City Renaissance* to include hotel, performing arts pavilion, retail outlets, apartments and a multipurpose ice arena. Tenant: North Iowa Bulls. Finance: city, state, private.

Capacity	2,400 (sport),, 5,000 (concert)
Cost	US$36.2m

IL, Chicago: DePaul University Basketball Arena



Multi-use arena for the DePaul University (Athletic Director Jean Lenti Ponsetto) basketball team at McCormick Place. Owner: Metropolitan Pier and Exposition Authority (MPEA). Funding: MPEA and DePaul $70m each, city $33m for land. Architect: Pelli Clarke Pelli Architects – Fred Clarke ($7.2m).

Capacity	10,000
Cost	US$173m
Completion	late 2016

IL, Rockford: MetroCentre

Exterior façade update, new box office and main entrance, video scoreboard, 11 corporate suites, club boxes, 200-person group terrace, retail centre, additional bathrooms, and new concession stands and food courts. Client: MetroCentre Authority. Renovation to support purchase of American Hockey League franchise, the elevation of the Rockford IceHogs into the American Hockey League, and a 10-year affiliation agreement with the Chicago Blackhawks.

Cost	US$23m

IL, Champaign: State Farm Center

Six phase, three-year transformation of basketball arena at University of Illinois, as well as renovating the Assembly Hall ($70m). Director of FM: Tom Divan. Design Study: AECOM. Seat replacements followed by construction of suites and loge premium seating areas. Team may have to play away at beginning of 2015-16 season. Building will become habitable 12 months of the year.

Cost	$165m
Completion	autumn 2016

IN, Buffington: Harbor Arena

Multipurpose proposal. Developer: Majestic Star Casino. Planning request with Northwest Indiana Regional Development Authority (RDA).

KS, Hutchison Arena

Renovation to sports arena built in 1962 to keep the National Junior College Athletic Association men's national championship basketball tournament for 25 years. More upper-level seating for people with disabilities, undersized practice gymnasium into new home team locker rooms, renovating an existing sports medicine area and weight room into meeting or hospitality space, upgrading heating, plumbing and electrical systems and adding air conditioning to the seating bowl. New main entrance and lobby, concession stands, more restrooms, elevators to reach the upper level, and office and meeting space. Two full-size practice gyms, a new weight room and mechanical and storage space. Architect: Sink Combs Dethlef (Chris Kastelic).

Cost	$29m

KY, Lexington, University of Kentucky: Rupp Arena

Replacement project announced by Lexington mayor but consideration being given to renovation rather than replace. Plan to remove shops and convention centre from around Rupp. Five year project anticipated. All chair-back seating, wider concourses, more restrooms and upgraded concessions, luxury suites and other levels of premium seating. New scoreboard. Market analysis for a 24,000 to 30,000-seat arena. Feasibility study: IMG College and International Stadia Group. Operator: Lexington Center Corp. (CEO Bill Owen). UK's contract with Lexington Center expires in 2018. Architect: NBBJ (Robert Mankin). M+E: ME Engineers. Construction: Hunt. Start in 2014.

Capacity	23,500
Cost	$250-$300m
Completion	Autumn 2016

MD: Baltimore Arena

Various proposals from developers to replace 45-year-old 1st Mariner Arena. Private funding interest from Whiting–Turner. Likely to extend convention center, and add arena. Also suggested for Inner Harbor. Research phase. Maryland Stadium Authority centre suggested a 18,500-seat arena with no major league basketball or hockey franchise, 500-room hotel to create a destination package. Arena income projection: $48.1m-$50.3m annually. Arena jobs: 730-760. Parking: 500

Capacity	18,500
Cost	$900m

MD, Baltimore County: UMBC Arena

University of Maryland, Baltimore County (Joe Rexing, director of facilities management) is replacing Retriever Activities Center (1973), home of the men's and women's basketball and volleyball teams. New events and convocation center on campus near the present site of the UMBC Stadium and baseball's Alumni Field and softball stadium, will host sports and community events. University architect: Joe Rexing. Area: 170,000ft².

Capacity	5,000
Cost	$67m
Completion	2017

ME: Bowdoin University Arena

University's future building plans include a new hockey arena. Masterplan: Doug Voigt of Skidmore, Owings and Merrill.

ME, Portland: Forefront Arena

Arena/convention centre as part of the Forefront development at Thompson's Point. Tenant: Maine Red Claws pro basketball team. Tax breaks under discussion.

Cost	$100m (total development)

MI, Detroit: Redwings Arena

Ground has been broken on the new hockey arena and 45-block entertainment district driven by Downtown Development Authority. Replaces Joe Louis Arena (20,058), fourth oldest NHL venue. Finance: $284.5m in property taxes, the rest from developer Olympia Development (Steve Marquardt). Owner: city. Operator: Olympia. Construction: JV Barton Malow, Hunt Construction Group and White Construction. Detroit Employment Solutions Corp. to develop training programmes to get Detroit residents ready to take construction jobs. Jobs: 5,500 (1,100 permanent). Event space: 650,000ft².

Capacity	18,000
Cost	$450m (+$200m other development)

MI: Kalamazoo Arena
Proposed downtown arena for WMU and the Kalamazoo Wings as part of mixed use development. Early community meetings taking place. Architect: Eckert Wordell Architecture, Engineering and Interior Design (Jason B. Novotny). Area: 215,000ft².

Capacity	6,800
Cost	$82m

MN: Crookston Arena
Developer: Crookston Civic Arena, LLC. Construction: Donlar Construction.

MN, Minneapolis: Target Center
Agreement between city's economic development department, Timberwolves, Lynx and AEG to take the arena through to 2032 in 'as new'. Redesign of exterior, new gathering spaces and pedestrian flow, more clubs, improved amenities, loading docks and increased capacity for concerts and family shows. Finance: Minneapolis $48.5m, Timberwolves and Lynx $43m, AEG Facilities $5.5m. Jobs: 200 full-time, 700 part-time. Incremental annual income: $100m. Events: 200.

Cost	$97m
Completion	2016

MS, Oxford: Ole Miss Basketball Arena
University of Mississippi Arena, the new home of the Ole Miss Basketball Teams. Located on the west side of Vaught-Hemingway Stadium. Area: 230,000ft2 training facilities, Courtside Club, Arena Club and All-American Suites. Replaces C. M. Tad Smith Coliseum (1966). Five-storey parking garage: 800. Finance: donations (Foundation) $95m. Design: AECOM. Construction: BL Harbert International ($68.9m).

Capacity	9,600
Cost	$105m
Completion	January 2016

MS: Jackson Arena
Study commissioned by Downtown Jackson Partners and the Central Mississippi Planning and Development District. Consultant: Populous (Russ Simons).

Capacity	15,000-18,000
Cost	US$100m

NC, Charlotte: Time Warner Cable Arena
Updates to keep the arena competitive and to bid on hosting the 2017 and 2018 NBA All-Star Games. Home of Charlotte Hornets. Restaurant renovations, bathroom improvements, new lighting, visitor locker room upgrades, moving the ticket office and scoreboard improvements, lower bowl reconfigure +600. Finance: city. Owner: city. Operator: Charlotte Bobcats.

Cost	$US27.5 (US$44m)

NC, Charleston: Carolina First Center
North Carolina Center for Health & Wellness and multipurpose convocation centre, Kimmel Arena at College of Charleston. For intercollegiate basketball teams and student health and recreational programmes. Architect: Betsch Associates. Area: 270,000ft². Finance: Naming gift $2m and college budget.

Capacity	5,000
Cost	US$35m

NC, Raleigh
Indoor practice facility for N.C. State's football and track teams. Near Carter-Finley Stadium 90,000ft².

Cost	US$14m
Completion	2015

ND, Jamestown: UoJ Arena
Basketball court on the east side of the Larson Center at University of Jamestown. Finance: donation - Harold Newman.

Capacity	2,200
Cost	US$16m

NE, Omaha: Baxter Arena
University of Nebraska Omaha on-campus arena (and separate training rink) as home to UNO hockey, basketball and volleyball as well as concerts and community ice (one third time). Split bowl seating plan so that top tier can be closed off for smaller events. Student, club and suite seating. Liquor license applied for. Finance: $39m donations, $3.6m university funds and $39m bonds. Architect: Lempka Edson Architects. GM: Mike Cera.

Capacity	7,500
Cost	$87.9m ($76.3m)
Completion	fall 2015

NJ: Monmouth University MAC
Multi-Activity Center of 152,400ft². Anchor arena. Architect: Ewing Cole Cherry Brott.

Capacity	4,800

NM, Albuquerque: Sports & Entertainment Arena
City looking for new options after proposal for 10,000 seat arena did not get expected funding.

NV, Las Vegas: All Net Arena
All Net Arena and Resort nongaming hotel project on the former Wet 'n Wild site (total project cost $1.4bn). Needs development agreement with Clark County. Developer: Jackie Robinson. Could be the first ever arena with a retractable roof. Architect: Cuningham Group (Brett Ewing). Consulting: HKS, Walter P. Moore and Uni-Systems.

Capacity	22,000
Cost	$690m
Completion	2017

NV, Henderson: Silver State Arena
Proposed as part of the planned Las Vegas National Sports Complex in Henderson on a 485-acre site in West Henderson. Finance: International Development Management and China Security & Surveillance Technology.

Cost	$650m

NV: Las Vegas Arena
Centrepiece of revitalisation of area between New York New York and Monte Carlo resorts. Design to capture energy of The Strip. Monumental glass entry facade with a giant LED overlay up to 118ft. Skin colour and banding reflects desert mountains. Balconies for dramatic views, covered VIP drop-off points, Lightweight screen for shade and wind protection. Bunker clubs, suits, in-bowl sponsor zones, private lobbies. Multiple locker and dressing rooms, complete broadcast facilities and staging innovations. Events: 100. Green: LEED Gold. Finance: private ($200m bank facility secured). Project Manager: ICON Venue Group. Developer: Las Vegas Arena Company - AEG (CEO Dan Beckerman) and MGM Resorts (CEO Jim Murren). Architect: Populous.

Capacity	20,000
Cost	US$375m ($350m)
Completion	2016

NY, Long Island: Nassau Veterans Memorial Coliseum
Will be relaunched after revitalisation programme. Long Islanders hockey team will move to Barclay Center in 2015. Developer: Nassau Events Center plc. Events: 300.

Completion	2017 (start 2015)

NY, Watertown Municipal Arena
Renovations agreed by council but not the price tag. Cost engineering possible. New roof, HVAC and flooring, additional administrative office space for the city's Parks and Recreation Department, a new front desk and entrance facing William T. Field Drive, a relocated concession stand with seating, a hospitality room for performers and entertainers, a main locker room a second-floor spectator access point to collapsible bleachers. Developer: City Council. Study: Stantec Consulting Services ($550,000).

Cost	US$10.3m (US$7m, US$8.2)
Completion	2016

OH, Cincinnati: Fifth Third Arena
University of Cincinnati department of Planning, Design and Construction exploring options for redesigning Fifth Third Arena. Better seating options along with upgrades to restrooms, HVAC, lighting, A/V, fire protection systems, roofs, concessions, suites and specialty club spaces. Reduce capacity, improve sightlines, upgrade club areas, restrooms, and add new roof. Athletic Director Mike Bohn. Architect: Populous. UC's trustees will review designs at the end of the summer and decide whether to move forward with the renovation of the 25-year-old arena.

Cost	US$70m
Completion	November 2017

OH, Cincinnati: U.S. Bank Arena
Proposed extensive renovations. Owner: Nederlander Entertainment (CEO Ray Harris). Operator: AEG Facilities. Seeking some public contribution with support of city, Hamilton County, and regional tourism leaders. Modernising interior and exterior, expanding venue seating. The 40-year-old arena has not undergone a major renovation since 1997. Multiple points of entry, new façade, continuous walkable concourse around the arena's base, which will connect the plaza level to the riverfront and The Banks. Better locker rooms to attract collegiate sports programming. Escalators and elevators, exterior video boards and freestanding video signage elements. Suites: 40-60, new level closer to stage. Club seats: 1,750. Project design: MSA Architects.

Capacity	18,500
Cost	$200m-$250m

OH: Dayton Arena
Proposed for Dayton Bombers hockey team and community teams and skating.

Capacity	5,500
Cost	US$30m

OR, Portland: Viking Pavilion and Ed Center
Massive renovation of the Peter W. Stott Center, Portland State University, which has served as a health, physical education and athletics facility since it was built in 1966. For public events, including lectures, concerts and athletic events, including PSU basketball games. Finance: OHSU $7.5m, state bonds $24m, donation $5m. Study space: 30,000ft2. Contractor: Fortis Construction ($32m).

Capacity	3,100
Cost	$45m
Completion	Spring 2018

SC, Charleston: North Charleston Coliseum
Proposed upgrades to keep the 12,000-seat arena modern and competitive for at least the next 15 to 20 years. Two easy-access food courts on opposite sides of the building. Deeper and larger suites, a new arena bowl sound system and the addition of catwalks with wider platforms, which would allow for expanded rigging capabilities and spotlighting events.

Cost	US$19m

SC, Spartanburg: Jerry Richardson Arena
For Wofford College. Basketball setting, with a separate volleyball section. It will include locker rooms, coaches offices, meeting rooms, a video scoreboard and ribbon board. Construction manager: Robins & Morton.

Capacity	3,400
Completion	2016

SD, Madison: Bahn Arena
Hockey practice arena adjacent to the Kohl Center for University of Madison-Wisconsin hockey teams. Concrete and steel construction, precast tiers. Ice system mechanical room is complete and the underfloor mechanical, electrical and plumbing installations are continuing. Women's hockey coaches offices, swim team lounge, hockey locker rooms.

Cost	US$27.7m

SD, Madison: University of South Dakota Arena
Developing initial construction plans for a new basketball and volleyball arena (connected to renovated DakotaDome (16,000), a track and soccer complex (1,000). Competition court, three practice courts, locker rooms, offices, a training room and a student-athlete academic centre with a computer lab, hall of fame. Athletic Director: David Sayler. Planning and Construction Director Cathy Wagner. Suites: 14. Construction: Mortenson.

Capacity	6,000
Cost	US$32.5m
Completion	2016

SD: Mitchell Events Center
Events Center Building Committee has unveiled a design. Capacity: 5,280. No funding package or location has been proposed.

Capacity	5,280
Cost	US$15m

TRANSFORMATIONAL REDEVELOPMENTS



In this Q&A, KSS Director, Andy Simons, speaks to Katie McIntyre about his ideas when it comes to reworking existing venues, revenue maximisation and maintaining heritage.

What are the main challenges of a venue redevelopment project, as oppose to a new build?

The main challenge is the maintenance of the venues viability and safety in use throughout the redevelopment programme. This requires extremely careful programming and phasing by the design team and then in turn by the contractor to ensure that the redevelopment can continue on programme whilst keeping the venue functioning week in week out.

Typically, the challenge is that a capacity of a particular venue or stadium would decrease during redevelopment, whilst at the same time the intention after redevelopment is that the capacity has increased. A key challenge therefore is to maintain the attractiveness and capacity to the greatest extent during the redevelopment works so that there is a robust platform to extend the desirability of attendance and the capacity after redevelopment.

At **Liverpool FC** with the redevelopment of the Main Stand, **KSS** and **Carillion** are currently on site facing exactly these challenges. The new Main Stand is being substantially redeveloped behind the existing Main Stand, whilst maintaining its use throughout the majority of the development.

How important is it to maintain the heritage and capture the history of the venue that you're renovating? And how do you best achieve this?

The love and loyalty of the fans for their venue is captured not only in the location and the image, but also in the smallest of details. Extensive stakeholder consultation with fans, residents, team and the Club's ownership is essential to establish a clear picture of what makes the venue so special and which aspects are loved and which are loathed.

Redevelopment, unless 100%, is rarely used as an opportunity for a complete reimaging of a stadium, renovations are typically evolutions of a Club's heritage evolving the design style that has made the club what it is, into contemporary and safer and better facilities, whilst capturing the spirit of the original venue. At Liverpool FC, the Client's clear directive was that the Main stand, although entirely new for 90% of its structure, was to have the image of having been in place for 100 years. The decision was very quickly made for a monumental red brick structure as part of four separate named stands.



Craven Cottage, Riverside Stand Expansion

Anfield is defined not only by its name and location, but by the fans loyalty and affinity for each particular stand. Therefore, the redevelopment was never going to envisage the commencement of the integration of the Main Stand into the Anfield Road or the Kop.

The new Main Stand is very much of itself with its own style and there was greater ease of design style and freedom, and greater ease of access and demarcation for construction.

In what ways can a revamped venue help to maximise revenue generation? And optimise attendances?

Stadia typically become obsolete in configuration and embedded technology after 15-20 years. The internal decorations and fit-out can reach a sell-by-date in as little as 5 years. It is essential that venues continue to redevelop and reinvent themselves regularly, both in the internal refresh »

ABOUT ANDY SIMONS

Andy Simons is a Director at **KSS** (**www.kssgroup.com**). He is one of the 50+ expert speakers participating in our 'live' event, **Stadia & Arena Asia Pacific 2015**, where he will discuss one of the hottest topics currently in the industry, which is the transformational redevelopments of sports facilities in continuous use.

Stadia&Arena ASIA PACIFIC 28-30 SEPT 2015



Craven Cottage, Riverside Stand Expansion





Wimbledon No.1 Court



Twickenham Stadium, Players' Facilities





Anfield Stadium Expansion, Liverpool

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and fundamental development, to maintain the maximum attractiveness, efficiency and viability.

Revamped venues are usually driven for the maximisation of revenue generation and this can take many facets in the brief to architects to achieve this outcome. Apart from the obvious creation of additional capacity for basic ticket sales revenue, it is essential that development greatly enhances the fan experience in arrival, the whole event and travelling home, driving the mind-set of "That was great, I want to do that again".

There needs to be good provision of concessions and catering, from silver service through to concourse basic services. It is necessary that having purchased both drinks and food that a general fan has the ability to move away from the concessions counter and place these items on a shelf or table in order to consume them comfortably and quickly before the event starts again. It is incredible how often lack of spaces provided for fans to actually consume the products leads to a failure in both turnover and ultimately fans desire to purchase items in the first place.

An obvious issue is the increase in toilet provisions. Stadia through the 1980s and 90s were typically short in toilet provision, particularly in female capacity and disabled facilities.

Typically, stadia refurbishments since 2000 have focused on increasing the scale and quality of the corporate hospitality offer to 10-12%. The ability to offer a full range of hospitality flexible for event and non-event days is key to ensuring maximised choices and revenue generation.

What technologies, design techniques or industry innovations have made the biggest impact when it comes to ensuring a viable redevelopment?

In design technologies, the biggest impact over the last 10 years has been the ability to design in Building Information Modelling (BIM). The shared three key disciplines of architecture, structures and services being able to coordinate in an integrated building model and render and model the design progress for the client, marketing, funding and then ultimately for the contractor, has radically changed the way we work and what is possible. The ability to design and configure bi-curvature surfaces is now second nature and the quality of the venues aesthetics and what is possible to be envisaged and constructed is a step change from venue architecture pre-millennium. The ability to create realistic and accurate seat-by-seat visualisations of the quality of the view and the venue position allows high value pre-sales to be achieved in all seat brackets prior to construction, which is extremely valuable for cash flow and securing preconstruction ticket sales revenue.

A negative impact on embedded technology could be argued that the provision of Wi-Fi access throughout a venue has allowed fans and spectators more time disengaged with the event and spend time updating social media or videoing as opposed to personally focusing on the event and giving it their undivided attention and vocal support.

What is the most important piece of advice you would give to any club or venue owner/operator looking to renovate their facility?

The most important piece of advice to give any club or venue looking to renovate or redevelop their facility would be to focus on the Return On Investment (ROI). Many decisions are made by the heart rather than the head, and the realistic likelihood of the ROI needs to be considered. ■

SD: Rapid City Arena

Citizens voting on $180m, 19,000 capacity arena proposal. Civic center board of directors purchased a preliminary design for a new arena ($385,000). Re-purposing of Barnett Arena as well as future expansion opportunities over the next 40 years at the civic center.$70 million worth of defects or shortcomings were identified at the Don Barnett Arena. Architects: ARC International (Donovan Broberg), Crawford Architects (David Murphy). Construction consulting: Mortenson Construction and J Scull Construction ($115,000). Reports will be considered in the autumn.

Capacity	6,000
Cost	US$54-180m

SD: Sioux Falls Events Center

Proposals at early stages. 'Coliseum committee' proposing arena in north of city.

Capacity	14,000+
Cost	US$100m+

TN: University of Memphis Center

Student recreation and fitness centre. Area: 192,500ft² along Southern Avenue. Four-court divisible gym, two-court gym, multi-purpose fitness centre with climbing wall, six racquetball courts, a quarter-mile indoor track, a lane pool, a recreational pool, an outdoor leisure pool, training facilities, large group exercise areas, classrooms, offices, a juice bar and a wellness and nutrition area. Three full-size turf fields, basketball and tennis courts will make up the outdoor component of the center. Three phases of construction. Finance: student fee increase.

Cost	US$62m
Completion	2018

TX, Arlington: University of Texas Center

Proposed University of Texas at Arlington events centre. Private finance.

Capacity	7,000
Cost	US$40m (budget)

TX, Edinburg: Bert Ogden Arena

Publicly-owned basketball arena for the Rio Grande Valley Vipers near Interstate 69C/Expressway 281 and Alberta Road. City of Edinburg and Vipers have signed memorandum of understanding. Four month timetable to contract. Basketball-specific for great fan experience. Screen: 40x20ft. Restaurant, lounges, suites, concessions. Jobs: 150. Finance: Vipers $25m, city $30m (special tax zone). Annual rent $350,000, 30-year lease. Investment group will donate land to a city-established corporation before construction begins. Design and build: Cantu Construction and Development Company.

Capacity	8,500
Cost	US$68m ($55m)
Completion	October 2016

TX: El Paso Arena

Four locations identified for new downtown arena proposal. Consultant: HKS Urban Design Studio. Events: 120. Finance: public and private $60-$70m.

Capacity	12,750
Cost	US$180m

TX: Fort Worth Arena

Voters approved financing measures which may begin a process towards building a new multipurpose arena adjacent to the Will Rogers Memorial Center. Land purchase under way. Finance: city half, private donors led by businessman Ed Bass half. Events: annual Stock Show Rodeo, equestrian and livestock events, concerts, sporting events and family shows. Operator: Event Facilities Fort Worth (not-for-profit) - 30years, 4 x 10-year options.

Cost	US$450m
Capacity	14,000
Completion	December 2019

TX, Huntsville: Propst Arena

Makeover of the Von Braun Center. Construction manager: Jeffords Associates. Construction: Vratsinas Construction. Finance: City and $5m donation (Propst).

Cost	US$24.5m

VA: Richmond Arena

Proposed new arena and redevelopment of the existing Coliseum site. Big enough to attract minor league hockey, professional women's basketball, and early-round NCAA men's basketball tournaments plus concerts. Consulting team: Barrett Sports Group, Populous, Weston Sports & Entertainment.

Capacity	15,000

VA: Virginia Beach Arena

Plans for unnamed NBA or NHL team to re-locate to Virginia Beach. Proposed sports authority and multi-purpose sports and entertainment venue. VB permitted to issue bonds for finance. Jobs: 3,944 during construction, 55 permanent and 322 part-time employees post-construction. Developer group: United States Management. Finance: private (city to pay for infrastructure).

Capacity	18,500
Cost	US$350m

WA, Tukwila: Northwest Arena

Proposal for an NBA and NHL arena just south of I-405 and near the Green River adjacent to the Sounder commuter rail station. Consulting stage, renderings issued. Area: 195,000ft². Height: 140ft. Green: LEED Silver. Ownership group: Russell Group.

Capacity	17,500

WA: Seattle Arena

Proposed arena near Safeco Field on land owned by Chris Hansen. Environmental Impact Statement completed by Department of Planning - 1,600 pages. The county and city are positive, should a professional team be secured. Part of effort to bring NBA and NHL to Seattle but not reliant on this. The Nordstroms and Steve Ballmer also revealed as investors. Opposed by Mariners. Cash also suggested to improve Key Arena to attract future professional sport team. Finance: city $200m parking taxes, Hansen consortium $290m and cost of any franchise. Previously, the NBA team moved to Oklahoma City. Muckleshoot Indian Tribe also completed a study for a $450m arena near Emerald Downs.

Capacity	20,000
Cost	US$490m

WI: Milwaukee: Bucks Arena

Wisconsin State Assembly voted to approve a bill that will earmark $250 million in public money to help fund the construction of a new downtown arena for Milwaukee Bucks. BMO Harris Bradley Center unsuitable for NBA team and new arena required to begin by November 2017. Just north of the BMO Harris Bradley Center. Area: 700,000ft². Plaza: 60,000ft². Also, state-of-the-art practice facility as soon as possible on Park East land just east of The Brewery development. Metropolitan Milwaukee Association of Commerce has hired the sports and entertainment arm of the Hammes Co. to provide advice on whether a new, multipurpose sports arena should be built, or whether the BMO Harris Bradley Center should be renovated. Bucks' lease ends 2017 and NBA wants arena to league standards by then. Demolition of the Bradley Center for hotel and additional commercial or office space. Architect: Populous, HNTB and Eppstein Uhen. Finance: .Finance: owners $250m, public $250m.

Capacity	17,000
Cost	US$500m

WI, Milwaukee: Marquette University Sports Center

University refining design concepts and budget for athletic performance research centre. The centre will provide locker rooms and office space for several athletic programs and combine indoor playing fields for Marquette's lacrosse and soccer programs. It will also feature an indoor track and a world-class athletic performance research facility. Architect: CannonDesign.

WV, Wheeling: WesBanco Arena

Complete facade overhaul, moving the main entrance to street level and expanding the lobby to the street. Second phase (TBC) will include restroom and concession stand upgrades. Construction: Colaianni Construction. Architect: M&G Architects.

Cost	US$4.2m
Completion	2015

WY: University of Wyoming Arena

Two-phase renovation for Arena-Auditorium. Phase one includes all new seating in the lower bowl below the concourse level. Padded chair-back seats 22 inches wide (18 inches). New lights, screens, sound, court floor, seating, media, band and student sections. ADA improvements. Much-improved practice facilities and locker-room, strength and conditioning and sports-medicine areas. Phase two includes new grand entrance to the Arena on the east side of the building, the creation of a new ticket office to serve Cowboy and Cowgirl fans, Club Area, UW Intercollegiate Athletics Hall of Fame and renovation of concession and rest room areas. Club seats: 500. Finance: 36 private donors $10m, Wyoming State $15m. Construction manager: Haselden Construction.

Cost	US$30m
Completion	2015



Andrew James



JRJ Parrish

Beijing's "Bird's Nest" National Stadium

TAILORING REGIONAL DESIGN

Katie McIntyre discusses the role of tailoring regional design to grow international content (sports & events) in the Asian market with AECOM's JRJ Parrish and Populous' Andrew James.

In this Q&A, Andrew James, Senior Principal **Populous**, Director of Asian Projects and JRJ Parrish, Principal, Global Sports, **AECOM**, provide their responses to a number of topics in regards to tailoring regional design to grow international content (sports and events) in the Asian market.

What are the noticeable differences in terms of how sports venues in Asia have been designed over the last decade compared to their counterparts in more mature markets, such as Europe and North America?



One of the big trends we've identified in Asia is in the growth of arenas to cater for entertainment rather than the traditional U.S. model of arenas for sports such as ice hockey and basketball. The large crowds in Asia want to see the mega music stars of Europe and so the new arenas of Asia are bigger, enabling more people to attend events.

We are designing both front and back of house facilities in a different way. For example, the viewing and acoustic conditions are different. Performance spaces are very flexible with fast turnaround back of house operations to increase event days and event capability. The **Philippine Arena**, which opened just over a year ago, is a great example. The bigger arena model means operators can reduce ticket prices and attract bigger audiences. Katy Perry played to 30,107 fans – her "biggest show yet" – at Philippine Arena in May this year.

In China, we are noticing another trend as clients and fans both demand a more sophisticated product. Clients want a facility to work not just for a one-off event, such as an international sporting competition, but they are looking for long term revenue streams. Our client on the **Zhuhai International Tennis Centre** under construction at the moment, wants to maximise the experience on event days by creating a tennis "festival" rather than just an "event day competition", as well as develop a range of revenue opportunities so that the tennis centre can be used all year round.



Until 2005, Asia's tally of hosting **Olympic Games** and **FIFA World Cups** was: 2x **Summer Games**; 2x **Winter Games**; and 1x **World Cup**. Development of sport in Asia, with 60% of the world's population and a highly diverse range of climates, cultures and economies, has been changing rapidly since then, and in the last decade an increasing number of major venues have been developed as governments came to recognise the opportunities and benefits of local, regional and international sport.

If anyone had any doubts about Asia's ability to create world-class venues they will have been dispelled when Beijing hosted the **2008 Olympic Games** and, with the **Bird's Nest**, created an instant international landmark and icon and some of the most stunning television imagery we have ever seen.

'Festival' events have been a common development driver for major venue projects, particularly in China, and clients have shown increasing interest in event programmes and additional facilities and attractions to improve revenue generation. However, further work is still needed to optimise events and facilities and the relationships between public and private funding, ownership and operation to ensure every venue operates successfully for many years after the initial opening event.

It's not just in international landmarks that Asia is a world leader. **Singapore's Sports Hub** may well hold a key to future development of successful venues. Developed as a Private Public Partnership (PPP), it combined sport, leisure, culture, commerce and retail with a stunning, waterside setting, to create a popular everyday destination in the heart of the city.

Do we see a lot more of Asia's modern venues designed with increasing and developing additional revenue streams?



Asia has traditionally been led by Government sponsoring sports projects, but this is changing, with the growth of private investment groups and wealthy individuals interested in the sponsorship of a venue or a team or an event. The growth of the middle class throughout Asia also means people have more disposable income, so they are willing to pay for better quality entertainment.

Venue owners and operators are most definitely looking to provide better quality venues with higher quality food and beverage offerings and a range of facilities. In Zhuhai, for example, the Mayor recognised there was the local demand for a high profile international tennis event, and he recognised it would be good for the city's profile as well. He knew that if the city provided a better high quality venue, he could attract a better event.

Another trend in Asia is the development of sport and entertainment facilities as part of a major mixed-use development. For example, the 40,000-seat baseball stadium – **Taipei Dome** – is part of a $500m retail, residential and office development. We've had to do things we've never done before in a sporting »



Philippine Arena



Zhuhai International Tennis Centre

« venue. The Dome space itself for example, can be divided into more than one stage, so two major concerts can be held at the same time. This has required skilful solutions; for example, it can be tricky to find the right solution for emergency exists and toilet facilities when a facility is operating as a dual venue.



Beijing's Bird's Nest demonstrated Asia's ability to develop iconic, international landmark, venues and successfully host major international and Olympic events but highlighted the challenge of creating a robust long-term legacy business plan.

The Bird's Nest is not alone. Development of revenue generation opportunities in Asia is not yet as mature as in the U.S. and Europe, and many venues have been developed for an initial major event without full attention to long term legacy use. Focusing on legacy design with appropriate overlays to suit major, one-off, events is particularly critical for multi-venue developments and was a fundamental principle of the **London 2012** and **Rio 2016 Olympic** master plans.

As designers, our goal is to work closely with the financial, commercial and event promotion teams from the very beginning of a project to develop a 'living' venue optimised for initial revenue generation but designed to evolve over time in response to changing requirements and market preferences, to enhance spectator and visitor experiences and improve revenue.

What are the benefits to such venues of tailoring regional design to grow international content? And what are the challenges?



We think that tailoring regional design is important in the sense of making the most of what is unique about a city and a country in every venue. But that goes for every project in every country.

In Asia, as anywhere else in the world, success in sports facility design is about providing the best content, experience and future viability of the venue, as well as looking after its aesthetics. The building should be beautiful but it should be functional too. We are not interested in designing beautiful 'white elephants', rather sports buildings that can be well used by the local community for many years into the future. **Nanjing Sports Park** in China is a great example of a successful sporting precinct a decade after it opened, because legacy was considered from the very beginning.



Development of grass-roots, local, regional, national and international sport are closely linked – few countries can succeed in world-class events without athletes, players and teams that compete continuously against top-class opponents on the world stage.

Sports venues are an important part of this process and benefit from additional event days hosting international events and increased TV exposure. But it's a competitive market and high quality, well run venues with excellent views, great atmosphere, easy spectator and operational access and a good range of facilities are more likely to achieve long term success.

Multiuse stadiums with movable sections of seating increase the variety of possible events but this greater flexibility needs to be balanced against the additional change-over costs between different configurations. Sustainable seating bowl cooling, as developed for the **Singapore Sports Hub**, can significantly improve spectator and player comfort and extend playing seasons in harsh climates to suit international event timetables.

There is a trend in Europe and America to change from combined athletics and field sports venues to stadiums optimised for specific games, such as football or rugby. Should Asia follow this lead or invest in sophisticated multi-use designs that can be reconfigured for athletics, field sports and other events?



The trend in Europe and the U.S. stems from the ongoing development of the professionalism of sport – the more professional the sport, the more money involved, the more a team is going to want its own bespoke stadium.

American baseball is most demanding. A team want not only a baseball-specific stadium but also an individual stadium with a field of play that suits the character and history of their fan base; the building is not just designed for a sport, it is specific to a particular team.

As football in China, Japan, Korea and possibly Indonesia professionalises, the teams and their own specific demands will start to influence more and we will begin to see the bespoke football stadia that are now being built by the EPL and European Football teams.



Europe and North America have generally moved away from shared athletics and rectangular pitch venues in favour of separate stadiums specifically optimised for single sports in order to maximise the spectator, player and TV experience.

But clients should be wary of assuming separate stadiums are always the answer just because they appear to suit Europe and America.

Combined track and field stadiums are still appropriate in some locations and moving sections of lower tier seating closer to the pitch are used successfully in a number of venues to improve views and atmosphere, albeit with a question mark over the end 'D's' of the athletics track.

Costs for moving large numbers of seats can be high and athletics venues are generally unable to match the atmosphere of dedicated rectangular field stadiums. Recent design developments do look more promising and the cost to benefit ratios of moving tiers may become considerably more attractive – an opportunity for new facilities in Asia to avoid the previous disadvantages of combined stadiums and expense of separate venues for each sport.

The benefits to health, fitness and quality of life of participation in sport are well recognised. What role can major venues in Asia play in promoting and enabling sport participation for everyone and how can enhanced facilities be funded?



Every time a city develops its major venues to host an international sporting event, such as an Asian Games, a Winter Olympics, or a National Games, it raises the profile of the city and the country on the world stage. But it also raises the profile of sport internally, not only of the elite athletes, but also sport at a grass roots level, which then filters through to increasingly developed facilities. A recent example of this we were involved with was in Incheon, in South Korea. The city of Incheon was maturing and civic leaders used sport and other international business conferences to raise the profile of the city internationally, culminating in the highly successful **2014 Asian Games** last year. The stadium is now being reconfigured as a football stadium and will also be used as a People's Park for the city of Incheon.

At this stage, most of the new or redeveloped facilities are still funded by governments in Asia. But as we talked about earlier in this piece, the growth of private investment and wealthy individuals will lead to more investment in sport, more professional sports, and a likely increase in the private public partnership (PPP) model developing in Asia. In addition the growth of the middle class with more money willing to pay for higher quality product will encourage more private investment in higher quality venues.



In the Singapore Sports Hub, Asia has one of the world's best examples of a major sport, leisure, cultural and commercial hub, a new district of the city. It's part of an overall strategy for promotion of sport throughout Singapore and is designed to play a key role in exposing the public, particularly the young, to sports as spectators, to give them the opportunity to try different sports, to identify potential excellence and provide elite training facilities. It's also a landmark for sport locally, regionally and internationally, raising Singapore's sporting and cultural profile.

The mix of uses covered by the PPP procurement has created an everyday destination integrated into the city, welcoming and inviting with the flexibility to cater for a wide range of visitors with commercial elements to help fund the sports facilities of the Hub.

The Sports Hub is a key element in a wider strategy for encouraging sport which also includes smaller scale town hubs to increase availability of facilities for a range of sports.

Continuous improvements in TV's and event broadcasting have significantly enhanced the viewer experience. How can venues evolve to compete with the draw of TV and ensure their long term success?



One of the big reasons fans like to attend the live game is the atmosphere created by a great game between rival clubs or even countries – the feeling that I was there; I was part of something bigger.

As good as event broadcasting and TV viewing has become, there is still nothing like the great atmosphere of a live game. Designers and venues owners and operators need to constantly evolve and improve the elements which create and enhance atmosphere. These include the bowl design, proximity of the seats to the action, the right capacity for the particular stadium, a sense of intimacy, special fan zones or areas where fans can interact and forms of entertainment other than the game itself – all these elements contribute to the atmosphere at an event.

We also need to be constantly mindful that a day out at the stadium begins from the moment fans leave home until the moment they return – it's a day long experience not just a game at the stadium.

On the flip side, venue owners and operators need to understand what prevents or discourages fans from attending events. We think two main reasons fans will choose to watch an event on TV rather than go to the venue is the ease of transport infrastructure to get to the venue and the cost of the event. Venues need to make sure it is as easy as possible for fans to get there. This includes even simple things like clear instructions to fans on the best way to get there, as well as bigger issues like working with the public transportation authority to ensure a seamless journey.



How can venues compete with TV? By focusing on the experiences that make a great venue special – being there, sounds, smells, excitement, anticipation, drama, sharing the experience and good food and drinks with friends and strangers.

We want comfortable seats, great views, an intense and exciting atmosphere in the seating bowl, easy movement around the facilities, well maintained and efficient toilets and above all we want safety, particularly if we have young children.

We'd also like unique, dramatic and exciting architecture to enhance our enjoyment of the event and give us a sense of ownership of 'our' stadium and we'd like additional facilities we can visit and use any day of the week. We also want to be able to get home quickly and easily without long queues and waits.

Finally, we want an innovative, well-designed, conveniently located stadium that puts the fans first. ■

ESSMA SUMMIT 2016

The location for the ESSMA Summit 2016 has been revealed as the San Mamés Stadium, home ground of Athletic Club Bilbao.

ESSMA is proud to announce that the location for the **ESSMA Summit 2016** will be the **San Mamés Stadium**; home of **Athletic Club Bilbao**.

This will mark the second edition of the summit, which will combine a technical visit with keynote speakers and in-depth workshops on numerous stadium management topics. The event will take place on January 19 and 20, 2016.

The San Mamés Stadium is a reference of the highest level in the world of football. It's one of the fields considered 'mythical' and is often referred to by its nickname, **La Catedral**. The stadium's inauguration took place in 1913, in the same place where the current stadium stands. One hundred years later, the old stadium has made way to the new San Mamés, with capacity for 53,000 spectators. It has been designed according to the most demanding standards, as per **UEFA's** 'Elite Category' status.

"It's an honour for ESSMA to have Athletic Club Bilbao to host the second ESSMA Summit in San Mamés Stadium. After the first successful edition in the Allianz Arena in Munich, San Mamés is an ideal setting to organise the first ESSMA event of 2016, which is full of stadium-related workshops, interesting keynote speakers and intensive networking," said ESSMA President John Beattie, who is also Stadium Director at Arsenal FC's **Emirates Stadium**.

HIGH-PROFILE HOST STADIUM

Athletic Club de Bilbao is one of the oldest and classic teams in the Spanish League. Located in Bilbao, in the province of Biscay (Basque Country), the side was founded in 1898. Eight League Championships and 24 Cup Championships shine on the club's record. Those victories make Athletic Club one of the most awarded in professional football. Nowadays, it is also one of the five European clubs – alongside Inter Milan, Hamburger SV, FC Barcelona and Real Madrid – that have played all the seasons in the main league and have never been relegated.

Athletic Club's sporting philosophy is governed by a code which states that only players who come up through the club's own youth team or through the youth teams of other clubs in the Basque region, may be signed up. A unique and superb way to work that needs to become a unifying power to overcome the discrepancies to be found in our daily lives.

