



WORLD WIDE WEAVE

The role of metallic mesh in the transformation of stadium architecture

Shiny shell, functional protection, lucrative advertising medium

Faster, higher, further: since ancient times, the best athletes have been competing against one another to win much-coveted sporting titles. The dream of fame and being undefeated fascinates protagonists and spectators alike. Whether the Olympic Games, European or world championships – top athletes competing for medals, trophies and titles have made sport a global spectacle that unites cultures. TV broadcasts of the key moments that make the difference between winning and losing combine up-close experience of events with maximum media presence. Consequently, the requirements to be met by sporting arenas are rather complex. Alongside the greatest possible flexibility of use, investors and operators also place great emphasis on the overall spectator experience and economic efficiency. Spectacular constructions and stages where people go to see and be seen underline the enormous change that sport and its architectures are experiencing. Exceptional aesthetics and multifunctional performance make stadiums a lucrative investment and long-term source of income. CREATIVE WEAVE metallic mesh from GKD – Gebr. Kufferath AG (GKD) has been a global player in the transformation of stadium architecture right from the outset.

Modern sports culture knows no boundaries – neither geographically nor in terms of performance or image. It's a lifestyle, where pleasure and profit



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ambitiously exist side by side. While today the final of the Champions League might attract tens of thousands of spectators, tomorrow's performance of Verdi's "Aida" caters to quite a different crowd and a rugby tournament then blows away spectators the day after. Enormous stadiums are being constructed to host "mega-events" like the Olympic Games in London, to be taken down or moved to a different location afterwards. Anything is possible, but finding the right balance of temporary elements and lasting identity represents a great challenge for planners and architects. They therefore look for materials that cater to these developments and allow new opportunities to be exploited in terms of expression and functionality. Dominique Perrault was the first to recognise the potential of the stainless steel mesh material produced by GKD, the world's leading technical metal weaving mill, demonstrating its impressive characteristics with the construction of the velodrome and indoor swimming pool complex in Berlin. This building's roofs, covered with "Futura 240" mesh, extend just one metre above the ground. As such, they mark the change in stadium architecture away from the construction of large halls and towards landscape sculpture.

The secret of success lies in the versatility of the solutions

The exceptional appearance of woven metal caters to the desires of planners and architects all over the world for expressions of dynamics, high-tech and quality in modern arenas. At the same time, the shimmering surface of the metallic mesh materials draws visual attention away from structural elements and provides stadiums with a living identity through their interaction with daylight and environmental influences. Large-scale back lighting or fully daylight-friendly medialisation systems enable this intention to be realised and allow the attractiveness of sporting venues to be cleverly exploited as an efficient platform for target group-oriented



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advertising. Alongside these visual arguments, the universal range of functions offered by GKD's stainless steel mesh is another key factor behind its use at many famous sporting venues. As it is strong enough to resist vandalism, easy to care for, maintenance-free and non-combustible, the material meets the fundamental requirements of modern facility management. The large range of mesh types – flexible or rigid, solid or fine – with tailor-made transparency, light and air transmission inspires planners to create ever more daring and bold designs. CREATIVE WEAVE textile shells protect stadium spectators from undesired direct sunlight, wind or driving rain. At the same time, the controlled air transmission facilitated by the woven structure guarantees the necessary ventilation for grass surfaces and stadium tracks. Metallic meshes can also be used as effective fall guards in hazardous areas, decorative cladding for lifts/elevators, stairwells, balustrades or railings, as well as granting unimpaired outside views from inside and controlling the degree of visual access for passers-by. Integrated, powerful LED profiles allow the texture to be transformed into high-performance, universal transparent media facade systems that can also seamlessly trace the outlines of curved facades providing distortion-free optics. Whether displaying motion pictures, video sequences or sophisticated graphics, there is simply no comparable alternative to GKD's **Mediamesh**[®] systems for permanent, energy-efficient and even hurricane-proof medialisation of large-scale facades for use during the day and at night.

