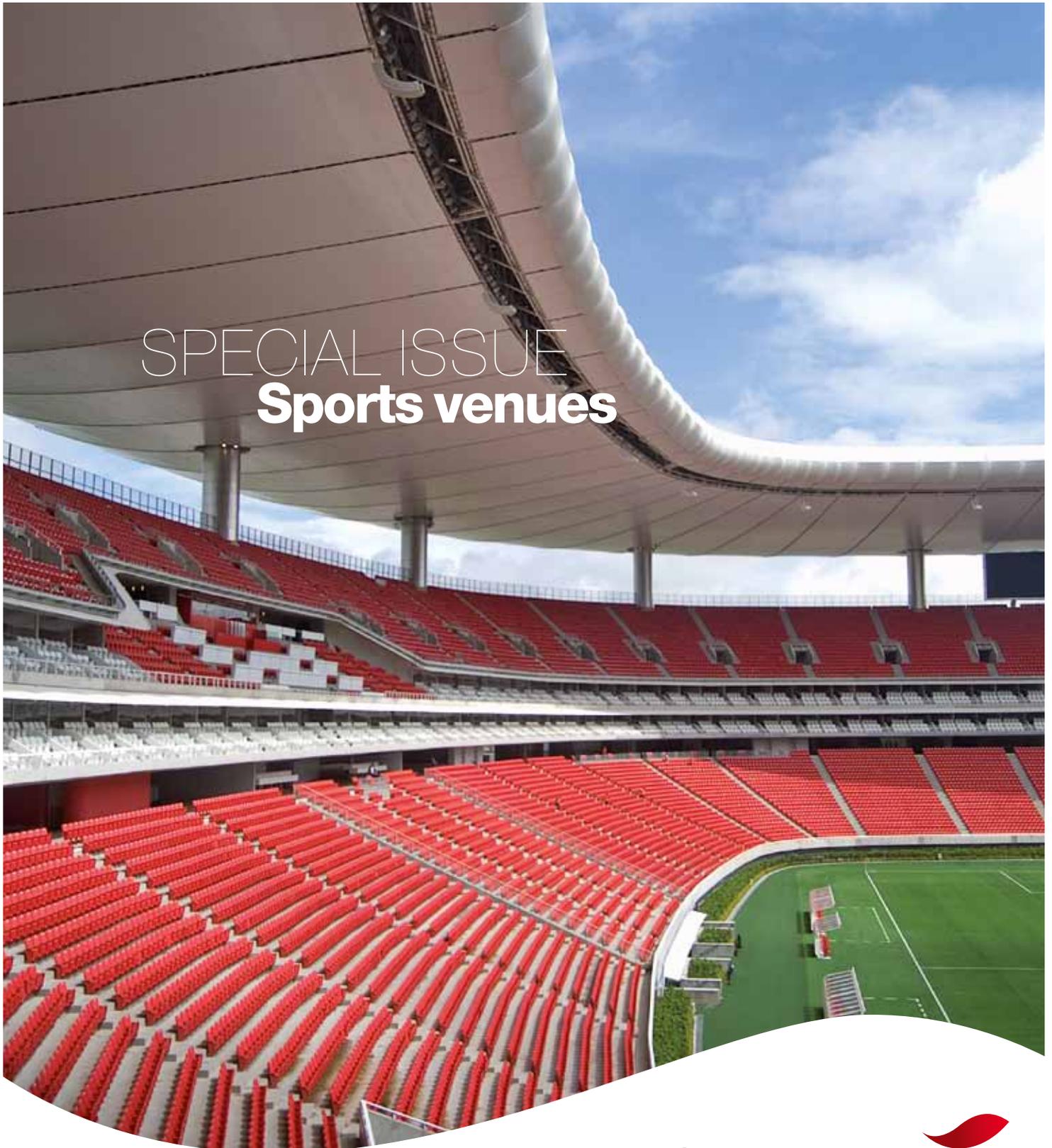


The news

#7 - July 2012

SERGE FERRARI NEWSLETTER - FLEXIBLE COMPOSITE MATERIALS

www.sergeferrari.com



SPECIAL ISSUE
Sports venues

Serge Ferrari 

Stadium – Warsaw – Poland



© Hightex

© Hightex



When required by weather conditions, the 11,000 m² of Précontraint composite membrane will deploy in 15 minutes.