"For a side like Athletic Club Bilbao, which is constantly growing and seeking new challenges to improve and develop its model, the fact that the ESSMA Summit 2016 will be held at our San Mamés stadium is always an opportunity to gather new experiences and contrast working methods to help in this continuous improvement," confirmed a representative for Athletic Club Bilbao.

"ESSMA is a unique common space for companies, leagues and clubs as end-users, for going forward in management, service, safety and security in the European stadiums. For Athletic Club and the Spanish LaLiga it is a pleasure to host the annual 2016 Summit. San Mamés Barria is in the vanguard of stadiums and is a perfect place for stadium managers to share knowledge and experiences while participating in the Summit's conferences and activities under the umbrella of ESSMA," added Alfredo Lorenzo, Security Director, **LaLiga**. ■



For further information on the ESSMA Summit 2016, go to: **www.essmasummit.eu**



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Stadium Australia – a fitting stage for the AFC Asian Cup Final Match between Korea Republic and eventual Champions Australia.

BIDDING, HOSTING & MASTERPLANNING

Katie McIntyre gets the lowdown on how to successfully bid, host and masterplan for a major sporting event from a number of key industry players.

Bidding, hosting and masterplanning for sporting events has been turned into an art form over the last decade, with bidding cities and venues having to compile professional business cases demonstrating in minute detail how they plan to either create or refurbish their existing venues to ensure world-class facilities, which will be sustainable, possess the needed infrastructure and offer a viable legacy in their post-tournament guises.

One person who has expert knowledge of both the bidding and hosting processes is Mark Falvo, Head of International Affairs & Government Relations at the **Football Federation Australia (FFA)**. Here, Falvo provides insights as to the process behind the FFA being successful in their bid to host the 16th edition of the **AFC Asian Cup**; an international soccer tournament organised by the **Asia Football Confederation (AFC)**, which was held in Australia, January 9 to 31, 2015.

2015 AFC ASIAN CUP

Falvo advised: ***"The FFA's bid for the AFC Asian Cup in 2015 was a complicated exercise over a period of nearly two years. A team comprising finance, legal, event management, project management, football operations and logistics experts was assembled and dedicated to preparing the most comprehensive proposition possible to the AFC. In addition to these full-time staff, expert consultants in the areas of security and stadium overlay were engaged to develop detailed plans and contribute to the drafting of key information in the bid book.***



Havanna Brown lights up Melbourne during the AFC Asian Cup Australia 2015 Opening Ceremony.

"The bid concentrated on highlighting the high quality level of existing stadium infrastructure, efficient transport networks, sound security and generous hospitality across the proposed host cities.

"The proposed stadia offered experienced venue operations staff a proven security environment, thorough access control systems and rigorous environmental protection standards. Some enhancements would be required to playing surfaces and floodlighting at training sites; however assessments during the bidding process allowed clear

plans to address these issues to be communicated to AFC.

"With no capital upgrades to proposed stadia required, the bid team was able to focus on explaining how it planned to stage a vibrant festival of football in 2015 and further elevate the standing of AFC's flagship event in the eyes of the world."

WINNING BID

Falvo continued: *"Activating Australia's culturally diverse communities was a key promise, and with more than 2,000,000 people of Asian heritage living in Australia, the opportunity to engage was quite significant. We wanted every venue to be a place where fans of all participating nations could feel 'at home' and be inspired to celebrate Asia's rich football culture.*

"No bid can succeed without the strong support of government. FFA's bid enjoyed this support from the Commonwealth Government along with the State Governments of New South Wales, Victoria, Queensland and the Australian Capital Territory. The provision of funding by the Commonwealth Government to undertake the bid, and the multi-Government funding model committed by all five governments, ensured not only that the bid would address all AFC requirements, but also allow for the Local Organising Committee's operations to commence quickly and with clear governance structures in place once the decision to award the AFC Asian Cup to Australia was made."

Australia were double-header winners in this case, securing not only the hosting rights to the event but also coming out as the eventual title winners of the 2015 AFC Asian Cup.

BARCLAYCARD ARENA: MASTERS IN SPORT

Another industry professional with expert knowledge in the fields of both bidding and hosting is Phil Mead, Managing Director of Arenas at the NEC Group that operates the National Exhibition Centre (NEC), the International Convention Centre (ICC), the Genting Arena (formerly the LG Arena) and the Barclaycard Arena (formerly the National Indoor Arena), all in Birmingham, UK. It also manages a range of support services including The Ticket Factory, catering company Amadeus, and the hospitality brand Amplify.

Barclaycard Arena is one of the world's busiest, large-scale indoor arenas, hosting more than 30 different sports and more World Championship events than any other arena in Europe. The venue was officially opened as the National Indoor Arena (NIA) in 1991 by Olympic gold medallist Linford Christie and since then has hosted major sporting events such as the 2003 IAAF World Indoor Athletics Championships, 2007 European Indoor Athletics Championships, 2012 World BMX Championships and Yonex All England Open Badminton Championships, the oldest and most prestigious event in the sport.

Throughout its history, the team at the Arena has gained valuable experience in the tender process, continuing to win bids for future sporting events including the Sainsbury's Indoor Grand Prix in 2017 and 2019 (ranked number one indoor event in the world for the last 10 years), the Yonex All England Open Badminton Championships, hosted annually until 2021 and the 2018 IAAF World Indoor Athletics Championships.

Phil Mead, Managing Director of Arenas at the NEC Group said: *"The Barclaycard* »



Barclaycard Arena

Arena has a rich history of welcoming sporting events to Birmingham – we opened in 1991 with sports firmly in mind and have continued to successfully hold sporting events every year since.

"The fact that we are such an established venue in the field goes in our favour, as event organisers, athletes, competitors and agents alike are familiar with the first class standard of care and service we provide for tenants. In addition to this, a crucial element in any tender process would be highlighting any planned improvements whether it be structural or for the customer experience."

ENSURING SUCCESS

The Barclaycard Arena's recent GBP£26m redevelopment has been a winning factor in the venues recent tenders, with new state-of-the-art facilities including comfier seating, an increased capacity, nearly 6,000m^2 of new pre/post show space, excellent hospitality choices and a brand new glass façade overlooking the Brindleyplace canal side development.

Mead added: *"The redevelopment has been vital in ensuring we continue to attract national and international sporting events to Birmingham in an increasingly competitive global marketplace, and hold our place within the premier league of arenas. Standards of service can often be the deciding factor in a tender process, and a recognisably strong and talented team can set your venue apart from the competition, alongside outstanding facilities."*

The Barclaycard Arena's successful bid to host the Yonex All England Open Badminton Championships through to 2021 was testament of what great service can achieve, as

Mead explained: *"The Arena is proud to have hosted such a prestigious event for the last 20 years, after what was a very competitive tender process. To be successful in our bid to continue to host the Championships through to 2021 is a great honour and will further cement our relationship with BADMINTON England and the Championships.*

"Similarly, in bidding for the IAAF World Indoor Championships together with British Athletics – the governing body for the sport in the UK – and the City, the President of the IAAF confirmed that Birmingham's staging of the World Indoor Athletics in 2003 was the 'best ever' and expressed his confidence that Birmingham 2018 will be better still.

"This was again, a fantastic endorsement for the Arena and highlights how working in partnership can be a key driver for success. I am absolutely confident that we'll deliver the most successful IAAF World Indoor Championships ever in 2018."

After listening to Mr Falvo's and Mr Mead's advice, it would seem that for those cities and venues looking to successfully bid on and subsequently host sporting events, the following elements need to be in place: Forward planning to ensure world-class facilities and amenities through careful masterplanning; sufficient focus placed on sustainability and legacy; and the right team to deliver the project, which can seamlessly interact with all relevant bodies and industry providers (including the architects and contractors). ■

Genting Arena.



DEMOUNTABLE VENUES FOR A LONGER LEGACY

Ten years ago, Athens invested in much infrastructure and the latest technology for the Summer Olympics. Today, these once modern sports facilities are now decaying, as a concrete plan for their subsequent use was never worked out. Such scenarios, however, can be avoided with forward-thinking planning, as NUSSLI's Reto Rey explains.

In December 2014, the IOC Assembly adopted the 'Agenda 2020', which places sustainability as a top priority for the entire Olympic Games, thereby setting standards. Specifically, this means that in addition to other objectives, host cities should make maximum use of their existing sports facilities and all other needs should be met with temporary facilities.

Reto Rey, Head of Business Development at the NUSSLI Group, sees great potential in measures such as these, both for environmentally sound and resource-saving event organisation, as well as with regards to cost optimisation for the host city.

"Our experience from previous large-scale events has shown that planning should not only focus on the event itself but also its legacy. For example, what happens with the infrastructure after the event? Can arenas or other sports facilities continue to be used in a meaningful and profitable manner? In order to answer questions like these, we come up with concepts which, besides addressing the needs of the event, also assess what they can be used for once everything is over. Accordingly, we develop suggestions for expansions or temporarily repurposing existing facilities, or even for entirely demountable structures," explained Rey.

SUSTAINABILITY AS A GOAL

A strong development towards sustainability cannot only be seen with the Olympic Games. The candidature committees of large-scale events are well aware of the importance of forward planning when it comes to upgrading existing venues to meet the requirements of a major event.



The airberlin world arena, with 20,000 seats, was built by NUSSLI within three months as a temporary interim stadium for the German football club Fortuna Dusseldorf.

"Those responsible for Russia's candidacy for the 2018 FIFA World Cup™ with help from NUSSLI already defined the capacities of their stadia and the possibility to expand this with temporary stands in the bidding phase, eight years before the event. Moreover, we planned out the size and location of additional temporary overlay for the World Cup. Concepts were developed for a total of 16 stadia in 13 host cities; all concepts will allow sustainable usability in terms of economy and environmental friendliness," Rey continued.

TEMPORARY INFRASTRUCTURES OF ANY SIZE

The principle of sustainability due to the use of temporary structures is, however, not just limited to large sports events: Wherever great events capture the imagination of audiences, yet afterwards nothing except unforgettable memories should remain, sophisticated modular concepts are the most forward-looking and therefore sustainable solution.

In addition to their great cost efficiency and short construction times, the greatest advantage of temporary infrastructures is there superior implementability in the most difficult locations. Remarkable examples of this are the Adidas Arena, which was constructed in the heart of Berlin directly in front of the Reichstag for the 2006 FIFA World Cup™, and a football fun park with approximately 40,000m^2.

The airberlin world arena is another prime example of a temporary stadium – 20,000 seats were created for the German football club Fortuna Dusseldorf. The matches of this second division club could not be held at the ESPRIT Arena, their home grounds, as the venue was used for the Eurovision Song Contest. NUSSLI created a secondary venue for the matches in just three short months. ■

STATE-OF-THE-ART

Ronnie Hurst, Project Director at the Department of Sport and Recreation, gives us *exclusive* insights into how the new Perth Stadium is delivering 'state-of-the-art' across all project phases.

Stadiums usually deliver on promises to include state-of-the-art technology or products upon opening, but the new **Perth Stadium** is leading the way in delivering state-of-the-art design, construction and management through Building Information Modelling (BIM).

The new Perth Stadium, located in Western Australia, will open in early 2018. This 60,000-seat, multipurpose venue will be capable of hosting **Australian Rules Football (AFL)**, cricket, rugby league and rugby union, football (soccer), and entertainment events.

Project Director on the new Perth Stadium, Ronnie Hurst, said the State Government owned and operated facility will be one of the first in Australia to be delivered to BIM Level of Development 500 (LOD500).

"The State Government is leading the way in the utilisation of BIM in major infrastructure projects across the State," said Hurst. ***"LOD500 will mean an entire BIM 'as-built model' of the Stadium and Sports Precinct will be handed over to the facilities management team at the end of construction in late-2017, allowing the BIM model to be utilised throughout the 25-year maintenance period."***

DESIGN AND CONSTRUCTION THROUGH BIM

The State Government contracted the **WESTADIUM** consortium, consisting of **Brookfield Multiplex**, **John Laing**, **Brookfield Financial** and **Brookfield Global Integrated Solutions**, to design, construct, partially finance and maintain the new Perth Stadium and Sports Precinct for 25-years. The WESTADIUM consortium architectural team consists of **HASSELL**, **Cox Architecture** and **HKS Sport + Entertainment**.

Like the State Government, WESTADIUM is committed to the utilisation and development of BIM for the new Perth Stadium and engaged BIM specialists, PDC BIM Evolved, to establish BIM best-practices across the project. The result is the development of a model that is pushing the boundaries of what BIM can deliver on a major infrastructure project.

A federated BIM model is issued weekly, compiling every model piece provided by design consultants and subcontractors into a single 'point of truth'. Since the first BIM architectural model piece was created in late 2013, a total of 51 BIM model pieces are now compiled into the federated model every week, including structural, services, logistics and subcontractor models.

Staff are able to utilise BIM on tablets around the new Perth Stadium site

All images credit: *Western Australia Department of Sport and Recreation.*

Software package iConstruct (an add-on to BIM management software Navisworks), automates what would usually be a lengthy manual process, saving the project significant time and cost.

Jon Stone, Regional Director for Brookfield Multiplex, said this weekly cycle is crucial to ensure everyone is accessing and working from current information. He advised: ***"This allows us to reap the inherent rewards of BIM, such as clash detection, allowing us to clearly identify any constructability issues in the design phase."***

INNOVATIVE NEW PURPOSES

The extent to which BIM has been incorporated into the construction process has also allowed the model to be used for some innovative new purposes, as Stone outlined: ***"For example, shop drawing reviews are now being carried out directly in the model, rather than from 2D drawings, with all actions and changes captured in a workflow attached to the model. This means that inconsistencies in the design can be easily picked up and all involved parties are working from the same information."***

BIM has also been instrumental in the project's design development phase. The project's nine User Groups, made up of future users of the Stadium, enhanced their understanding and input into the stadium design following their viewing of BIM.

The Sports Fans User Group, made up of 30 West Australian fans, and the Access and Inclusion User Group, which informs the Project Team on accessibility matters, have had the opportunity to virtually travel from the public transport hubs surrounding the Stadium, through the ticketing gates and across all five-levels.

"The BIM technology enables us to deliver on our 'fans first' aspiration and ensures that the new Perth Stadium caters for everyone regardless of age, experience or ability," Hurst said.

He added: ***"BIM has also enabled the Media User Group to 'see' the Stadium, the commentary boxes, and the sightlines from the media facilities to the pitch – years before the build is complete. As a result, they have been able to identify their preferred camera positioning within the media facilities and highlight potential functional issues, which the Project Team can amend in the final design, ahead of construction."***

TAKING BIM ON SITE

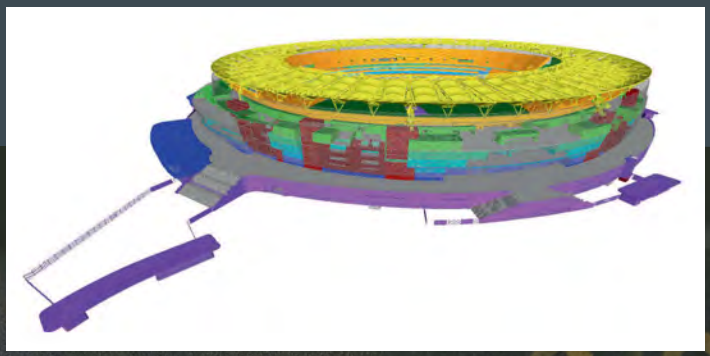
The benefits of BIM are now being taken out into the field, with BIM 360 loaded onto tablets for use on site, as Stone advised: ***"Using the tablets, you can locate where you're standing on site and bring up the 3D model for that area.***

"In the construction phase, it makes it easy to see if everything has been built to the design – you can pick up small inconsistencies that might not be seen from a 2D drawing."

However, heightened visibility isn't the only benefit. The tablets also allow commissioning checklists, defect reports and site status information to be completed – all while working on site.

This means the model is not only the central source of information for design and construction, but can also be used for progress tracking, commissioning and eventually facilities management and operations.

All of this data is stored in one central location in the cloud, with project staff across all levels plus subcontractor



◀ *A federated BIM model of the new Perth Stadium is issued weekly, compiling every model piece provided by design consultants and subcontractors into a single 'point of truth.*

▲ *Each piece of steel carries a unique barcode, which is scanned as it moves through each stage of the manufacture and production process, and again after it is installed on site. This information is fed from the contractors system directly into the BIM model, where it is used for reporting purposes and updating the as-built status in the model.*

teams able to access tailored information (based on individual requirements) on an easy to read dashboard.

FACILITIES MANAGEMENT

Due to the procurement structure of the new Perth Stadium, Brookfield Global Integrated Solutions, who will manage the Stadium and Sports Precinct for 25-years, are already involved in the design and construction phase.

From a BIM perspective, this means the Facilities Management (FM) team can provide input into the information captured in the BIM model, assisting with the provision of asset registers and management in the operations phase.

The final deliverable of a LOD500 BIM model will contain detailed information on every item located within the Stadium, as it has been built, down to every last chair and LED light, allowing a complete asset register across the entire Stadium and Sports Precinct to be generated through the model within 24 hours.

CHANGING APPROACH TO CONSTRUCTION

Like any new process, incorporating BIM to this level requires a new way of looking at construction, as Stone explained: ***"One of our biggest challenges on the project is the transition from traditional construction methods to BIM construction."***

To assist in the process, BIM has been made accessible to every member of the project team.

"BIM stations are located around the site offices with the current model available for everyone to access. Every new starter on the project is given a BIM induction and numerous training sessions have been carried out," said Stone.

The commitment from the Government to utilise BIM has also been important. The State Project Team works closely with Westadium in the BIM implementation and has procured its own BIM work stations and tablets with all team members participating in BIM training programs.

"The BIM model will only be as good as the information fed into it, so educating and engaging people is just as important as the software itself – if not more," said Hurst.

CASE STUDY: STRUCTURAL STEEL IN THE BIM MODEL

With over 10,000 individual pieces of steel being used to build the Stadium structure, tracking every piece to its exact location and installation status sounds like a Herculean task. However, linking the steel supplier's own tracking system into the BIM model has allowed for seamless tracking and reporting on the steel progress.

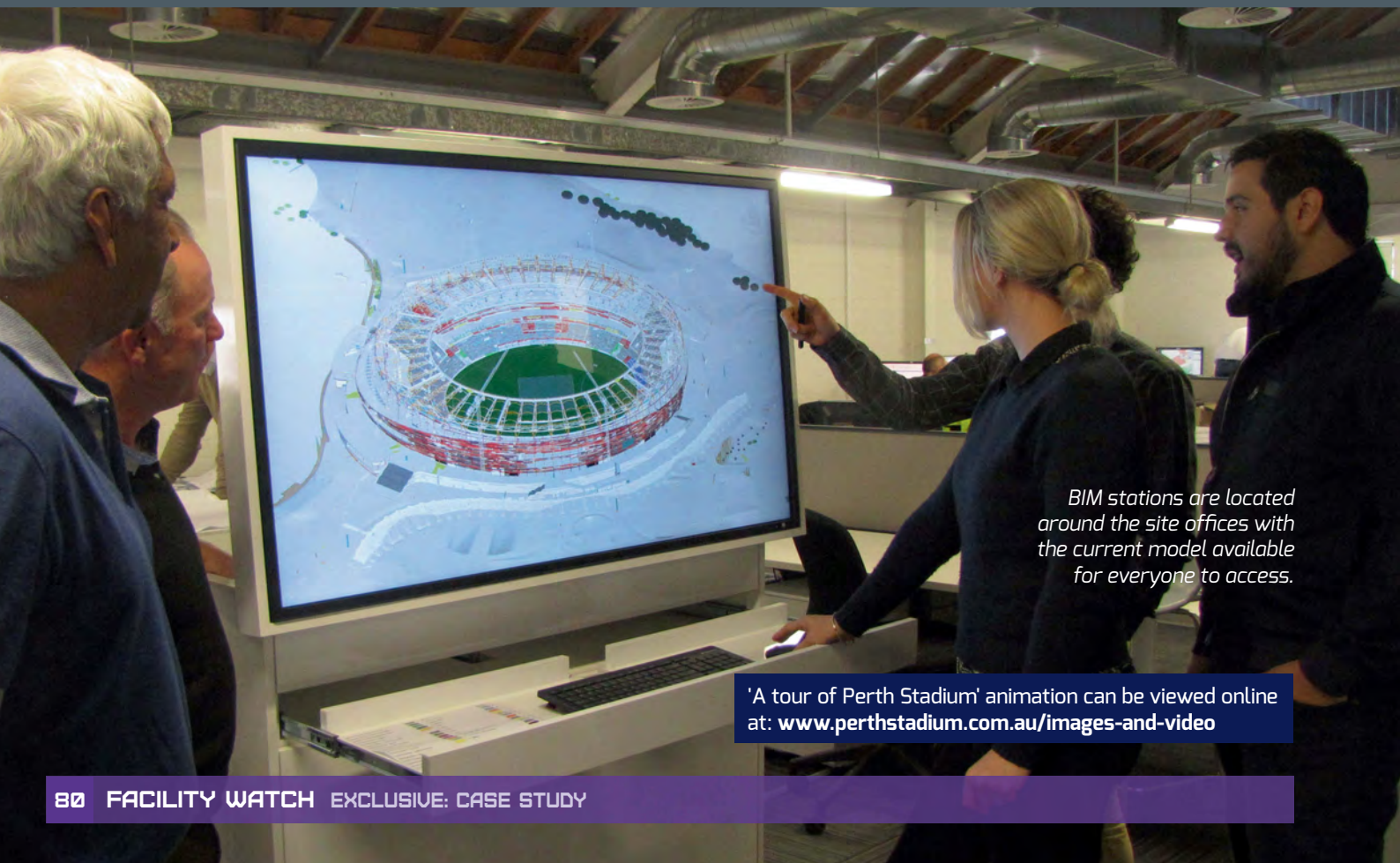
Each piece of steel carries a barcode, which is scanned as it moves through each stage of the manufacture and production process, and again after it is installed on site. This information is fed from the contractors system directly into the BIM model, where it is used for reporting purposes and updating the as-built status in the model.

In addition, using BIM 360, staff can scan the barcode on site to take them to that exact piece of steel in the model. The associated properties of the steel are immediately visible, including a link back to the latest construction documents in project's document management system. This allows the BIM model to be the central source of information for everyone across the project, even while out on site.

DELIVERING ON PROMISES

The new Perth Stadium is pushing the boundaries of what BIM can deliver on a major building infrastructure project. It is being utilised by project staff and subcontractors in the design and construction of the Stadium and Sports Precinct, and will continue to be utilised throughout the 25-year maintenance period.

Most importantly, BIM will not only deliver on the Stadium's 'state-of-the-art' promise but also ensure delivery of a 'fans first' venue. ■



BIM stations are located around the site offices with the current model available for everyone to access.

'A tour of Perth Stadium' animation can be viewed online at: **www.perthstadium.com.au/images-and-video**

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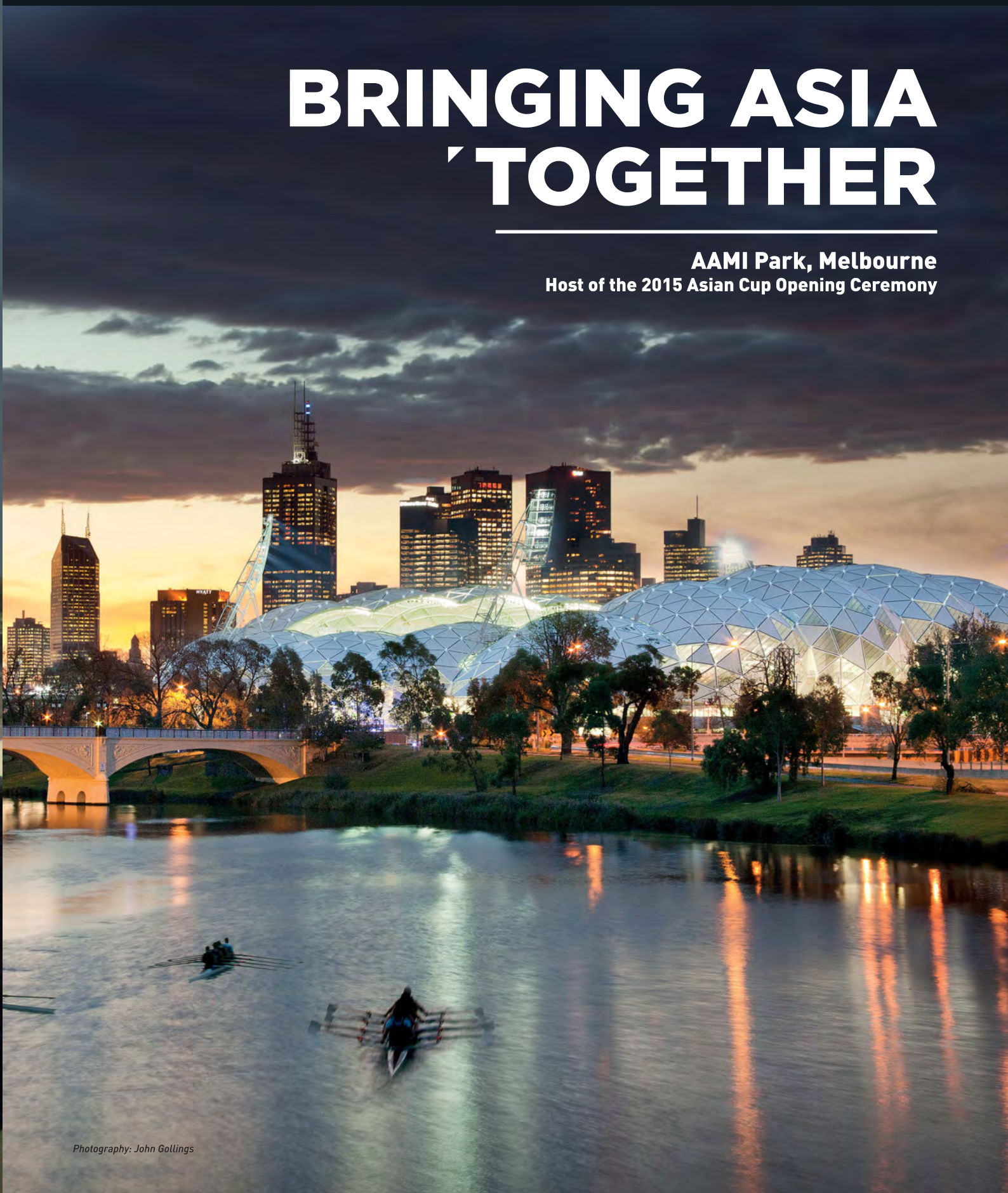
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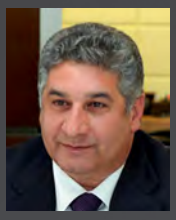
AAMI Park, Melbourne

Host of the 2015 Asian Cup Opening Ceremony



Photography: John Gollings

BAKU OLYMPIC STADIUM


Minister Rahimov


Simon Clegg

Katie McIntyre reports on the brand new 68,000-capacity Baku Olympic Stadium, which was the centrepiece of this year's inaugural European Games.

Baku was awarded the **inaugural European Games** at the **41st EOC Congress** in Rome. The ceremony was attended by Azerbaijan President, Ilham Aliyev, who is also President of the **Azerbaijan National Olympic Committee**; the then President of **FIFA**, Sepp Blatter, and the President of **UEFA**, Michel Platini.

Azerbaijan was subsequently awarded four matches in UEFA's pan European **EURO 2020** soccer tournament – three group games and one quarter final.

Speaking prior to the Games – which ran from June 12-20 – Simon Clegg, the Baku 2015 Chief Operating Officer, said: ***"The Baku 2015 European Games will provide a lasting sporting legacy for the city of Baku and the people of Azerbaijan. Not only will the stadium be used for the inaugural European Games and Euro 2020 but also the Islamic Solidarity Games in 2017.***

"The achievement of building the stadium should not be under estimated and it will be a great source of pride for Azerbaijan."

LASTING LEGACY

Minister of Youth and Sport and Baku 2015 CEO, Azad Rahimov, added: ***"This great sporting legacy is part of a cohesive plan putting sport at the heart of a diversified economy and healthy society.***

"It is important to remember that these inaugural Games are part of President Aliyev's vision to enhance our country's position as a dynamic, hospitable cultural and business centre. Azerbaijan is already known as a key provider of energy for the continent, but thanks to events like the 2012 Eurovision Song Contest, the FIFA Women's U-17 World Championship, the Baku 2015 European Games and, in the coming years, the 2016 European Formula One Grand Prix, the Baku 2017 Islamic Solidarity Games, and UEFA EURO 2020 football matches, our profile will be higher than ever."

Rahimov continued: ***"These large-scale events will provide immediate use for much of the infrastructure and human legacy of Baku 2015. Perhaps less tangible but equally important will be the great benefit our city and country will gain in terms of positive attention from the world's media and sport fans.***

"The Baku 2015 European Games will also leave our country richer than ever in terms of the Azerbaijani public's skills, motivation and pride in what we can achieve together. Beyond the employment opportunities the Games have already generated and will continue to create up to and including the Games, they will contribute to providing Azerbaijan with an ever-deeper pool of experience and ability."

For Baku 2015, there were four clusters and eighteen competition venues, twelve of which were permanent venues, of which five were new builds, namely the **National Gymnastics Arena**, **BMX Velopark**, **Baku Aquatics Centre**, **Baku Shooting Centre** and the **Olympic Stadium**. There were then six temporary venues, namely: the **Water Polo Arena**; **Beach Arena**; **Basketball Arena**; **Mountain Bike Velopark**; **Triathlon**; **Cycling road race and time trial**.

ABOUT THE EUROPEAN GAMES

The European Games is a multi-sport event for athletes from all over Europe and is held every four years. The Games are owned, organised and regulated by the **European Olympic Committees (EOC)**.

The European Games were created at the General Assembly of the European Olympic Committees on December 9, 2012 in Rome, Italy, when 84% of the National Olympic Committees (NOCs) of Europe voted for the creation of the European Games.

A number of cities have already expressed their interest in hosting the second edition of the European Games in 2019. The EOC is setting up a working group to coordinate the bidding process for the 2019 European Games.





Baku Olympic Stadium
Credit: Baku 2015 Organising Committee

BAKU 2015: HOST VENUES

Village cluster: **Olympic Stadium**; **National Gymnastics Arena**; and **Athletes Village**.

City Cluster: **Heydar Aliyev Arena**; **Tofiq Bahramov Stadium**; **Freedom Square**; and **Baku Sports Hall**.

Flag Square cluster: **Baku Aquatics Centre**; **Water Polo Arena**; **Basketball Arena**; **Beach Arena**; **Crystal Hall 1**; **Crystal Hall 2**; and **Crystal Hall 3**.

Western venues: **Baku Shooting Centre**; **Mountain Bike Velopark**; **BMX Velopark**; **Mingachevir**; and **Bilgah Beach**.

















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CENTREPIECE OF THE GAMES: BAKU OLYMPIC STADIUM

Baku Olympic Stadium's construction site preparation began on June 6, 2011, some eighteen months before the city was awarded hosting rights to the inaugural European Games, for which the venue was the centrepiece, hosting the spectacular Opening and Closing Ceremonies.

In late 2012, the Turkish firm, **Tekfen Construction and Installation Co. Inc.**, was awarded the Design & Build contract for the stadium, which was financed by the Azerbaijan national oil company **SOCAR**. Construction of the foundations commenced in January 2013.

The initial stadium design by the Turkish company was then transitioned to the current design by the worldwide architectural and construction service provider, **Heerim Architects and Planners**, based in Seoul, Korea. Heerim led the entire design team and also provided construction management services.

International engineering firm **Thornton Tomasetti** provided structural design services for the stadium. To meet an aggressive eighteen-month design and build schedule, the project team performed design and construction simultaneously. To maximise design flexibility, the structural design used piled raft foundations, a system more typical of high-rise buildings than stadiums.

Thornton Tomasetti's Managing Principal, Mike Squarzini, said: ***"This project was highly complex, delivered in a hyper-compressed timeframe. The challenge was to build a world-class stadium worthy of hosting the Olympics, all in 2½ years from concept to delivered facility. This is a success story of collaboration and creative thinking from all participants – ownership, designers, engineers and constructors – focused on achieving that goal."***

Senior Principal, Hi Sun Choi, added: ***"The stadium is in Baku on the Absheron Peninsula, which has undergone several seismic events in the past. The name Baku means 'city where the wind pounds', which is fitting. As such, the stadium was designed for the severe seismic loads similar to California's and the very high wind loads similar to Alaska's coastal region. However, the real challenges were the aggressive construction schedule and coordination of work with the design and construction team members who are scattered across eight countries. The international team brought the diverse and best practices in stadium design and construction from around the globe, and successfully delivered this project in time for the European Games."***

An advanced modelling approach, i.e. BIM, also supported the accelerated schedule. The engineering team developed an automated design routine to check beam and column reinforcement against seismic code provisions, greatly speeding the design process. Precast reinforced concrete, main and secondary steel structures were all modelled using **Tekla Structures** 19.0 and full fabrication drawings were delivered to the contractor's fabrication facility in Turkey.

DESIGN & BUILD

Construction of the six storey, 65.7m-high, 225,000m^2 venue – that sits on a 650,000m^2 site – was completed in February 2015. The 68,000-capacity stadium is now a prominent landmark in the city.

SIS PITCHES AT BAKU OLYMPIC STADIUM

Cumbrian firm, **SIS Pitches** completed work at the brand new **Baku Olympic Stadium**, ready for the first ever European Olympic Games.

The SIS Eastern European team in Azerbaijan built two brand new natural turf pitches – one training pitch and the main stadium pitch at the impressive stadium.

Baku Olympic Stadium was used for the first European Olympic Games, with the opening ceremony taking place at the venue on June 12, 2015. The Games were designed and are to be regulated by the European Olympic Committees (EOC).

The stage was built over the pitch for the opening ceremony, which saw 6,500 athletes and officials in attendance, along with 5,000 volunteers and performers.

The SIS Pitches team went in after the Opening Ceremony to re-turf the pitch ready for it to be used for the Games from June 21 onwards.

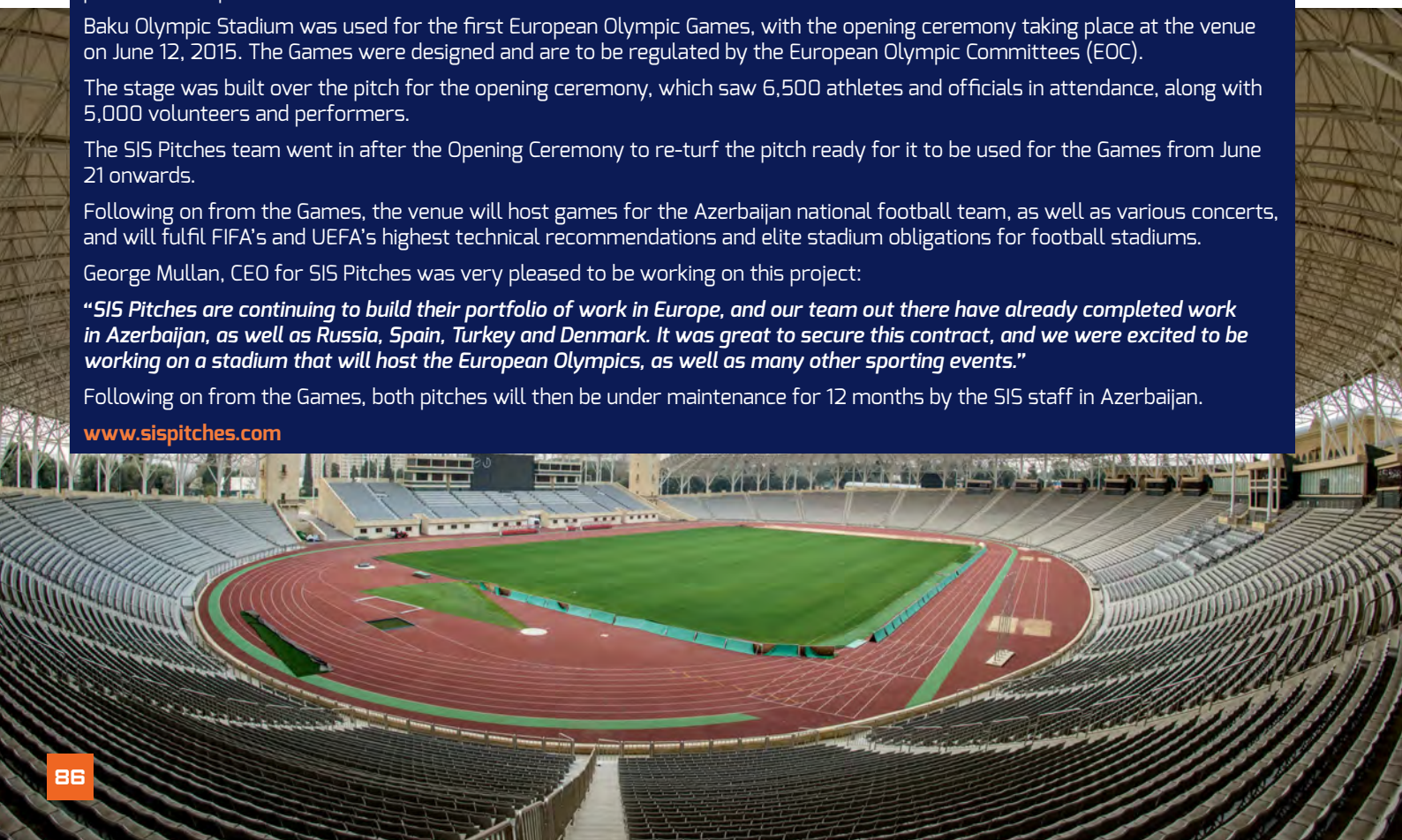
Following on from the Games, the venue will host games for the Azerbaijan national football team, as well as various concerts, and will fulfil FIFA's and UEFA's highest technical recommendations and elite stadium obligations for football stadiums.

George Mullan, CEO for SIS Pitches was very pleased to be working on this project:

"SIS Pitches are continuing to build their portfolio of work in Europe, and our team out there have already completed work in Azerbaijan, as well as Russia, Spain, Turkey and Denmark. It was great to secure this contract, and we were excited to be working on a stadium that will host the European Olympics, as well as many other sporting events."

Following on from the Games, both pitches will then be under maintenance for 12 months by the SIS staff in Azerbaijan.

www.sispitches.com





VENUE IN FOCUS
BAKU OLYMPIC STADIUM

COMMS AT THE EUROPEAN GAMES

The P.A. People delivered the world's largest, clearest and most innovative ceremonies communications (comms) system for the inaugural European Games.

The Opening and Closing ceremonies of international sporting events in the 21st century have become their own genre of epic theatre. Used by host nations to communicate their history, achievements, values and ideals, the ability to conceptualise, design and deliver these vast spectacles is the preserve of a handful of elite international creative and technical agencies. The P.A. People is one such specialist, with an impressive of track record of delivering comms solutions to events such as the Winter and Summer Olympics, Asian Games and Commonwealth Games.

The P.A. People successfully provided communications, CCTV and technical services to the ceremonies of the 2015 European Games. An audience of nearly 70,000 watched 2,000 performers and 6,000 athletes representing 50 nations in 20 sports open the Games with a combination of traditional music and poetry, gravity-defying aerial effects, multimedia, international superstars and pyrotechnics.

Central to the Opening Ceremony was the giant revolving stage. At different times, it was called on to hold hundreds of performers, rotate to display complicated scenery, emulate the birth of a mountain range with hydraulics, and have both water and fire emerge from it. Its first big moment was a section called 'Miniatures', in which 300 performers and 200 trap doors were utilised to create a revolving panorama of recreated illustrations from the works of Azerbaijani national poet Nizami Ganjavi, a 12th century writer and philosopher famous for works such as 'Layla and Majnun', a story of star-crossed lovers said to have been the inspiration for 'Romeo and Juliet'.

Bringing this one scene to life took 26 stage management staff working in unison on stage, all on full duplex wireless comms, with a further 54 full duplex wireless comms packs and around 25 wired packs under the stage as its own separate system.