Table tennis: Yamuna Stadium, New Delhi

The portfolio of famous sporting venues with metallic mesh reflects the virtually inexhaustible formal language and functionality of this industrial base material in stadium construction. The most recent example is the Yamuna Stadium in New Delhi, India, which was opened in the summer of



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2010 for the largest sporting event in the city's history, the Commonwealth Games. With 272 competitions in 17 sporting disciplines, as well as over 7,000 athletes and officials from the Commonwealth states, this event enjoys reverence comparable with the Olympic Games among the countries that take part. The venue for the archery and table tennis events was the Yamuna Sports Complex in the 16-million metropolis of New Delhi. With seating for 5,000 spectators, 10 practice areas and a multifunctional hall, the planners at Peddle Thorp Architects, Melbourne, developed a stadium that can hold its own against any other venue worldwide. The facades of the circular building employ 86 "Tigris" stainless steel mesh panels to create a visually seamless shell. With intelligent interplay of reflection and transparency, its woven skin transforms the sporting venue into a modern interpretation of coexistence. At the same time, the mesh provides effective sun protection for the subtropical climate in New Delhi with temperatures well in excess of 40°C.

Football: cult stadiums in London, Paris, Bern, Madrid

CREATIVE WEAVE stainless steel mesh will be used at the legendary Wembley Stadium for the 2012 Olympic Games in London. Some 1,200 square metres of "Tigris" stainless steel mesh will partially cover the facade of the world's largest stadium, which was opened in 2007. This mesh underlines the lightness of the iconic stadium designed by Norman Foster. Stainless steel mesh is also an integral part of three other cult top-level footballing venues. The Stade de France was constructed in Paris in 1995 for the football World Cup. Its "Omega 1520" woven skin made of a mesh offering varying levels of transparency, continues to provide this venue with a unique appearance. The huge 80,000-seater stadium was the first to enjoy the aesthetics and functionality offered by the woven building material. Alongside its task as fall guards, the architects Claude Costantini,



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Michel Macary, Michel Regembal and Ayméric Zublena used the wire mesh to establish a dialogue between the interior and exterior of the arena through interplay between opacity and transparency. For the facade of the new Wankdorf Stadium, the architects Luscher, Schwaar and Rebmann also selected various Omega meshes. The precisely adjustable aerodynamic properties of the woven shell were the key factor behind this decision. Since the stadium faces into the prevailing wind direction, a non-draughty atmosphere in the stadium had to be combined with the necessary air circulation for adequate pitch ventilation. Tests in the wind tunnel determined the optimum mesh design to secure both effects. The striking entrance to the Estadio Santiago Bernabéu in Madrid was created using 3,300 square metres of "Escale 7x1" spiral mesh. The area of the panels on the stadium facade, angled at 32°, was originally to be used as a projection platform for advertising targeted at the football fans queuing to enter the stadium. Although this intention was ultimately not realised, the mesh used in the facade creates an amazingly three-dimensional impression thanks to its special reflective characteristics.

Tennis: Caja Magica, Madrid

The Caja Magica, another arena in Madrid which was constructed within the scope of the bid to host the 2016 Summer Olympics, represents a further milestone of metallic mesh in the construction of multifunctional sports venues. Over an area of 80,000 square metres, it boasts three courts, which offer seating for 12,000, 5,000 and 3,000 spectators respectively. The stadium gets its name from its three-piece roof construction, which can be opened as if by magic converting the indoor arenas into open-air stadiums. The entire complex is seamlessly enclosed in a special version of the "Escale 10.5 x 1.2" stainless steel spiral mesh. The facades of the indoor courts use "Escale 7x1" mesh cladding. Architect



Dominique Perrault selected the various spiral mesh sizes to cater for the different viewing distances, working to the principle of: the shorter the distance, the smaller the spirals. The reflective surface of the panels draws attention away from the gigantic construction and employs precisely defined light and air transmission to convey an outdoor feeling to the inside of the stadium.

Formula 1: Shanghai International Circuit

In constructing one of the most technically complex and expensive F1 circuits in the world, designer Hermann Tilke selected all building materials in line with the strictest aesthetic standards and to secure maximum functionality. In the "Tigris" stainless steel mesh, he found a transparent and air-permeable material that, alongside the necessary fire protection regulations, also complied with the sophisticated visual qualities he was looking for. A total of 12,950 square metres of CREATIVE WEAVE mesh today encapsulate the rear and side facades of the main terraces and the rear sides of the two secondary facades. 157 elements, each up to 30 metres long and 7.70 metres wide, were installed within just a few weeks. This was made possible by fixing the material using rods integrated into the mesh, a system which has been proven in a large number of other projects.