[View video >](#)



© Hightex

■ Retractable Roof wins award at World Stadium Congress 2012

Opened in January 2012, the new 59,000-seat capacity Polish national stadium was built as a venue for the Euro 2012 football championship. Its characteristic feature lies in the technology of its fully retractable central roof made of Précontraint Serge Ferrari composite material. This innovative concept enabled the Warsaw stadium to win two World Stadium Congress 2012 "Awards", one for its usage of high technology and the other for its multifunctional capacities.

Hosting all events and not being restricted by weather is just one of the main requirements for modern sports venues. Warsaw National Stadium is a perfect example of a facility that is designed by the public authority in search of versatility and a high level of return on investment. Initially designed to support and host the Euro 2012 matches, the stadium has long term plans for being a cultural event venue and to host major regional concerts. To achieve all of the demands put on the venue it was decided to have a fixed roof in

combination with a central retractable portion – which can be open or closed based upon the weather. The retractable section is supported by 60 cables; and each cable has a motor capable of 4 ton traction as the roof open or closes on 15 different trolleys. This central retractable section then seals to the perimeter roof for a watertight finish.

Designed to withstand the extreme folding and wind conditions; the Précontraint composite membrane was ideal for this application as its uniformity in the field



is widely known. Manufactured using two different membranes from Serge Ferrari – the interior 10,000sqm section of 1202 S2 is mechanically welded to the exterior a 1302 S2 membrane.

This combination of composite membranes allowed for a larger section to be retractable and thereby satisfying the engineering and societal requirements for the facility.



PROJECT DATA

- Architect:
JSK Architekten
- Consulting engineer:
**Schlaich Bergmann
and Partners**
- Fabrication/Installation:
Hightex GMBH
- Serge Ferrari flexible
composite materials:
> **Précontraint 1202 S2**
> **Précontraint 1302 S2**
Material area: 11,000 m²

SERGE FERRARI ADVANTAGES

- Specific folding and
double-fold strength tests
- Translucence
- 100% recyclable through
Texyloop®
- Eco-efficiency proven by LCA

■ Estadio Omnilife: temple of Mexican football

Located at Zapopan, in the heart of “La Primavera”, the famous “Chivas de Guadalajara” football team’s new stadium appears as a green volcano beneath a cloud made of Serge Ferrari composite membrane. Estadio Omnilife, with its 45,000 spectator capacity, was the venue for the Pan American Games in October 2011.

The underside of the roof, light as a white cloud, is made of

tensioned Précontraint 1002 S2, like a ceiling. For this project, the flexible composite material was specifically designed and produced with an opaque layer to hide the roofs interior frame systems and support cables above.

To ensure VIP comfort, the suites and hospitality boxes also include a layer of solar protection in the form of blinds featuring Soltis. A composite material which features a micro-aeration - allowing for self ventilation; it provides an excellent solar barrier while maintaining the view.

PROJECT DATA

- Architects:
Massaud & Pouzet, France
- Fabrication/Installation:
Lonas Lorenzo
- Serge Ferrari flexible composite materials:
 - > **Specially manufactured opaque Précontraint 1002 S2**
Material area: 57,600 m²
 - > **Soltis 86**
Material area: 4,000 m²

SERGE FERRARI ADVANTAGES

- Resistance to bad weather, UV rays and soiling
- Excellent dimensional stability
- 100% recyclable
- Eco-efficiency proven by LCA



■ The Pan American Games: a performance event

As a prelude to the London Olympics, top South American athletes were able to compete

at the new Telmex Stadium built specifically for the event. 10,000 m² of tensioned Précontraint 902 S2

were deployed in the form of open petals above the spectator stands. The Précontraint 902 S2 compo-

sitive material is distinctive due to its translucence, its solar reflection coefficient and its low maintenance S2 fluorinated surface treatment.





The concept of "cladding"-type tension demands dimensional stability and strict compliance of material behaviour with design calculations that only the Précontraint composite membrane guarantees.

Green & Legacy Sports Infrastructures

■ London 2012: international show- case for sustainable construction

London's promise in relation to organising the 2012 Olympic and Para-Olympic Games was to build for the "greenest games ever" in Olympic history and to transmit a sustainable heritage to future generations. The city was awarded the organisation of this event based on this promise. The Olympic Delivery Authority (ODA), responsible for Olympic site and infrastructure design and construction worked with the construction industry and the British government to make the event a showcase for current best construction practices. Jo Carris, London 2012's environmental consultant and ambassador recalls this unique environmental policy decision.

"Right from project initiation in 2007, the ODA published a sustainable development strategy embracing 12 social and environmental aims. This document conveys a clear message to industry: only suppliers capable of offering the highest levels of sustainability would be considered. The ODA set up rigorous processes to ensure that sustainable development undertakings would be fully extended during building design, procurement and construction. Rigorous inspections became essential for the ODA to keep its publicly made promises on the successful outcome of these Games.