The comms system as a whole was vast; over 1,000 two way-radios, more than 200 IP-enabled intercom panels and hundreds of beltpacks. It was one of the largest communications system ever used in a live event. The biggest technical challenge was how to make 80 full-duplex wireless comms packs work in the same place.

"It had never been done before on that scale," said Nick Eltis, Senior Technical Director for the ceremonies for creative and production firm **FiveCurrents**. ***"We have often tried to do big full duplex wireless systems and it has literally never worked, as the technology hadn't been reliable enough."***

The P.A. People solved this technical difficulty by using **Clear-Com's** new Freespeak II DECT wireless technology. DECT functions in the globally license-free 1.880 to 1.933GHz range.

Fritha Truscott, the Games' Associate Show Producer - Show Control, for FiveCurrents, was in charge of the team under the stage. She explained: ***"I had a staff of more than 65. A fifth were local stage management and 18 were employed just for the opening ceremony as the 'block captains' on the revolve for the 'Miniatures' section. The comms we had on the revolve were extraordinary. I have never been on such clear-sounding comms. I had all these locals out there, that had never done anything like this before, doing their own mini show-call on each section of the revolve, and I was able to communicate with them clearly. It was awesome."***

Carving out a safe operating spectrum for such a large wireless system was a long process that involved the technical team from FiveCurrents, The P.A. People and the Azerbaijani government.

"We did the initial spectrum plan and allocated how many duplex and simplex channels we needed, as well as radio microphones, in-ear monitors, WAPs and anything else with a frequency", said Carl Gosine, the Game's Technical Director – Systems, for FiveCurrents. ***"It was all put in a spectrum allocation chart. That was sent to the organising committee and to the government. We put in our first spectrum request in September. New TV stations started coming on-line in January and we had to go back and say 'this is affecting our spectrum'. There was a lot of back and forth."***

The final piece of the RF puzzle was solved by splitting up the full duplex systems. ***"In the end, we used two Freespeak II systems in two different frequency bands,"*** clarified The P.A. People's Chris Dodds.

It wasn't just Clear-Com's Freespeak II that made it into the stadium's comms system. A huge range of equipment from the brand was used, including two Clear-Com Eclipse HX-Omega Digital Matrix systems, two Eclipse HX Median Digital Matrix frames, fifteen HelixNet Master Stations, 150 HelixNet Beltpacks, and more than 200 Clear-Com V-Series Intercom Panels. Clear-Com even provided two support engineers to ensure that everything ran smoothly with their gear.

Complementing the comms system, The P.A. People rolled out a site-wide CCTV system, providing a vital visual complement to comms audio.

"We used our CCTV panel in the light booth all the time," said Travis Hagenbuch, Lighting Designer for lighting design group **Full Flood**. ***"We used it to help focus lights in places we couldn't see, we used it to mimic some TV camera angles, and even to check smoke machines under the stage. Not having to send someone to do all those things helped save a lot of time."***

Synchronising playback, lighting, cameras and cues involved displaying SMPTE time code throughout the control rooms and in other system control locations, another responsibility that fell to The P.A. People.

Travis Hagenbuch commented: ***"Everything supplied to us worked flawlessly, was flexible, and was intuitive to use, and I've never seen a comms system this large and complex. The integration of all three of Lighting's radio channels into the headset panels was a life-saver when trying to talk to the crew and find someone quickly – that's a feature I wish was on a lot more shows."***

FiveCurrents are no strangers to this scale of production. Their recent portfolio includes London and Sochi Olympics, as well as producing ceremonies for the recent events in Toronto and Los Angeles.

"Using the comms system in Baku was a superior experience; a super-integrated solution," said Scott Givens, President of FiveCurrents. ***"We work all over the world, and having a turnkey system that works, is essential."***

It has been designed to meet the highest international standards for stadiums set by the **Union of European Football Associations (UEFA)**, the **International Federation of Association Football (FIFA)** and the **International Association of Athletics Federations (IAAF)**.

Enclosed in circular shape, spectator access is possible via three large ramps leading to an elevated esplanade surrounding the building. From there, 26 gates lead to the stands.

There are three tiers of regular/GA seating on the sides and two behind goals. Between the lowermost and middle tiers, there is an extra level of premium seating. The stadium contains a total of 127 VVIP, VIP and CIP Suites, offering an overall capacity for 720 spectators. The venue also features some 3,078 car parking spaces, a 1,800-seat warm-up area and an Information Centre.

The stadium's outer cladding – designed by Thornton Tomasetti – is made of Texlon® ETFE cushions – designed and manufactured by **Vector Foiltec** – can be transformed into a giant screen at night.

Andrés Amat, Project Manager for Vector Foiltec on the Baku Olympic Stadium project, advised: "Our ability to provide turnkey solutions, in a limited time, meant that we were best placed to deliver the project within the ambitious 18-month design and build schedule. Our in-house multidisciplinary expertise ensured a seamless transition into the design team. Early involvement meant that we were able to successfully influence the design to expedite the complex installation of the 51m high façade.

"The lightweight structure with its diamond-shaped panels meant that substantial savings could be made in the steel tonnage, which resulted in cost savings and environmental benefits. Texlon® ETFE will assist with these goals, while adding to the aesthetics of one of the most iconic buildings in Baku."

STRUCTURE & FORM

The stadium's structure was modelled in two locations: Volos, Greece (**Sdeng Steel & Structural Detail Engineer**) and Istanbul, Turkey (**Tekfen Engineering**). Communication with the principal designers in Seoul, South Korea, (**Heerim Architects and Planner**s) and New York (**Thornton Tomasetti**) was a success story using BIM tools. From the outset, it was clear to all participants that this way of communication would be the only way to achieve maximum teamwork efficiency with such a short timeframe.

With the European Games now over, the Azerbaijan national football team has taken up residency at the Baku Olympic Stadium, which is now their 'home' ground. The stadium will also host a number of major events in the coming years, including the **2017 Islamic Solidarity Games** and EURO 2020 matches. ■

OSRAM'S LIGHTING SOLUTIONS

Osram was responsible for equipping **Baku's Olympic Stadium** and the **National Gymnastics Arena** with innovative lighting solutions.

Osram subsidiary companies installed outstanding lighting at the **European Games 2015** in Azerbaijan; with **Siteco** having equipped the Baku Olympic Stadium with an HDTV-compliant floodlighting system, and **Traxon** having transformed the National Gymnastics Arena into a radiance of light with dynamic lighting solutions.

Prior to the European Games, Osram equipped the National Gymnastics Arena in Baku with an innovative and dynamic lighting system. 600 Traxon Wall Washer Shield AC XB bathe the facade of the arena in colourful light to create impressive combinations. 10 transparent screens implemented with a total of 11 km of Traxon media tubes, and constructed to provide supplementary mechanical stability, were fixed to the facade of the sports location. The sophisticated e:cue control solution activates automatically with the coming of night to then switch off in the morning hours. Pre-programmed sequences play graphic animations and various colour chases across the screens.



National Gymnastics Arena



Baku's Olympic Stadium

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GOLD STANDARD

d&b audiotechnik illustrates how they were 'in the game' at the inaugural European Games.



Baku hosted the inaugural European Games back in June.
Credit: *Harry Engels, Getty Images*

Earlier this year, Azerbaijan's largest city and capital, Baku, hosted the inaugural **European Games**. Between June 12 and 28, almost 6,000 athletes competed in 20 different sports, ranging from traditional athletic competitions to beach soccer and BMX cycling. Competitions took place across a number of different venues, some permanent, some temporary, some large, some small. Specialist audio supplier, **Dimension**, and **Sports Technology** Director, Damian Rowe, had the challenging task of supplying audio systems for the Games' competition venues, and for the many corporate and press facilities that required a pro audio presence.

Rowe is no stranger to events of this magnitude; a veteran of the **Sochi Winter Olympics, London 2012 and Glasgow Commonwealth Games**, his CV is something of a gold standard.

Rowe advised: *"Across the 21 venues, over half were rigged with* **d&b audiotechnik** *loudspeakers as their primary systems. Wherever possible, we always choose d&b for this type of job for one very simple reason: They are the best product available. The combination of power, processing and control you get from the wide range of systems is unsurpassed."*

Project Manager, Mike Sumner was Head of Audio for Glasgow and Baku, and worked alongside Sports Technology in Sochi and London. He advised: *"It's probably easier to say which d&b systems we didn't use rather than the ones we did. T10s were the perfect choice for the* **Basketball Arena** *that had a capacity of 2,500, while the nearly 4,000-seater* **Beach Arena**, *that hosted beach volleyball and beach soccer, was rigged with V-Series. In other venues we made use of Q7s, B4s and M4s for example. No matter which product is chosen from the range, be it new or old, d&b reliability and quality of sound reinforcement is a given. The value of that is hard to quantify, especially when you are working so far away from home."*

CRYSTAL CLEAR

"In the **Crystal Hall** *indoor arena, originally built for the Eurovision Song Contest, there were three venues. In the boxing venue, we used an almost identical T10 system to the one that was in both the* **Excel Centre** *for London 2012 and the SECC for the Glasgow games, a solid endorsement of that loudspeaker."*

However, in the **Crystal Hall** venue for fencing, karate and taekwondo, Sumner tried something new. The Y10P loudspeakers from d&b were used as a stand-alone point source system as there was no means of flying an array. This was something of a difficult space that was changed around dependent on which sport was being played, as Sumner outlined: *"I'd never used them before; they were light and easy to rig and performed exceptionally well, giving a really warm feel in the low to mid range."*

Sumner is also an enthusiastic user of d&b's ArrayCalc, as he commented: *"I use ArrayCalc throughout the planning process and then once we're onsite it plays an invaluable role. With events of this nature, we visit the venues and measure the rooms that are then built into ArrayCalc. But, of course, it's not unusual to find that the venues are not completed in time or when we arrive onsite the spaces have been altered significantly. With ArrayCalc we can pitch up and make the necessary changes without it becoming a time consuming or logistical nightmare. I wouldn't leave home without it. Even when we are using loudspeakers from another manufacturer, that don't offer a calculation programme, I would still refer to ArrayCalc to offer a ballpark solution. The fact that it's free and available to everyone is amazing."*

Providing appropriate audio solutions for everything from morning press conferences to huge sporting events is always a challenging project, and necessarily fraught with unforeseen difficulties, changes and frustrations. Sumner undoubtedly views d&b audiotechnik loudspeaker systems as somewhere he can comfortably hang his hat, as he pointed out: *"There are many reasons that I would always be happy using a d&b system at an event such as this; not least that they perform so well. There is always a speaker in the d&b range that will fit the job perfectly and the fact everything is so interchangeable means that, across twenty odd venues, we were able to provide the right solution in the right place. In an environment where help can be hard to come by, a choice of d&b loudspeakers is something of a 'get out of jail' card for me."* ■

BOLD SLEEK DESIGN

The proposed new shared home of the Chargers and Raiders NFL teams, the L.A. Stadium in Carson, boasts a sleek, smooth design that mirrors the city's love affair with the automobile and would see the return of Pro Football to L.A. with remarkable style, as Katie McIntyre reports.

With the NFL looking to relocate a team or indeed teams to the Los Angeles area, the **San Diego Chargers** and **Oakland Raiders** announced that they would be collaborating on a joint proposal to build a privately-financed, USD$1.7bn stadium in Carson, California, which the two teams would share if they relocate to the city.

Carson's City Council has already unanimously approved the project, which is gathering momentum after the team's latest meeting with the League in August 2015. However, the stadium project is obviously dependent on the League's decisions as to which team/s will move to L.A. (There are two stadium proposals: the **L.A. Stadium** in Carson by the **Oakland Raiders** and **San Diego Chargers** and a stadium proposal in Inglewood for the **St. Louis Rams**.)

Kicking off the project, the two teams first held private meetings with a number of shortlisted architecture firms, with each company attending interviews and subsequently presenting their designs. MANICA Architecture, which has their headquarters in Kansas City, as well as offices in London and Shanghai, was selected to lead the design of the project.

The stadium's stunning design mirrors the city's love affair with the automobile, as President of **MANICA Architecture**, David Manica, confirmed: ***"The sleek, smooth design has been inspired by the 21st century design and aerodynamics of luxury sports cars."***

UNIQUELY L.A.

With a unique L.A. location, the stadium's open-air, canopy design perfectly represents the Southern Californian weather and lifestyle; harnessing sunshine and shade, with little or no barriers between the interior and exterior thanks to large operable walls. In terms of access, the site benefits from having direct access to two major freeways and maximises space for tailgating. VIPs also benefit from dedicated access lanes, as well as in-stadium parking with valet parking.

In its base mode, the stadium would offer a capacity of 65,000-seats, which could be increased to 72,000 for a Super Bowl. Although the stadium has been envisaged as a high-end, multiuse sports and entertainment venue, NFL will be evidently and proudly at its core.

Much like the New York Jets and Giants, who share **MetLife Stadium** – which is currently the only NFL stadium shared by two clubs – the new **L.A. Stadium** would be the home ground of these two teams. There has been much speculation that with both the Chargers and Raiders playing in the AFC West, one may have to move to the NFC, although this is not necessarily the case, as the stadium's clever design means that both teams can be facilitated as the 'home' team at the same time. At field level, both teams have equal facilities, »



L.A. STADIUM

Project Statistics

Client	San Diego Chargers and Oakland Raiders
Capacity	65,000-seats; 10,700 Club Seats, 170 suites, 6 clubs
Location	Carson, CA
Design Architect	MANICA Architecture
Planned opening	2019



All images credit: *MANICA*



mirrored each end, and the venue can be 'branded' through the network of signage mediums to celebrate each side equally. Additionally, the stadium would only be used on game day, not for practice or training.

MODERN DESIGN

The two teams wanted a design that would be instantly recognisable. Efficient on the inside, luxurious on the outside; just like the luxury sports car that is at the heart of the stadium's design.

Outside, the stadium would boast plenty of space dedicated to the sacred ritual of tailgating, as well as an authentic farmers market that would bring local flavour to a time-honoured tradition. Additionally, there would be a 10,000-seat amphitheatre that could host pre-game activities, or even drive-in movies!

Designed to provide an extraordinary football experience, fans would be pulled into the game day action as soon as they arrive on site, with seven exterior video screens adding to the sense of excitement and anticipation. Once inside, they would be able to watch all of the action on the field, thanks to the stadium's phenomenal sightlines.

The flowing, sparkling, modern stadium design would feature a horseshoe-shaped seating arrangement that would be open on one end; similar to the historic L.A. Coliseum. At the centre of the large open peristyle, would be a tower of about 120ft, which would become a signature feature for the stadium, the NFL League, and the city of Los Angeles itself.

FIVE-STAR HOSPITALITY

A Peristyle Bar – unparalleled in size at 56,000sqft – would capture the L.A. vibe and reflect the city's rich sporting and film history, ensuring all fans a premium experience, with great views and a concourse connecting all three GA areas.

When it comes to VVIPs, the stadium would boast a uniquely L.A.-themed premium experience, with the 40,000sqft Directors Club benefitting from the largest on-field patio, where VIPs can hang out with the players. The groundbreaking open-air Hollywood Club – the first of its kind – would feature a 175sqft retractable glass wall, and the Academy Suites – where exclusivity will reach new heights – will offer patrons special pre-game access to the field, as well as other VIP facilities and amenities, including an exclusive club-within-a-club.

In terms of the venue's green credentials, the stadium will utilise solar panels and also use passive heating to take advantage of the natural winds and ventilation. The landscaping will be made up of drought-tolerant plants.

From start to finish, this new uniquely L.A. 65,000-seat stadium – which could open in 2019 should the teams be successful in their bid to move to L.A. – has been designed to provide easy access, five-star hospitality and capture the energy and excitement of every game for every fan, and would welcome Pro Football back to L.A. with remarkable style. ■



Credit: *MANICA*



Credit: *MANICA*



Credit: *Steelblue/MANICA*

Background image credit: *Steelblue/MANICA*



MANICA

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image by steelblue and MANICA



Simon Smith

WEMBLEY'S WATCHMAN

Simon Smith, Associate Director of Stadium Services at Wembley Stadium, explains his role, the challenges and how England's National Stadium is evolving.

Can you describe your role at Wembley Stadium?

I was very proud to have been appointed Associate Director of Stadium Services for **Wembley Stadium**, working for **The FA Group**. I think it's everyone's dream and the pinnacle of my career to come and work at Wembley. I first came here as a child with my grandfather in 1979 and as a fan I've come here around ten times since. So, to get the opportunity to come and work here in 2012/13 was irresistible.

The role I took at the Stadium is a combination of many of the things that I have done in my career to date. Whether it's high level corporate services, operations management or working in a sporting environment, as I did previously with **Tottenham Hotspur Football Club**, all of these experiences have been brought together in my current role, which is extremely broad in its nature.

I look after the crown jewels: the Wembley pitch, maintenance and cleaning of the Stadium, all the occupational health and safety for The FA, and a lot of the technical event day set-ups for both sport and music, which is probably one of the more unseen sides of the role but is key to the successful running of an event. There's also a commercial element to my role, as I look after the retail offering on event days and on non-event day we operate the stadium tours and the stadium store, including the e-commerce site.

What previous experience has proved dividends?

Working at Tottenham Hotspur was a great experience and I was very proud to be associated with a club with such history. It was a great insight and honour to see how an elite sports team operates and the expectations on the support set-up to provide the best environment for these elite players to perform. My role at Tottenham, as the Head of Training Ground Operations, included the project management of the clubs state-of-the-art training centre, as well as the day-to-day running of the whole site.

My role as an Operations Manager in the **Master Community** in Dubai was also very important when coming into this role. It was a large and extremely busy environment and put me in good stead for working at the Stadium because there's such a high volume of activity either on event or non-event day. We often have up to 8,000 staff in the building to put on the event, as well as the 90,000 fans that come through the door.

What are the main challenges of your role at Wembley?

There is a desire to succeed and be the best, which underpins everything we do at the Stadium. The events and the size of the events we deliver are outside the norm. It is vital therefore that we have the right mind-set going into each event and we are very diligent in ensuring we recruit the right people that share this mind-set, vision and the energy required for the roles here.

My start and end point is all about excellence and motivating my teams to share this vision and desire to deliver



across the board in a collaborative way. Delivering something special is about looking at it from different angles, not only from a business perspective but from a fan experience perspective and what their expectations are when coming to events at the Stadium. Having a sense of pride about what you're delivering is also key to a successful event day.

We undertook an ambitious winter refurbishment of the pitch at the end of 2014, which was a huge success, and set us up nicely for the commencement of the 2015 calendar at the start of March.

Working for The FA and Wembley Stadium means you are constantly in the media spotlight and as such we can never rest on our laurels and must always endeavour to be the best we can be.

How is the stadium evolving?

A theme that has run throughout my time here has been the evolution from a technology perspective for the Stadium. We've invested heavily in its development, which is key to remain a major player on the world stage. This could be from the hydraulic stage pocket, which allows us to effectively 'remove' a portion of the seats in the west end of the Stadium to allow for a stage build not to encroach onto the pitch, to the new score boards and level two LED ribbon (the longest continuous ribbon in Europe), which allows us to engage even more with fans on event day.

We also have the largest inbound LED screens on the front of the Stadium, which went in during the autumn of 2013. We have an excellent partnership with telecommunications company **EE** (signed in February 2014), and they have supported in the development of technology, improving connectivity and enhancing fan experience. A great example of this has been the Wembley connected by EE App, which gives fans event day content, travel information, offers and the chance of seat upgrades.

With the rise of handheld devices and social media, fans are looking for that little extra from venues. It enhances people's experiences and can improve our own efficiencies to provide that once-in-a-life-time moment and inspire memories during people's visit to the Stadium. Technology is at the forefront of stadium development and how we can wisely embrace it will be key in the coming years.

Elsewhere, we're always looking at how we can do things better, and the work we have done in attaining the ISO accreditations (140001, 180001, 90001 and 20121) really highlights what we're trying to achieve as a stadium. These are a real demonstration of our work to be recognised as the 'Best Stadium in the World'. The accreditations do not come easily and are independently audited over two different stages. It's changed for the better how we work – adding process, structure and consistency – and will ensure that we continue to evolve and get better.

What importance is placed on environmental, sustainability and corporate social responsibility (CSR) processes?

The work we do as a stadium on environmental and sustainable solutions is a cause that's very important to me personally and to my team. As a governing body and such an iconic Stadium known throughout the world, we should be at the forefront of CSR and the accreditations and awards we've received for our work in this area is testament to how seriously we take it; from our carbon footprint figures and record on recycling, to how we manage our utilities efficiently, ensuring we are being innovative in our approach to it.

We are in a position to make a very strong impact in the local and wider London community and I think it is right that we drive this forward and play a positive role in society. To highlight our commitment to the community, the Stadium gives 1% of its annual turnover each year to the Wembley National Stadium Trust, an independent body providing grants and bursaries to the local community and sporting initiatives.

You were recently appointed President of the newly-formed Association of Professional Venue Management (APVM). What role will it play in the sector?

In a different way to our community work, I do think it's also very important to share best-practice with other venues. When I was approached to be the President of the **APVM**, it was something that fitted nicely with our wider business objectives here at Wembley.

It's important that we can use the Wembley name and the integrity it brings to support the launch of APVM and that people can see there's strong credibility to the Association. Then it's up to the Association to use the opportunity it has to deliver outstanding content, be it from an educational perspective, peer-to-peer learning, venue tours, webinars, online training or connections to the best suppliers that are in the market place. One of our main desires is that the Association becomes a strong tool for all venue professionals across Europe.

It's great that we, as a stadium, are in a position to lead the way in excellence and inspire the next generation of talent, whilst continuing to develop and learn to continuously improve our own offering as a professional venue.

Finally, how is your role evolving role at Wembley Stadium?

The beauty of working at Wembley Stadium for The FA is that it's always slightly different; be it different teams, different music artists or even new events, like the Euro 2020 semi-finals and final. Each year provides a new set of challenges, new motivations and, most importantly, new things that allow our teams to be challenged and inspired to provide the best stadium experience in the world for event owners and their fans. ■



FIVE OF THE BEST

Katie McIntyre hears from a number of industry leaders on the top five initiatives and technologies that can be employed to increase both your venue's number of event days and its profitability.

With the vast majority of modern sports venues needing to be viable businesses in their own right, the sector has seen an explosion in the number of multiuse venues.

No longer do these mammoth facilities simply host the traditional one sport's team, rather they now host not only one or in some cases two tenant clubs, but also additional sports and non-sporting events, such as concerts, exhibitions, gala dinners and even weddings.

To assist these venues with increasing the number of event days and to therefore optimise the number of revenue generation avenues, a number of innovative initiatives and technologies can be employed. To follow are examples of five such leading products and solutions that can be utilised to increase a venue's bottom line:

PROTECT YOUR TURF

Stadiums all over the world look to maximise the amount of revenue generated from their venue year-round.

While you are able to see a return on investment (ROI) in season, what do you do when there are no games to be played? No sponsors to buy in? No spectators to watch the game? You turn to other uses for the venue such as:

- Concerts
- Festivals
- Graduations
- Tournaments

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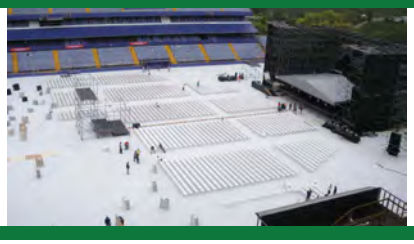
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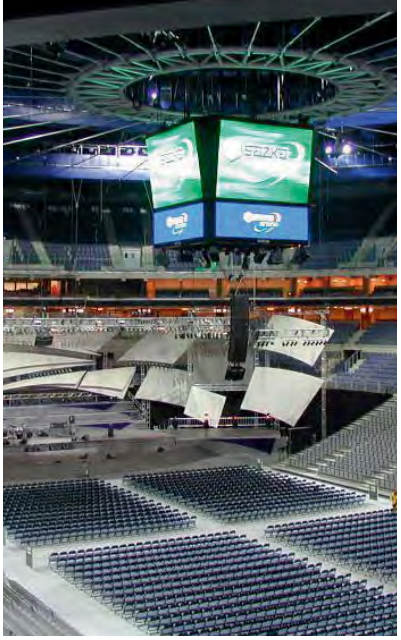


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POURING RIGHT



MCAT Automation describes their central beer distribution system and how its reliability, speed and efficiency is paying dividends at the 18,000-seat O2 Arena in Prague.

Venue managers and operators are constantly striving to reach their twin targets of enhancing the fan experience AND increasing revenue streams in an increasingly competitive marketplace.

Beer sales are a vital revenue generator, especially when typically 35% of the entire crowd can visit the concession areas during the half time break. It is therefore critical that a venue which has such a high demand in short periods has a highly reliable, fast and efficient system in place to maximise financial returns. Plus fan loyalty can be damaged if queue times are too high.

One company who has proved the performance, reliability and profitability of their system over ten years in the same Arena is **MCAT Automation** from the Czech Republic. In 2004, they developed a central beer distribution system (CBDS) for the 18,000-seat **O2 Arena** in Prague (formerly **Sazka Arena**). This was based on long-distance beer distribution pipes conveying beer from the storage tanks in the lower levels to all required locations throughout the venue.

Being hosts of the **Ice Hockey World Championships**, the Arena needed a highly seamless and efficient system, which supplied two types of beer to all restaurants and vendors in the venue, enabling them to sell large quantities of beer in a short period of time. Thanks to the unique technology of the CBDS, 1,660hl of beer was produced and delivered to the customers throughout the Championships; a volume that would have been impossible to distribute with the standard use of a KEG system.

DELIVERING CHEAPER BEER WITH HIGHER PROFITS

MCAT Automation's process control system offered a compelling challenge to more conventional KEG systems in a variety of ways. That included a much simpler beer expedition process from the brewery to the tank truck, which delivers cheaper beer that yields higher profits. Furthermore, the tank truck and pipe system in the Arena is much simpler and more efficient, eliminating the need for manpower, whilst also taking up far less room. The automatic control system comprising of control computers and fast flow beer dispensers ensures permanent high quality beer, which is served quickly to customers (even the tenth customer in line gets served within 1 minute). Combining the system with fast flow beer dispensers ensures that fewer staff are needed, again reducing costs.

ELIMINATING WASTAGE

Another key quality of the system is the elimination of wastage. At the end of an event, the remaining beer automatically flows back into the tanks to be used at the next event. Through careful monitoring, the beer can be even kept for up to three weeks.

Company CEO, Dr Jaroslav Stuna, explains that the additional advantage of the control system is that it also provides critical data to the venue managers: ***"It shows exactly how many beers were sold, at what time, and at which kiosk. This enables management to anticipate demand for upcoming events."***

The end result is a highly efficient system that continues to deliver an incredible 1,000 beers per minute. Furthermore, it only takes one staff member to operate and maintain the CBDS System.

NEW INNOVATIONS

Over the last ten years, MCAT has continued to enhance the system, including more efficient and cheaper new materials for the beverage distribution and technology, which further reduces beer wastage by enabling beer to be delivered to only selected parts of the Arena, perfect for smaller events. A special beer flow meter enables precise measurements, whilst Wi-Fi is used to save on cabling and installation costs, and enable real-time remote monitoring via PC, tablet and smart phone. ■

www.mcat.cz
www.2s2b.com





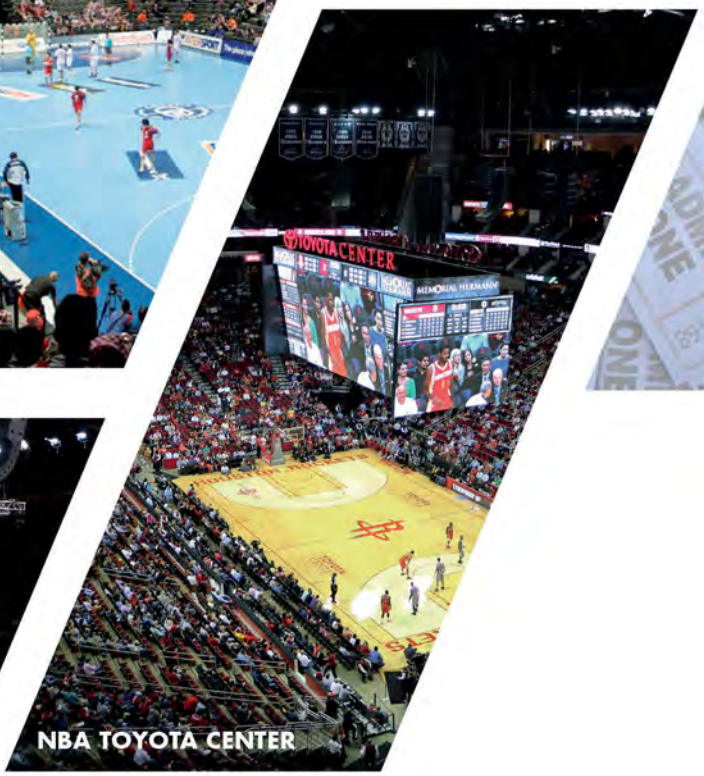


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REVOLUTIONARY SOFTWARE

Barclays Center's Bruce Ratner took a leap of faith on a new way to inspect his facility, revolutionising the way stadiums and arenas manage their buildings today.

Archaio shows how their venue management software is revolutionising the way stadiums and arenas manage their buildings today.

Archaio believes in a world in which safety and accountability should be the norm and not the exception. For those modern organisations who seek this, the Company developed a secure, mobile cloud-based solution. Now, with Archaio, venue managers and owners can run their properties more efficiently, reduce liability and increase workplace safety.

More than 40,000,000sqft and over 100 properties worldwide are inspected daily. Archaio enables real-time building inspections and reporting on any web-enabled device, including the **Apple** iPad.

Client feedback has been key in improving features, like extending floor plan digitising to include parking lots where the greatest number of liability issues and incidents arise for stadiums, or to simplify overseeing all aspects involved in cargo ships, where Archaio has drawn from one if its newest clients, **Atlantic Bulk Carriers**.

Every industry where the service is used, provides new requirements and features, but they all share the need to save time and money. These are obviously two important benefits, but another is even more critical, independent of whether it is used in a stadium or a cargo ship.

REVOLUTIONARY VENUE MANAGEMENT SOFTWARE

In late 2013, Bruce Ratner of the **Barclays Center** took a leap of faith on a new way to inspect his facility, revolutionising the way stadiums and arenas manage their buildings today.



Archaio enables real-time building inspections and reporting on any web-enabled device, including the Apple iPad.

Word spread of the delivery of increased safety, accountability and efficiency for facilities, and Archaio was honoured to sign **MetLife Stadium** as their next sports venue, closely followed by **Yankee Stadium** with their training facility in Tampa.

As the list of Archaio's clients has grown, and new features suggested by them have been included, it would seem that service would have become more and more complicated but, on the contrary, simplicity of use and implementation have remained key elements.

MetLife Stadium's Dave Duernberger confirms: ***"Minimal training is required. Doing pre-event cleaning inspections, I picked up an iPad and walked two other executives through it in less than five minutes. They took off with the iPad and never asked any questions."***

It is not often that a simple technological solution alters the way things are done in such a dramatic way, and how much value those changes can provide by preventing safety liabilities, increasing efficiencies and saving money. Facilities and venues that keep running on slow, inefficient and costly paper-based inspection processes will be left behind in today's competitive environment. ■

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MEASURING RETURN ON INVESTMENT

Ungerboeck Software (USI) highlights the five ways to measure Return on Investment (ROI) in your event management software.

If you run an event venue, you are more than familiar with the complexity of hosting events. Event management software helps venue pros gain the upper hand in the day-to-day battle for control, but it can be difficult to quantify the benefits.

To follow are the five key areas to explore for a true read on the ROI of your system:

Reducing redundant systems: One potential area of cost savings is replacing two or more systems with one comprehensive platform. Hard costs are easier to calculate. Look at subscription or license fees, ongoing maintenance or service agreements, training costs, etc. for each system. For those using software tools for different operational silos, there may be a clear savings with a broader platform that manage the work of multiple systems for less. In addition, take a look at the soft costs of managing multiple systems. How many hours (estimated) are spent managing multiple vendor relationships? Also, consider ongoing costs of training new employees on multiple systems versus one.

Reducing staff hours via automation: Sophisticated event management software can greatly reduce repetitive administrative tasks and reduce staff hours. Comprehensive systems can often save 3-10 hours per week, per user. This can mean lowering staff costs through attrition, reducing overtime hours, or creating additional time for more important tasks. Target staff positions where data has to be double-entered between systems – whether that is from customer files to operational service orders, re-keying of event info into online calendars or websites, or transferring information from operations to accounts receivable. Isolate common repetitive tasks in sales, administration, operations and finance to estimate savings. Figure 1-3 hours per week for roles with only minor double data-entry and 5-10 for positions manually entering or moving a lot of information.

Expense reduction from better reporting: One of the advantages of more robust, comprehensive platforms is the access and consolidation of event data. By having a single repository for data, detailed reports can be easily pulled without hunting for or having to cross-reference information. This can lead to operational insights that normally would go unnoticed. For example, you could discover that your venue never trends over a certain number of a particular inventory item, but you stock more. Insights like these are harder to predict, but can result in incremental costs savings over time.

Eliminating revenue 'leakage': Changes on-the-fly are part of running a venue. Event organisers often need additional or different equipment on the day of the event. And most of the time those changes are not captured in a systematic way that makes it to the final invoice. That is 'sold' business that never translates into actual revenue. With an event management system capable of capturing changes during an event as part of the billable record, clients typically get a 5-10% increase in overall revenues. Take an informal survey of staff or audit a recent event. Assume 3% potential up-side if leakage is a rare occurrence and 10% if it is relatively common.

Increasing sales revenues: Formal CRM systems are beginning to find favour with event venue sales teams. And while sales automation tools are clearly leading to an increase in revenues broadly, CRM systems that are custom-made for the events industry have even greater potential to drive sales increases. When calculating ROI from the addition of a CRM system, a rule of thumb is to expect an average return of USD$8.71 for every USD$1 spent (Nucleus Research, June 2014). ■



Philips ArenaVision LED lighting at Bourg en Bresse.
Credit: *Gregory Picout*

ENHANCED EXPERIENCE

www.lighting.philips.com

Philips highlights how their connected lighting provides a different experience for different types of events; all the time ensuring an enhanced fan experience.

Stadia and arenas are home to a broad spectrum of events. With connected lighting, the illumination inside and outside the venue can be adjusted according to the event or audience. Offering a high value, flexible way to energise players, athletes and artists, connected lighting enhances the viewing experience.

Philips *ArenaVision LED* floodlighting is an innovative LED pitch lighting concept that fulfils all contemporary and future field-of-play requirements, such as light level, uniformity, glare rating and HDTV super slow motion broadcasting. The flexible floodlighting – designed and optimised for TV coverage of football, rugby, American football and other sports events – will transform your venue into a truly multipurpose entertainment venue.

IMMERSIVE EXPERIENCE

The use of LED technology provides the opportunity for your arena to use lighting in a more creative way, for a completely immersive experience for spectators and players. The solution includes a dedicated user interface and a control system that allows quick, easy and reliable monitoring of the system. The ability to switch between optimal lighting configurations provides complete flexibility to switch on and off or dim each floodlight individually.

With this new lighting system it will be possible to create pre-set light scenes to provide specific conditions, such as dimmed energy saving levels for cleaning and maintenance purposes, as well as training level lighting.

SPECIAL LIGHTING EFFECTS

The Philips *ArenaVision LED* control system can also be used to create special entertainment lighting effects during a sports event, which would normally require dedicated stage lighting, providing the opportunity for the floodlights to be integrated into pre- and post-match light shows to help build the atmosphere and excitement in the stadium for a unique visitor experience. The instant on/off nature of LED lighting even allows for the creation of a simple blackout effect if required.

More than ever before, lighting can add value to your stadium. The main priority for professional sports venues has always been to ensure the correct light levels on the pitch, but with the arrival of the digital age, there is a great deal more on offer. The Philips *ArenaVision LED* floodlighting system bridges the worlds of entertainment lighting and to date static, high quality sports pitch lighting to deliver a memorable experience for visitors whether they are coming to watch a match or to hear their favourite bands perform during a music concert in the stadium.

REVENUE OPTIMISATION

The whole *ArenaVision LED* pitch lighting system can easily be integrated into the light show of a concert, making your venue more attractive and providing cost savings on rental equipment, and real ease-of-use for the event organiser. Next to that, safety and crowd management can be improved by using this flexible lighting installation to guide people in case of emergency or to exits after the event.

Clubs and venues will also benefit from maintenance savings due to the exceptional long life of the LED system. Typically, metal halide floodlighting lamps are replaced every three-seasons to maintain the lighting levels required. Whereas the Philips LED system is expected to last in excess of 10 seasons. ■

GLOBAL CONVENTION

Soccerex present details on their upcoming Global Convention, taking place in Manchester, UK, September 7-9.

www.soccerex.com

The world's premier football business event is returning to the capital of club football, 7-9 September. Following Manchester's highly successful inaugural hosting in 2014 this year's event promises to be bigger and better than ever.

Bringing together the industry's leading figures from across the globe, the **Soccerex Global Convention** will consist of a thought-provoking conference programme packed with business insight, alongside a market-leading international exhibition and an extensive variety of networking platforms.

Stadia and infrastructure issues, in particular, will be a major focus within this year's conference programme, presenting the perfect opportunity to learn about the planning, delivery and legacy behind the thirty-plus tournaments taking place over the next five years, including next year's **UEFA European Championship** in France, the **2018 FIFA World Cup™** in Russia and the **2022 FIFA World Cup™** in Qatar.

WORLD FOOTBALL ELITE

As ever, the Convention will play host to world football's elite, providing a platform for every confederation and local organising committee to showcase their individual tournaments, with dedicated exhibition space, tournament-specific workshops and round-table discussions on the different stages of tournament delivery.

Oordeoo have also been announced as event partners, becoming the Global Convention's Official Telecoms Partner, sponsoring one of the event's stadia workshops as well as giving a presentation at the event. Qatar-based Ooredoo will be playing an integral role in the **2022 FIFA World Cup™** and will be providing exclusive insight into their plans to provide a range of intelligent network solutions designed to deliver news and information to fans inside the tournament's stadiums and global TV audience.

The Telecoms giants will also be joined by San Jose Earthquakes President, Dave Kaval, in a headline session looking at how stadia technology will shape the future of the beautiful game. Kaval will be speaking about the club's brand new **Avaya Stadium**, which is the first cloud-enabled venue in the world and has been nominated as Venue of the Year alongside **Wembley**, the **Maracana** and **Camp Nou**.

LEAGUE GIANTS IN ATTENDANCE

As well as the demand from major event organisers, the ongoing requirement for clubs and national FAs to develop their stadiums will ensure the involvement of the football world's leading clubs and rights holders. The event has already received the backing from some of the biggest institutions in the game, including **La Liga** and **The Football League**, who have both signed up as institutional partners. The two league giants will have a significant presence at the Convention and will both be holding meetings for their respective commercial and marketing directors during the three days; guaranteeing all 20 Spanish clubs and 72 English league teams in attendance.

Mobile Media Content will also be leading a workshop on their virtual visualisation technologies being integrated across European football and will be presenting alongside senior representatives from Manchester City and Wembley Stadium.

The Convention's conference programme will be addressing a number of key areas within the industry, including ticketing, seating, in-stadium technologies, Wi-Fi systems, goal-line assistance, turf pitches and many more, and the event's exhibition floor presents an unparalleled opportunity for stadia suppliers to present their products to the football industry.

With over 2,500 of the industry's elite expected to attend, including key representatives from Europe's top clubs, federations, government officials, local organising committees, tournament organisers, stadia suppliers, sponsors, agencies, key industry media and many more, the Soccerex Global Convention is a must-attend event for stadia companies looking to develop business within the football world and announce their brand on a global stage. ■



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ESTO REPORTS

ESTO explains how they conducted a study to highlight the development of rugby and synthetic turf in France.

The development of new generation synthetic pitches is not something new in France; it has been going on since 2001. The country currently boasts about 1,800 synthetic pitches, which represents only 4% of all pitches in France.