Horse and camel racing: Ascot Racecourse and Nad Al-Sheba, Dubai

The Ascot Racecourse, which is steeped in tradition and where spectators can quite literally see genuine horsepower in competition, also uses stainless steel mesh to set contemporary accents. In the course of the complete redesign of the horse racing circuit to create a high-quality leisure facility with a new main stand and improved visibility for all spectators, the stairwells were also redesigned. Philip Johnson from HOK Architects selected GKD's "Baltic" mesh for an area of 1,600 square metres to offer



protection from driving rain and create fall guards. 16 lanes, each 20 metres long and 5 metres wide, create a seamless visual perimeter around the round towers and underline the superb ambience of the venue. The architects of the engineers office designing the Nad Al-Sheba camel racing track in Dubai set similar design accents by selecting the "Tigris" stainless steel mesh. Here it was also a matter of cladding the stairwells of the main stand to prevent the risk of spectators falling down, while at the same time creating a visual link to the exclusive atmosphere. With effects that vary between solid surface effects and transparency depending on the viewing angle, the mesh meets the exacting specifications.

Skiing: Östersund and Holmenkollen

With its unusual combination of high functionality and aesthetics, GKD stainless steel mesh has also paved the way for top-level winter sports stadiums. A good example of this is the ski stadium in the Swedish town of Östersund, which is used throughout the year as a training and competition venue for skiing events. At the heart of the large cross-country arena with various event-hosting buildings stands a 53-metre high water tower with restaurant and viewing platform at its top. The Openeye and Claes-Göran Andersson architects firm selected "Tigris" mesh as facade cladding for the exposed building. With shimmering reflections during the day and colourful lighting effects at night, the woven metallic skin makes the tower the landmark feature of the venue that can be seen from afar. This is an approach that the Danish office JDS architects also followed for the spectacular construction concepts of the legendary Holmenkollen ski jumping facility in Oslo. The special fascination of this venue is based on the sophisticated, seemingly floating silhouette of the stainless steel mesh, which clads the ski jump's entire steel construction. Performing the function of a wind filter, which protects the athletes from dangerous side gusts



during flight, the semi-transparent membrane shimmers during the day through interplay with natural daylight. In the evening, the mesh, which is backlit from inside the ski jump, transforms the sporting venue into a brightly lit ramp ascending into the heavens. A total of 4,300 square metres of "Sambesi light" and "PC-Sambesi" stainless steel mesh clad the steel frame construction, which now ranks as one of the top winter sports venues since hosting the 2011 Nordic World Ski Championships.

Baseball and basketball: Yankee Stadium, New York, and American Airlines Arena, Miami

Stainless steel mesh has been popular as an exceptional visual and functional building material at the spectacular stadiums of cult US teams for some time. For example, over 3,000 square metres of GKD's "Tigris", "PC Tigris" and "OC Omega 1505" wire mesh shape the external and internal design of the new home to the famous New York Yankees. Yankee Stadium in the South Bronx relies on the mesh's rugged strength and resistance in its role as cladding for elevator compartments, walls, stairwells and balustrades. Glass bead blasted logos on the mesh panels above the elevators lend the shiny texture a customised team identity. The famous multifunction stadium of NBA team Miami Heat, the American Airlines Arena, became a pioneer for the next generation of stadium constructions with installation of an almost 320 square metre **Mediamesh**[®] facade. The objective here was to create an innovative advertising and communication platform for the arena that welcomes 1.4 million sports and music fans every year. At the same time, the operators were keen to retain an unrestricted view from the lounge, as well as the video and daylight capability of the large-format display. In addition to this, the client stipulated hurricane resistance for wind speeds of up to 145mph, maintenance-free characteristics and low energy consumption. The transparent **Mediamesh**[®]



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system is exemplary in its fulfilment of all of these requirements, as well as blending seamlessly with the arena's curved glass facade. Whether images, graphics, films, live recordings or interaction with the spectators via Twitter, the latest metallic mesh product from GKD sets no limits to customised use both during the day and at night. The world of sport and its sponsors are communicated perfectly to fans thanks to the screen's brilliant sharpness.