One of the 12 aims retained was to "identify, source and use materials respectful of the environment and socially responsible".

ODA cooperation with all stakeholders led to establishing a policy in relation to PVC based on a stringent specification for the manufacturing, usage, re-usage and recycling of PVC materials. This policy demanded innovative, sustainable solutions — specifically, the use of phthalate-free PVC — which only the Serge Ferrari company has succeeded in developing for its flexible composite materials. Serge Ferrari also guarantees its products' recyclability through its operational Taxyloop® recycling network for any of its flexible composite membranes, which would neither be re-used nor re-implemented."



Serge Ferrari flexible composite materials



Bowling Club - Raymond Terrace - Australia



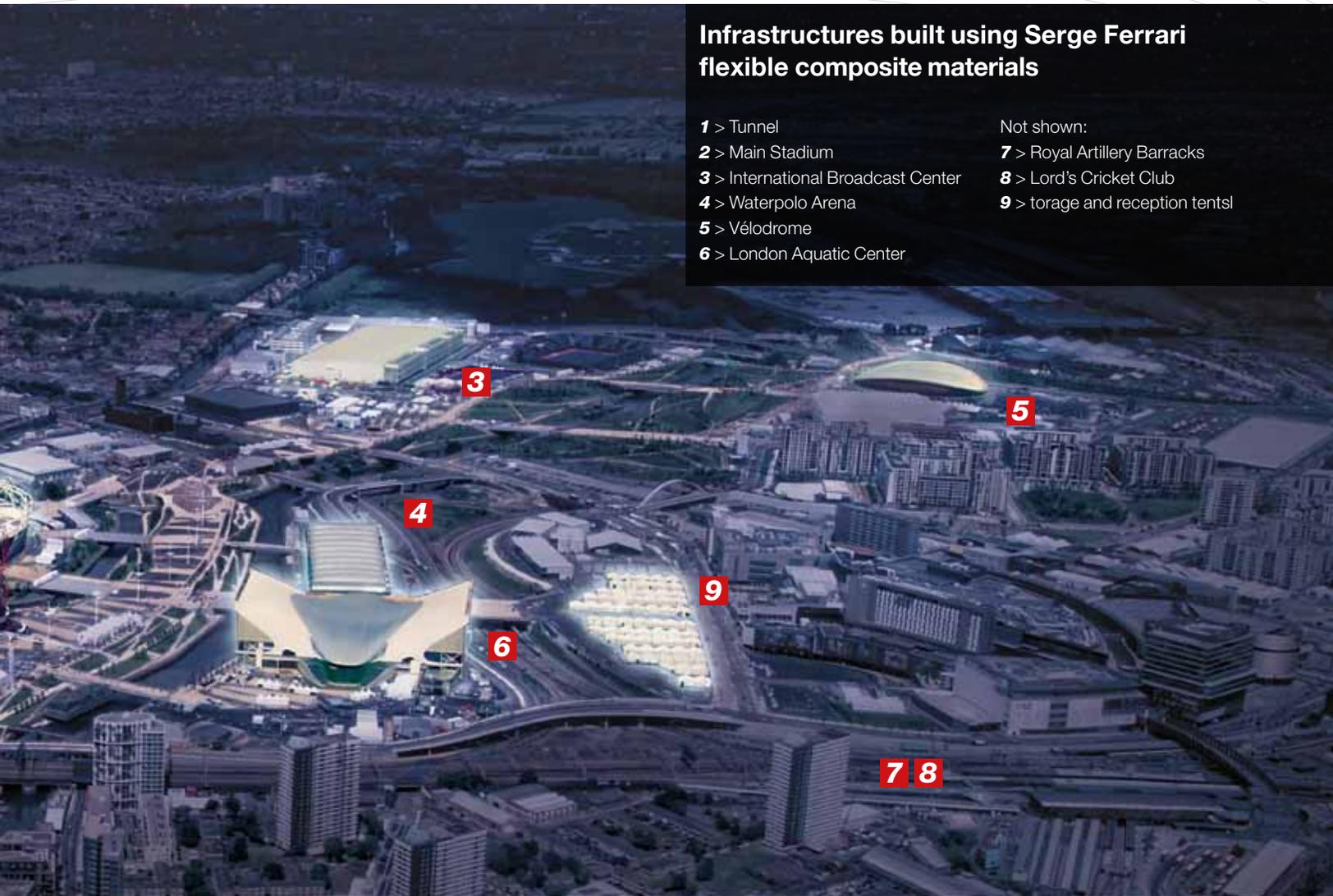
Velodrome - Aigle - Switzerland

Implementation of Serge Ferrari flexible composite materials in the most iconic sports infrastructures, like those of London 2012, bears witness to their intrinsic qualities, prompting solutions suited to the functional needs of buildings and their requirements in terms of modularity, multifunctionality, mobility or operating flexibility.