Although the development of synthetic pitches is continuously on the rise in France, it has to be recognised that they are more expensive to build than grass pitches, although they require a lot less maintenance. Another advantage is that they offer longer hours of utilisation; as grass pitches are difficult to use when the ground is frozen or when they are waterlogged due to heavy rainfall periods. Moreover they also need 'resting time', which decreases even further the length of time during which they can be used.

Nowadays, the new generation of synthetic pitches offer the best solution in terms of cost and usage. The specifications of these new pitches are closer to natural grass in terms of flexibility, rotational friction and ball bounce, and sometimes even superior in the shock absorption and energy return. Also the technical specifications of these so-called synthetic turf pitches are such that it is less harmful for players when they fall, which reduces a lot of traumatic accidents.

With regard to the use of these synthetic pitches for sports such as rugby, **World Rugby** has developed the Rugby Turf Performance Specification to ensure that these new types of playing surfaces replicate the playing qualities of good quality natural grass, to provide a playing environment that will not increase the risk of injury to players and that they are of adequate durability (on the condition that they are well maintained).

MARKED IMPROVEMENT

Revised in 2011, 2012, and again in 2015, the Performance Specification is a rigorous test programme for synthetic turf that assesses the ball surface interaction, player surface interaction and durability of products, and has been modified to align the standard with that of the **FIFA Quality Concept for Football Turf** and ensure that there is continuous improvement as artificial turf develops.

Rugby Union was therefore very quick to adopt the new generation synthetic turf surfaces for the development of the game. World Rugby Regulation 22 was introduced in 2003 to ensure that 3G surfaces replicate the playing qualities of good quality natural grass. Any synthetic turf used for any form of competitive rugby (at all levels of the game) needs to comply both with Regulation 22 and the Rugby Turf Performance Specification.

The Organising Committee for the 2007 Rugby World Cup in France generated €33m for the **French Rugby Federation**. From this, €25m was used for the development of rugby and more importantly €5m was used for the development of synthetic pitches designated for rugby use only around the country.

Over the last six years, over 277 synthetic pitches have been installed in 29 countries. This exponential growth in synthetic turf pitches for use in rugby, has also coincided with a rise in the amount of dual use pitches for both rugby and football.

ABOUT ESTO

The **European Synthetic Turf Organisation (ESTO)** is an association formed to ensure quality turf and to provide information that can help clients and end-users find the most appropriate solutions in synthetic turf systems. As a non-profit organisation, ESTO offers neutral and unbiased information for the promotion of synthetic turf, enhancing its numerous advantages and benefits. The organisation is actively contributing to standardisation to improve test methodology and continuously strives for transparent and consistent harmonisation of the requirements for the large variety of sports performances. **www.theesto.com**

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CASE STUDIES

As previously stated, the use of synthetic pitches for rugby is not a new phenomenon in France; with most of the country's professional rugby clubs having access to a synthetic pitch for training at least, if not for matches.

ESTO used the following short case studies to examine how different rugby clubs from different levels (professional to amateur), and for different age groups, use these third generation synthetic pitches to develop the sport.

CASE STUDY 1: THE FRENCH NATIONAL RUGBY CENTRE (CNR)



Inaugurated in November 2002, the **CNR** is the biggest and most important training centre for rugby in France. It is not only host to the training and formation of the youth teams, but also the venue for all stages of preparation and recovery of male and female national teams.

Since 2011, the CNR is equipped with a covered third generation synthetic pitch, specifically designed for rugby and approved by the World Rugby guidelines. This is an example of putting into practice the new technology (3G synthetic pitches) at the highest level of French rugby. As a result, top French rugby players can practice safely and with the highest level of performance they need all year around. »

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CASE STUDY 2: ROUEN RUGBY CLUB



Rouen Rugby Club plays in Federal 2 (equivalent of 4th division) and has the ambition of joining the rugby elite within the next few years. To make this dream a reality, club President, Marc-Antoine Troletti, decided to invest approximately €2.5m to develop the infrastructure. His vision begins with the development of proper infrastructure. To achieve this, the club is renovating their stadium to include housing, a hotel, a supermarket, and also increasing its capacity. They will also install a synthetic turf pitch in the stadium.

The project should be complete by the end of 2016. By then, the President is confident that Rouen Rugby Club will be in the league above (Federal 1) and he believes that thanks to this project and also by recruiting intelligently within the next few years, the club will ascend to the French rugby elite.

CASE STUDY 3: RACING METRO 92



Racing Metro 92 is a French rugby club based in Paris, which plays in the Top 14 (highest division in France, also considered the best championship in the world). The club's Training Centre, approved by the Ministry of Youth and Sports and the French Rugby Federation, was created in 2007. After 7 years of hard work, it has just been recognised as the No.1 training centre for rugby in France, not only on sporting criteria but also academic achievement and quality of infrastructure.

In October 2012, the training centre for youth teams and for the first team was opened on new grounds in Plessis-Robinson. This included many new structures, such as offices, classrooms, weight room and a new housing building, but more importantly for the game and the players it offers both synthetic and natural fields.

Racing Metro 92 go even further in the use of technology. By the end of 2016, they will play their games in a brand new high tech stadium called Arena 92. Besides having a giant screen of 2400m^2 and a closed roof, **Arena 92** will have a synthetic pitch, which will make Racing Metro 92 the first club in France to play official games on a synthetic pitch.

For all remarks against the use of synthetic pitch in rugby, Club President, Jacky Lorenzetti stated: ***"For me, rugby isn't supposed to be a mud bath. These types of pitches (synthetic) are stable in all seasons, players get less injured and the game is quicker... The English rugby club, Saracens, mark twice as much tries since they have been playing on a synthetic pitch. On natural grass, you can play between 6 and 8 hours a week and it costs €150,000pa to maintain. On a synthetic pitch, you can play 24/7 and it costs €15,000pa to maintain."***

CASE STUDY 4: STADE RENNAIS RUGBY CLUB AND RENNES ETUDIANTS CLUB RUGBY (REC RUGBY)



At the beginning of 2012, a synthetic pitch was inaugurated for both these clubs. **Stade Rennais Rugby Club** uses the synthetic pitch for training when climatic conditions do not allow the use of grass pitches and the youth team of REC rugby use it for both training and matches. For all concerned, this new synthetic pitch is a breath of fresh air, especially when compared to the state of the grass pitch next to it, which is completely ruined by the cold weather and by the stamping of shoe studs.

REC rugby U16 play at the national level and are first of their group. They play all the matches on the synthetic pitch. Their coach Mael Le Galloudec stated: ***"The kids don't imagine the chance they have to play on this type of surface, they play in optimum conditions... In winter, it is difficult to train on grass pitches which can sometimes lower the performance of the team. On synthetic pitches, speed is a plus and the difference between the players is more pronounced. It advantages players who are more technical...synthetic turf corresponds perfectly to our philosophy of the game which is to play in movement."***



CONCLUSION

These case studies clearly show that synthetic pitches are an essential tool in the development of rugby in France. Clubs from all divisions and from all age groups already use or are looking at installing synthetic pitches. Not only does it allow the use of the pitch all year round, given its highly resistant quality, but it also maximises game performance and minimises player injury.

In addition, climatic conditions in many countries where the game is played, result in natural grass surfaces becoming badly worn and unsuitable for use in winter. In countries where the game is developing, these surfaces offer an ideal solution when climate or resources make good quality natural grass pitches difficult or impossible to achieve.

In the future, it is hoped that the development of multi-use artificial turf pitches, where rugby and association football can be played, will provide a potential solution to facility operators wishing to maximise the use of their facilities through community use and to those struggling with stadium microclimates that make the maintenance and growth of natural grass difficult. ■



“In 2015 UBER, the worlds largest taxi company owns no vehicles, FACEBOOK the world’s most popular media owner creates no content, ALIBABA the most valuable retailer has no inventory and AIRBNB the worlds largest accommodation providers owns no real estate.”

The European Turf Group the assembler, designer and installer of worlds biggest single artificial turf project in 2015 has no manufacturing facilities.





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NEW HYBRID TECHNOLOGY

www.sispitches.com

SIS Group introduces their groundbreaking hybrid technology, *SISGRASS*.

The cameras beam down on that perfect green rectangle, surrounded by thousands of expectant supporters. High in a gantry the TV sports commentators are waxing lyrically about the state of the pitch. The players will have no excuses, they warn. The ground staff have done an amazing job and ***"it's a carpet down there"***.

What the millions of TV viewers won't realise, is just how accurately that description reflects the 21st century playing surface. Most people, for instance, would be shocked to learn that many of the English Premier League (EPL) football teams are, actually, playing on a 'carpet'. Indeed, EPL clubs are moving en masse towards the very latest technology in flawless grass surfaces, which incorporate high-tech synthetic yarns that are literally woven into the ground, to merge with natural grass. The result is a perfect, smooth, hard-wearing 'hybrid surface' that is essential to both players and grounds staff in sport today.

NEW HYBRID TECHNOLOGY

At the spearhead of this new hybrid technology is **SIS Group**, a company with a glamorous client roster that includes Real Madrid, Barcelona, Chelsea, Manchester City and United, Galatasaray, Spartak Moscow, FC Porto and a host of others.

SISGRASS is the name of the latest SIS Group product and provides a powerful solution to a global market chasing superb, performance-optimised, damage-resistant, pitches with easy maintenance.

The company is coy over the groundbreaking technological developments required to create *SISGRASS*. Its unique, patented installation equipment is shrouded from prying eyes, as it advances across immaculately prepared grounds, hooked into a GPS satellite to ensure laser-like accuracy.

The *SISGRASS* injector vehicle effectively adds a reinforced 'weave' of synthetic grass. Typically, the surface is first seeded and only when the first green shoots emerge is the yarn then mechanically injected alongside it. Alternatively, under ideal conditions, *SISGRASS* can be added to an existing grass pitch.

UP TO 3X MORE PLAYING HOURS THAN NATURAL GRASS

On the average pitch, a staggering 240 million monofilament fibres are painstakingly added and snipped to a precise length. As the seeded grass continues to develop, it combines with the strong yarn. The result is so perfect that most people fail to spot the reinforced turf system, which increases pitch stability and delivers up to three times more playing hours as natural grass.

The polyethylene yarns used by SIS feature subtly-coloured strands of varying tone and thickness, creating a pitch that is still 95% natural but marries the best elements of both synthetic and natural surfaces.

SISGRASS UK Projects Director, Phil Blackwell, advised: ***"What our new equipment offers is a unique range of stitch lengths, so with SISGRASS you get a pitch built to your exact specifications, not a surface compromised by the limitations of outdated machinery."***

SISGRASS technology ensures the fastest installation time on the market too, as Blackwell confirmed: ***"Basically, we can lay a pitch with one machine in ten days. We are getting close to our aim of building able to lay a hybrid pitch within a week. We are confident nobody else can do that."***

NO EXTRA MAINTENANCE REQUIRED

Under pressure ground staff, as well as players, are discovering the benefits of *SISGRASS*. With many sports clubs demanding additional revenue streams through non-sport use such as concerts, a synthetic surface can stand up to the battering from thousands of feet and is quickly rehabbed after. The pitch requires no extra maintenance compared with natural grass – both need mowing, watering and fertilising.

Typically, a loop of yarn is inserted into the ground to a depth of 18cm, with 2cm showing above ground. The grass is allowed to grow around it and will usually be mowed when it reaches 2.5cm in length. Installation is critical, as only the correct sub-surface and yarn injection will allow the synthetic yarn to anchor the natural grass roots and create a uniform surface that facilitates optimum running conditions, ball performance, durability and resilience, as Blackwell – a former Ipswich Town FC groundsman – advised: ***"That's what our machinery allows us to do."*** He also advised that rival hybrids can take three times as long to install.

Other sports, such as rugby and Gaelic football, require different lengths of grass due to safety and wear compromises but the hybrid surfaces are even finding their way into these fields.

HIGH-PROFILE INSTALLATIONS

SISGRASS has recently been installed at Chelsea FC and Hull City FC training grounds, as well as at the prestigious St George's Park; National Football Centre and home of English Football.

Annually, SIS Group produces more than 600,000sqm of pristine artificial grass – custom designed for a staggering array of sports, schools, public spaces and residential gardens. Much of it is a product of the clattering looms and spinning bobbins on the SIS tufting shop floor at its base in Maryport, Cumbria, which have provided critical jobs in a cash-strapped region for years. Those surfaces have been installed at more than 120 stadiums across the world, from the freezing Russian hinterlands to the sweltering heat of Dubai. ■

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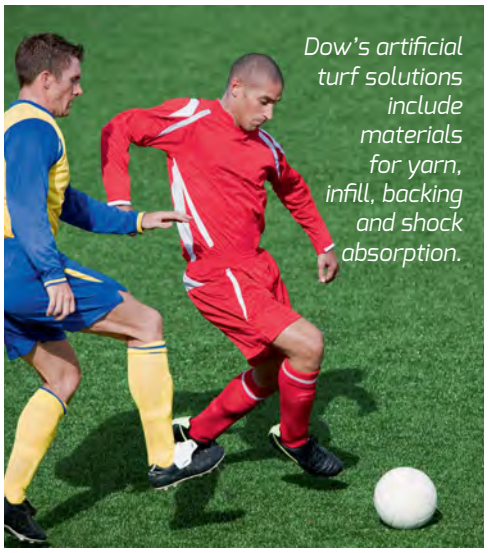
ESTO
European Synthetic Turf Organisation

COLLABORATION IS KEY

Dow explains how collaboration is key to ensure innovation in artificial turf systems.

In today's ever-evolving artificial turf market, manufacturers must meet stringent industry demands, particularly the drive for high performance sustainable solutions tailored for long-term durability.

FIFA, for instance, acknowledges the potential of artificial turf for the development of soccer. However, ***"only artificial playing surfaces that have been tested in the laboratory and on the field according to the stringent testing criteria of the FIFA Quality Program can be used for official competitions,"*** observed David Lopez, Technical Service Engineer at **Dow**. ***"This means that those systems fulfil the quality requirements necessary for football in terms of playing performance, safety, durability and quality assurance."***



Dow's artificial turf solutions include materials for yarn, infill, backing and shock absorption.

Advances in technology have revolutionised the quality, safety and play performance of pitches, with third-generation systems making artificial turf surfaces a reality for a variety of sports like soccer, field hockey and rugby. These third-generation surfaces are by far more player-friendly. Whether we're talking about surface hardness, or traction, their performance is much closer to natural grass. Some products have achieved 100,000+ cycles on the Lisport test, which measures wear to synthetic surfaces caused by soccer boots. This score is significantly higher than the 20,200 cycle requirements for FIFA 1 Star surfaces.

NEXT LEVEL SPORTS SURFACES

Today, the industry is embarking in the early development cycle of fourth-generation artificial turf systems. Responding to increasing demands for enhanced sustainability and higher performance standards, this new generation system will bring even softer and stronger fibres, new infill and non-infill systems, and more efficient and recyclable backing solutions.

These new generation pitches consist of as many as six layers and getting these different elements working in perfect synergy is a highly complex process, with many variables to be considered, but one **The Dow Chemical Company (Dow)** believes it can help accomplish thanks to its unique market position, capabilities and collaborative development approach.

DREAMS BECOME REALITY

Working closely with customers, Dow harnesses its R&D and technical capabilities to produce innovative solutions, which benefit the entire value chain – including developing octene-based *DOWLEX™* polyethylene resins for softer yet durable yarns, and *ENFORCER™ Sport*, an improved polyurethane-based elastomer-backing, that's lighter than current solutions, more efficient for installers and locks the whole system together to enhance pitch durability and players' experience.

In close collaboration with customers, Dow is also developing *ENFORCER™ Sport* polyurethane-based adhesives for improved adhesion of the turf during installation. Combined with the polyurethane backing, these adhesives generate an excellent joint bond improving the durability of the pitch.

"Dow's broad technology portfolio is carefully calibrated to work together and helps to create artificial turf surfaces that allow players and athletes to excel, offers excellent protection from motion-related injuries and demonstrates great durability and resilience," said Lopez. ***"With strong performance characteristics, Dow's artificial turf technology is at the centre of some of the most effective and highest performing systems on the market."***

Pursuing a collaborative development approach, Dow enables value chain partners to custom-design turf surfaces to meet specific professional sport requirements. Dow's 'Pack Studios' and innovation centres provide partners a unique collaborative capability and an exclusive opportunity to leverage Dow's expertise, product portfolio, application testing capabilities and access to a global network of experts to accelerate innovation.

Whether you require playing surfaces for soccer, golf, rugby, hockey, school sports fields or community recreation grounds, Dow's dedicated team of experts will work with you in designing your next sport surface that performs better for longer. ■

www.dow.com/artificialturfsolutions

BRINGING INNOVATION TO RIO 2016

Dow was recently involved in a successful multi-party collaboration with **Polytan STI**, a leading global manufacturer and sports surfaces supplier, in the development of a high-performance artificial turf system, which was selected by the International Hockey Federation for the hockey competition at the **Rio 2016 Olympic Games**.

Building on a successful partnership during the **London 2012 Olympic Games**, the innovative pitch is based on Dow's polyethylene and polyurethane technologies to create a high-performing, faster and more reliable surface tailored for optimal performance of the world's best hockey players vying for gold in Rio.



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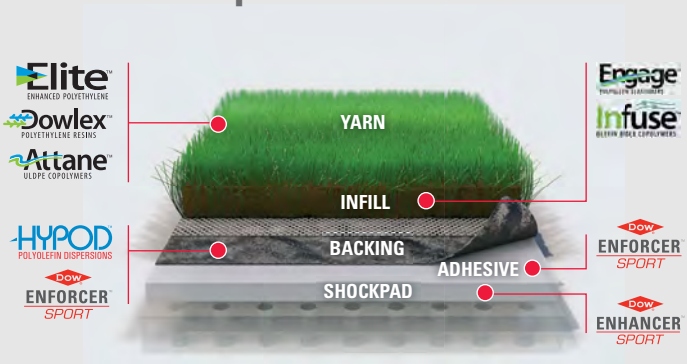


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EXPANDING INTO ASIA PACIFIC

Trocellen explains how their ProGame shock pads are expanding into Asia Pacific.

The shock pad market started almost 30 years ago, with just standard and plain foam. However, as a way to meet increasing consumer quality demands, **Trocellen** introduced the XC shock pad to the market some 10 years ago. This was produced in their manufacturing facility in Troisdorf, Germany, under the ProGame brand.

The ProGame system has evolved through years of cooperation with pioneers from the synthetic turf industry to maximise safety and comfort. The layer system is lightweight, easy and fast to install, and meets the requirements of the international standards in various sports.

Initial sales focused mainly on the European market, but this has recently expanded globally to reflect the boom in sports venue development. A good example of this is the **Astro Corporation** from Japan. With the aim to develop further the SEA and Oceania market, **Trocellen Group** decided to invest in the same technology in Malaysia, to enable them to be able to locally supply a shock pad solution to the region.

With over 60 major sports venue projects planned for the region in the next eight years, there is an increased recognition that having the correct shock pad system is critical in ensuring a high quality playing surface, especially in countries which experience climate extremes and high humidity.

SHORTER LEAD TIMES

Since 2013, the Malaysia plant has been able to replicate the shock pad produced in Germany to the same specification, thanks to the fact that exactly the same components are used. This gives a big advantage and reassures customers that whichever factory they purchase the shock pad from, they will always get the same material and performance. Another key advantage is the shorter lead time, which is a critical factor in the installation of the pitches.

Astro Corporation now has the opportunity to buy the XC shock pad either from Germany or from Malaysia, without the need to re-test systems already in place, whilst still keeping the 'dimple' foam supply from Germany. Dimple foam is a special product used with in-situ technology, aimed to reduce the quantity of granulate and PU binder and improving the results for vertical deformation and energy restitution in the total system.

Astro Corporation have successfully used the ProGame shock pad for many prestigious projects, including **Hokuriku University Football Field** and **Keio University Football Field**. They have other high profile projects currently in the pipeline.

Trocellen Malaysia is now targeting the SEA, Oceania and India as new markets to develop further the global sales of the ProGame shock pad, with the technical support of their colleagues in Germany. ■





You can contact Catherine Tiew for details on Malaysian production at: **progame@trocellen.com.my** or Luca Girelli for the German production at: **lgirelli@trocellen.com**

www.trocellen.com

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TROCELLEN AT STADIA & ARENA ASIA PACIFIC

Visitors to this year's **Stadia & Arena Asia Pacific** event at the **Singapore Sports Hub** (**September 28-30**), will have the opportunity to meet with representatives from **Trocellen's** Malaysian office who will be exhibiting at the event (**Stand C02**).

PITCH MANAGEMENT

In this special roundtable-style feature, a number of industry experts provide their insights regarding the key factors and considerations when following a Pitch Management Programme.



MLR's special lighting rig solution made for a tennis court; seen here in use at Wimbledon's Centre Court.

In this special roundtable-style feature, the following industry experts share their thoughts on the key factors and considerations to bear in mind when following a Pitch Management Programme: Tobias Owegeser (**TO**), CEO, **SMG Sportplatzmaschinenbau GmbH** (**SMG**); Piet Tytgat (**PT**), International Business Manager Sports & Flooring, **Recticel Flexible Foams**; and Kolbjørn Sæther (**KS**), Founder & CEO, **Mobile Lighting Rig AS** (**MLR**).

What are the key factors and considerations when following a Pitch Management Programme?

KS: When it comes to the key factors of a Pitch Management Programme for natural turf, all factors related to natural turf must be considered, including:

- **Selection of grass species** for the turf based on climatic conditions, soil type and requirements wear and use.
- **Optimum fertilisation and irrigation**. In addition to sound groundsman knowledge and practice, it is advised to analyse the soil condition by monitoring temperature, moisture and nutrition. Having good drainage is important for the result.
- It does not help with fertilisation and irrigation without **temperature and light**. Modern stadia have insufficient lighting for grass growth for large parts of the pitch due to shade from the large stands. Supplemental lighting is therefore required, in many cases also under-soil heating.
- **Use of supplemental lighting**. Cold and warm season grass species require different levels of light intensity and amounts of light over a time period. The 'grow lights' also enable grass growth in winter, provided the temperature is not too low. The area to be covered with lighting rigs and the lighting level are decided based on climatic conditions, grass species and the time available for lighting treatment. »

SMG recommends the use of advanced equipment that combines brushing action with levelling of the infill, and also provides a sieve for the collection of debris.



TO: Publications of various international studies have revealed that a maintenance-free pitch is nothing but wishful thinking. Regular maintenance of synthetic turf is important to maintain aesthetics and safety, playing performance and longevity of the surfaces. The industry has agreed on these main criteria: Brushing the surface; levelling the infill material; and keeping the surface clean, which means regularly removing leaves, grass and other natural debris before they decay and become a breeding ground for moss, algae and weeds.

Adequate maintenance management also includes a visual inspection of inlaid seams and line markings.

Only these methods allow artificial grass to retain characteristics comparable with natural grass and have proven to protect the investment into sporting fields.

How does the quality of the pitch contribute to better and more attractive play?

KS: I have heard many times managers and coaches complaining about the quality of the turf (especially after they have lost). When I tried to Google it for reference I only managed to find articles about artificial turf, and comparing it with natural turf etc. But looking at it from the angle of natural turf, if must be obvious that quality turf affects play positively.

TO: Playing activities and training flattens the synthetic fibres and makes the filling material uneven. This leads to a deterioration of the attributes of the artificial turf, and thus its playability. However, it depends on a flat and stable surface with low friction values in order to ensure an appropriate ball roll and ball rebound.

How can a pitch lighting rig system contribute to maintaining a high quality pitch?

KS: Any stadium pitch suffering from shaded areas will need supplemental lighting to promote grass growth. Light is the most important factor in the photosynthesis process, and with sufficient light strength (photon density) and amount of light (light integral) over time, together with temperature, water and nutrition, it will enable growing and maintaining a quality turf.

With sufficient light, the roots will be much longer and stronger, and the leaves will be thicker and healthier, thereby allowing more games to be played and becoming more wear tolerant.

Grass grown under such conditions will also prepare the grass for the harsh winter conditions, making it easier to maintain a high turf quality also in that period of the year.

Does a quality pitch lead to a reduction in the number and type of injuries? If so, please expand on this?

KS: Bad natural vs good natural; it is obvious that a good pitch is likely to reduce the number of injuries.

PT: It is surely true that we should aim for high quality pitches in order to keep the number and type of possible injuries at the lowest possible level. This idea of 'quality' plays out on two levels. First, there is a need to build pitches with a repeatable level of performance; the difference between two pitches needs to be kept within a narrow a limit as possible. Next to that, the level of quality needs to be kept as high as possible during the lifetime of the pitch.

A re-bounce shock pad is a pre-manufactured high density foam pad. Manufacturing it in a controlled environment and making it easy to

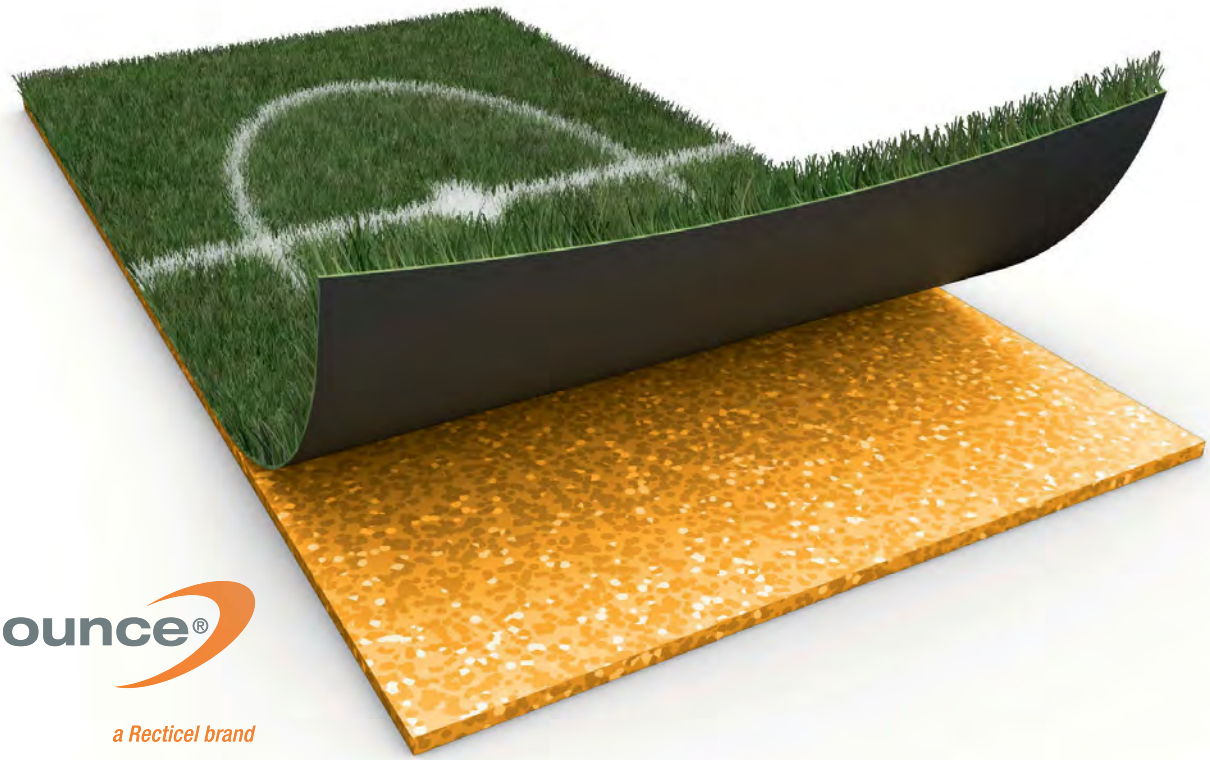




Recticel's re-bounce shock pads are high density pads that resist against severe dynamic and static durability tests. They are made of recycled material, produced with the lowest possible energy needed. The pads are very easy and safe to install.

PROTECTING

RECTICEL
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Shock pads tailored for player performance, comfort and safety

re-**bounce**® shock pads are specially tailored for different sports and always easy to install. Our specially designed high density foams guarantee each shock pad will last over the lifespan of several artificial turf carpets. Sport-functional properties are consistent over the whole pitch with efficient heating, if there is field heating, cooling in warm climates and perfect drainage.

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Ibrox Stadium: Three units of MLR's type s100 lighting rig.

install, results in a very high level of repeatability of performance between installations. The high density of the pad warranties a very durable performance in use over the lifetime of the pitch.

TO: There is no clear evidence that actually more injuries occur on artificial turf. The criticism probably is more related to older pitches, because the construction of modern, artificial playing surfaces comes very close to the natural conditions.

According to **Wolfgang Potthast**, from the **German Sport University Cologne**, when it comes to **FIFA-Certified**, the difference in modern flooring between a new artificial turf pitch and a real grass field is very small.

Professor Jay H. Williams, Ph.D. (Blacksburg, USA), has conducted eight studies using data from nearly 1.5 million hours of play that included nearly 10,000 injuries. He reported that slightly less than two-thirds of the time had been played or trained on natural grass, where 75% of the injuries had occurred. After all of the injuries were analysed, it was found that the risk of injury on artificial turf was 10-14% lower than on natural grass.

In my opinion, we should continue to work on the certification criteria on and improve those further on.

What role do shock pads play in artificial turf systems and how can they improve a field's durability and performance?

PT: A re-bounce shock pad is developed to bring a part of the performance, which was supplied by the infill, under the carpet. This results in a system with a lower fibre height, less infill and a shock pad. By doing this, a more robust system is obtained, which will be more durable in its performance.

The re-bounce portfolio foresees a solution for the different performance criteria needed for different sports and by changing some parameters in the pad new criteria can be fulfilled. A re-bounce shock pad is a high density pad that resists against severe dynamic and static durability tests. This guarantees a continuous performance even in cases where maintenance was not done properly.

Next to that, additional properties are added to the system like, for example, the cooling of the pitch by buffering water into the shock pad.

TO: Shock pads have the advantage that they give the artificial turf system a sufficient elasticity even in the substructure and thus less-filled synthetic turf floor height is necessary.

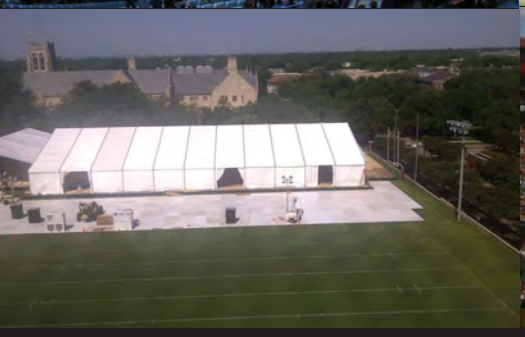
The 'filling' of artificial grass with sand and rubber granules, for example with 40mm instead of 60mm floor height, can be implemented more easily, since a 40mm fibre stands easier than a 60mm fibre. The quality in terms of evenness of the infilling material can therefore be implemented more easily. In addition, at least in-situ shock pads assume a levelling function during the installation process with paving machines. The foundation for the artificial turf is therefore already more even than without the shock pad.

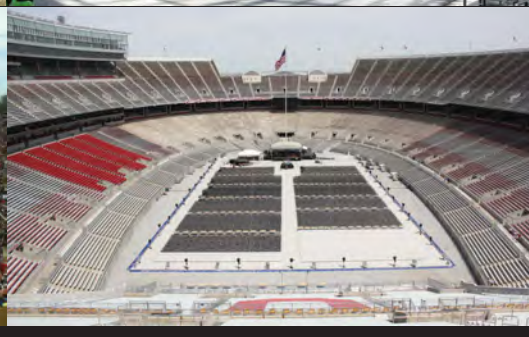
How important is Sustainability and Recycling?

PT: This should be one of the major concerns of everyone in the industry. The **Recticel** re-bounce shock pads are

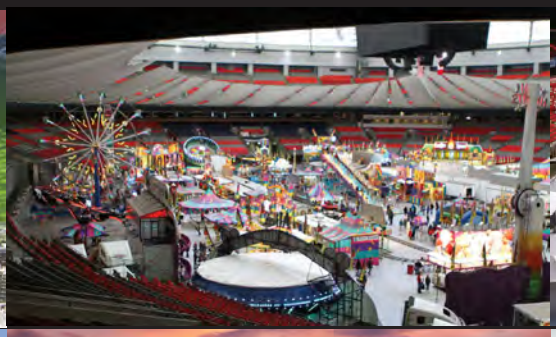




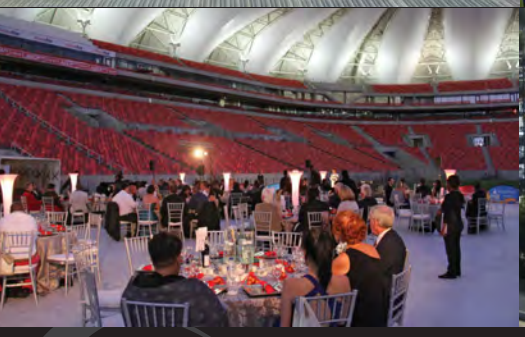




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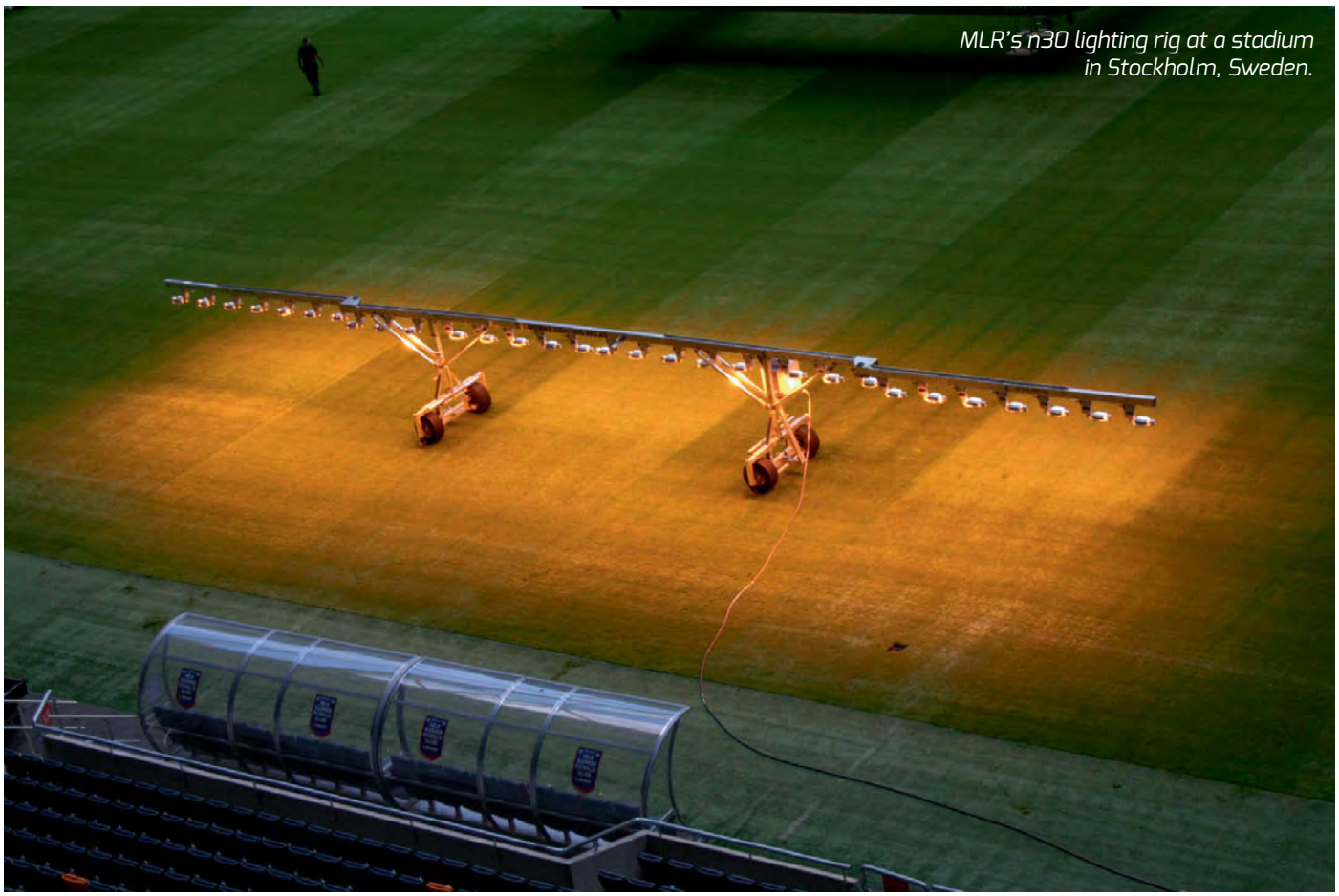




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MLR's n30 lighting rig at a stadium in Stockholm, Sweden.

made of recycled material, produced with the lowest possible energy needed and this in a safe environment for the workers. The pad is very easy and safe to install. There is no negative interference with the environment and the pad lasts for a long time. Once it has reached the end of its life, it can easily be removed in order to go for recycling to start a new life. A re-bounce shock pad helps people to be healthy without endangering our planet.

TO: Worldwide, millions of artificial grass surfaces are laid, which have to be removed and discarded sooner or later. The reuse of components such as sand, rubber or even the lawn (completely or partially) plays an important role.

How important is regular and correct maintenance?

TO: SMG argues that a lack of maintenance reduces the longevity of a synthetic sporting facility. The company also makes a difference between 'regular' and 'advanced' maintenance.

In contrast to simple 'drag' brushes, SMG recommends the use of advanced equipment that combines brushing action with levelling of the infill, and also provides a sieve for the collection of debris. These units have the advantage that debris is not brushed into the system but rather collected.

Correct field cleaning – also called 'deep cleaning' – has to be executed by special equipment capable of removing a proportion of the infill materials, cleaning them, sucking the dust out and bringing the infilling material back to the surface.

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SMG AT STADIA & ARENA 2015

SMG will be running a site tour and practical workshop on artificial turf maintenance during our **Stadia & Arena Asia Pacific** event.

For further information, check out the conference program online at: **www.saevents.uk.com**

How do you keep abreast of all the latest developments and best-practices?

TO: SMG is operating in more than 75 countries and in constant contact with customers. Their feedback is an essential factor for the daily work and also for new developments, accompanied by the daily presence and ongoing installations on jobsites worldwide. Of course, SMG's worldwide trade show activities and attendance at congresses and conferences is a significant part of the learning culture in the company. ■



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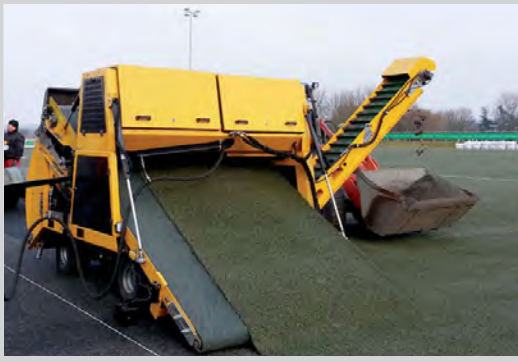


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GOING GREEN

Katie McIntyre interviews Justin J. Zeulner, Chief Operating Officer and founding Board Member of the Green Sports Alliance, to get his insights on the 'greening' of the sports venues sector.

GREEN SPORTS ALLIANCE

With nearly 300 sports teams and venues from twenty different sports leagues and fourteen countries as Green Sports Alliance members, what have you identified as being the main 'hot topics' in terms of sustainability and sports venues?

To clarify, the **Green Sports Alliance (GSA)** now has over 300 teams, leagues, venues and events on board. We publicly launched in 2011 with a handful of teams from the Pacific Northwest and have realised tremendous growth, in less than five years.

The GSA focuses on engaging the sports industry in the following topic areas:

- Practices that drive zero net emissions, energy efficiency and renewables
- Advancing recycling and composting practices
- Water conservation
- Transportation
- Greener cleaning products and practices
- Ecologically smarter products and procurement practices
- Healthier food

Not only do we mobilise and advance these initiatives with our teams, leagues, venues and events, we are working with the supply-chain of the sports industry (a USD$1.3tn/year industry globally) to engage the private sector to further connect what we collectively can do together to promote ecologically smarter products and services. Additionally, we are advancing fan engagement campaigns and mobilising athletes to advance the greening of sports movement.