Aesthetics, dynamics and top performances have fascinated sports fans since ancient times. The architecture employed impressively reflects the enormous transformation taking place at sporting venues and the ever greater expectations of spectators. Metallic mesh from GKD lends this very special, yet constantly evolving tradition of "bread and games" an ever changing and fascinating face.

15,986 characters incl. spaces

GKD – WORLD WIDE WEAVE

As a privately owned technical weaver, GKD - Gebr. Kufferath AG is the world market leader in metal, synthetic and spiral mesh solutions. Four independent business divisions bundle their expertise under one roof: Industrial Mesh (woven metal mesh and filter solutions), Process Belts (belts made of mesh and spirals), Architectural meshes (façades, safety and interior design made of metal fabrics) and Mediamesh® (Transparent media façades). With its headquarter in Germany and five other facilities in the US, South Africa, China, India and Chile – as well as its branches in



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France, Spain, Dubai and worldwide representatives, GKD is close to markets anywhere in the world.

For more information:

GKD – GEBR. KUFFERATH AG
Metallweberstraße 46
D-52353 Düren
Tel.: +49 (0) 2421 / 803-0
Fax: +49 (0) 2421 / 803-211
E-Mail: metalfabrics@gkd.de
www.gkd.de

Please send a reprint to:

impetus.PR
Ursula Herrling-Tusch
Charlottenburger Allee 27-29
D-52068 Aachen
Tel.: +49 (0) 241 / 189 25-10
Fax: +49 (0) 241 / 189 25-29
E-Mail: herrling-tusch@impetus-pr.de

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Picture 1: The roofs of the velodrome and indoor swimming pool complex Berlin, covered with GKD mesh, extend just one metre above the ground.



Picture 2: Façade with Escale 7x1 mesh at the Santiago Bernabéu stadium, Madrid.



Picture 3: The distinctive landmark of the Parque del Manzanares, Madrid, is Dominique Perrault's Centro Deportivo Multifuncional del Manzanares.

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Picture 4 © GKD/ Iwan Baan
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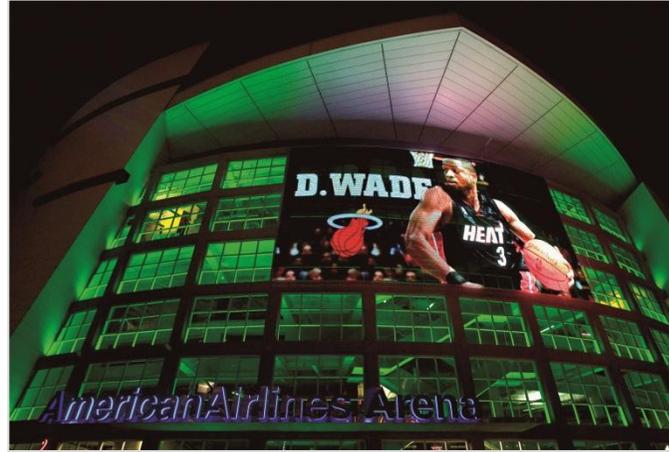
impetus.PR
Agency for Corporate Communications GmbH

Ursula Herrling-Tusch
Charlottenburger Allee 27-29
D-52068 Aachen
Tel: +49 [0] 241 / 1 89 25-10
Fax: +49 [0] 241 / 1 89 25-29
E-Mail: herrling-tusch@impetus-pr.de

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Picture 4: Stainless steel mesh performing the function of a wind filter at the ski jump Holmenkollen, Oslo.



Picture 5: The first large, transparent Mediamesh® facade at a sports arena – American Airlines Arena, Miami.



Picture 6: The visually seamless shell from stainless steel mesh provides effective sun protection for the Yamuna Stadium in New Delhi.

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Ursula Herrling-Tusch
Charlottenburger Allee 27-29
D-52068 Aachen
Tel: +49 [0] 241 / 1 89 25-10
Fax: +49 [0] 241 / 1 89 25-29
E-Mail: herrling-tusch@impetus-pr.de