Infrastructures built using Serge Ferrari flexible composite materials

- 1 > Tunnel
- 2 > Main Stadium
- 3 > International Broadcast Center
- 4 > Waterpolo Arena
- 5 > Vélodrome
- 6 > London Aquatic Center

- Not shown:
- 7 > Royal Artillery Barracks
 - 8 > Lord's Cricket Club
 - 9 > storage and reception tents



materials: tested and proven on the ground worldwide



Paris Country Club - France



Beckham Academy - London - UK



La Florida bicentennial stadium - Chile



Swimming pool - Val d'Isère - France

ASSETS FOR HIGH ENVIRONMENTAL PERFORMANCE BUILDINGS

- > Lightweight construction systems
- > Controlling natural light
- > Optimising acoustic comfort
- > Reducing energy consumption
- > Enhancing thermal comfort

Aquatic Centre – London – United Kingdom

Serge Ferrari flexible composite materials, combined with lightweight structural systems, meet the functional requirements of temporary sports buildings prior to subsequent re-use.



London Aquatic Centre: a majestic structure based on versatile variable geometry

The LAC (London Aquatic Centre), a majestic structure designed by Zaha Hadid, is inspired by the fluid geometries of moving water. The spectacular roof, architecturally conceived in the shape of a 160 m long x 80 m wide wave spans the central building and spreads outwards like the wings of a manta ray with two temporary canopies composed of 25,000 m² of Serge Ferrari NPP* composite membrane.

The LAC concept embodies the organisers' environmental approach: to build permanent structures, if they can be used after the event, and to build temporary structures, if they cannot.

Thus, only the central building will form part of the Olympic heritage: an aquatic centre with a 2,500-seat spectator capacity. The wings, which shelter removable 17,500-seat stands during competition, will be later dismantled. The composite materials will be re-used in the United Kingdom as new tensioned structures.

A lightweight construction system

The completely removable building wings are covered with 18,000 m² of opaque Précontraint 1002 S2 composite material. Providing a lightweight construction solution, this composite membrane ensures roof watertightness and contributes to the building's light and thermal environment.

A structural paradox: the composite membrane, which usually forms curved surfaces, is here installed in flat 7-metre span fabric panels. It slides in aluminium runners fixed to the steel roof

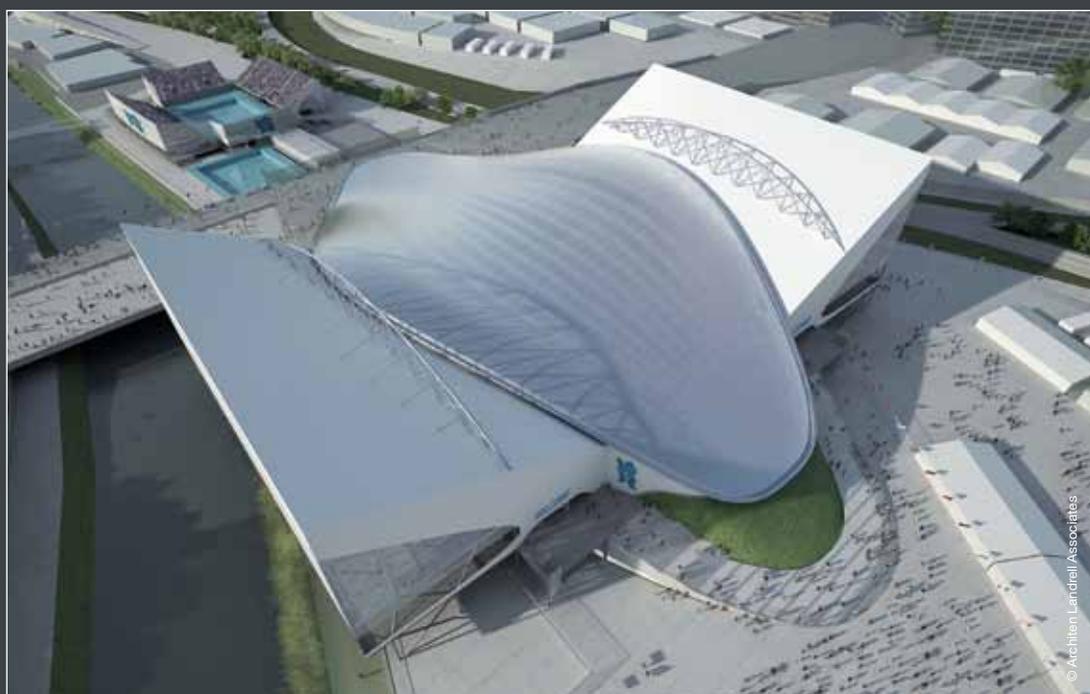
frame. It should be noted that the Serge Ferrari material is a NPP* composite. It complies with the organiser's environmental specification, while guaranteeing the required strength, aesthetics (whiteness and brightness) and flame retardancy imposed by its Euroclass B-s2,d0 fire rating. Serge Ferrari is the only manufacturer capable of taking up this challenge.