Utilising the platform of sports to advance environmental stewardship is the most influential and effective way to reach hundreds of millions, if not billions of people.

ABOUT JUSTIN J. ZEULNER

Justin J. Zeulner, Chief Operating Officer and founding Board Member of the Green Sports Alliance (GSA), is a foremost leader in the movement to 'green' professional sports worldwide. Zeulner has guided the GSA in reaching critical mass and major influence within the sports industry by leading professional teams, venues, colleges and leagues across the nation, leveraging the cultural and market influence of sports to promote healthy, sustainable communities where we live and play. Prior to joining the Green Sports Alliance, Zeulner was a Senior Project Developer at **Vulcan, Inc.**, the investment and innovation company founded by Paul G. Allen. Zeulner also formerly served as Senior Director of Sustainability and Public Affairs for the **Portland Trail Blazers** from 1999 to 2014. In this position, Zeulner established the first known scope III carbon footprint assessment in professional sports, and implemented a corporate sustainability charter and progressive environmental policies on behalf of the organisation. Additionally, Zeulner led several environmental campaigns, in addition to developing and patenting the GreenDrop Recycling Stations to help achieve landfill diversion goals and activate fan engagement. These stations are now used by sports teams, venues, and colleges across the U.S.

The Golden 1 Center, the future home of the Sacramento Kings, is set to open autumn/fall of 2016. They plan to leverage energy efficiency strategies that range from the use of LED fixtures to installing sustainable photovoltaic (PV) solar systems on the ESC's roof.



How has the industry evolved over the last decade in terms of recognising the need for more 'green' initiatives, design etc.?

The sports industry is undergoing a cultural shift where sustainability and environmental stewardship are becoming a priority. The evolution has advanced from being "the right thing to do" to an "obligation".

In sports venues across the world today, you can now find examples of green initiatives, including solar arrays, on-site edible gardens, successful zero waste initiatives and healthier, locally sourced food options at concessions stands. A decade ago, the idea of "greening" was barely on the radar of the sports industry – now, it is rapidly becoming an imperative at every level of this industry.

What role does the GSA play in informing the sector on the best-practices and solutions to employ?

The GSA is the most influential environmental non-profit advising teams, leagues, venues and events in advancing ecological goals, and plays the primary role in collecting, producing and disseminating the most up-to-date information on better practices in the development and implementation

of greener initiatives within the sports industry.

The GSA uses a variety of approaches to inform the industry, including an annual conference, newsletters, webinars, published reports, facilitated networking and direct advising. In June, for example, the Alliance published and released Champions of Game Day Food, a first-of-its-kind report that documents the growing trend of influential sports industry concessionaires and iconic professional teams and venues embracing greener (and healthier) food service programs.

What are the key environmental and financial benefits that a sports venue can benefit from by converting to LED lighting?

LED lighting is far more efficient than traditional sports lighting – converting to LED field/court/rink lighting may cut energy consumption per event by as much as 50-60%. LED lighting is also quite effective for concourses, parking garages, exterior lighting, suites, and back of house areas. The reductions in energy consumption directly and significantly reduce utility costs and environmental footprints. There are also financial savings that result from reduced labour and maintenance costs, as the lifespan of LED lights is exponentially longer than the available alternatives.

What are the latest trends in LED lighting for the sports venue sector?

Sports venues started installing LEDs in parking garages and concourses, but the major trend currently is with LED performance lighting. Several venues in the NBA, MLB and NHL are now using LEDs to illuminate the actual fields/courts/rinks, with fantastic results to date. The technology is still improving, but it has already proven to meet or exceed all performance standards imposed by leagues and broadcasters, and it has other advantages including instant on/off capability, a larger spectrum of colours, the ability to enhance the fan experience and significantly reduced heat from lights.

The GSA is currently developing a guide to LED lighting in sports venues, in collaboration with several sports leagues. This publication will provide the sports industry with the latest information on successful installation of LED lighting. The goal of this resource is to encourage teams and venue operators to explore LED options through sharing better practices.

Champions of Game Day Food provides a detailed summary of some of the more successful game day food greening programs at professional sports venues across North America.



How best can sports venues engage with their fans when it comes to sustainability?

Sports venues can engage fans by implementing visible sustainability initiatives where fans can interact directly with practices such as recycling, composting, water conservation and getting to/from events. Using existing outreach platforms, such as social media, signage, video screens, etc., at sports venues is an excellent way to connect fans to new and existing sustainability efforts. Indeed, installing waterless and low-flow fixtures at our venues is a smarter ecological practice, conserves resources and reduces operating costs. However, the potential impact to reach the millions of fans that interact with these fixtures with environmentally focused messaging and fan engagement, has greater impacts.

What evolutions do you think we can expect to witness in terms of sports venue and sustainability in the next ten years?

We are already witnessing a 'race to the top' in terms of new sports venue development, with each vying to be the 'greenest' yet, and as such sustainability is ingrained from the start in stadia operation. Net zero emission buildings will become commonplace, with rapid support and inclusion of renewable energy projects, as well as ultra-efficient building performance. As mentioned prior, LED lighting is experiencing rapid growth and that is expected to continue.

ABOUT THE GREEN SPORTS ALLIANCE (GSA)

Since February 2010, the GSA has brought together venue operators, sports team executives and environmental scientists to exchange information about better practices and develop solutions to their environmental challenges that are cost-competitive and innovative. The information gathered from this collaboration is available to Alliance members in order that they gain a better understanding of how sporting events can be performed in an environmentally sensitive manner. The Green Sports Alliance was conceived and founded by Paul G. Allen's **Vulcan Inc.** and the **Natural Resources Defense Council**. Inaugural members and partners of the Alliance include the **Seattle Seahawks**, **Portland Trail Blazers**, **Seattle Sounders FC**, Seattle Mariners, Seattle Storm, **Vancouver Canucks**, the **Bonneville Environmental Foundation**, **Green Building Services** and **Milepost Consulting**.

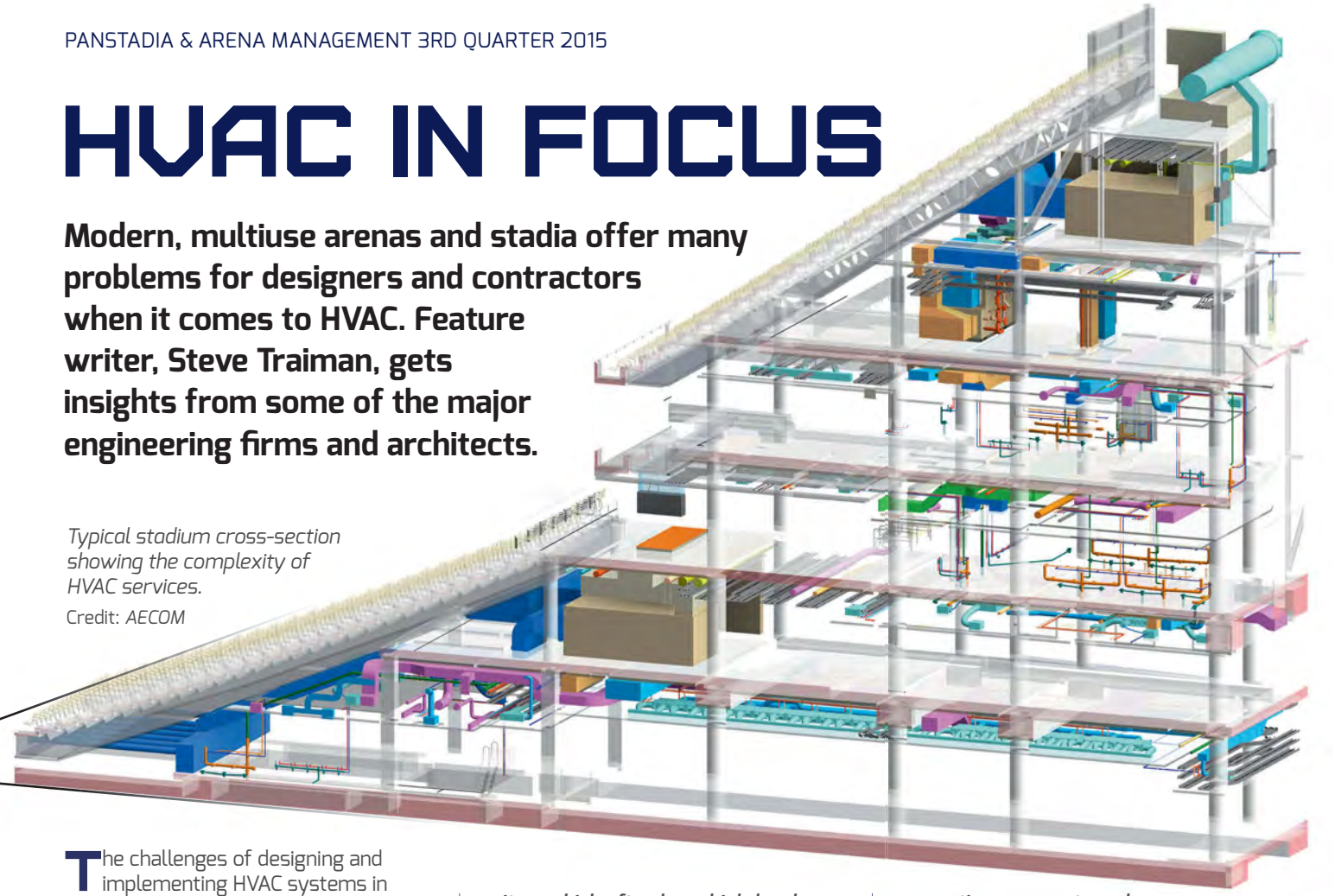
As the general populace becomes more interested in healthy eating and local sourcing, food systems are also quickly improving. In ten years, NOT having a recycling program will be almost unheard of. Sponsorship of sustainability initiatives has increased and will grow significantly over the next several years.

Is enough being done by the sector – i.e. venues, leagues, federations, associations – to tackle the sustainability issue? If not, how can things be improved?

While a number of sports venues, leagues and teams are doing what they can to tackle environmental stewardship and develop better practices, we have more opportunities to explore. Support, promotion and implementation of the program work and initiatives that the GSA focuses on should remain the primary focus to further the greening of sports movement. Our industry has just initiated the journey towards tapping into the cultural and market influence of sports to help educate and inspire and promote healthy, sustainable communities where we live and play. ■

HVAC IN FOCUS

Modern, multiuse arenas and stadia offer many problems for designers and contractors when it comes to HVAC. Feature writer, Steve Traiman, gets insights from some of the major engineering firms and architects.



Typical stadium cross-section showing the complexity of HVAC services.
Credit: *AECOM*

The challenges of designing and implementing HVAC systems in stadia and arenas are wide-ranging and require specialist contractors, with their technical know-how. To 'lift the lid' on the subject, we have gained insights from a number of major engineering firms and sports architects to assist you with your next HVAC project.

In terms of identifying some of the key challenges, **ME Engineers'** Principal and CEO, Michael Hart, advised: ***"Sporting venues present many unique challenges in HVAC design. Unique and highly aesthetic architectural and structural systems mean we have to work creatively with the architects and structural engineers to design and distribute our systems, sometimes driving our very system selections... complex operations that require tremendous system flexibility... to adapt design concepts to extreme climates... and, most certainly, by limited budgets and very tight construction schedules, which require quick decision-making and synergistic analysis."***

Principal, Jeff Sawarynski, added: ***"Some of the more challenging experiences I've faced are related to humidity control (or lack thereof) in open-air stadiums. We have to help owners, architects and contractors understand it may be impossible to control humidity in interior spaces with operable windows and transient populations – like club lounges and suites, which often have high-level finishes that must be appropriate for high humidity, and wide temperature and humidity swings when necessary. Facility personnel may need to learn how to operate systems prior to, during, and after an event to limit the effects of humidity fluctuation on materials."***

THE CHALLENGES OF HVAC IN SPORTS VENUES

Highlighting another challenge, Sawarynski advised: ***"Another common challenge is how we size our central plants (i.e. chilled water, heating water) or system capacities when central plants are not appropriate. Sports venues tend to operate across multiple weather seasons and tend to host numerous partial-house events. Therefore, they operate at extreme 'part load', where only a portion of system capacity is needed much of the time. The HVAC system must be scaled appropriately to allow it to function at extremely low loads, and also at the planned 'worst' full-load condition.***

"The most complex projects tend to be those with the widest array of events and operating conditions in extreme climates. As an example, the 73,000-seat University of Phoenix Stadium, home of the NFL Cardinals, hosts a full NFL season and Super Bowls, conventions, concerts and corporate events. It may have the roof open or closed, the playing field inside or outside, operating in mild winter weather or extreme desert heat. Our approach must consider all these possibilities. Any limitations built into the systems to lower construction cost must be clearly conveyed to the owner during design, so they can make an informed decision and understand which future operating situations may be problematic."

For another example, **Baylor McLane Stadium**, **Populous** Project Architect, Sherri Privatera, noted: ***"With the intense summer heat in Waco, we knew a shade canopy would be important. Working with ME Engineers, we used computer programs to determine the most effective shape, and a wind study by RWDI confirmed the design approach to maximize breeze circulation. The 38 serrated walls around the stadium have proved an excellent solution along with the shade canopy. The 147,000ft^2 canopy structure, from 75-125ft deep, shades as much of the seating as possible."***

THE ROLE OF THE BUILDING SERVICES ENGINEER

AECOM Global Sports' Building Engineering Lead, Peter Ayres, observed: ***"Not so long ago, the building***

services engineer was the bridesmaid of the professional team when it came to stadium and arena design. It was a bit of heating and cooling in the directors' box in the main stand, and little more than plumbing for the toilets, some emergency lighting and a few power points for the burger stands for the rest of the stadium.

"But all that has changed, driven by a variety of factors, including:

Spectator expectations: With changes in demographics and the increase in corporate offerings with the competing lure of televised sports, spectators expect and demand higher levels of comfort and convenience.

Premium facilities: Modern stadia offer fans a variety of match day experiences, particularly in their choice of food and beverage (F&B). This generates a need for climate control spaces and a wider variety of F&B outlets throughout the building, not just in the traditional 'main stand'.

Non match day revenue: The potential to provide non match day functions, such as conference facilities, catered events and other visitor attractions, such as museums and club shops, has become fundamental to creating a sustainable business case for large modern stadia. These functions require a completely different level of building services to the traditional open concourse.

Technology: A state-of-the-art stadium demands a huge level of services infrastructures to support the demands of HDTV broadcasting, integrated sight and sound systems, mobile communications and stadium control systems.

Resilience: Sport is big business and a blackout during a crucial match could cost millions. Multiple levels of resilience are required to protect broadcast and sponsorship revenues, especially for global events.

"Throw in the provision of cooling to keep players and spectators safe and comfortable in extreme environments as sport becomes more and more globalised, and what you have is an extremely complex, high performance building. This places huge demands on HVAC building services engineers, not only to design energy efficient systems to deliver the required performance levels in a wide variety of spaces, many of which are very difficult to control, but also to integrate the vast array of plant and distribution networks into geometrically complex building forms."

CASE STUDY: U.S. BANK STADIUM

Jon Vollmer, Preconstruction Manager for **Harris Mechanical** – a division of **Harris Companies**, advised: ***"As of this past July 1st, our HVAC work was 60% complete on the US$1.06bn, 73,000-capacity U.S. Bank Stadium, opening next July as the new home of the NFL Minnesota Vikings in Minneapolis."*** Vollmer also confirmed that about 90% of the building's air handling units were already set in place; at least 16 of these will provide temporary heating and cooling by autumn/fall 2015.

The venue is a one-of-a-kind project designed by architect **HKS**. The building's signature roofline is meant to evoke the bow of a traditional Viking ship. The clear, ethylene tetrafluoroethylene (ETFE) roof will be the largest of its kind in the world and will give fans the feeling of an outdoor stadium, while protecting them from Minnesota's unpredictable weather.

"The stadium's unique design presented special challenges to our team. The angled walls, unexpected contours and discontinuous floor plan meant HVAC installation had to be carefully thought out. Connections between the concrete floor structure and exterior wind bracing structure made routing and supporting duct systems especially tough," said Vollmer.

TEAMWORK AND COORDINATION

Adam Grahek, HVAC Project Manager for Harris on the **U.S. Bank Stadium**, added: ***"One of the stadium's highest profile HVAC challenges was installing the upper bowl ductwork. The large 84" diameter bowl supply duct system had to be installed at the upper perimeter of the roof structure. Size and accessibility made this scope seemingly impossible. Our team worked closely with the steel erector to develop a plan to install duct on catwalk steel prior to placement. This teamwork and coordination kept the project on schedule."***

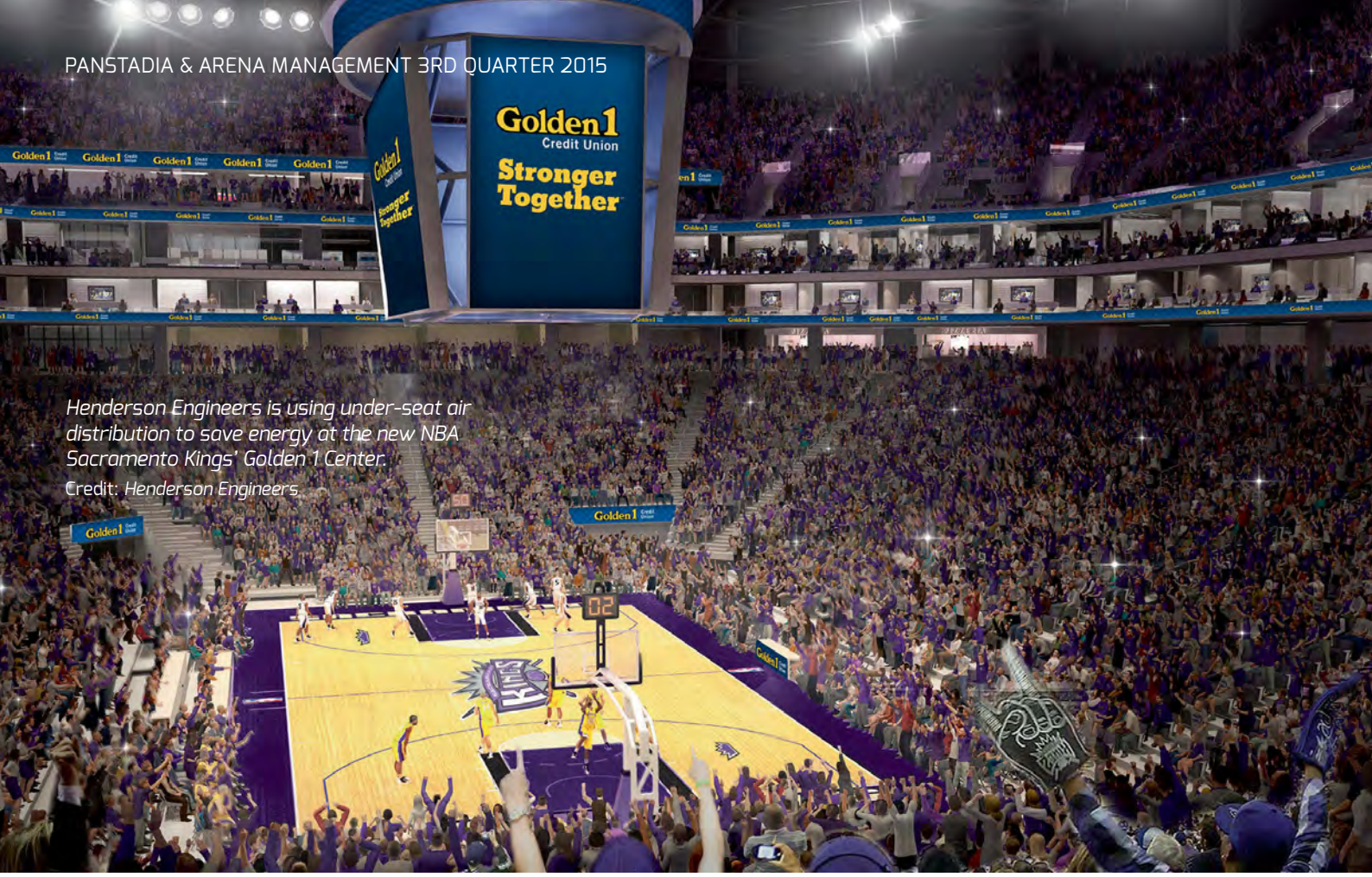
Grahek also explained: ***"Planning for maintenance access is another difficulty in an asymmetrical building. We have been in close contact with the City of Minneapolis to plan equipment access. If the work cannot not be kept at ladder height, Harris has been building service platforms for access."***

Vollmer added: ***"Pre-planning, pre-fabrication and computer modelling were critical parts of the project planning that helped us stay in front of the construction schedule. First identifying and focusing on the largest risks and most difficult scopes of work kept us from holding up any of general contractor, Mortenson's, critical path items. Breaking the building into manageable pieces allowed our teams to focus on solutions.***

"In keeping with original goals, all mechanical systems are being modelled, fabricated and preassembled before arriving at the stadium, with 80% of prefabricated skids now on-site and in place. Tested systems are helping to alleviate space issues and work continues within the tight schedule. All told, the U.S. Bank Stadium contains 22 miles of HVAC piping and 2.4 million pounds of HVAC ducts. Overall, the project is on schedule to meet its completion goal of July 2016." »



U.S. Bank Stadium's upper bowl 84-inch-round ductwork installation presented Harris Mechanical with a major challenge.
Credit: *Harris Mechanical*



Henderson Engineers is using under-seat air distribution to save energy at the new NBA Sacramento Kings' Golden 1 Center.

Credit: *Henderson Engineers*

CASE STUDY: GOLDEN 1 CENTER

"As mechanical engineers, our biggest challenge with modern arenas is to bridge the desire for energy efficiency with the physical limitations of the equipment used to condition the building," emphasised Kevin Lewis, Vice President of **Henderson Engineers**. *"The effectiveness of cooling equipment has reached a point where it gets slightly better over time, but with diminishing returns.*

"Since arenas are now multi-purpose oriented, it's even more important to ensure that HVAC engineering is done in a flexible way. This often has the largest implications for the control system, especially if an arena is used extensively. Adjusting the facility from basketball to hockey to a concert provides a challenge as each scenario requires different set points to maintain the correct environment. A robust control system that is fully-integrated throughout the facility often provides the best chance for success in terms of the building condition and long-term sustainability."

Lewis continued: *"For the new US$477m, 17,500-seat Golden 1 Center in Sacramento, California, opening autumn/fall 2016 as the new home of the NBA Kings, one strategy we incorporated was the utilisation of under-seat air distribution. Providing the air beneath the patrons' seats allowed the use of a 'higher leaving' air temperature, saving energy. This strategy delivers a cleaner environment as dirty air rises to the top of the arena where it's returned back to the unit. Additionally, it allows for almost instantaneous cooling to the patrons, eliminating the need to pre-cool the arena hours in advance.*

"With more new arenas targeting LEED certification, vital concerns related to HVAC include diminishing returns on further efficiency of equipment; other methods, including natural ventilation, different air delivery method, controls optimisation; run time of facility – energy recovery; Central Plant Theory; and, for hockey, humidity control and air throw.

"While most sustainable thinking happens during arena design, we have found that as big of a difference, if not more, can be made after an arena is open. We focus on working with the building owners and operators long after the project is finished to guarantee the designed systems are working as they should. We partner with building management to provide commissioning and energy monitoring services, adding value to the end-user."

ABOUT ME ENGINEERS

ME Engineers, Inc. has an exceptional record with more than 30 years of designing sports and entertainment facilities. Our portfolio includes 175 sports projects in 14 countries; 60 professional league venues and 8 with retractable roofs. **Chase Ballpark** in Phoenix, completed in 1998, was the first major fully air-conditioned retractable roof seating bowl in the world. Nationals Park was the first LEED-NC certified professional venue. We draw from this rich experience and deep knowledge base to develop balanced solutions to common and emerging design issues; from sustainability and legacy needs to schedule and phasing constraints to extreme climate conditions.

In addition to HVAC and electrical power design in stadia, ME Engineers provides specialty-engineering services including energy and airflow modelling, award-winning architectural lighting design, low-voltage/infrastructure fibre optic cabling design, and specialised sports lighting. We have authored technical reports and standards for the NFL, NBA, NHL, MLB, and MLS in the U.S., as well as for FIFA, World Cup Cricket and Olympics worldwide.

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HVAC UPGRADES AT BRIDGESTONE ARENA

Mike Rogers, Senior Principal at **Smith Seckman Reid (SSR)**, used their work on the **Bridgestone Arena**, home of the NHL Nashville Predators, as an example of the challenges in HVAC and how to overcome them.

Rogers said: ***"The original design eliminated desiccant dehumidification systems, traditional in the southern U.S. to deal with elevated humidity levels. This was to save initial costs and there was no NHL team. SSR began with a basic Opportunity Assessment to identify energy conservation opportunities, in conjunction with an analysis of the existing seating bowl environment and its effect on the ice sheet. The NHL has defined guidelines for environmental control within the seating bowl, as well as ice floor temperature, and thus hardness. For most of the season this was not an issue, but when the Predators made the playoffs into June, the building was not capable of meeting NHL requirements. In the playoffs, the Predators were spending a lot on temporary chillers and the elevated humidity within the bowl can degrade the playing surface, making it softer and slower for play.***

"Our challenge was to solve the environmental shortcomings in the seating bowl and reduce overall energy consumption, within the funding method. The Predators were using Energy Conservation Bonds, which require a specific payback period based on energy costs savings, usually less than five years. Adding additional cooling and dehumidification is not an energy saving measure, so we had to cut energy costs in other areas to make up the difference. We narrowed the targets down to key areas of Energy and Water conservation: Dehumidification of the arena seating bowl; lighting control system installation; HVAC control system upgrades and improvements; lighting efficiency improvements; efficient wash sink faucets and toilets in the public restrooms; and efficient urinals in the men's restrooms.

"Bowl dehumidification was accomplished with low-temperature chillers and additional low-temperature cooling coils to the Bowl Air Handling units. This additional capacity allowed implementation for a dehumidification control strategy, drying out the bowl air and providing a much-improved playing surface."

Rogers said in conclusion: ***"Fine tuning and upgrading the building's HVAC controls provided nearly two-thirds of the overall cost reduction, with a payback in less than three years. The balance of energy savings came from upgrading the lighting system controls and changing over 1,000 fixtures to high efficiency units – with a payback in less than four years. The Tennessee Valley Authority (TVA) provides incentives for lighting control and efficiency improvements, and we received nearly USD$100,000 from the TVA as an incentive. The entire project was funded with Energy Conservation Bonds and calculated payback will be less than five years. Considering nearly half the overall cost was in the addition of bowl dehumidification, this is quite a feat."***



SSR's Bridgestone Arena Bowl dehumidification improved fan comfort and ice surface for NHL Predators playoff games.
Credit: *Nashville Predators*



SSR's chiller installation at Nashville's Bridgestone Arena. Credit: SSR

THE LAST WORD

When meeting the challenges of HVAC in sports venues, the last word went to ME Engineers' Michael Hart, who summed up: ***"Cost is a key challenge, as many sports venues have a limited number of events, so it's often difficult to justify large expenditures for complex or highly-efficient HVAC systems. It may not operate enough to realise appropriate payback for this investment. In turn, with a limited HVAC budget, it can be very challenging to design systems that meet the aesthetic, operational and efficiency goals of the project. In order for the design team to provide quality and useful feedback on system alternatives, owners/developers must have an accurate understanding of the events a given venue will host and must also understand the limits of the HVAC system their budget can accommodate."*** ■

INNOVATIONS IN ROOFING MATERIALS

Katie McIntyre reports on the latest innovations in roofing materials, with input from some key industry experts.

To best analyse the latest innovations in roofing materials for sports venues, it's beneficial to go back to the very beginning.

Between 1960 and the early 1980's, stadiums in locations that experienced extremely inclement weather were constructed as domes. Later on, it became more popular to add a retractable roof to a stadium, which meant traditionally outdoor sports, like football, soccer and rugby, could still be played if the weather was bad with the roof 'closed', which ensures the comfort of the spectators. And, unlike their predecessors, the domes, these retractable roof stadiums allow for the playing of sport in outdoor conditions, i.e. with the roof 'open', when the weather is more favourable.

BENEFITS OF RETRACTABLE ROOFS

Another benefit of retractable roofs is that they allow for the growth of natural grass playing fields in environments where extreme hot and/or cold temperatures would otherwise make the installation and maintenance of such a field cost prohibitive.

Around the world, there are many different types and forms of retractable roof installations at stadia, from **Poland's National Stadium** to Canada's **BC Place Stadium** and Germany's **Commerzbank-Arena**.

Architecturally speaking, retractable roofs vary greatly in terms of shape, material and movement. For example, in the U.S.A., **Miller Park** has a 'fan-shaped' roof and in Japan, **Toyota Stadium** has an accordion-like roof. »



Poland's National Stadium features a retractable PVC roof, which unfolds from a nest on a spire suspended above the centre of the pitch. It was inspired by the cable-supported unfolding roof system of Commerzbank-Arena in Frankfurt, Germany, and is similar to the newly renovated roof of BC Place Stadium in Vancouver, Canada.

Credit: Tadeusz Rudzki

MEHLER: FABRICS AS THE BEST MATERIAL FOR STADIA ROOFS

It was the innovative approach to architecture of the late Frei Otto, winner of this year's Pritzker prize, which started a revolution in stadia roofing, says **Mehler Texnologies'** Julian Refghi.

Frei Otto's experiments in tensile architecture enabled the stadia roofs of today's iconographic venues. One of their common features: Huge areas are covered with considerable few materials.

Within the last ten years, material science has gained speed. The highly technical materials like low-e coatings for energy savings or durable printed fabrics are the result of elaborate R&D work. Nano coatings, which enhance self-cleaning properties, were already tested in the 1990's but lately evolved to highly sophisticated materials.

Obviously a tensile roof and its substructure consume far less material than a metal or concrete cover. Merging roof and façade simplifies and minimises material consumption even further.

Apart from this expenditure measured in tons, fabrics involve a lightness that reminds us of the playfulness of what we're actually watching. This more psychological effect adds to another saving that is physically measurable very clearly: Having a translucent fabric roof obviously reduces energy consumption for artificial lighting.



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VECTOR FOILTEC: ROOFING FABRIC INNOVATIONS

We need to continue to support the trend towards more sustainable construction by using fewer materials and only materials that can be recycled, suggests Andrés Amat, Project Manager for **Vector Foiltec** on the **Baku Olympic Stadium** in Azerbaijan and **San Mamés Stadium** in Bilbao, Spain.

Roofs built using lightweight Texlon ETFE don't need as much steel to support them and the ETFE is fully recyclable.

Vector Foiltec's engineers innovate for every project to match the architect's intent, helping them to achieve new geometries with Texlon ETFE and to extend the limits of this material.

Texlon ETFE is ideal for large-span roofs, including moveable roofs, like the one on the **Singapore National Stadium**, which turns the building into a true multi-tasker, capable of hosting various sports, concerts and flat-floor exhibitions.

Installation teams can rapidly install roofs made from pre-manufactured Texlon ETFE elements without having to build scaffolding, helping to meet immovable deadlines such as the first game of a season or an Olympic Games Opening Ceremony.

email
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vector foiltec

Delivering stadium innovation*

*in extreme conditions

Baku National Stadium has a façade and roof featuring 62,300m² of Texlon® ETFE by Vector Foiltec. The project was delivered in just 12 months, from initial consultation to on-site completion, despite snow, winds of over 75km/h and temperatures ranging from -3˚C to 38˚C.

75km/h -3°c 38°c



© 2015 Getty Images

Most retractable roofs are made of metal, while some, such as the roof of the **University of Phoenix Stadium**, are made of water-resistant fabric. Although each retractable roof differs in these aspects, **Safeco Field's** is unique in that it is the only one in North America that does not form a climate-controlled enclosure when in the extended position; rather, it acts as an 'umbrella' to cover the playing field and spectator areas during inclement weather, with no side walls enclosing the stadium.

THE AUTHOR OF LIGHTWEIGHT STRUCTURES

The German architect and structural engineer, Frei Paul Otto, is widely regarded as being the originator of lightweight structures, in particular tensile and membrane structures, including the roof of the **Olympic Stadium (Olympiastadion)** – home to **FC Bayern** – in Munich for the **1972 Summer Olympics**. Frei Otto won the RIBA Gold Medal in 2006 and was awarded the Pritzker Architecture Prize in 2015, shortly before his death.

Paul Hyett, Principal at **HKS Sports & Entertainment Group**, said: ***"Frei Otto's work, particularly at Munich, has had an immense impact on generations of the world's finest architects, and through them on many of the world's most impressive sports facilities. In this respect, if he didn't actually change the course of architecture, he certainly opened up a complete new avenue in terms of genre. Quite simply, he is the father of the modern tensile structure."***

MATERIAL EVOLUTION

Just as the structural forms of stadium roofs have evolved, so have the materials from which they are made.

When the **Allianz Arena** opened in Munich, Germany, its roof was one of the first to be capable of changing colour thanks to its ETFE-foil air panels, which can be lit red for **Bayern Munich**, blue for TSV and white for the German National Football Team. Allianz Arena's innovative stadium-facade lighting concept has subsequently been adopted at other venues, like at **MetLife Stadium** in the U.S.A., which lights up blue for the NFL Giants, green for the NFL Jets, and red in concert-mode.

The **Singapore National Stadium** – which celebrated its first year in operation by successfully hosting the **2015 SEA Games** – boasts the world's largest free-spanning dome roof. Made of weather-resistant ETFE, the roof blocks the sun's heat, giving shade and protecting spectators from the hot and humid Singapore weather, and also acts as a barrier from torrential rain. At night, the retractable roof doubles as a giant projector screen, which can display images such as the Singapore Flag.

Similarly, the roof of the 68,000-capacity **Baku Olympic Stadium** – which was the centrepiece of the inaugural **European Games** – is made of Texlon® ETFE cushions that can be transformed into a giant screen at night.

Another example is the new **Konya Stadium**, which has an all-seated capacity of nearly 42,276 and is totally covered. The roof is designed in one pour with the facade, which consists of differently shaped triangles that are filled with distinctive tensile materials – some translucent, some transparent. Most obvious are the green panels that reoccur on the roof. Here there is a three dimensional membrane structure based on arches, which was necessary to enable the wide spans over the stalls.

With delivering the best possible fan experience remaining a top priority for stadium owners and operators, we are likely to bear witness to even more innovations in terms of stadium roof design and fabrics, especially with mega events such as the **FIFA World Cup** being played in countries like Qatar, where protection from the elements is vital. It will be the architects, designers, engineers and fabrics manufacturers' job to take over the baton from Frei Otto, and run with it. ■



Konya City Stadium features a striking roof facade.

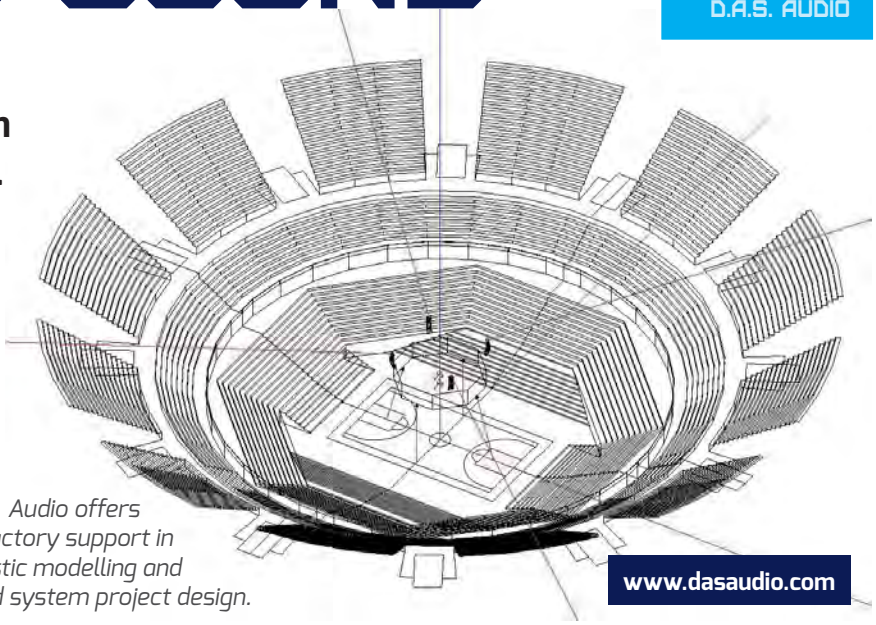
Baku Olympic Stadium – which was the centrepiece of the inaugural European Games – sports a roof made of Texlon® ETFE cushions, which can be transformed into a giant screen at night.

Credit: *Altkat Architectural Photo*

LATEST INNOVATION IN AUDIO
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***American Airlines Arena**, home of the Miami Heat, installed with D.A.S. Audio systems.*

Founded under the name **Dynamic And Sound** in 1971, **D.A.S. Audio** has evolved into an internationally-recognised manufacturer of loudspeaker systems, power amplification and audio processing equipment. Currently made in the main facility in Valencia, Spain, D.A.S. will soon be expanding their manufacturing processes into the USA, with a 'soon to be online' manufacturing facility located in Miami, Florida.

D.A.S has become synonymous for exceptional performance and support to their dealer base and distribution network worldwide. As a company, D.A.S. has always been supportive of the growth for each regional distribution centre and provided the tools needed for the distribution centres to grow in each vertical marketplace.

An additional key element to D.A.S.'s success was that the Company has always been a 'complete manufacturer'; meaning that they have always manufactured ALL of their own raw frame needs. As a manufacturer, D.A.S. has always been in complete control of its supply chain, as it manufactures all of their raw frame needs.

COMPLETE CONTROL

Manufacturing their own raw frame needs, gave the Company's engineering team complete control of the supply chain. And although this may not be the most prosperous path to fast growth and product delivery, the engineering team soon became very aware of the quality control aspects of the final product that they had full control over the reputation of the quality of the final product.

Only recently did the D.A.S. engineering team begin a co-development project with the engineering team from Powersoft with the 'M-Force' motor-driven technology. This brings two power house engineering teams – each very well respected in their own right – working together on this new technology.

With direct subsidiary offices located in Miami (USA), Singapore, Sao Paulo (Brazil) and Shanghai (China), D.A.S. has grown their infrastructure to become a dominate world force, offering both Sales and Service Support from each of these worldwide locations. The key to each distribution centre was the Service Center offering the specific support needed and adapted for each region, within the vertical market that D.A.S. was focusing growth on. For instance, in the USA, D.A.S. had seen huge growth in the Live Sound vertical market, due to their focus on the line array offerings, which fit into this vertical market offering. But, in addition to this market, D.A.S. also put a large amount of support into the Installed Sound marketplace, featuring these line array offerings, and that segment had also grown significantly in a down economy for the region. Additionally, D.A.S introduced the Event Series, which brought many of the line array technologies to a lower priced market segment, opening up a completely new market segment to line array technology.

EXPANDING PRODUCT OFFERINGS

In recent years, the D.A.S engineering team has focused their efforts on expanding the product offering in the Installed Sound market segment. This focus has brought the expansion of the "WR" product line (a full exposure offering), and the addition of the Sound Force Series; a complete product offering that focuses on providing a complete offering for the "Club Sound marketplace", a segment that D.A.S. previously was extremely strong in.

To add a 'point and shoot' tool set to work with the advanced line array technology offerings, the "HQ product line" was developed. This line is designed for medium to large scale installations in stadiums, auditoriums and arenas, and offer a series of tight patterns for use in these types of high output applications. Usable individually or in multiple unit arrays, this product line has a large offering of array elements, including low frequency elements.

Additionally, the D.A.S. engineering team has been working with several key consultants worldwide developing product offerings for various specific applications in the world of Installed Sound. Many of these revolutionary products will also be further developed into product lines that will be integrated into the D.A.S. offering to meet the needs of designers and installers worldwide. ■

HITTING A HOME RUN

One Systems reports on how they have hit a home run at the Great American Ballpark.