External safety cladding for stands

7,000 m² of Stamisol FT 381 white openwork composite material

clad and make safe the temporary stands. Its intrinsic characteristics and recyclability were determining for Stamisol FT 381 material selection: Stamisol FT 381 reduces heat transmission and encourages air circulation with its 28% porosity, thereby contributing to regulate humidity level within the internal space. Designed for large dimension ventilated facades, Stamisol FT's strength is unmatched. It is B-s2,d0 fire-rated and is 100% recyclable.

* Non Phthalate Plasticizer



PROJECT DATA

- Architect:
Zaha Hadid Architects
- Project Managers:
Glenn Morley and Sara Klomps
- Consulting Engineer:
Tensys
- Fabrication/Installation:
Architen Landrell Associates (ALA)
- Serge Ferrari flexible composite materials:
 - > **Roof:**
Précontraint 1002 S2
Black out NPP
Material area: 18 000 m²
 - > **Facade:**
Stamisol FT 381 NPP
Material area: 7 000 m²

The Waterpolo Arena – London – United Kingdom

Précontraint 1002 S2 NPP version "Silver" composite material establishes the building's personality and will ensure good integration into various areas during forthcoming usages.

© Susan Matthews



■ A 100% removable, re-usable building

The Waterpolo Arena, hallmarked David Morley Architects (DMA), is a temporary structure, which will be demolished after the Olympic Games. The building clad in Précontraint 1002 S2 NPP* Silver is distinctive due to a sloping inflatable roof, which undulates like a breaking wave.

The building's unsupported span of 54 m x 124 m required a strong, flexible, lightweight material. It also had to meet the building's structural demands during operation, but also to stand up to dismantling, while maintaining structural and aesthetic integrity in view of its re-use.

In addition, the composite membrane had to satisfy the structure's

functional requirements, specifically to contribute to controlling the internal thermal environment and eliminate risks of condensation beneath the roof to prevent droplets from falling into the pool and on the 5,000 spectators!

Précontraint 1002 S2 NPP composite material was a natural choice in this context.

Large spans of 54 m long x 10 m

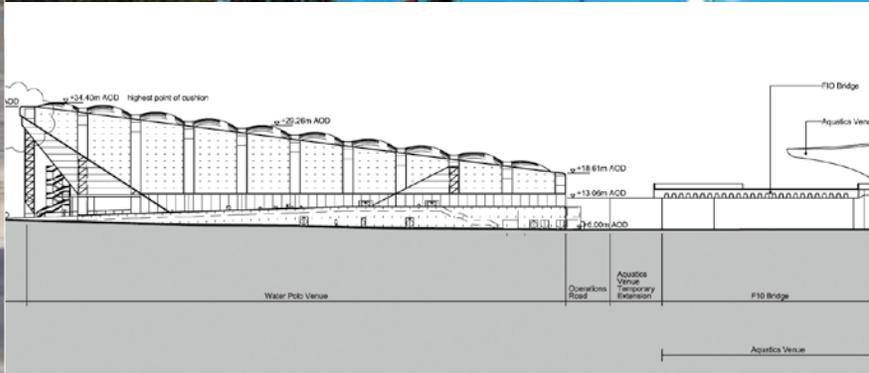
wide double membrane cushions were made up and inflated with air at a pressure of approximately 300 pascal before being installed to form the roof. The advantages of the inflatable cushions are two fold the elimination of condensation and formation of the inclined roof, the opaque version of Précontraint 1002 S2 composite membrane creates the

luminous environment required for high-definition recordings and broadcasts. Acoustically, the sound reverberation effects inherent to aquatic centres were reduced by installing 1,000 m² of Soltis 99-1, which offers an uncluttered acoustic absorption performance level.

* Non Phthalate Plasticizer



© Architen Landrell Associates



© Susan Matthews

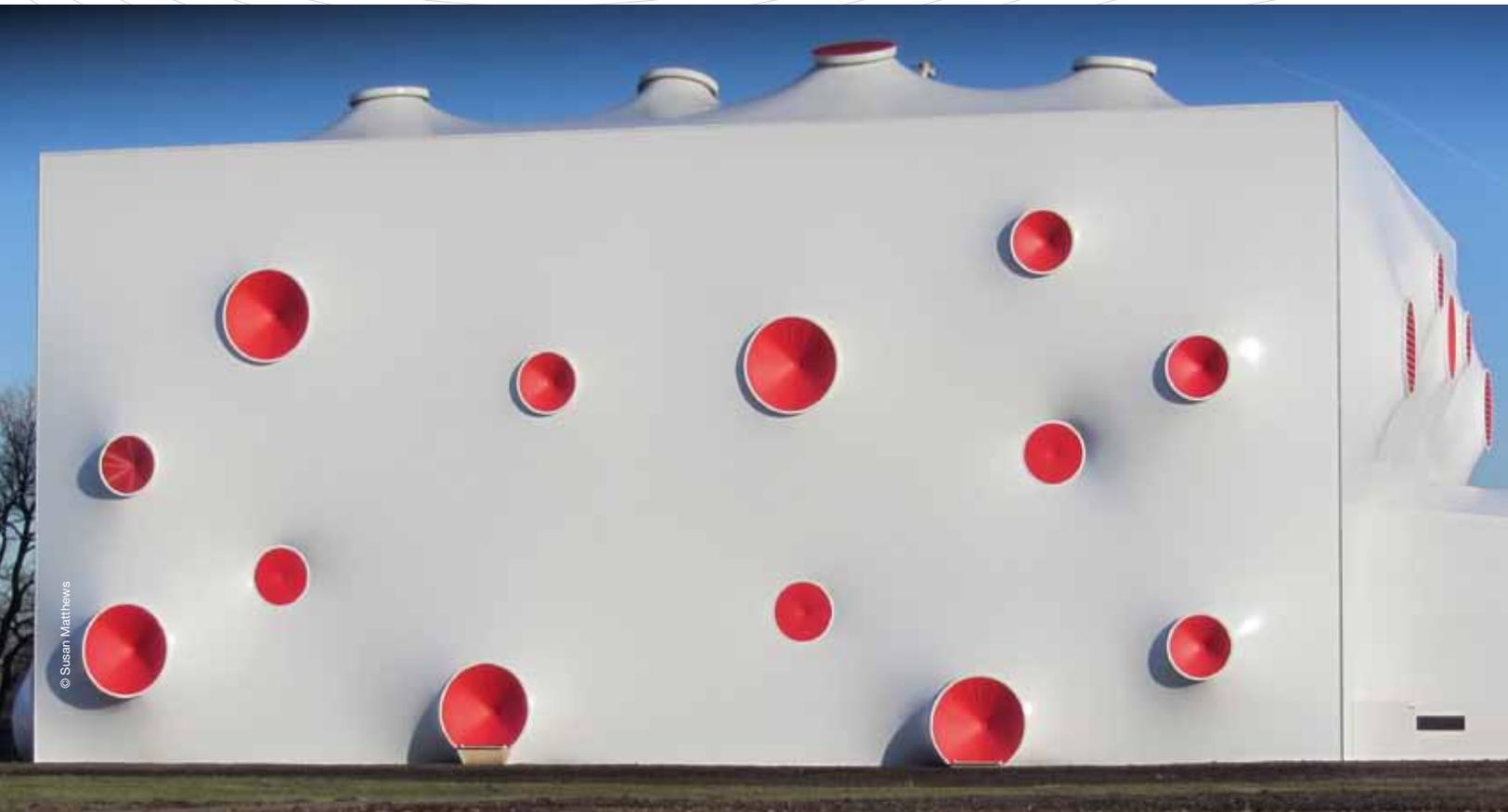
PROJECT DATA

- Architect:
David Morley Architects
- Consulting engineer:
Buro Happold
- Fabrication/Installation
Architen Landrell Associates (ALA)
- Serge Ferrari flexible composite materials:
 - > **Précontraint 1002 S2 NPP**
Material area: 22,000 m²
 - > **Soltis 99-1 NPP**
Material area: 1,000 m²