Forty-eight One Systems 112IM Direct Weather loudspeakers reinforce the Great American Ballpark.



Great American Ballpark, home of the Cincinnati Reds baseball franchise, began a multi-staged sound reinforcement system upgrade in 2011. The existing system was showing signs of wear and tear, making an upgrade overdue.

ThermalTech Engineering was tapped to design the system upgrade with **Industrial Communication & Sound**, a division of **CTL Engineering**, charged with installing it.

The project was divided into stages to minimise disruptions during the baseball season. The main PA was installed in 2011, with subsequent updates made in 2012 and 2013. 2015 marked the year to replace a distributed system covering 11 independent audio zones throughout the stadium. Forty-eight **One Systems** 112IM Direct Weather loudspeakers were utilised for the job.

"The 112IM fit the specification for a medium format all-weather loudspeaker with superior vocal intelligibility," explains Norm Stout, Industrial Communication & Sound. ***"We had not used One Systems loudspeakers before but working with their sales rep and the company, decided they would be a perfect fit."***

HIGH VOCAL INTELLIGIBILITY

The One Systems 112IM is a high-performance 12-inch two-way loudspeaker system with a strong injection-moulded enclosure, making it ideal for the Great American Ballpark application that required high vocal intelligibility and sonic accuracy

The 112IM incorporates a patented large-format high frequency driver designed and built by One Systems. The ET compression driver has a unique 'equivalent throat' design that allows the driver's radiation pattern to be controlled by the phase plug's summation plane, rather than the conventional exit diameter at the end of the driver's structure. The ET driver has a large format 3.25-inch, titanium diaphragm and a close-spaced circumferential ring phase plug to insure extended high frequency bandwidth.

... the 112IM's enclosure is made of a special copolymer optimised to handle harsh environments and high UV exposure.

UNIQUE DESIGN

The 12-inch low frequency driver features One Systems' patented Inside/Only Voice Coil Technology, which utilises a unique voice coil wound on the inside of the voice coil's support structure. This design delivers high magnetic system displacement, as well as increased heat dissipation, for reduced power compression and higher reliability. Its unique design and 4-inch voice coil deliver 800 watts continuous, 3,200 watts peak power handling.

"The project scope was to replace a number of existing loudspeakers, so the mounting locations were predetermined," adds Stout. ***"Based on the location, we had to custom-design a mounting bracket that would accommodate the speaker dispersion angles successfully to cover the intended audience area. We designed the bracket to give us a certain degree of rotational latitude to be fine-tuned after the loudspeaker was hung."***

Five separate custom mounting brackets were designed to accommodate different mounting locations and type of required down angle for each of the loudspeaker zones. Some loudspeakers were horizontally mounted off of wall surfaces, some were horizontally mounted from ceiling surfaces and others were vertically mounted to hang from towers in the outfield area.

"Each of these required special attention so that the loudspeaker face was not obstructed," Stout continues. ***"There were required variations in loudspeaker elevation due to existing conditions such as video walls, building facades and more. Only one group of the One Systems 112IMs were installed with the standard factory U-bracket."*** Stout notes that they worked with a local fabricator to facilitate manufacturing, welding, hot dip galvanising and painting of the brackets.

WEATHER PROTECTED

Most of the 112IM loudspeakers were installed with some degree of protection from the elements, tucked under eaves or other structures when possible. Only a handful of loudspeakers in the right grandstand were mounted out in the open. But even with some protection, it was of extreme importance that the loudspeakers be capable of handling even the worst weather scenarios.

Fortunately, the 112IM's enclosure is made of a special copolymer optimised to handle harsh environments and high UV exposure. All its external rigging hardware and its grille are made of 304-grade stainless steel. The grille is a 3-layer 'rain shield' design that minimises direct rain, snow and dust particle contact with the system's transducers. The system's unique vent design also enables excess moisture drainage from the interior of the enclosure. The enclosure and grille are rated to IEC 529 / IP 45 (solid object penetration to 1 mm (0.04 inches) and water jets from any direction). The 112IM's enclosures and components are also rated to Mil Spec 810.

"When we were done, we walked through all of the areas and it sounded terrific," concludes Stout. ***"The ballpark is extremely happy with the end result and when the client is happy, we know we've done our job right."*** ■

THE *HYBRIDS* HAVE ARRIVED

As a leader in premium direct weather speakers, One Systems is moving into the future with a new HYBRID series of models offering superior corrosion resistance, and creating incredible value for designers and venue owners.



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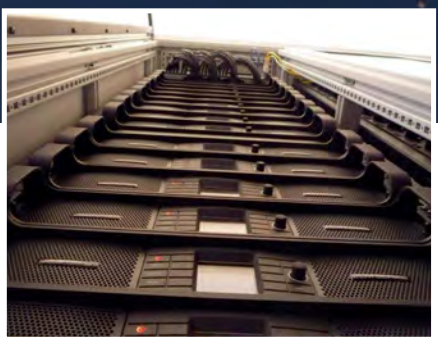
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WORLD'S LARGEST PLM INSTALL



A total of 157 Lab.Gruppen PLM series amplifiers were specified for BC Place Stadium in Vancouver, Canada, which represents the largest single fixed installation of PLM power in the world to date.

Since it opened in 1983, **BC Place Stadium** in Vancouver, Canada, has been lauded for its iconic beauty. Though its recent upgrade has altered its appearance, the re-design has been tailored to not only enhance the user experience, but its visual appeal too.

Sound system-wise, improvements have been just as significant. **Clair Brothers Audio Systems** has installed a huge **JBL** VLA line array speaker system, which fulfils entertainment and safety roles. The system is driven by **Lab.gruppen** *PLM Series* amplification and processing, fully integrated with **Peavey** *MediaMatrix NION* for distribution and control.

The audio challenge at BC Place was met by a collaboration between audio consultant Ian Wolfe of **Acoustical Design Group** and **Clair Systems'** Senior Engineer, Jim Devenney, who designed the amplification and control systems with assistance from **Audinate**, Lab.gruppen, Peavey, JBL, **Audio Associates** and **Tech Spa**. A cross-company team of over 30 people contributed to this part of the project alone.

A total of 160 JBL VLA601-WRC line array cabinets were specified. Above the seating, 12 arrays have been flown, evenly spaced around the oval structure. Each array comprises 11 JBL VLA601-WRC cabinets. Six more clusters of VLA601-WRC cabinets under the scoreboard – four of five and two of four – and two down firing JBL PD5212 speakers, cover the entire floor of the stadium, totalling approximately three acres.

LARGEST SINGLE FIXED INSTALLATION OF PLM POWER

A total of 157 Lab.gruppen PLM Series amplifiers have been specified – 112 PLM 10000Q and 45 of the flagship model – the PLM 20000Q – which represents the largest single fixed installation of PLM power in the world to date. Both models support audio transport via Dante – Audinate's digital audio networking protocol – which was central to the audio integration at BC Place. The monitoring and the audio transport are all via Dante, across one network along with system control, on a fully-redundant network topology.

The PLM Series' on board **Lake** Digital Audio Processing speaks to Peavey's MediaMatrix nWare software, which controls the MediaMatrix NION n3 audio processors. This was made possible by Tech Spa's development of the existing Peavey software.

Regardless of their power capabilities, the PLM Series amplifiers come equipped with Dante networked audio distribution, Lake Processing and load verification with real-time monitoring. The PLM 20000Q was developed to deliver unrivalled power over four channels, with each channel rated at over 5,000W into 2.2 – 3.3 ohms. Originally created to meet the demands of high-performance touring, with Clair Global as a key early customer, it quickly gained a reputation as an equally potent solution for the installation market because of its very high power density, low mains consumption and its aforementioned smart system control and tuning features. The PLM 10000Q offers very similar functionality with four channels of 2,350W at 2 ohms.

NETWORK BUDDY

The PLMs' network buddy where this system is concerned, the MediaMatrix NION n3, is part of a series renowned for stability, efficiency and robustness. It boast 448-channels of high-speed digital audio bus for seamless expandability and offers a low-latency audio path suited to projects as huge as BC Place.

Audinate's Dante brings BC Place's audio infrastructure together with minimal hassle and high performance. Regarded as a true plug-and-play digital audio network, it utilises standard internet protocols over Ethernet, and provides reliable, sample accurate, low latency distribution. Over 500 Dante channels have been used at BC Place. If a Dante network of that scale was translated into other digital networking options, the results would be unworkable. Dante adoption was crucial and therefore the equipment had to comply. With **Zen**, Audinate's automatic device discovery and system configuration protocol, what was a potentially complicated network set-up was made much simpler.

Despite the challenges involved, the project was completed on time and the system provides the requisite combination of power and smooth coverage.

"In the end, we came up with an elegant and effective solution to match the expectations of audiences that visit this impressive facility," concluded Clair Systems' Senior Engineer, Jim Devenney. ■

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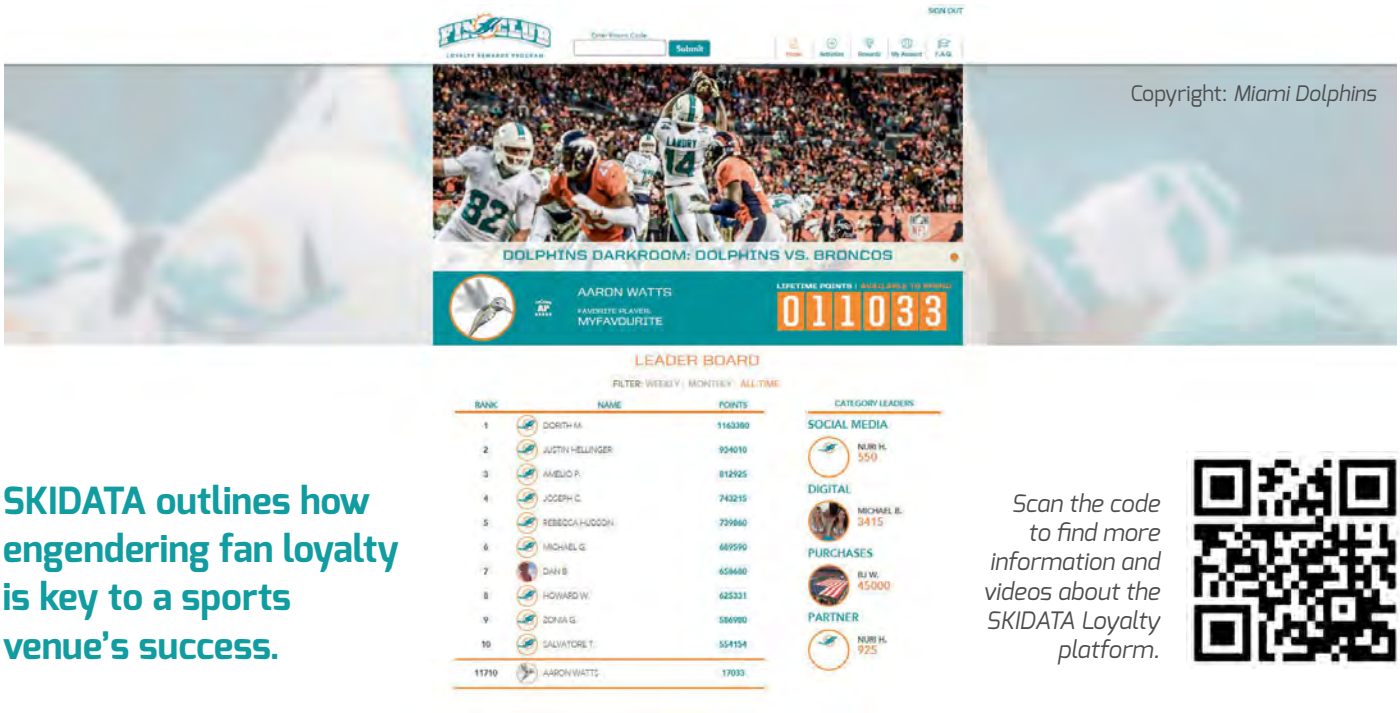
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FAN LOYALTY IS KEY TO SUCCESS



Copyright: *Miami Dolphins*

SKIDATA outlines how engendering fan loyalty is key to a sports venue's success.

Scan the code to find more information and videos about the SKIDATA Loyalty platform.

As a solution provider, **SKIDATA** offers its customers fast and secure access control solutions, as well as many ways to push their business forward, such as *SKIDATA Loyalty*.

Professional American sports teams, like the **Seattle Sounders FC** (Major League Soccer/MLS) and the **San Francisco 49ers** (National Football League/NFL), are already benefitting from *SKIDATA Loyalty*; which creates a strong link between the operators and their guests.

Fans collect points for all their interactions with their club – both on premise and online – which can be exchanged for products that money can't buy. While customer behaviour is being motivated with rewards, revenues are being increased and costs decreased. Furthermore, the operator is increasing their knowledge about its customers and fans. Thanks to a deep understanding of customer interests, a sports club can target its activities and promotions towards the fans interest.

LOYALTY PROGRAM

In August 2014, the **Miami Dolphins**, an American football team of the NFL, located in Miami, together with SKIDATA, kicked-off their new loyalty program 'The Fin Club'. Members collect points for interactions, such as surfing the club website, interacting on Facebook, following on Twitter or consuming food & beverage in the stadium. The collected loyalty points can then be exchanged for various services, such as special merchandise products or interactions with the team.

The new Fin Club gives the Dolphins a 360° view of all of its fans. They can now see data on how the members are interacting with the team, what events they attend, what items they are interested in, etc. So, when the time comes to interact with that fan, they already know their habits.

The Fin Club platform works with social media and integrates in-stadium with all major merchandise and food and beverage outlets in real time. The platform is capable of serving all 76,100 fans simultaneously at the Dolphins **Sun Life Stadium** and even if all fans hit the 'redeem' button at once, *SKIDATA Loyalty* handles it flawlessly.

REVENUE GENERATION

While the loyalty platforms provide the fans with a value-added experience, they are producing real dollars for the Dolphins; with SKIDATA having tracked the following results:

- Nearly **USD$3** per person spending increase on food and beverage by loyalty cardholders
- **59%** of cardholders arrive at least 30 minutes early to the game when encouraged with points
- **39%** of cardholders are swiping their cards at food beverage stands
- **50%** more spending in the first 60 minutes of the gates opening. ■

ABOUT SKIDATA

SKIDATA is an international leader in the field of access solutions and their management. There are almost 10,000 SKIDATA installations worldwide, in ski resorts, shopping centres, major airports, municipalities, sports stadiums, trade shows and amusement parks, providing secure and reliable access and entry control for people and vehicles. The company places great value in providing solutions that are intuitive, easy to use, and secure. The integrated concepts of SKIDATA solutions help clients optimise performance and maximise profits. SKIDATA Group (**www.skidata.com**) belongs to the publicly-traded **Swiss Kudelski Group** (**www.nagra.com**), a leading provider of digital security solutions.

Loyalty.Logic

Cohesiveness as
between penguins.



Loyalty.Logic - The SKIDATA engagament platform

Raise your customer engagement to a new level! SKIDATA provides with Loyalty.Logic a platform that enables you to develop and run your own loyalty program. Your fans earn points for all interactions with the club - online or on-site at the stadium. The collected loyalty points can then be redeemed for products that cannot be bought with money. With rewards, you influence customer behavior while, at the same time, increasing revenue and reducing costs. In addition, you expand your knowledge of your guests and fans. Thanks to this better customer understanding, you can coordinate your activities and promotions to be specifically targeted to the interests of your fans.

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TRANSFORM & PROTECT

Douce Hydro highlights how its revolutionary 'lift & skid' system transforms France's 50,000-seat Stade Pierre Mauroy into a 28,000-seat arena and explains how its sister company, Jarret Structures, has been chosen for the seismic protection of Greece's Stravos Niarchos Foundation Cultural Center.'

Douce Hydro creates the ultimate transformation when France's 50,000-seat **Stade Pierre Mauroy** becomes a 28,000-seat arena in less than 24hrs, thanks to a revolutionary 'lift and skid' system.

Douce Hydro set this challenge, which enables the stadium to adapt both its capacity and indeed functionality, thanks to a brilliant electro hydraulic system.

REVOLUTIONARY SYSTEM IN USE AT STADE PIERRE MAUROY

Indeed, the 'lift and skid' system ensures that:

- The half pitch can be raised to a height of 6m by means of twelve large synchronised cylinders.
- The half pitch can be moved thanks to the twenty-four synchronised skidding systems equipped with a function of level compensation.
- The system is redundant and can compensate for the possible malfunctioning of one or more cylinders without compromising its operation.
- Each of the cylinders has the power to lift 1,300 tons and all have had a *KERADOUCE®* coating applied to ensure optimal resistance to their environment. It also offers one of the best abrasion and corrosion resistance solutions available in the market place; having been successfully used to protect Douce Hydro's cylinders for more than twenty years.

SNFCC GREECE

In 2016, the city of Athens will inaugurate one of the most important projects ever undertaken in Greece: the USD$566m **Stravos Niarchos Foundation Cultural Center**. This huge infrastructure will host the **National Library of Greece** and the **Greek National Opera** in a 170,000sqm landscaped park, designed by the architect **Renzo Piano**.

Education, Culture and Durability are the key words of this world premiere project, funded by the **Stravos Niarchos Foundation**.

Located on the edge of Faliro Bay, the structure is designed as a multifunctional arts, education and entertainment complex. As one of the largest construction projects in recent Greek history, the Stravos Niarchos Foundation Cultural Center will have an immediate impact on the local economy, providing jobs and infusing capital into a challenging economic landscape.



The construction is clearly oriented towards sustainability, especially thanks to the 10,000sqm roof, made entirely of solar panels, for the complete self-power of the building.

SEISMIC PROTECTION

Jarret Structures, a **Douce Hydro** company department, has been chosen for the seismic protection of the structure. Its technology operates at two levels: The first step consists in suspending and lifting the load of the canopy, supported by 30 columns, thanks to springs and dampers.

Secondly, the fluid viscous dampers will protect the building in case of: seismic disturbances, wind gusts or hoarding snow. These special devices will be placed between the vertical bearing elements and the foundation of the buildings, absorbing much of the destructive seismic energy before it is transmitted to the superstructure.

The seismic isolation does not only provide additional safety to the structural building frame, but also reduces earthquake movements, protecting it from damage.

At the beginning of August, the impressive 7-day lifting operation was successfully realised, thanks to the joint work of the operators and engineers on the dockyard. ■



www.doucehydro.com

LET THERE BE LIGHT

Musco illustrates how they are bringing lighting innovation to the world's top events and venues.

Since 1976, **Musco Lighting** has been at the forefront of sports lighting innovation with extensive research and testing of lighting technology, and the precise science of light control. This dedication has allowed Musco to develop state-of-the-art lighting systems that improve player and fan visibility, provide reliable operation, reduce environmental impact and positively impact owners' budgets.

These advancements in technology have allowed Musco to put its knowledge to work and light some of the world's most prestigious facilities and events, such as the **Daytona International Speedway**, **Bahrain International Circuit**, **Emirates Stadium**, **Wimbledon's Centre Court**, **Yas Marina Circuit**, **Millennium Stadium** and **Churchill Downs**. These installations are all connected by one common thread: Musco's ability to develop cost-effective lighting solutions that meet the needs of facility owners, players, spectators and television broadcasts.

By offering efficient lighting solutions using either an LED or HID light source, Musco has the expertise and the systems to deliver a complete lighting solution that fits the specific needs of the facility and sport.

TWICKENHAM STADIUM

As the largest stadium in the world devoted to rugby, **Twickenham Stadium** wanted a cost-effective lighting solution that would take the entertainment experience to the 'next level' and meet the sustainability goals. Musco took on that challenge and installed its *SportsCluster Green™* lighting solution using an LED light source.

Musco has spent nearly a decade researching and designing lighting systems around the LED light source that have made a significant impact on the ability to control light and further reduce energy consumption. Musco's systems are optimised with advanced optics and reflectors to efficiently direct light onto the playing surface, reduce glare for players and spectators and minimise wasted light.

"The pinpoint nature of the LED light source allows us to develop precise optics that optimise light distribution for unique applications," says Jeff Rogers, President, Musco World. ***"Making the transition to LEDs continues to become more economically feasible for select complexes and facilities because of the long life of the LED light source."***

Since the system is factory aimed, wired and tested, the RFU was able to significantly cut installation costs and timing. The lighting solution reduced energy consumption at Twickenham by 48% compared to typical 2000w metal halide floodlights. The new system features instant on/off/dimming controls and DMX capabilities ready for special effects. In addition, operating costs will be reduced thanks to Musco's ten-year warranty that eliminates maintenance.

VITALITY STADIUM

In July, **AFC Bournemouth** announced the selection of Musco's *SportsCluster Green™* with an LED light source to light **Vitality Stadium**. With the club's recent promotion into the Barclays Premier League, AFC Bournemouth needed a lighting system that would meet the League's approval, reduce glare for players and spectators, and eliminate costly maintenance.

"We are really pleased to be working with Musco for an LED lighting system," advises Cherries General Manager Liz Finney. ***"There have been so many developments at the stadium over the summer and this is one of the most exciting. The new floodlights will provide a better matchday experience for supporters inside the ground and those watching all around the world as the club competes on a global stage."***

With the installation of this system, Vitality Stadium joins Emirates Stadium as the two English Premier League venues to feature Musco's LED lighting solution.

LEADING THE WAY

Backed by a global team of technicians, Musco's system-approach to lighting offers reliable and efficient operations that are covered by a parts and labour warranty. Musco's knowledge and expertise on providing reliable lighting systems, along with advancements in the precise control of light, continue to pave the way in the sports lighting industry. ■



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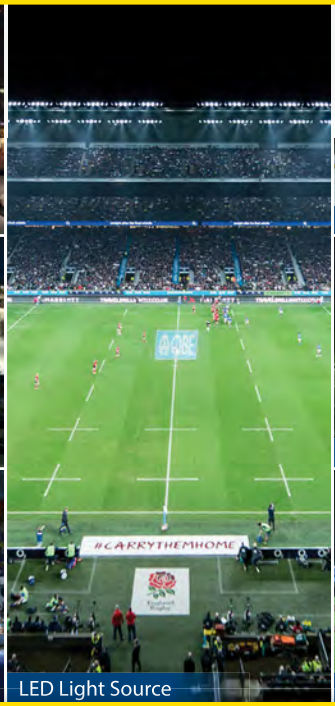
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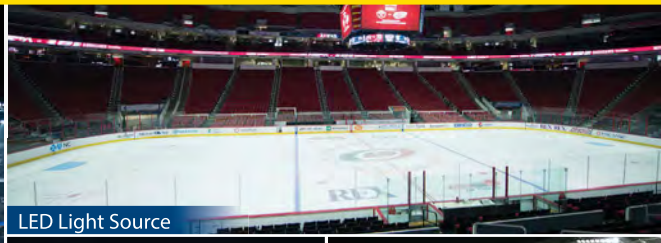




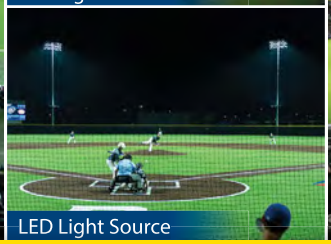














For nearly 40 years, Musco has specialised in the design and manufacture of sports and large area lighting. We are committed to providing floodlighting solutions and services you can rely on.

Musco's solutions – using LED or metal halide – provide superior energy efficiency, environmental light control, and cost effectiveness, all supported by our leading product assurance and warranty programme.

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We Make It Happen®

MISSION POSSIBLE

Dallmeier reveals how the Eintracht Stadium in Braunschweig, Germany, has been exclusively fitted out with their video equipment to ensure security for both the home and visiting fan areas.


Credit: *Polytan*

The video system at **Eintracht Stadium** in Braunschweig has been completely modernised using exclusively equipment from **Dallmeier**. The heart of the installation, the unique *Panomera®* multifocal sensor technology, provides security for both the home and visiting fan areas.

This unique camera technology, patented by Dallmeier, is unlike single sensor cameras in that it uses several lenses, each with a different focal length.

"This makes it possible to monitor large expanses and distances from just a single location – in real time and uniform picture resolution, excellent dynamic response and consistent depth of focus," explained Roland Meier, Head of Panomera® Multifocal Sensor Systems at Dallmeier.

Eintracht Stadium posed a real challenge for cameras. Not only because the running track significantly increases distances to the spectators, but also because the light conditions made it practically impossible for conventional cameras to operate effectively.

"There is a space between the stand and the roof, which allows light into the stadium but creates a very difficult situation for many cameras, as we discovered in the course of our tests," explained Marcus Meyer, Technical Director of **Stadthalle Braunschweig Betriebsgesellschaft mbH**, Eintracht Stadium's operating company.

UNRIVALLED PICTURE QUALITY

However, with the *Panomera®* system each sensor defines its own contrast, white balance and exposure. This in turn enables significantly more effective dynamic range and unrivalled picture quality over the entire scene – even with widely varying light conditions within the same image.

For managing the system, operators can make use of the multiple *Panomera®* Viewing Clients and the *SeMSy®* management software with joystick.

Armin Gallus, a member of the crisis management team with the Braunschweig police, is enthusiastic about the system, as he explained: ***"One of the most important features for us is that the entire scene is recorded without interruption. This means that if something does happen, we can look for it in the recordings at any time. And the resolution of the cameras is really impressive, not only live but also in the recordings. That is critical for us, because it means we have evidence which we can use to identify and detain offenders."*** ■





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SPECTATOR SAFETY

In this Q&A, we hear from three of Preformed Markings recent customers on their own experiences of working with the company.

Since writing about their success with **Charlton Athletic** in our *Q1/Spring 2015* issue, **Preformed Markings** have continued to rapidly expand their list of successful sports projects around the UK with their innovative spectator safety solutions. In this Q&A, we hear insights from recent customers: Mark Broadley (**MB**), **Leeds United FC**, **Elland Road**; Alan Bexon (**AB**), **Nottingham Forest**, **The City Ground**; and Greg Pillinger (**GP**), **Ipswich Town**, **Portman Road**, who share their own experiences of working with the company.

Safe ingress and egress from the ground via all of the stairways is obviously a vital and recurring issue in spectator safety, what made you decide to work with Preformed Markings to help with this?

AB: The safe movement of a large number of people brings its own problems and can be particularly problematic in wet weather. Even though the seated areas are under cover, wet shoes and clothes can cause areas to become slippery. In addition, spillages can increase the risk of people slipping. The product we chose to use, with the help of Preformed Markings, provides us with a safe surface that also improved the aesthetics of the venue, which is also an important consideration.

GP: We decided to work with Preformed Markings for a variety of reasons: Good feedback from other stadia (Charlton FC), the ease of application of the product, good customer service and also the warranty of the product.

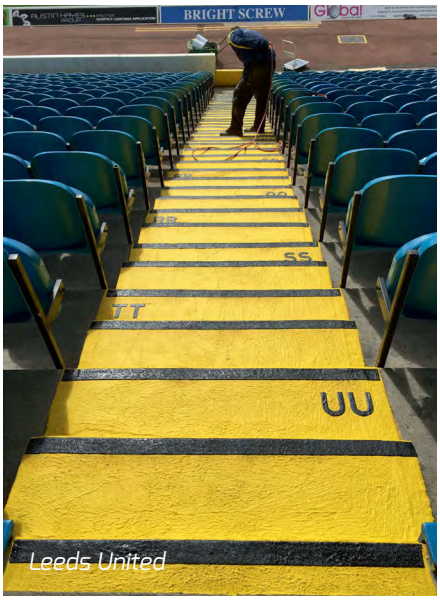
MB: After seeing the work that they had done at Bournemouth and Derby, I realised that Preformed Markings could be of great help here at Elland Road, as we've been having problems with the degrading stairways for some time. I agreed to get them to do a sample stairway in the East Stand. We were very impressed with the results and ease at which paint could be applied to the stairways. Even our own maintenance team could carry out the install, we just needed to get the materials from Preformed Markings.

How long did it take to finish the upgrades and how satisfied are you with the results?

AB: The work took 3-4 days to complete but is just the start for us. The plan is to extend the improvements around the stadium and our maintenance team, who received instruction from Preformed Markings on how to apply the products, will be responsible for rolling this out over the next few months.



Ipswich Town



Leeds United



Nottingham Forest

GP: The stand we were upgrading took about 3-4 weeks and we were very satisfied with the results.

MB: Very satisfied and I'd say it took three men around 1 week to complete the East Stand, which looks exceptional on TV. We are in the process of completing the rest of the stairways around the ground.

What kind of feedback have you had from the fans and also other executives at the club?

AB: Some parts of The City Ground are over 50 years old and have started to become tired. Visitors to the stadium cannot fail to be impressed with the work that has been done this summer and the Chairman is keen for these improvements to continue.

MB: Loads of positive feedback from fans and staff. In fact, everyone who sees the improvements comment on how well the stadium is looking. So much so that on the last matchday many fans were stopping to have their picture taken on the track, which was painted blue and had added the LUFC badge either side of the goal. ■

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SAFETY & SECURITY IN FOCUS

In this Q&A, Malcolm Tarbitt, Executive Director – Safety & Security at the International Centre for Sport Security (ICSS), provides his insights on venue safety & security.



Malcolm Tarbitt

The costs and complexity of building sport venues has increased dramatically over the last decade. At a time when budgets are being squeezed, why must venues invest in safety and security from the very beginning?

Whilst many may not have recognised it, safety and security has a fundamental role to play on the bottom line and financial success of a venue or event. If done correctly and incorporated right from the start of the design phase, good security planning has the ability to significantly reduce operational costs later on, as well as contribute to the overall legacy of a venue or an event, by providing employment opportunities and developing a local community's economy and image as a safe and secure sporting event destination.

All too often at the moment within the sport and stadium management industry, many venue owners and architects include the security elements at the later stages of the design and planning process, resulting in added costs once the security consultant is appointed later on.

How can new venues and stadium owners avoid added costs and maximise Return on Investment (ROI) through security planning? Are there any projects or examples of this at the moment?

At the **ICSS**, we believe the security design consultant must be involved from the very start, before any architect has been approached. This would include the risk assessment and master planning of the venue or event precinct, as well as the security design approach for the venue itself. Not only will this improve the quality, cost-effectiveness and the overall operations, but it will also provide peace of mind for all those organising and attending sporting events.

A good example of a venue that has recognised the benefits of this is **AS Roma's** new 52,500-seat **Stadio della Roma** (pictured below) project that we are currently working with, located in Tor di Valle, south west of Rome's historic city centre.

Due to be completed in time for the 2016-17 Serie A season, this groundbreaking project has recognised the significant long-term financial benefits that an effective security design and implementation model can have on the long-term business objectives of the club.

Time will tell, however if this project should be held up as an example in the future of how proper, long-term security planning can play a valuable contribution to the bottom line of sport venues, both in Italy and elsewhere.

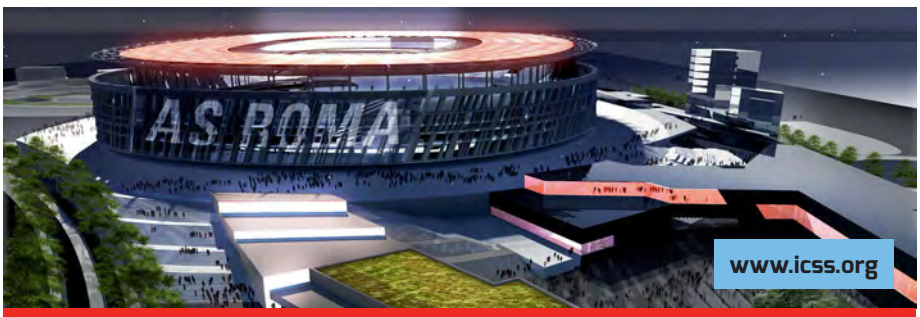
Are there any new or developing trends in safety and security that events and venues should consider?

One growing area affecting sport safety and security, as well as many other areas in the sport industry, is the increasing influence of technology and its effect on the way that major events are secured.

As stadiums and major events commercialise and look to increase interactivity and engage more fans, the technology being used is becoming increasingly complex. As a result, we have already seen several new threats emerge this year, including the use of drones, as well as the growing number of cyber-attacks now affecting sport venues and events. Data protection and cyber security will also be another growth area that sporting event organisers will have to invest in, particularly as merchandise, ticket sales and in-stadia marketing moves toward digital and smartphone platforms.

With this in mind, I expect over the next few years an increasing professionalization of the sport safety and security sector to occur, as the industry begins to address the growing knowledge gap that we are now noticing in competence levels of safety and security personnel at major sporting events. New technology calls for improved and continuous training programmes to be implemented for the workforce in the industry.

Recognising this need, the ICSS is developing several cutting-edge and comprehensive training platforms, including the recently launched *International Advanced Studies Programme* with **SRH University Heidelberg**, as well as teaming up with the **European Stadium and Safety Management Association (ESSMA)** to support the sport industry and enhance safety and security standards in sport. ■



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Andrew Cooke, Director Security Operations, **ICSS**, is one of the 50+ industry-elite speakers at **Stadia & Arena Asia Pacific 2015**, during which he will give a presentation on integrated security planning and also join a roundtable on major event masterplanning.



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For more information about the ICSS and how we can enhance your venue or event, please visit **www.theicss.org** or email us at **ssi@theicss.org**

FITS
FINANCIAL INTEGRITY & TRANSPARENCY IN SPORT FORUM

The **FITS FORUM 2015** will take place on **3rd and 4th September 2015** at the World Intellectual Property Organisation (WIPO) Conference Centre in Geneva, Switzerland. The event will bring together the world's leaders from sport, government and the financial and commercial sectors to address the crucial threats facing the financial integrity and transparency of sport and pave the way towards long overdue reform.

To register your interest for the FITS FORUM 2015, please visit **www.theicss.org** and use the hashtag **#FITSForum**

SEEING IS BELIEVING



In this Q&A, Danny Wilson, Director of Stadium Sales and Operations at Manchester City FC's Etihad Stadium, explains the reasoning behind the stadium's recent transformation and how it is evolving the match day experience.

The **Etihad Stadium** has undergone a transformation over the last 12 months, with an extra 7,500 seats being added, in addition to striking new digital signage, including two flagship jumbo displays, each coming in at close to 100m^2, as well as an asymmetrical LED system on a mid-tier level.

How did you first approach the project to replace the flagship LED displays at the Etihad Stadium? For example, how did you decide on the type of displays? And what you wanted to achieve through their installation?

Our aim throughout this project has been to take the fan experience during a live football match to the next level by immersing them visually into the action and environment. This started with quite a high specification technical brief for a 16mm pixel pitch LED platform. Together with **LG** we had calculated that this would allow us to give every seat in the house a front row view of the action and by having a 16:9 aspect ratio we could split the screen to showcase data, statistics and a live feed in very high detail.

This led to the final solution, which is two bespoke 97.5m^2 LED displays and an asymmetrical LED ribbon, all from **LG Electronics**.

What were the main drivers behind choosing LG to provide the screens?

This is a very high level investment, and one that is crucial to achieving the next generation of fan experience, so we took the decision very seriously. LG has a proven track record of delivering large scale LED displays to an impeccable standard, so we sent our team to the R&D facility in Seoul to find out exactly what could be delivered.

LG impressed at every level and were able to deliver a full solution from design to installation and maintenance. We strive to forge a deeper level of integration with our partners, exploring ways we can both add value, so with LG as a partner it is great to showcase the very best of their work to bring to life the very best of ours.

What were the main challenges of the project and how were these overcome?

The biggest challenge was the incredibly tight timescale. Out of the football season, the Etihad Stadium is utilised for a range of other activities, from rugby through to live music concerts, so this gave us just four weeks for the whole install.



Having the right team in place was imperative and this included LG, the infrastructure team at the stadium and the integrator, **Pioneer Digital**. Pioneer played a key role in bringing everyone together and making sure things were delivered on time and on budget. They were very reliable and ensured that we didn't fall down at any point in the project. We definitely had the dream team!

For the technology itself, factors such as the viewing angle of the fans from the stadium's three tiers of seating, unpredictable lighting as the sun moves overhead during the course of a day and challenging logistics were all key considerations.

How did the expansion work on the South Stand affect the project?

With both the jumbo displays on the North Stand, this didn't affect their installation at all. However, it did factor in the installation of the ribbon, as this runs all the way around the mid tier, so an extra party was added into the delivery mix in the form of our construction partner. We liaised with them to factor this into everyone's timescale and no problems were encountered.

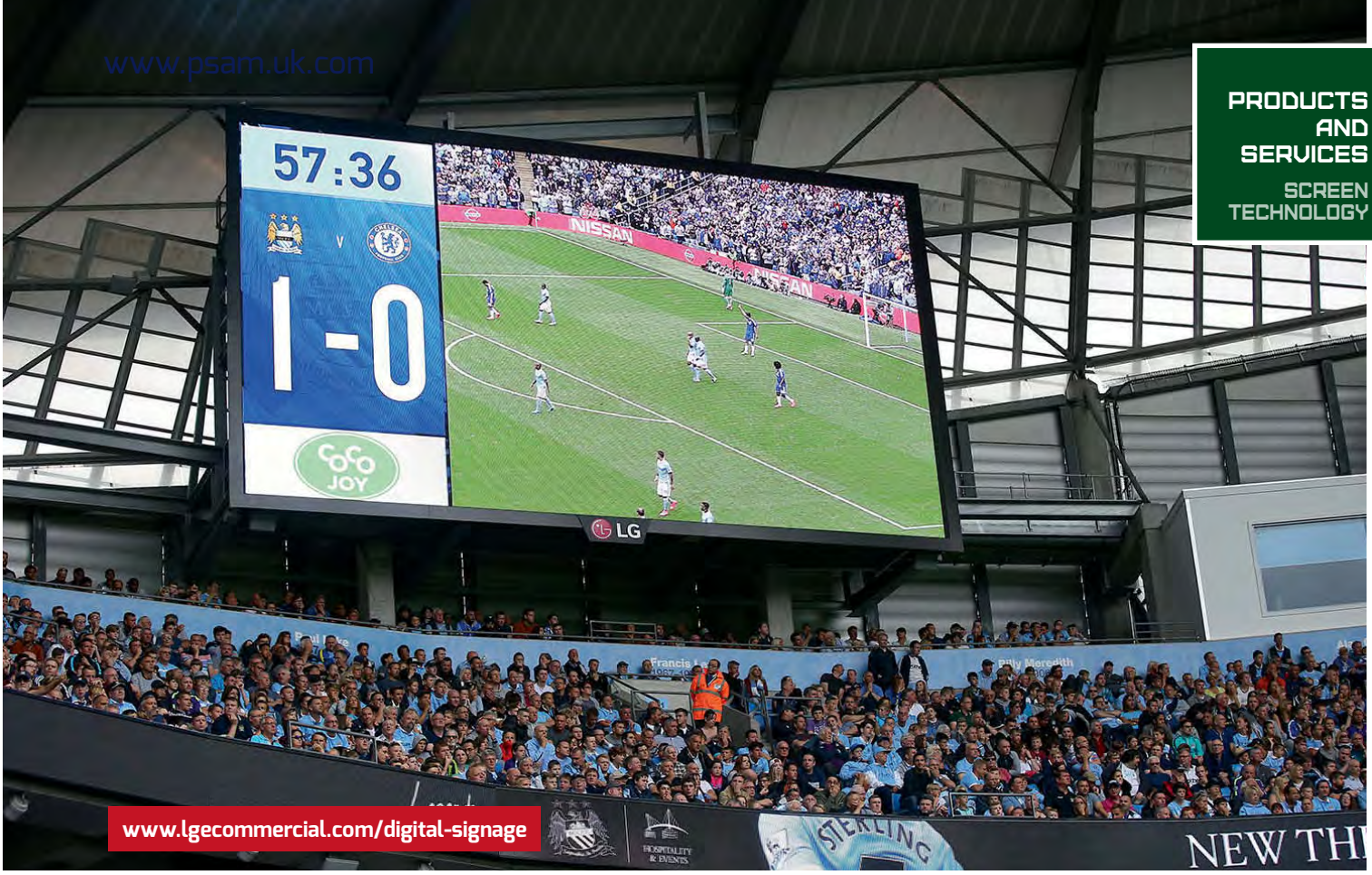
Increasing fan engagement at the Etihad Stadium was a major driver for this project, how has the digital signage helped achieve this?