SERGE FERRARI ADVANTAGES

- Lightness and flexibility
- NPP flexible composites
- Resistance to UV rays and bad weather
- Euroclass B-s2, d0
- Easy maintenance
- 100% recyclable through Texyloop®
- Eco-efficiency proven by LCA

Covered shooting ranges – Woolwich – United Kingdom



© Susan Matthews



*Installed Précontraint,
Soltis and Stamisol
composite materials
are 100% re-usable and
recyclable.*

© Base Structures

■ Royal Artillery Barracks: avant-garde design temporary structures

It couldn't have been more natural for the Olympics 2012 shooting events to be held at the foot of the Royal Artillery Barracks, built in 1776, while respecting the site's World Heritage classification. Magma Studio therefore designed three, temporary, movable, and recyclable barrack buildings made of Serge Ferrari NPP* composite materials.

These three unusual buildings, each identifiable by its specific bright coloured disks (orange, magenta and blue), are covered with Précontraint 1002 S2 NPP, a composite material which offers unique advantages:

- they meet the organiser's stringent environmental specification,
- being lightweight, they are as quick and easy to install as to remove and re-install,
- manufactured based on

Précontraint Serge Ferrari® patented technology, they are flexible, very strong extremely stable dimensionally: characteristics that remain durable, even after several installation-removal operations, - finally, the membranes natural translucency provides the natural light contribution and recreates the variations in the sun's strength or the clouds' conveyed shadows,

conditions to be met to ensure official approval of the performance characteristics of these sporting events, which are usually held in the open air.

Inside, 14,000 m² of white micro-aerated Soltis 92 NPP composite were tensioned to respond to a triple concern: enhancement of thermal comfort, absorption of sound reverberation and contri-

bution to aesthetics by concealing the building frame members, while maintaining maximum light transmission.

Finally, 10,000 m² of Stamisol FT 381 NPP openwork composite material were installed to support structurally the ballistic protection screens.

** Non Phthalate Plasticizer*



PROJECT DATA

- Architect:
MAGMA Architecture
- Fabrication/Installation:
Base Structures
- Serge Ferrari flexible composite materials:
 - > **External envelope:**
Précontraint 1002 S2 NPP
Material area: 22,500 m²
 - > **Internal lining:**
Soltis 92 NPP
Material area: 14,000 m²
 - > **Structural support:**
Stamisol FT 381 NPP
Material area: 10,000 m²



■ London Main Stadium: the most ecological stadium in Olympic history

By selecting Précontraint 1202 S2 composite membrane for the stadium roof and entrance canopies; Populous, a world renowned architectural firm took full advantage of the lightness, strength and recyclability of Serge Ferrari composite material in total compliance with the organiser's environmental strategy. The stadium received the World Stadium Congress 2012's "Award for the most sustainable stadium".

The 33,000 m² of Précontraint 1202 S2 composite material for the roof fulfills three goals: to protect two-thirds of the stands from bad weather, to shelter the competition area from the wind to ensure official approval of possible records and to control light transmission to reduce "the dazzle" which causes issues with worldwide broadcasting of the events.

Structural and aesthetic durability

Manufactured based on exclusive Précontraint Serge Ferrari® patented technology, the compo-

site membrane guarantees the structure's exceptional structural and aesthetic durability while maintaining a lightweight solution for the facility.

Moreover, an S2 fluorinated surface treatment was applied to the Précontraint 1202 S2 composite material to ensure additional aesthetic durability.

Modularity and recyclability

The Main Stadium is distinctive due to its avant-garde functional design. The concept required that the facility be able to host 80,000 spectators for the games

and following the events be able to be reformatted to ultimately host 25,000 fans.

The Précontraint 1002 S2 roof can be quickly and easily dismantled, then re-used in a new configuration, while conserving the integrity of its characteristics and performance. As for the unused composite, this can find a second life in material re-usage networks or be recycled through Serge Ferrari's operational Texyloop® network, a determining option for the organiser.