The jumbo screens and ribbon have been crucial in providing a major focal point for this. Our technique has been to use these platforms to visually immerse fans into the action and to make the whole match experience a two way event.

For this we worked closely with our event production team to plan the content beforehand to make sure these display solutions were the best options and could be maximised fully.

To encourage fans to contribute, the elements that have been the most successful include creating different fan zones on the ribbon, showcasing digital fan flags and making the line-up more impactful and dynamic through the additional data that can be shown.

The creative teams have really managed to leverage the displays and this all contributes to a better atmosphere throughout the game for everyone, not just the home fans. We are continuing to evolve this to keep it fresh and make sure that every time





someone visits they see and experience something new.

How important was it to have displays that could optimise the fan experience?

Essential. A key focus has been on working with fans to enrich the match day experience and digital assets have proved to be the most impactful way of doing this. The content can reflect real-time and be easily updated in line with events.

Now that the displays are up and running, they have changed the face of the fan experience by making them a bigger part of the action, through factors like fan Tweets being displayed on the ribbon during the game.

They are also more connected to the club through a new data-tainment experience, which shows match play stats, such as possession, shots on goal and player stats.

Fans are also connected to other matches with scores from around the country being shown, adding to the tension at crucial times of the season when every point matters.

Can you provide our readers with further information on the asymmetrical LED ribbon technology; like how it works and what key advantages can be afforded through such a system?

Asymmetrical LED has a higher pixel density from top to bottom, so when you only have a small vertical footprint for the displays, this is an effective way of achieving a higher resolution, which ensures you maintain the image quality. This is very important to the flagship brands that sponsor the club, as they need to make sure their logos are displayed to the right ratio, with accurate colour reproduction and with striking clarity.

Are there any more A/V related development plans for the Etihad Stadium in the near future?

We are continuing to expand in a number of different areas, from the new **City Football Academy** training site to the Etihad Stadium South Stand expansion.

We see A/V always playing a primary role in these diverse environments. The key for us is to continue to support our fans by making these spaces the best environments possible and we're already seeing the impact. We're committed to maintaining this progressive approach and are pushing forwards to make this a next generation stadia facility. ■

SITTING COMFORTABLY

Stechert illustrates how their specialist knowledge of sports venue seating design and manufacture is paying dividends for their growing client-list.



Stechert has installed a bespoke seating solution in dugout at Stoke City's Britannia Stadium, including electrically adjustable backrests and heating.

One interesting example of a football club and a manufacturer working closely together is that of English Premier League team **Stoke City** and the German seating specialists **Stechert Stahlrohrmöbel GmbH**.

Two years ago we reported how Stechert had successfully supplied the club with luxury heated VIP seats for the Directors Area and since then this relationship has continued to strengthen.

Another area which the club was keen to improve were the seats used in the dugout area as Managing Director, Richard Smith, explains: ***"We wanted to replace the seating to our dugouts for two reasons, primarily to afford the players more comfort than they had previously and secondly to present our commercial partners with an advertising opportunity on the new seat headrests. The comfort issue was borne out of the fact that the existing seats were padded versions of our standard stadium seats and were quite cramped in configuration. We wanted to enhance the environment such that it gave the players more room and better posture. They can sometimes be called upon at short notice for a substitution, so it is far better for them physiologically to be in a more relaxed position. We worked with Stechert to produce a bespoke solution that gave us everything we needed to meet our objectives. This included advice from our medical staff to create a new seat with the additional features of electrically adjustable backrests and heating."***

DESIGN FEATURES

Another design feature is that the headrest is exchangeable to reflect a change in sponsor, something which will be of great value to stadiums that host different tenant teams. Installation took place in early August, just in time for the opening home game of the season against Liverpool.

"We are absolutely delighted with the end product that Stechert have produced for us and we could not have asked for them to be more helpful throughout the process" adds Smith.

Stechert's 'TipUp Smart' and 'COPACABANA' seats have also been installed in the same area, whilst the recent renovations to the hospitality area included the installation of 700 'LUGANO' seats.

Stechert's successful involvement with English clubs now extends to **Everton**, who also recently ordered the 'LUGANO' seat and **Tottenham Hotspur** who, in early August, installed over 100 heated 'HAMBURG VIP' model seats for the luxury boxes in their West Stand.

GROWING PORTFOLIO

In addition to increasing their UK business, the company has also supplied seating solutions to a range of other sports venues throughout Europe. These include the recent delivery and installation of 10,000 'ARENA' seats for the **Aachen CHIO** equestrian stadium, home of the famous CHIO and the European Championships taking place in August. Also, at the Arctic Circle, the new **Rovaniemi Stadium** (Finland) has just opened with 2,000 'BERLIN' seats in the colours blue-white-green.

In July, the **Bulstrad Arena** in Ruse, Bulgaria opened and was quickly acclaimed as being one of the most modern multipurpose-halls in Southeast Europe. The venue features over 5,000 Stechert seats, including 120 'Copacabana Business' seats and more than 5,000 'TipUp smart' seats. Over 1,200 of these seats were mounted on telescopic grandstands, which enables the Arena to host a wide variety of different events, including concerts and various sports.

Bobby Velkov and Ivan Drandiyski, the managers of **Bulstrad Arena**, were enthusiastic about the quality of the seats and the handling of Stechert Group: ***"We are completely happy with the seat from Stechert. The great design and comfortable shape fit flawlessly in our new Arena. Everything from the order to the installation worked out perfectly."*** ■


Rovaniemi

COLUMN
DIMITRI HUYGEN

FAN ENTERTAINMENT

Dimitri Huygen, Managing Director of ESSMA, showcases the Association's first fan entertainment experience in the USA.



Since my column last year, in which I highlighted that ***"everybody is speaking about fan experience"***, we surveyed our members and subsequently organised our first '**ESSMA Fan Experience Tour**'.

What could be a better way to discover examples of fan experience with a proven added-value for the fan and the club than a tour of USA venues? Indeed this will be the ideal event for our members to become submerged into the American way of fan entertainment. We are convinced that the first **ESSMA** event to the USA will provide insights in customer experience and boost our members' fan entertainment/engagement development.

Paul Turner, Director of Event Operations & Security at **AT&T Stadium** in Dallas, gave an outstanding presentation at the last **ESSMA Summit** in Munich and demonstrated how clubs and stadiums should communicate and interact with fans in order to have sold-out events and increase revenues. With an ARPU (Average Revenue Per User) of USD$70, the AT&T Stadium is a world-leader in terms of profitability. Paul Turner will host the group at the AT&T Stadium during match day preparations on Saturday September 5.

IDEAS & INSPIRATION

We are convinced that our members will witness great ideas during the tour and will implement some of them upon returning to their home stadiums.

The outline of the tour will be four venues in New York City and three in Dallas, focusing – apart from the main 'Fan Experience' topic – on networking and knowledge-exchange. Two match days will bring the 'real deal' to the participants, so they can discover how fan entertainment/engagement contributes to the success of stadiums.

All those practical examples will be also shared at the next ESSMA Summit, taking place at San Mamés Stadium in Bilbao, January 19 to 20, 2016. Further information on the Summit can be found on page 72.

Let's stay connected via **www.essma.eu** & **www.essmasummit.eu** ■

Dimitri Huygen is Managing Director of ESSMA
@DimitriHuygen

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AT&T Stadium (formerly Cowboys Stadium) and inset, Paul Turner, Director of Event Operations & Security.

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Skyfold outline their acoustic space management solutions, which can provide sports venues with additional revenue streams.

www.skyfold.com

Stadiums are iconic landmarks for any city and are becoming centres for community activities as facility management teams look at revenue generating options for non-sports events.

Traditionally used solely for sporting events (and in many cases, for one singular sport), stadiums were only used for about 20-25% annually, racking up large maintenance costs for the rest of the year when the facilities remained unused. Contemporary stadium designs now offer more control over space management, enabling the venues to be used for large or small revenue generating events throughout the year.

Architects and facility managers have long been relying on **Skyfold's** quick and easy acoustic space management solutions to reconfigure multifunction rooms, players' meeting rooms and auditoriums for press conferences and the media, and even to control crowd circulation!

FLEXIBLE SPACE MANAGEMENT

Skyfold® offers flexible space management at the touch of a button. It is an acoustic retractable wall system that stores in the ceiling when not in use. This electric system is deployed by a turnkey/push button operation and is fully automatic; it does not require manual operation. Skyfold products can be used in just about any location that requires quick and easy space division. With no wall or floor tracks, the system conveniently and discretely retracts into the ceiling cavity; with no compromise on the space design and no wastage of floor space for storage pockets.

From the preliminary design stage of a project, the Skyfold technical design team can assist architects with designs for clients, and understand their requirements of space flexibility. Skyfold's design team can also work with the structural consultants on their requirements for loads and later with the interior designers for their finish options to provide a completely integrated solution to meet their criteria for space flexibility.

Skyfold walls are very well suited for retrofit projects because they are light weight walls, with only a dead load to consider. Venue managers with a refurbishment or retrofitting need, can contact Skyfold for solutions to create luxury and VIP suites from existing space or to configure a large space into multi-use facilities for corporate meetings or parties.

MULTI-USE SPACES: GENERATING REVENUES

Many venues are now looking at increasing their business in the off-season through hosting conferences, corporate meetings, exhibitions, parties and even weddings. The scope for hosting these kinds of events is influenced by maximising the usage of available space in the facility.

There is an increasing trend for stadiums to not only be used for sporting events, but for multi-use, which



can be quickly reconfigured for various events. Skyfold walls retract into the ceiling cavity leaving no trace of a wall having been there just minutes prior, and with no unsightly wall or floor tracks. Several finish options to match the interiors also help to provide a backdrop to any event. Floor space, which is automatically calculated as seating space, is maximised, since storage pockets are not required.

Sub-letting the facilities on non-sporting event days plays an important role in alternate revenue generation. Space flexibility is the key to adapt to clients' requirements for large or small events. For example, corporate parties for the holiday season or New Year, would mean only a few days of brisk revenue. This unusual business time can be maximised by hosting multiple events during the same day! Since Skyfold requires between 1 to 5 minutes of set up time, the banquet space can be quickly set up by staff.

The main benefit of a Skyfold wall is its quick and effortless space division, with minimum maintenance costs. The clients and facility operators can also use this to their advantage when they have functional requirements, like crowd control, or revenue generating options, like converting the media room to an auditorium or conference room for corporate events.

CREATING THE ULTIMATE LUXURY SUITE

With the aim of providing VIP guests with an extremely high level of service, quality and comfort, luxury suites in stadiums are now an increasingly lucrative source of revenue generation. A major criterion when designing luxury suites that architects consider is the flexibility of the space to reconfigure it from a VVIP suite, used by heads of state on match days, to prime spaces that can be hired out as meeting facilities for corporate events on non-match days.

As VIP packages are developed to include and reflect the level of luxury provided, restricted lounge access, catering, hostess services and club facilities for the dignitaries can be conveniently located in an area enclosed by a Skyfold wall.

INDOOR PRACTICE AREAS & CROWD CONTROL

A large indoor arena can be divided into smaller spaces at the touch of a button for two simultaneous games. Skyfold walls are third party certified for an impact resistant test with superior acoustics.

Skyfold's easy to use mechanism and quick automatic control make it an effective tool to control indoor traffic. The openings no longer need to be permanently open or closed.

Skyfold walls can be accommodated as per the opening size to close up or open areas depending on the number of visitors or to regulate the flow of foot traffic. Areas that are not used can be closed off to save on HVAC costs.

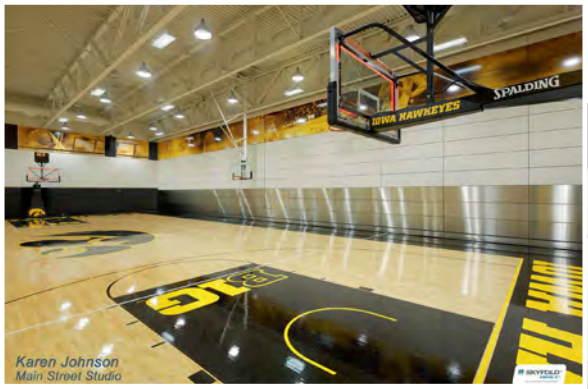
TRIED AND TESTED

Skyfold walls have been the industry leader for over 20 years and rigorously tried and tested by users, with nearly 5,000 installations worldwide. The Skyfold wall has been acoustically tested by an independent government authorised laboratory in full accordance and compliance with ASTM E90 (ISO 140-3) for a completely functioning retractable wall.

With numerous built-in safety features, the lifting mechanism is designed with superior safety factors. All tests are certified by a government authorised third party. Additional safety features include auto reverse, obstruction safety sensor and a back-up operation in case of power failure.

OPERATION AND MAINTENANCE COSTS

Operation and maintenance costs are kept to a minimum, as no manual intervention is required. Minimum damage to the walls over the years, and reduced loss of acoustic function, keep the cost of owning a Skyfold wall extremely low. ■



Skyfold systems enable large indoor arenas to be divided into smaller spaces at the touch of a button for two simultaneous games. Pictured above at the University of Iowa.

Skyfold offers several high-end finish options suitable for use in luxury and VIP suites (pictured here at the University of Oklahoma).

SEATING AS A REVENUE TOOL

Katie McIntyre illustrates how seating is a major component when it comes to revenue optimisation at sports venues.

Increasingly costly, modern day sports venues need to generate more revenue for their owners and managers. Seating is a vital part of this revenue optimisation, whether the venue in question be an 80,000-capacity Olympic stadium or an 8,000-capacity ice hockey arena.

Just as sports venues have evolved over the years – from single team operations to multi-sport, multiuse facilities – so have the demands of today's sports fans. In turn, the seating sector – especially when it comes to premium seats – has undergone its own transformation, which has also affected how a venue's seating is configured.

As Bill Dorsey, Chairman and Founder of the ALSD explains: ***"In 1990, only 3% of the seats were considered premium. Today, 20% of a major venue's seats are considered premium, which can account for nearly 50% of the ticketing revenue."***

This explosion in the percentage of premium seating is evident in venues such as the 51,700-capacity **Aviva Stadium** in Ireland, which boasts no less than 10,000 seats at premium level and a further 1,300 at box level.

Even General Admission (GA) seats have witnessed a revolution over the last number of decades, with **Arsenal FC's Emirates Stadium** choosing to focus not only on the spectator experience for their Corporate/Premium guests but also for their GA fans. This marked a step change in stadia design and consequently on the football business in the UK, with Arsenal increasing their match day revenues by 111%.

By conducting market feasibility studies, venues looking to refurbish their existing facilities or build new ones, can pinpoint the optimal number of seats and configurations, and add to their bottom line. »

THE BOX SEAT

Emirate's Stadium merchandise sales have increased by 500% and a portion of this increase has been strongly attributed to the seating design of The BOX Seat, which provides the world's widest clearway access in venue seating.*

**Arsenal Holdings PLC Financial Statements 2006/2007*



Venues and architects alike are looking for new and innovative approaches to revenue generation. However, the 'tried and tested' methods are far from being forgotten, and when it comes to seating, **The BOX Seat** is at the forefront of those using innovative design to maximise revenue potential.

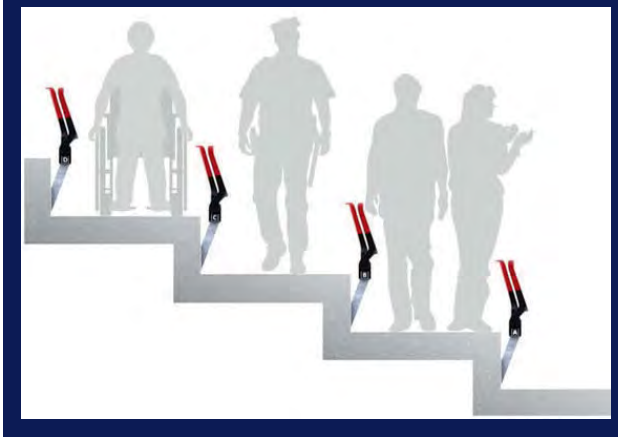
The trademark compact design of The BOX Seat focuses on providing the widest aisle depth possible, creating a generous 'clearway' for spectators and allowing for accelerated access and egress from the venue as a whole and from an individual's seat.

From a revenue generating perspective, the benefits of this are two-fold. Firstly, the 'clearway' allows a spectator to exit their BOX Seat swiftly and reach vendor facilities with ease, meaning on-going income streams are promoted and the potential sales from food, drink and merchandise are greatly increased.

This same BOX Seat trademark also works to reduce both venue maintenance and operational costs. Spectators are able to enter and exit the site 50% quicker because of the two person aisle depth, meaning start up and shut down time is dramatically reduced. As a result, savings are made from the associated overheads, e.g. cleaning and security personnel and power costs.

As well as meeting the ever-evolving needs of fans by providing them with a sophisticated space in which to enjoy the event, The BOX Seat range is also a powerful driver of revenue, offering an all-important cash flow boost for venues.

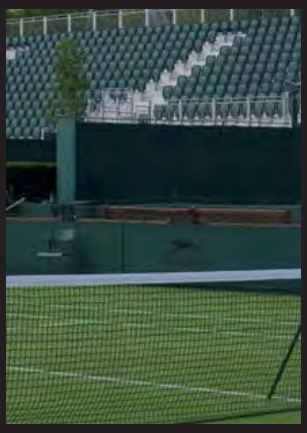
For full details on The BOX Seat innovations, visit: **www.theboxseat.co/innovations**



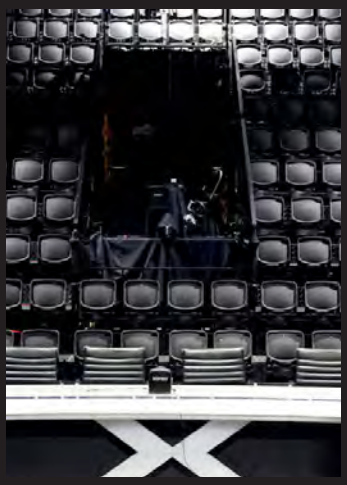
The compact BOX Seat maximises aisle depth resulting in savings from overheads and an increase in revenue potential.

MULTI VENUE SEATING

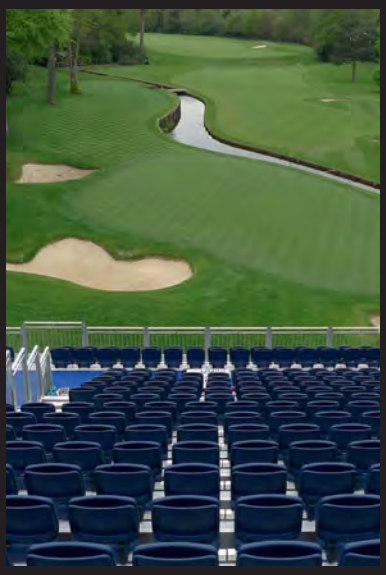




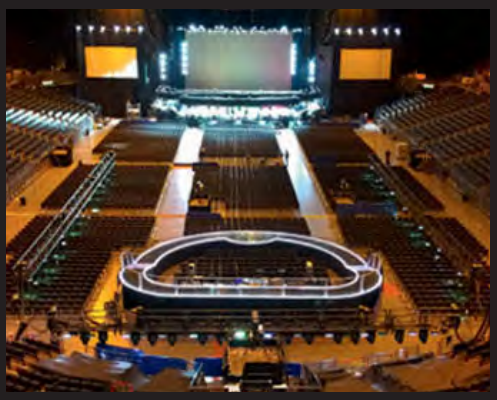
Tennis Complex



Television Studio



Golf Course



Concert Hall

'The BOX Seat' and 'Box Seat' are registered trade marks. The BOX Seat is subject to multiple global design and patent registrations.

STECHERT AT VELTINS-ARENA

Part of **FC Schalke 04's** pre-season renovations to their **VELTINS-Arena** have included installing 2,000 new artificial leather 'Hamburg VIP' seats from leading seating provider **Stechert Stahlrohrmöbel GmbH**. This follows on from Stechert installing the same high quality model in all VIP boxes in the stadium 2 years ago.

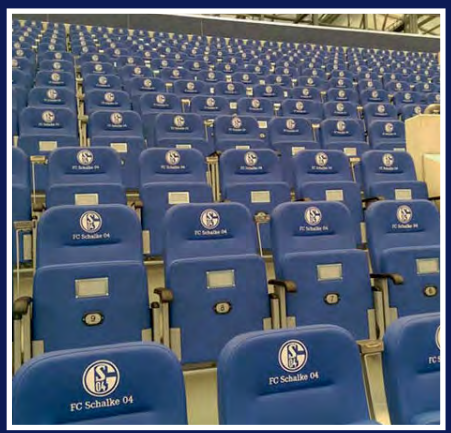
Alexander Jobst, Board Member in charge of marketing commented: ***"We are very happy with the new seating, which makes our business area even more comfortable. The seats stand out through their high density foam upholstery and its very modern design. All seats have been produced in our club colour, king's blue, and are embroidered with our S04 club logo."***

Other recent projects include installing 48 new 'Champions DeLuxe' VIP seats for the woman's Champions League final at the **Jahn Sportpark** in Berlin and 100 fully upholstered FRANKEN VIP seats and 200 FRANKEN VIP special edition seats to German 2nd division team **FC Heidenheim** (**Voith Arena**).

www.stechert.de/en/home/





















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ADVERTISERS' INDEX

Abacus Lighting	105
AECOM	29
ARCHAIO	Show Guide 9
Arena Projekt	55
Arup	39
Cox Architecture	81
D.A.S Audio Asia Pte Ltd	Show Guide 11
Dallmeier Electronic GmbH & Co KG	146
Douce-Hydro	142
Dow Europe	113
ESSMA	149
ESTO	111
European Turf Group	109
FSB	66
Funktion-One	51
Gardiner & Theobald LLP	48
Geiger Engineers	73
Gensler	47
HKS Architects	43
HOK	21
IAVM	147
ICSS	151
KSS Design Group	65
L'Acoustics	99
Leyard Europe s.r.o.	34 & 35
LG Electronics Benelux Sales B.V.	9
Manica Architecture	93
MCAT Automation s.r.o.	19
ME Engineers Inc	127
Mehler Texnologies GmbH	131
Mott MacDonald	7
Musco Lightng Inc	145
One Systems Inc	137
OSRAM GmbH	85
Philips Lighting B.V.	4
Populous	IFC
Preformed Markings Ltd	25
Recipneu	107
Recticel Flexible Foams	117
Signature Systems Inc	97
SIS Pitches	26 & 27
Skidata AG	141
SMG Sportpltzmaschinenbau	121
Soccerex	139
Stechert	161
Terraplas Plc	101 & 119
The Box Seat	159
Trocellen GmbH	Show Guide 7
Ungerboeck Software	Show Guide IFC
Vector Foiltec	133
Walter P Moore	17

YOUR NEXT ISSUE

The next edition is our ***Showcase Special***, which will feature a round-up of all the year's stand-out projects, along with an array of in-depth articles by our advertisers and supporters, covering everything from architecture and design, to the latest products and emerging technologies.



*The next issue will also include an in-depth review of our 'live' event, **Stadia & Arena Asia Pacific 2015**, with details on the region's latest sports venue projects.*





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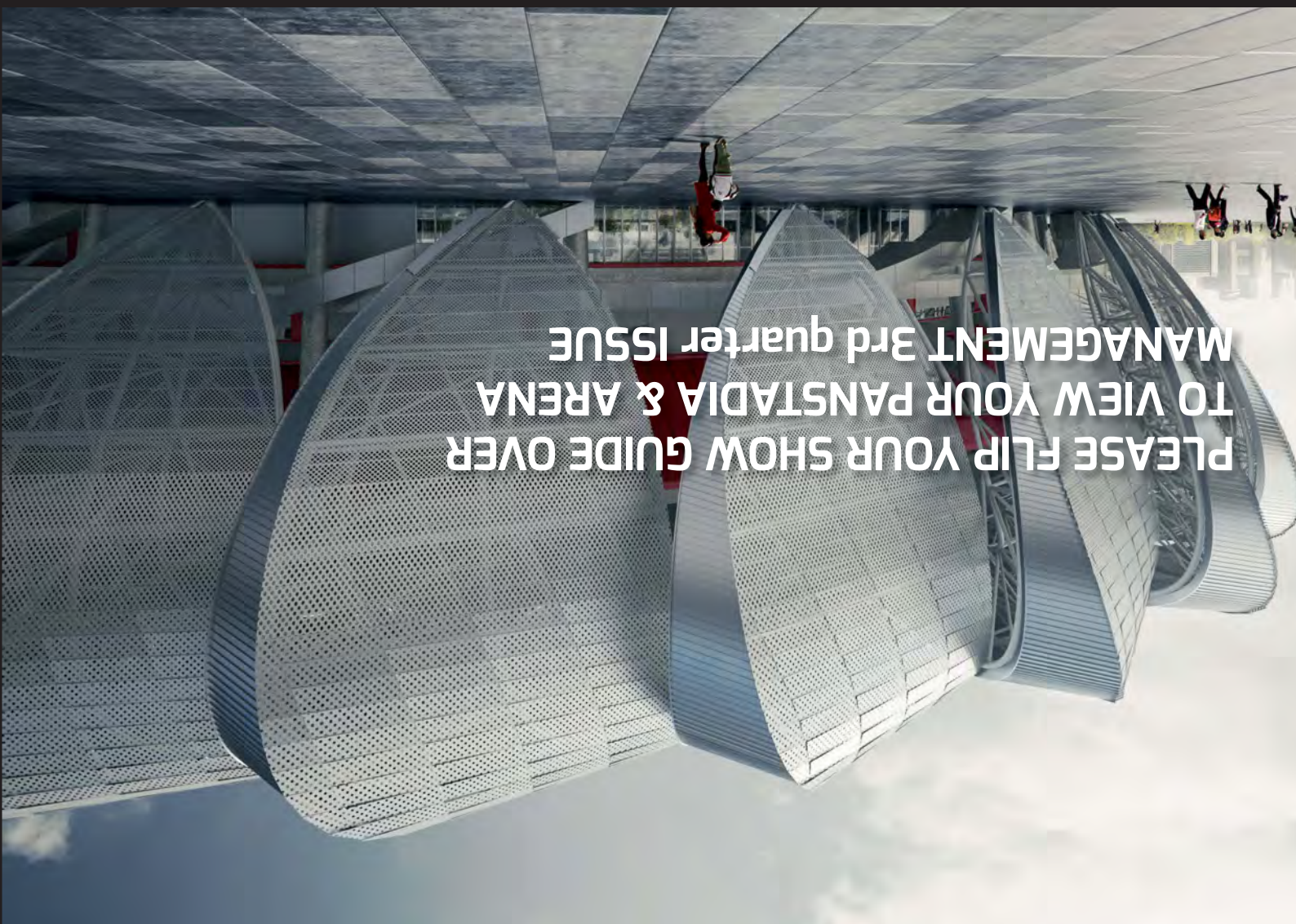
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Stadia&Arena

ASIA PACIFIC
28-30 SEPT 2015



PLEASE FLIP YOUR MAGAZINE OVER TO VIEW YOUR STADIA & ARENA ASIA PACIFIC 2015 SHOW GUIDE



DAY 3 AM WED 30 SEPT 2015

08:45 **Morning registration and coffee**

sponsored by USI Ungerboeck Software International

REVENUE GENERATION, VENUE MANAGEMENT & FAN ENGAGEMENT – OPEN FORUM

10:30 **Coffee break and networking in Exhibition Hall**

sponsored by AECOM

11:00 SESSION 10B: Fan engagement: New ideas on how to exceed fans expectations (roundtable)

It is clear that modern sports fans have much higher expectations of the 'live' stadium or entertainment experience. A panel of leading industry experts will share their experiences and opinions on initiatives to give your supporters more 'bang for their buck', increase fan loyalty and enhance the game day experience in order to create lasting and memorable moments.

Panellists:



Douglas Danapal
Business Manager
Singapore Rugby Union



Alice Edinger
Senior Account Manager
Disney Institute
– Asia Pacific



Greg Gillin
Senior Vice President
Venue Development
Live Nation



Melissa Pine
Vice President, Asia Pacific
WTA Finals Tournament
Director



Russell Yell
Director
Movement Strategies

SESSION 11: Technology in stadia: Key considerations when assessing requirements for your own venue (roundtable)

This session is especially aimed at venue managers, operators or municipalities who have under their remit sports venues which are currently reaching the end of their life cycle and urgently in need of modernisation. Clearly the increasing and changing demands on modern sports venues places a huge challenge on their technology infrastructure and the panel will discuss key considerations regarding technology provision and requirements, especially for venues looking to increase their revenue streams.

Panellists:



Chris Dodds
Managing Director
The P.A. People



Trevor Easley
Host Country Security Design, Risk and Assurance Lead – Supreme Committee for Delivery and Legacy (2022 FIFA WORLD CUP QATAR)



Fred Lazzerini
Managing Director Asia-Pacific
Ungerboeck Software International



Kevin Worster
Director – Major Projects
Siemens

13:00 **Lunch and networking in Exhibition Hall**

sponsored by HARMAN

14:00 **Exhibition Hall closes**

14:00 Site tour and practical workshop on artificial turf maintenance, featuring live product demonstrations and expert advice

in association with SMG

Although the support for and use of artificial turf is growing around the Asia Pacific region, there is still a lack of quality practical information available about what steps should be taken to properly maintain an artificial field. To help with this, all attendees are invited to attend a live series of practical demonstrations at a local artificial field to learn everything they need to know about the different maintenance steps that should be followed to help ensure the optimum maintenance management program. Experts from SMG will showcase their market-leading TurfCare TCA1400 and SportChamp SC2 maintenance machines and also discuss the practical steps needed to create a maintenance program to fit your own facility requirements.

For further information about SMG please visit **www.smg-gmbh.de/en**



DAY 3 AM WED 30 SEPT 2015

08:45 **Morning registration and coffee**

sponsored by USI Ungerboeck Software International

STADIA DESIGN/BUILD/ENGINEERING & MAJOR EVENT PLANNING – SOUTH FOYER

09:15 SESSION 9: **The cultural specificity of stadia: Creative approaches to sports venue design that best serve a city's way of experiencing sport (roundtable)**

Over recent years there has been increasing focus on the legacy role of major sports buildings and the key role that architecture can play in creating buildings that best serve a city's or local community's way of experiencing sport and the benefits this can bring. A panel of experts will share their own insights and experience based on working on sports projects around the globe.

Panellists:



Trevor Easley
Host Country Security Design, Risk and Assurance Lead – Supreme Committee for Delivery and Legacy
(2022 FIFA WORLD CUP QATAR)



Erhan Ilıcalı
Coordinator of Architecture Departments/Architect
Bahadır Kul Architects (BKA)



Dan Meis
Founder & Design Principal
MEIS



JRJ Parrish
Principal
AECOM Global Sports



Dipesh Patel
Director and Founder
Pattern Design



John Rhodes
Director of Sports + Recreation + Entertainment
HOK

10:30 **Coffee break and networking in Exhibition Hall**

sponsored by AECOM

11:00 SESSION 10A: **Global projects in focus: The latest leading edge designs and approaches for worldwide stadia**

Making the most of what you've got without stopping what you do.

Presented by:



Andy Simons
Director
KSS

Andy will discuss one of the hottest topics currently in the industry which is the transformational redevelopments of sports facilities in continuous use.

BIM Blue Print to Delivering Low Cost Stadia

Presented by:



James Middling
Global Head of Sport & Events
Mott MacDonald

James examines Mott MacDonald's 'blueprint'-thinking which crystallised under Northern Ireland's award-winning Casement Park stadium project.

Kai Tak Multi-Purpose Sports Complex

Presented by:



Alastair Graham
Director
KPMG Hong Kong (Programme Manager – Kai Tak Multi-Purpose Sports Complex)

An introduction to the exciting new sports complex planned for Kai Tak in Hong Kong.

12:30 **Lunch and networking in Exhibition Hall**

14:00 **Exhibition Hall closes**

sponsored by HARMAN

14:00 SESSION 13: **Closing keynote from the Disney Institute: Disney's approach to quality service**

This Disney Institute program will dive into the importance of attention to detail and how Disney train their cast members (employees) to treat their guests (customers) as VIPs. As leaders in the sports industry it is important to understand that fans are your guests and the interactions they have with your stadium employees and third party vendors will impact the overall fan experience. As a service provider of sport, you may not have the ability to control what is featured on the playing field; however, you do have control of what happens around the event. From parking lot attendants to ticket takers and concessionaires to ushers, they all have the ability to negatively or positively impact the overall fan experience. An exceptional fan experience is a direct result of employees delivering a high standard of quality service that Disney has prided itself on for many years.



Alice Edinger
Senior Account Manager
Disney Institute – Asia Pacific



Wing Tan
Senior Facilitator
Disney Institute – Asia Pacific

DAY 2 PM TUE 29 SEPT 2015

REVENUE GENERATION, VENUE MANAGEMENT & FAN ENGAGEMENT – OPEN FORUM

14:15 SESSION 5B: **1 year on! The Singapore Sports Hub: A reflection on a year of challenges and successes**



Damian Bush
Senior Director – Venues & Event Management
SportsHub Pte Ltd



Mark Collins
Managing Director
Global Spectrum Asia

15:20 SESSION 6B: **Mixed martial arts as a revenue generator for Asia Pacific venues**

ONE Championship™, Asia's largest mixed martial arts organisation, have held successful events that draw up to 20,000 fans all over Asia. One of the key components to be able to provide one of the most memorable 'live' experiences in Asia is a world-class arena. ONE FC have agreed to multiple-year agreements with leading stadiums such as MOA Arena in the Philippines and the Singapore Indoor Stadium, both of which have hosted multiple ONE FC events. Victor shares why the importance of having a world-class venue to hold mixed martial arts events and how it contributes to the event's success.

Presented by:



Victor Cui
CEO
ONE FC

15:50 **Coffee break and networking in Exhibition Hall** *sponsored by* POPULOUS

16:20 SESSION 7B PART ONE: **How the design and thinking around synthetic sports surface technology is and will continue to change to meet the mega-trends and generational changes of participation in sport**

Martin will explore the latest research on participation in sport from Australia, that reflects global trends in sport, and explain why this is generational change is also impacting the synthetic surface technology at a stadium, regional and local level. Will the technology provide opportunities for Stadia and Community Fields so that more people can participate in sport and can stadia be more flexible to ensure they can achieve their return on investment.

Presented by:



Martin Sheppard
Managing Director
Smart Connection Consultancy

16:45 SESSION 7B PART TWO: **Playing surface management roundtable: A global perspective on design, installation, quality assurance and maintenance challenges**

Moderator:



Lee Penrose
Director
STRI Ltd

Panellists:



Nigel Felton
Owner
Sports & Stadia Services Ltd



Chris Hague
Manager
Turf Grass Productions



Martin Sheppard
Managing Director
Smart Connection Consultancy



Nick Smith
Partner
Proleisure



Hamish Sutherland
Managing Director
HG Sports Turf Pty Ltd



Ian Tittershill
Vice President International
TarkettSports

17:45-19:30 EVENING NETWORKING AND COCKTAIL RECEPTION IN EXHIBIT HALL

All delegates and exhibitors are invited to attend our evening reception in the heart of the exhibit hall. High quality food and drink, great entertainment and invaluable face time with key decision-makers. Not to be missed!



DAY 2 PM TUE 29 SEPT 2015

STADIA DESIGN/BUILD/ENGINEERING & MAJOR EVENT PLANNING – SOUTH FOYER

14:15 SESSION 5A: **Roofing challenges in modern stadia**

PART ONE: Key factors influencing the life span of stadia roofs

Presented by:



Thomas Hermeking
Sales Manager Cable Structures
Pfeifer Seil und Hebertechnik

The majority of sports projects are existing structures undergoing a refurbishment or renovation process. This often involves an amendment of a roof structure on the existing bowl, sometimes even adding a movable portion. More and more of these structures are not built for eternity and architects and engineers have to respond to this. This presentation will analyse how to work between an always growing request for higher material quality and judging a realistic life span of the structure.

PART TWO: Modern stadium design meets high performance fabrics

Presented by:



Mohammed Bahsh
Specification & Project Development Manager
Verseidag Indutex GmbH

The latest stadium designs are increasingly incorporating high performance materials made of textiles for roof and facade applications. When it comes to the latest design concepts, these technical textiles are no longer limited to translucency and acoustics only. What are the key values a fabric roof and facade can provide and what is necessary to ensure their performance?

15:05 SESSION 6A: **Tomorrow's together: What will shape the venues of the future?**

Global design practice Populous present the results of their year-long project to discover how the venues of the future will look, feel and function, undertaken in association with ***PanStadia & Arena Management*** magazine. Having explored the key trends throughout 2015, integrating feedback from ***PS&AM's*** readership, three leading designers from Populous' global offices will outline their visions of the future.



Chris Paterson
Principal
Populous



Paul Shakespeare
Associate Principal
Populous



Greg Sherlock
Senior Architect/Principal
Populous

15:50 **Coffee break and networking in Exhibition Hall**

sponsored by POPULOUS

16:20 SESSION 7A: **Stadia and arena: Aerodynamics and beyond**

Presented by:



Dr Melissa Burton
Global Head of Civil Structures
BMT Fluid Mechanics Ltd

Today's modern stadia & arena are complex multifunctional buildings hosting a variety of events. The commercial and financial success of these structures would not be possible without the support of sophisticated and highly specialised engineering services such as wind engineering and building physics studies. This talk will highlight the importance of early considerations of wind and climate in architectural design and demonstrate through the use of case studies how the wind tunnel can be used as a design tool in assessing the impacts of complex wind flows within the urban environment.

16:45 SESSION 8: **Major event masterplanning: Ensuring a successful event and legacy (roundtable)**

Major events have a significant impact on their host cities. The development of the masterplan at a venue, precinct, park or city scale is crucial to guiding decisions and ensuring efficient delivery. This panel will discuss key considerations in approaching the development of a masterplan and will draw on a range of examples.

Panellists:



Andrew Cooke
Director Security Operations
ICSS (International Centre for Sport Security)



Andrew Sharp
Chief Executive Officer
EPG



Adam G Williams
Practice Leader Design + Planning, Director
AECOM Sports

DAY 2 AM TUE 29 SEPT 2015

08:30 **Morning registration and coffee**

sponsored by Dallmeier

REVENUE GENERATION, VENUE MANAGEMENT & FAN ENGAGEMENT – OPEN FORUM

11:00 SESSION 3B: Virtual stadium showcase: Ideas and inspiration for your own sports venue!

A unique opportunity for attendees to listen to rapid fire presentations from 8 leading product and service providers from around the globe, offering the latest in ideas for improving your own sports venue!

Featuring presentations from Signature Systems Group, Zinwave, Star Events Group, Light10 Industries, Intelligent Engineering, Mehler Texnologies, Harman and Archaio.

12:00 SESSION 4B: Revenue optimisation: New approaches to maximising your venues income from design through to operations (roundtable)

More is demanded from modern stadiums than ever before and one key aspect of this is the ability to both develop existing revenue streams and develop new ones. A panel of industry experts will examine this in detail from the role of the modern stadia designer through to operational and technology revenue drivers.

Panellists:



Jim Renne
Principal + Sports Design Director
ROSSETTI



Brian Morris
Chief Executive Officer
Melbourne & Olympic Parks Trust



Nick Daffern
Managing Director
Rapid Retail Ltd



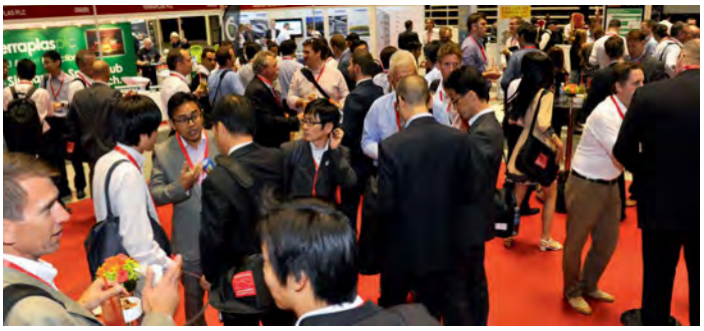
Don DeMarinis
Vice President - Sports & Entertainment; Foodservice Management
Oracle



Jason Hill
General Manager Commercial
Sydney Cricket & Sports Ground Trust

13:00 **Lunch and networking in the Exhibition Hall**

sponsored by h+k







DAY 2 AM TUE 29 SEPT 2015

08:30 **Morning registration and coffee**

sponsored by Dallmeier

STADIA DESIGN/BUILD/ENGINEERING & MAJOR EVENT PLANNING – SOUTH FOYER

09:00 SESSION 2: Asian venues in focus: In-depth presentations on regional sports projects

Delegates are invited to learn about the plans for regional sports projects currently under development or how design approaches have been adapted to reflect the unique characteristics of the region.

Shantou Sport Park: Operational challenges in creating a multi-function sports venue in China



Greg Turner
General Manager
Shantou University Sports Park



Roger Barrett
Special Projects Director
Star Events Group Ltd

Greg will discuss the challenging process in expanding on the original design to develop a sports park which includes an NBA standard arena capable of functioning as a multi-function venue. Roger will talk about Star Events role in the project which included designing and supplying a world-class rigging system.

Adapting return on investment approach to sports and entertainment venues in Asia



Jim Renne
Sports Principal
ROSSETTI

In Asian countries, it's important for venues to engage guests in authentic and meaningful ways. The evolving international model integrates the fan, culture, context, hospitality and function to provide value. How does the US revenue model translate into designing venues in South Korea and China?

Australian cricket venues in focus



Alastair Richardson
Sports Director
Cox Architecture

As well as the many recent and upcoming Australian projects Cox have undertaken, Alastair will also be discussing the importance of cricket venues to the Asian region with a focus on the Adelaide Oval, SCG and the new Perth Stadiums.

10:30 **Coffee break and networking in Exhibition Hall**

sponsored by ROSSETTI

11:00 SESSION 3A: Designing for extreme climates (roundtable)

Modern stadium designers face complex challenges to create comfortable, safe environments for players and spectators in increasingly extreme climates. This panel brings together stadium designers, operators and technical experts.

Moderator:



Peter Ayres
Director - Buildings + Places and Business Unit Leader – Sports
AECOM

Panellists:



Chris Dite
Associate Director, Sport Venue Design
Arup



Kourosh Kayvani
Global Sports Leader
Aurecon



Angus MacLeod
Technical Director – Asia Pacific
Vector Foiltec



Lee Penrose
Director
STRI Ltd

12:00 SESSION 4A: Key facets of stadia planning

brought to you by ICSS

PART ONE: Integrated security planning: The key to optimise operations whilst minimising risk and cost



Andrew Cooke
Director Security Operations
ICSS (International Centre for Sport Security)

Andrew will look in-depth at the security requirements behind major event hostingf, focusing on optimising technology costs as well as looking at what's on the horizon.

PART TWO: Sound advice: Using audio to enhance fan engagement



Jim Griffiths
Director
Vanguardia Consulting

PART THREE: Game on: Maximizing the fan experience through unique design approaches

Presented by:



Chris Lamberth
Director of Global Sport Development
HOK

Using two North American HOK projects, Chris will present a new variety of premier seating and hospitality environments.

13:15 **Lunch and networking in the Exhibition Hall**

sponsored by HOK

DAY 1 PM MON 28 SEPT 2015

13:00 **Registration**

sponsored by SIEMENS

ALL Monday afternoon activities are FREE for everyone to attend and will take place in the Open Forum area in the Exhibition Hall.

13:45 Welcome speeches



Alan Levett
Chairman
Alad Ltd



Jason Ng
Executive Director
MP Singapore Pte Ltd



Mark Collins
Managing Director
Global Spectrum Asia

14:00 SESSION 1: Regional market reports: Recent developments and upcoming project opportunities

Moderated by:



Nigel Benton
Publisher
Australasian Leisure Management

Attendees are invited to listen to leading experts from around the region provide updates on the current status of upcoming sports projects in their country and share their opinions on industry developments and their implications both nationally and overseas.

PART ONE: SINGAPORE. THE SEA GAMES AND SINGAPORE SPORTS HUB: FROM CONCEPT THROUGH TO DELIVERY – HOW A VENUE DESIGNED AND BUILT FOR LEGACY HOSTED A MAJOR GAMES



Jin Teik Oon
Chief Operating Officer
SportsHub Pte Ltd

In June this year the Singapore Sports Hub successfully hosted the 28th Southeast Asian Games (SEA Games) which brought together over 4300 athletes from 11 participating nations competing in 402 events in 36 sports. This presentation will examine the story of the games from successful bid through to the triumphant end result.

PART TWO: AUSTRALIA

Panellists:

in association with HCR



Brian Morris
Chief Executive Officer
Melbourne & Olympic Parks Trust



Jason Hill
General Manager Commercial
Sydney Cricket & Sports Ground Trust



Phil Martin
Strategic Relationship Manager
Cox Architecture

PART THREE: INDONESIA. SPORT FACILITIES DEVELOPMENT IN INDONESIA



Timmy Setiawan
President Director
PT Unitri Cipta

16:00 WELCOME RECEPTION AND NETWORKING IN EXHIBITION HALL

Attendees will have the opportunity to meet with over 50 leading suppliers of services and solutions to the sports venue sector. Many of these companies will be showcasing their services in the region for the first time. The exhibit hall is the place to hear about the latest projects and industry developments, see new technology in action and be presented with a myriad of new ideas for your own sports venue project requirements.



18:00 **Close**

MEDIA PARTNERS

Around The Rings (ATR)
Since 1992, Around The Ring's global team of journalists has been on the scene of virtually every important event on the Olympic calendar. From the selection of every host city since 1990 to IOC votes on changing the sport program to multiple visits to assess cities' bids, ATR is there.
www.aroundtherings.com

Australian Leisure Management
Australasian Leisure Management magazine is the only business media in the leisure industry in Australia, New Zealand and Asia - with news and features covering aquatics, attractions, entertainment, events, fitness, parks, recreation, sport, tourism and venues.
www.ausleisure.com.au

FuturArc
Read by leading architects and building community professionals in Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam and beyond, FuturArc magazine is the voice of green architecture in Asia Pacific.
www.futurarc.com

GlobalSportsJobs
The leading specialist digital talent platform for the international sports industry. It provides an innovative, technology-driven solution to help sports organisations source a greater quality and diversity of talent, and is helping further professionalise and educate the sports industry.
www.globalsportsjobs.cn

Green Sports Alliance
Launched in March 2011, the Green Sports Alliance is a nonprofit organisation with a mission to help sports teams, venues and leagues enhance their environmental performance. The Alliance has grown to over 210 teams and venues from 16 sports leagues.
www.greensportsalliance.org

Green Sports Alliance Summit
The Green Sports Alliance Summit serves as a platform for the sports community to unite around sustainability – bringing together more than 600 industry stakeholders to learn from 80+ leaders and engage their peers in meaningful dialogue.
www.greensportssummit.org

Lighting Today
An architectural lighting trade magazine that targets professionals in the lighting industry, including manufacturers, suppliers, designers, architects, specifiers and many more. Published since 2002, Lighting Today currently has a global audience of over 47,000 readers.
www.tradelinkmedia.biz/publications/4

Panstadia & Arena Management
PanStadia & Arena Management magazine is the undisputed leader for the business of stadia, arenas, sporting and live events and venues across the globe. The super-title enjoys distribution to 20,000+ top-level industry professionals in 120+ countries.
www.psam.uk.com

MEI
Major Events International (MEI) are the only global professional membership scheme across all sectors in the major events industry. They have years of experience working with best in class companies for world sporting events such as the World Cup, Olympics and regional games.
www.majoreventsint.com

Southeast Asia Building
Southeast Asia Building (SEAB), published bi-monthly since 1974, is a Singapore-based trade magazine devoted to architecture, interior design, landscape architecture, roof & facade and facility management.
seab.tradelinkmedia.biz

Sport Asia
Sport-Asia.com is part of SportAsia's multi-media platform including Facebook **/sportasiamagazine**, Twitter **@SportAsiaMag** and E-News. Focused on 'Sport in Asia, Asia in Sport', **Sport-Asia.com** features wide-ranging news, views and insights.
sport-asia.com

Sportcal
Sportcal is the most comprehensive provider of sports market intelligence worldwide and the essential resource for anyone in the business of sport. Only Sportcal can bring you truly independent global sports market news and intelligence in more sports than anyone else.
www.sportcal.com

UK Venue Managers Association
The UK Venue Managers Association (UKVMA) provides a platform for members to share information, management styles, real project experiences and best practice whilst gaining private access to other members, networking opportunities and suppliers.
www.ukvma.org

Venues Today
Founded in 2002, Venues Today Inc. is the leading source of original reporting for live entertainment and events, serving management, owners and suppliers to music, sports and meetings venues internationally.
www.venuestoday.com

World Football Insider
The leading source for news about the business of football. Founded in 2009, INSIDER has been on the scene for the biggest events in football with a team of reporters with more than 15 years of experience. INSIDER brings the best insight and news about football to a global audience.
www.worldfootballinsider.com

Stand B01

Populous

Populous is a world leader in the design of sports and entertainment buildings, having worked on over 1,000 projects around the world. With a portfolio of over 400 major event venues, they are recognised as a world leader in overlay design, procurement and construction.

populous.com

ROSSETTI

A global architecture design and planning firm with over two decades of experience in sports and entertainment design solutions for every type of sport – international games, professional, college and recreational. Our core focus is Designing Experiences. Generating Value.

www.rossetti.com

Stand C03

Siemens

Siemens AG (Berlin and Munich) has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization.

www.siemens.com

Stand D11

SMG Sportplatzmaschinenbau GmbH

Since 1975, SMG has been dealing with the development of modern machinery for the installation of synthetic surfaces in the sports industry. Also, for artificial turf or granule infilling carpet maintenance, SMG has presented the world's first innovations since the 1980s.

www.smg-gmbh.de/en

Stand D08

Ungerboeck/USI

Ungerboeck delivers world-leading event and venue management software, empowering over 40,000 users worldwide. Whether you manage a stadium, arena, sports or event venue of any kind, our software provides an airtight system with the power to manage your entire business.

www.ungerboeck.com

LOCAL EVENT PARTNER

MP International

MP Singapore is part of the MP International (MPI) group who are part of the Pico group. MPI is headquartered in Singapore with offices across Asia and Europe. Projects include APEC Leaders Week 2009, 117th International Olympic Council Session, and ITMA 2015 in Milan.

www.mpinetwork.com

CLOSING KEYNOTE

Disney Institute

The long-standing reputation Disney Theme Parks and Resorts has for incredible service and friendly employees is not magic, it is sound ideology consistently applied in business. Find out more in the closing keynote.

www.disneyinstitute.com

EVENT PARTNERS

IAVM

Representing public assembly venues from around the globe, IAVM's active members include managers and senior executives from auditorium, arenas, convention centres, exhibit halls, stadiums, performing arts centres, university complexes and amphitheatres.

www.iavm.org

Singapore Exhibition & Convention Bureau

A group of the Singapore Tourism Board (STB), the Singapore Exhibition & Convention Bureau™ (SECB) has a mission to champion business travel and business events. They aim to establish Singapore as a dynamic business events destination.

www.yoursingapore.com

Sport Singapore

A statutory board of the Ministry of Culture, Community and Youth, Sport Singapore's core purpose is to inspire the Singapore spirit and transform Singapore through sport.

www.sportsingapore.gov.sg

Your Singapore

Singapore is a bustling cosmopolitan city that offers a world-class living environment. One interesting facet you'll discover about Singapore is a ubiquitous collage of cultures, where people of different ethnicities and beliefs coexist.

www.yoursingapore.com

Stand E06

Windtech Consultants

Windtech Consultants are a leading global wind engineering consultancy firm that has worked on over 2,500 projects. We support sustainable design by providing accurate modelling and sound advice for natural ventilation, daylight, solar access, glare and thermal comfort.

www.windtech.com.au

Stand B12

Zinwave

Zinwave is a global provider of a unique active wideband in-building wireless, Wi-Fi and IP coverage solution for high density buildings. UNItivity comprises a 150MHz-2700MHz frequency range, making it flexible, scalable and future-proof.

www.zinwave.com

PRESENTING SPONSORS

Global Spectrum Asia

Celebrating its 10th anniversary as a company in 2010, Global Spectrum is owned by Comcast-Spectator, which in turn is owned by the Comcast Corporation, making the company the world's most dynamic, well-capitalised facility management company.

www.global-spectrum.com

EVENT SPONSORS

AECOM

The AECOM global sports team, responsible for over 100 stadia and arenas and masterplanners of the London 2012 and Rio 2016 Olympic Games, is a collaborative community of urban designers, engineers, economists, planners, cost consultants, project managers and architects.

www.aecom.com

Stand B02

HARMAN

HARMAN designs and develops premier audio, visual, infotainment, and enterprise automation and software services solutions for consumers and businesses with a focus on the automotive, mobile, enterprise, telecommunications and healthcare markets.

www.harman.com

Stand E04

Cox Architecture

Cox Architecture is one of the largest architectural practices in Australasia with 350 staff and 25 Directors across 7 offices in Australia and overseas. They provide services in architecture, planning, urban design and interior design.

www.coxarchitecture.com.au

HOK

HOK recently launched its Sports + Recreation + Entertainment practice with the acquisition of 360 Architecture. As a leader in sports facilities design, HOK's expertise encompasses arenas, stadiums, training facilities, recreation centers, entertainment venues and mixed-use districts.

www.hok.com

Stand B07

d&b audiotechnik

d&b audiotechnik operates internationally as a manufacturer of high quality loudspeaker systems for sound reinforcement speech and music in public places. The headquarters, which also house R&D and manufacturing, are located near Stuttgart in the south west of Germany.

www.dbaudio.com

Stand D03

ICSS

The International Centre for Sport Security (ICSS) is an international, independent and not-for-profit organisation. With an aim to improve security, safety and integrity throughout the world of sport; the ICSS provides expertise, services and global knowledge.

www.theicss.org

Stand C01

Dallmeier

Dallmeier is one of the world leading providers of products for network-based video surveillance and has more than 30 years of experience in the development and manufacture of high quality components and complete solutions for the CCTV/IP sector.

www.dallmeier.com

KSS

KSS are architects and designers with a strong portfolio in sport architecture. They believe that architecture has the potential to inspire and be a force for good. The built environment forms the backdrop to people's lives, and provides comfort, security, stimulation and enjoyment.

www.kssgroup.com

HQ series

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The D.A.S. HQ series is designed for medium to large scale installations such as arenas, auditoriums, stadiums and theaters. The HQ models offer tightly controlled coverage patterns and high output capabilities being usable individually, or in multiple unit arrays.

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EXHIBITOR PROFILES

Stand C04

Mehler Texnologies

With over 60 years of development and production experience, Mehler Texnologies is one of the leading companies in coated fabrics. More than 53,000,000sqm are produced and sold each year under the brand names VALMEX®, POLYMAR® and AIRTEX®.

www.mehler-texnologies.com

Stand E03

Sports & Stadia Services Ltd

In 20 years the company has developed proven, effective and practical protection systems against rain, snow and extreme cold. The MacLeod Cover is used in football and rugby stadiums throughout Europe and recently at FIFA World Cup qualifiers in Poland and Belgium.

www.sportsandstadia.co.uk

Stand F01

NCR Corporation

As the world's largest provider of self-service and full-service solutions, NCR is shaping the total point-of-service consumer experience across multiple industries in over 100 countries with POS software, self-checkout, kiosks, ATMs, and retail hardware maintenance and support.

www.ncr.com/hospitality/international

Stand A05

Stadia & Arena Asia Pacific 2016

Stadia & Arena Asia Pacific is a must-attend event for everyone involved in the sports venue industry, and especially for those wanting to do business in the region. We are delighted to announce the event's inaugural visit to Tokyo, Japan, in 2016 – visit our stand for details.

www.saevents.uk.com

Stand F06

Oracle Corporation

Through the acquisition of MICROS, Oracle brings over 35 years of expertise in delivering robust, scalable hardware and software solutions to venues across the globe that need to cater to tens of thousands of fans during high-volume periods.

www.oracle.com/industries/hospitality

Stand F05

Star Events Ltd

Custom-built from thin wall, high-tensile steel trusses that offer significant advantages over aluminium, Star Events' mothergrids feature the company's Active Roof Technology control system, with automated grid levelling, weighing and multiple pre-programmed positions.

www.stareventsltd.com

Stand D09

PFEIFER Seil Und Hebetechnik

PFEIFER Cable Structures Division concentrates on building light-weight structures, based on an all ETA approved portfolio of tensile elements. Their expertise comprises all aspects of engineering, fabrication and installation.

www.pfeifer.de/en

Stand D05

Terraplas plc

Terraplas pioneered the first Turf Protection system for Wembley in 1991 and has continued to be the world-leader for the last 23+ years thanks to innovations in cutting-edge design, production and material technology. No matter the climate, location or event, Terraplas has the solution.

www.terraplas.com

Stand E05

Redaelli Tecna S.p.A.

Redaelli is a world leading manufacturer of steel wire rope cable solutions for tensile structure applications. We have successfully delivered complex cable assembly solutions to stayed, suspended, tied arch and cable net structures, including stadia for the 2014 FIFA World Cup.

www.redaelli.com

Stand C02

Trocellen

Trocellen is a manufacturer of cross-linked PE foams. With more than 600 employees at eight sites, the company has been present in the artificial turf shock pad business for more than 25 years. Our ProGame brand provides long-lasting, high quality solutions for pitches.

www.trocellen.com.my

Stand C03

Siemens

Siemens AG (Berlin and Munich) has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization.

www.siemens.com

Stand D08

Ungerboeck/USI

Ungerboeck delivers world-leading event and venue management software, empowering over 40,000 users worldwide. Whether you manage a stadium, arena, sports or event venue of any kind, our software provides an airtight system with the power to manage your entire business.

www.ungerboeck.com

Stand C06

Signature Systems Group

Signature Systems Group is the world's largest manufacturer of temporary, modular flooring systems that protect natural grass, artificial turf and ice arenas. Our systems are in use at prestigious arenas and stadiums worldwide and have proven themselves through extensive use.

www.eventdeck.com

Stand B08

Vanguardia Consulting

Vanguardia Consulting is a cutting edge design and engineering consultancy for the music and leisure industry formed by some of the leading acoustic engineers in the entertainment and sports industry. International projects include the 2012 Olympic Games in London.

www.vanguardiaconsulting.co.uk

Stand D11

SMG Sportplatzmaschinenbau GmbH

Since 1975, SMG has been dealing with the development of modern machinery for the installation of synthetic surfaces in the sports industry. Also, for artificial turf or granule infilling carpet maintenance, SMG has presented the world's first innovations since the 1980s.

www.smg-gmbh.de/en

Stand D03

Verseidag-Indutex GmbH

Throughout the world, the name Verseidag is synonymous with innovative, high-quality, coated 'technical textiles'. Verseidag brings together unique expertise in high-performance materials combined with state-of-the-art, cutting edge production technology.

www.verseidag.de

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EXHIBITOR PROFILES

Stand D06

Arch Style Construction

Arch Style Construction is a specialised high-tech enterprise company focused on developing and implementing the international patent 'Arch-Type Support Structure', the latest and most innovative achievement in the field of post-tension steel structures.

www.archstyleconstruction.com

Stand B01

Archaio

Archaio believes in a world in which safety and accountability are the norm. To achieve this, we developed a secure, leading mobile cloud-based solution. With Archaio, you can run your property and assets inspections efficiently, reduce liability and increase workplace safety.

www.archaio.com

Stand D12

Asia Pacific Seating

A seating manufacturer of retractable seating systems and outdoor mobile grandstands, Asia Pacific Seating specialises in the design, manufacture and installation of education buildings, multipurpose sports facilities, community halls and small outdoor sites.

www.pacificseating.co.nz

Stand F03

BMT Fluid Mechanics Ltd

BMT Fluid Mechanics is internationally recognised as a leading independent specialist in the field of wind engineering, architectural aerodynamics and building physics. Based in London, BMT has offices in New York, Houston, Hong Kong, Kuala Lumpur, Abu Dhabi & Dubai.

www.bmtfm.com

Stand E04

Cox Architecture

One of the largest architectural practices in Australasia with 350 staff and 25 Directors across 7 offices. We provide services in architecture, planning, urban design and interior design. Projects includes exhibition and convention centres, stadia and sports halls.

www.coxarchitecture.com.au

Stand B07

d&b audiotechnik

d&b audiotechnik operates internationally as a manufacturer of high quality loudspeaker systems for sound reinforcement speech and music in public places. The headquarters, which also house R&D and manufacturing, are located near Stuttgart in the south west of Germany.

www.dbaudio.com

Stand E01

D.A.S. Audio

Based in Valencia, Spain, with subsidiary offices in Miami, FL, and Singapore, D.A.S. Audio is a leading manufacturer of loudspeaker systems, power amplification, and related audio processing equipment for professional touring and installed sound applications.

www.dasaudio.com

Stand C01

Dallmeier

Dallmeier is one of the world leading providers of products for network-based video surveillance and has more than 30 years of experience in the development and manufacture of high quality components and complete solutions for the CCTV/IP sector.

www.dallmeier.com

Stand B06

Douce Hydro/Jarret Structures

Douce Hydro technology has proven to be industrially successful over the past 50 years, using special fluids characteristics made of viscous silicon to obtain device function. The range of dampers size is not limited, and the company can design dampers to your request.

www.doucehydro.com

Stand A01

Ferco Seating Systems

Established in 1983, Ferco Seating specialises in the design and manufacture of auditorium, cinema, home theatre, education and stadium seating. European design and Asian manufacture ensures cost-effective, top quality products for customers in over 30 countries.

fercoseating.com

Stand D10

Global Spectrum Asia

Global Spectrum has become one of the leading and best financially resourced private venue management companies in the industry. With 107 client venues in the US, Europe, Canada, Southeast Asia and the Middle East, they presented 12,251 events in the last fiscal year.

www.global-spectrum.com

Stand B02

HARMAN

HARMAN designs and develops premier audio, visual, infotainment, and enterprise automation and software services solutions for consumers and businesses with a focus on the automotive, mobile, enterprise, telecommunications and healthcare markets.

www.harman.com

Stand A04

HG Sports Turf

HG Sports Turf is a global leader in the design and construction of elite, natural, synthetic and reinforced turf sports fields. Across Asia Pacific and the Middle East, our turf systems have staged some of the world's most prestigious sporting events.

www.hgsportsturf.com.au

Stand B10

Hussey Seating Asia-Pacific

With offices in the USA, UK, Taiwan, Vietnam and Singapore, Hussey Seating is well placed with a team of regional business partners to serve customers with its 'global strength and local presence' philosophy. The company offers well-engineered retractable and fixed seating.

www.husseyseating.com

Stand B04

Intelligent Engineering/SPS Terraces

Since 1996, Intelligent Engineering (IE) has developed and commercialised a sandwich plate system, now known as SPS. This innovative product has been used as a terracing application for over 7 years, with the first SPS Terrace installed at the iconic Royal Ascot Racecourse.

www.ie-sps.com

Stand F04

Light10 Industries Pte Ltd

Light10 Industries integrates architectural design with multiple state-of-the-art technologies. Taking an imagineering approach, we blend experiential and multi-platform technologies into what we call "transmedia architecture engineering".

www.light10industries.com

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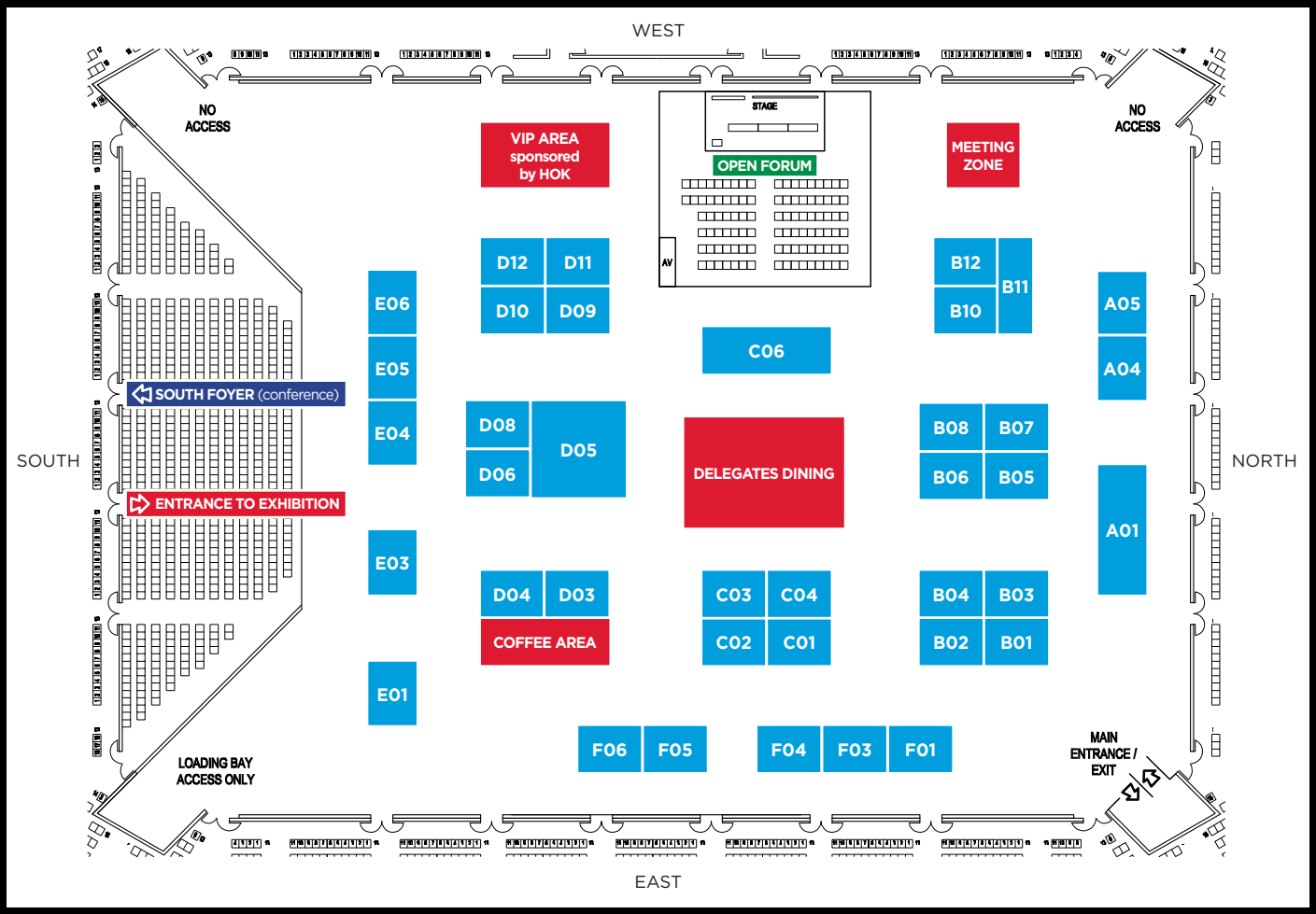


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EXHIBITORS

The exhibition area will be on the floor of the **Singapore Indoor Stadium**



EXHIBITOR NAME	Stand
Arch Style Construction	D06
Archaio	B01
Asia Pacific Seating	D12
BMT Fluid Mechanics Ltd	F03
Cox Architecture	E04
d&b audiotechnik	B07
D.A.S. Audio	E01
Dallmeier	C01
Douce Hydro/Jarret Structures	B06
Ferco Seating Systems	A01
Global Spectrum Asia	D10
HARMAN	B02
HG Sports Turf	A04
Hussey Seating Asia Pacific	B10
Intelligent Engineering/SPS Terraces	B04
Light10 Industries Pte Ltd	F04
Media Centre	B11
Mehler Texnologies	C04

EXHIBITOR NAME	Stand
NCR Corporation	F01
Oracle Corporation	F06
PFEIFER Seil Und Hebetechnik	D09
Redaelli Tecna S.p.A.	E05
Siemens	C03
Signature Systems Group	C06
SMG Sportplatzmaschinenbau GmbH	D11
Sports & Stadia Services Ltd	E03
Stadia & Arena Asia Pacific 2016	A05
Star Events Ltd	F05
Terraplas plc	D05
Trocellen	C02
Ungerboeck/USI	D08
Vanguardia Consulting	B08
Verseidag-Indutex GmbH	D03
Windtech Consultants	E06
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WELCOME

Dear Industry Colleagues

We are delighted to welcome you once again to the **Singapore Sports Hub** for the 17th annual **Stadia & Arena** event. With the Asia Pacific region playing host to the **2018 Winter Olympics**, **2018 Commonwealth Games**, **2019 Rugby World Cup**, and now both the **2020 Summer** and **2022 Winter Olympics** there is more reason than ever before to bring the industry together to network, exchange ideas and opinions over the next three days.

This year we are giving you even more content with the addition on the first afternoon of a series of special discussions looking at the state of the sports venue market in Singapore, Australia and Indonesia which will be directly followed by our Opening Reception in the exhibit hall.

The following two-day schedule features a diverse range of conference sessions covering the entire spectrum of hot topics relating to design/build, operational and technology issues, as well as comprehensive presentations on major upcoming projects from around the region and further afield, reflecting the global gathering of attendees at this event. We are delighted to welcome back the **Disney Institute** to give our Closing Keynote presentation. This will mark the second time Disney has addressed the show, with it proving a huge success at our 2013 event, and it is sure to finish the conference in style!

Don't miss out on the opportunity to go around the exhibit hall and visit the diverse range of companies who are exhibiting at the show, many of whom are presenting their services in the region for the first time.

Finally, I would like to thank all our event partners and sponsors for their support and assistance in helping us bring the event to fruition and look forward to meeting you in person over the next three days.



Sam Wibrew
Project Director
Stadia & Arena Asia Pacific 2015

Greetings and a warm welcome to Stadia & Arena Asia Pacific 2015!

Following the success of the inaugural event last year, we are pleased to present the second edition of **Stadia & Arena Asia Pacific**. The event brings industry professionals in the business of sports venue design/build, management, operations and technology together for in-depth discussions on exciting trends and developments in the sports arena.

The sports industry in the region continues to thrive, thanks to upcoming major events such as the **2017 Southeast Asian Games** in Malaysia, **2018 Asian Games** in Indonesia, **2018 Commonwealth Games** in Australia, **2018 Winter Olympics** in South Korea, **2019 Rugby World Cup** and the **2020 Summer Olympic Games** in Japan.

For us in Singapore, 2015 is a special year for our sports industry as we have successfully hosted the **28th Southeast Asian (SEA) Games** at the then newly-built **Singapore Sports Hub** earlier this year. More than 500,000 spectators attended the Games at 31 venues during the 12 days, a testimony that sporting events are gaining popularity here in Singapore and the region.

The three-day **Stadia & Arena Asia Pacific** conference brings together many experts to share their experiences in planning and constructing world-class sports venues, best practices on organising international sporting events, updates on new developments in the region and ideas on sustaining and optimising revenue streams. Held alongside the conference is a showcase of the latest products and technologies by international solution providers.

The event would not have been possible without the support from key industry organisations. Hence, we would like to express our heartfelt appreciation to our event partners, **International Association of Venue Managers (IAVM)**, **Singapore Sports Hub** and **Sport Singapore**, event sponsors and media partners.

We wish all participants a fruitful and rewarding experience, engaged in knowledge sharing, business discussions and networking.



Jason Ng
Executive Director
MP Singapore Pte Ltd

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At a glance

(Event schedule on pages 15-21)



Stadia&Arena ASIA PACIFIC 28-30 SEPT 2015

Monday 28 September

13:00 **Registration** — *sponsored by* SIEMENS

FREE FOR ALL ATTENDEES: OPEN FORUM AREA, EXHIBITION HALL

13:45 **Welcome speeches**

14:00 **SESSION 1 PART ONE: The SEA Games and Singapore Sports Hub - from concept through to delivery. How a venue designed and built for legacy hosted a major games**

SESSION 1 PART TWO: Australia market report - expert roundtable — *in association with* NCR

SESSION 1 PART THREE: Indonesia market report

16:00 **Welcome reception and networking in Exhibition Hall**

18:00 **Close**

PAID DELEGATE STREAM ONLY (South Foyer)	FREE EXHIBITION ENTRY STREAM (Open Forum Area – Exhibition Hall)

Tuesday 29 September

08:30 **Morning registration and coffee** — *sponsored by* Dallmeier

STADIA DESIGN/BUILD/ENGINEERING & MAJOR EVENT PLANNING	REVENUE GENERATION, VENUE MANAGEMENT & FAN ENGAGEMENT
09:00 SESSION 2: **Asian venues in focus: In-depth presentations on regional sports projects**	

10:30 **Coffee break and networking in Exhibition Hall** — *sponsored by* ROSSETTI

11:00 SESSION 3A: **Designing for extreme climates (roundtable)**	SESSION 3B: **Virtual stadium showcase: Ideas and inspiration for your own sports venue!**
12:00 SESSION 4A: **Key facets of stadia planning** *brought to you by* ICSS	SESSION 4B: **Revenue optimisation: New approaches to maximising your venues income from design through to operations (roundtable)**

13:15 **Lunch and networking in Exhibition Hall** — 13:00 **Lunch** — *sponsored by* HOK

14:15 SESSION 5A: **Roofing challenges in modern stadia**	SESSION 5B: **1 year on! The Singapore Sports Hub: A reflection on a year of challenges and successes (roundtable)**
15:05 SESSION 6A: **Tomorrow's together: What will shape the venues of the future?**	15:20: SESSION 6B: **Mixed martial arts as a revenue generator for Asia Pacific venues**

15:50 **Coffee break and networking in Exhibition Hall** — *sponsored by* POPULOUS

16:20 SESSION 7A: **Stadia and arena: Aerodynamics and beyond**	SESSION 7B PART ONE: **How the design and thinking around synthetic sports surface technology is and will continue to change to meet the mega-trends and generational changes of participation in sport**
16:45 SESSION 8: **Major event masterplanning: Ensuring a successful event and legacy (roundtable)**	SESSION 7B PART TWO: **Playing surface management roundtable: A global perspective on design, installation, quality assurance and maintenance challenges**

17:45 **Evening networking and cocktail reception, Exhibition Hall**

19:30 **Close**

Wednesday 30 September

08:45 **Morning registration and coffee** — *sponsored by* USI Ungerboeck Software International

09:15 SESSION 9: **The cultural specificity of stadia: Creative approaches to sports venue design that best serve a city's way of experiencing sport (roundtable)**

10:30 **Coffee break and networking in Exhibition Hall** — *sponsored by* AECOM

11:00 SESSION 10A: **Global projects in focus: The latest leading-edge designs and approaches for worldwide stadia**	SESSION 10B: **Fan engagement: New ideas on how to exceed fans expectations (roundtable)**
12:00	SESSION 11: **Technology in stadia: Key considerations when assessing requirements for your own venue (roundtable)**

12:30 **Lunch and networking in Exhibition Hall** — 13:00 **Lunch** — *sponsored by* HARMAN

14:00 **Exhibition Hall closes**

14:00 **Site tour and practical workshop on artificial turf maintenance** — *in association with* SMG

14:00 **SESSION 12: Closing keynote from the Disney Institute: Disney's approach to quality service**

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About Ungerboeck Software
Ungerboeck's venue and event management software solution is utilized by more than 40,000 users worldwide, including stadiums, arenas, convention and conference centers, theaters and performing arts centers. Thanks to its modularity and flexibility, Ungerboeck Software can easily be configured to meet your individual needs. As industry experts, we're happy to share our knowledge and help you find the right solution for your organization.

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BRINGING TOGETHER INDUSTRY LEADERS IN ALL ASPECTS OF SPORTS VENUE DESIGN/ BUILD, MANAGEMENT, OPERATIONS AND TECHNOLOGY FROM AROUND THE WORLD

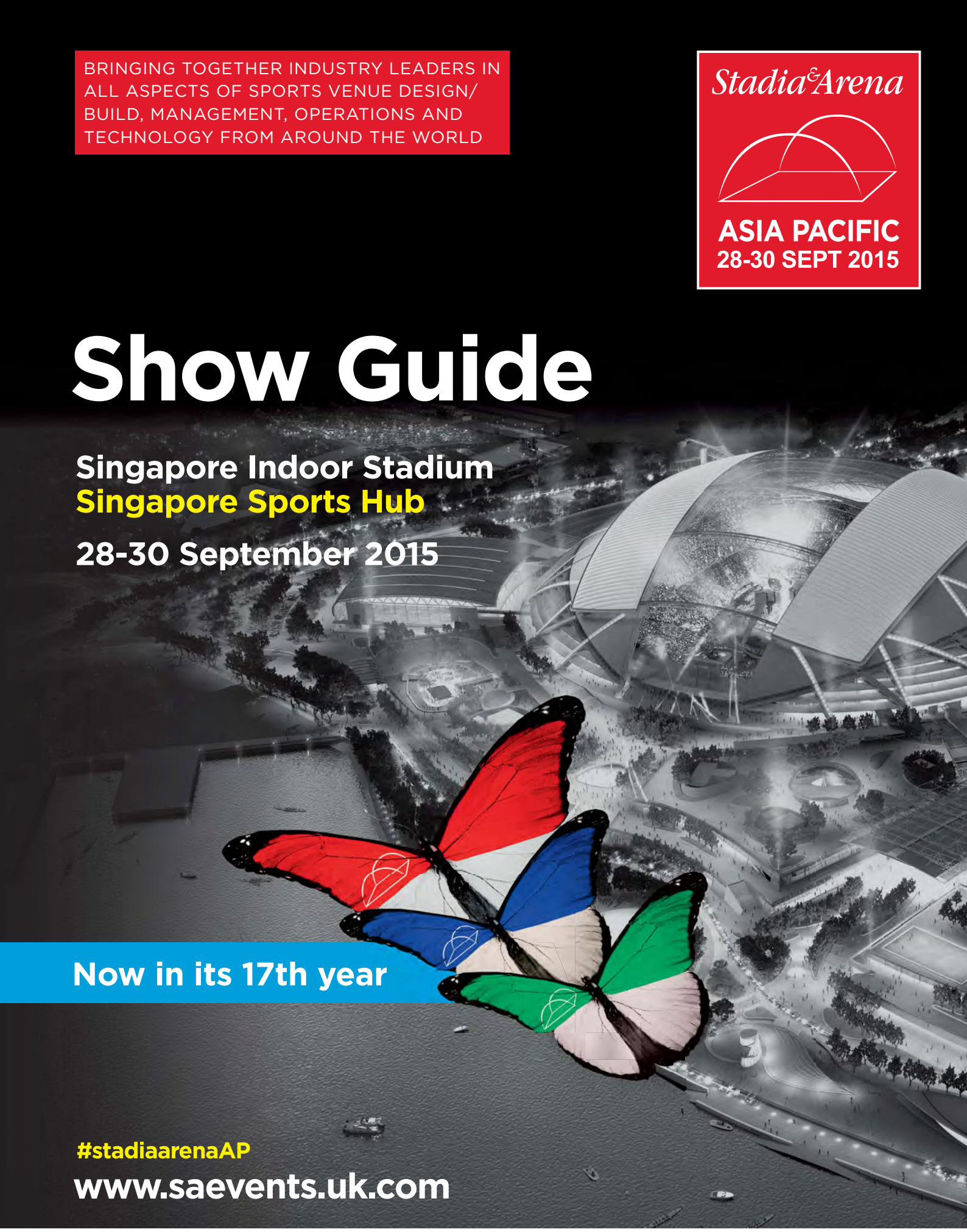
Stadia&Arena

ASIA PACIFIC
28-30 SEPT 2015

Show Guide

Singapore Indoor Stadium
Singapore Sports Hub

28-30 September 2015



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