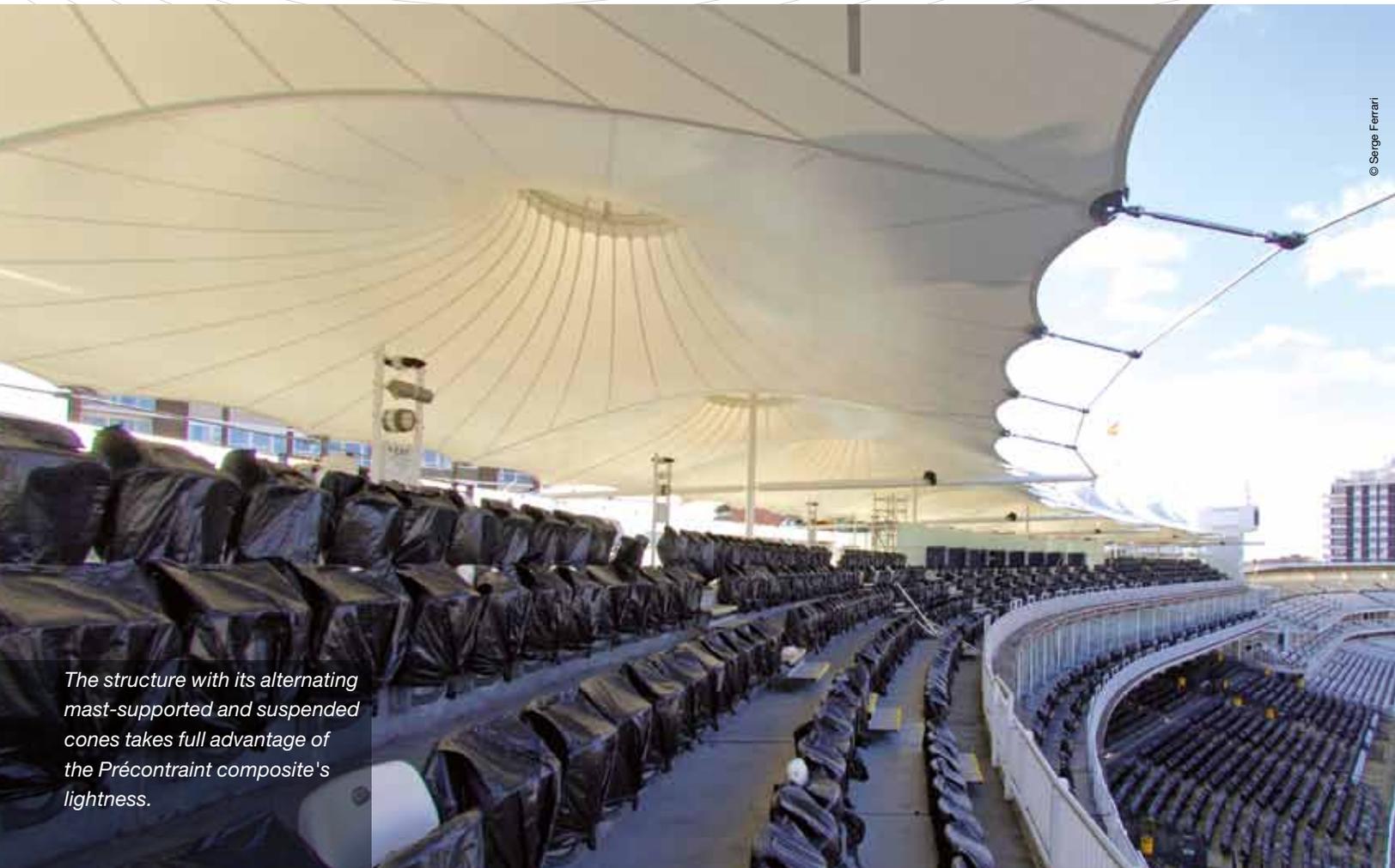
PROJECT DATA

- Client:
Olympic Delivery Authority
- Architect:
Populous
- Consulting engineer:
Buro Happold
- Fabrication:
Seele Cover GmbH
- Serge Ferrari flexible composite materials:
 - > **Roof: Précontraint 1202 S2**
Material area: 33,000 m²
 - > **Canopies - 12 modules marking access to stands: Précontraint 1202 S2**
Material area: 5,000 m²



SERGE FERRARI ADVANTAGES

- Exceptional dimensional stability
- Resistance to UV rays, bad weather and soiling
- S2 fluorinated surface treatment
- 100% recyclable through Taxyloop®
- Eco-efficiency proven by LCA



The structure with its alternating mast-supported and suspended cones takes full advantage of the Précontraint composite's lightness.

© Serge Ferrari

■ Lord's Cricket Club: a low environmental impact rejuvenation

The famous British club, which hosts top level competitions since 1814, will open its beloved premises to Olympic archers this summer.

In 2006, one of the United Kingdom's premier structures was renovated based on sustainable development logic: 1,200 m² of Précontraint 1002 T2 composite material were installed to cover the stands, replacing old composite membranes, which were 100% recycled through the Texyloop® network to give birth to new raw materials.

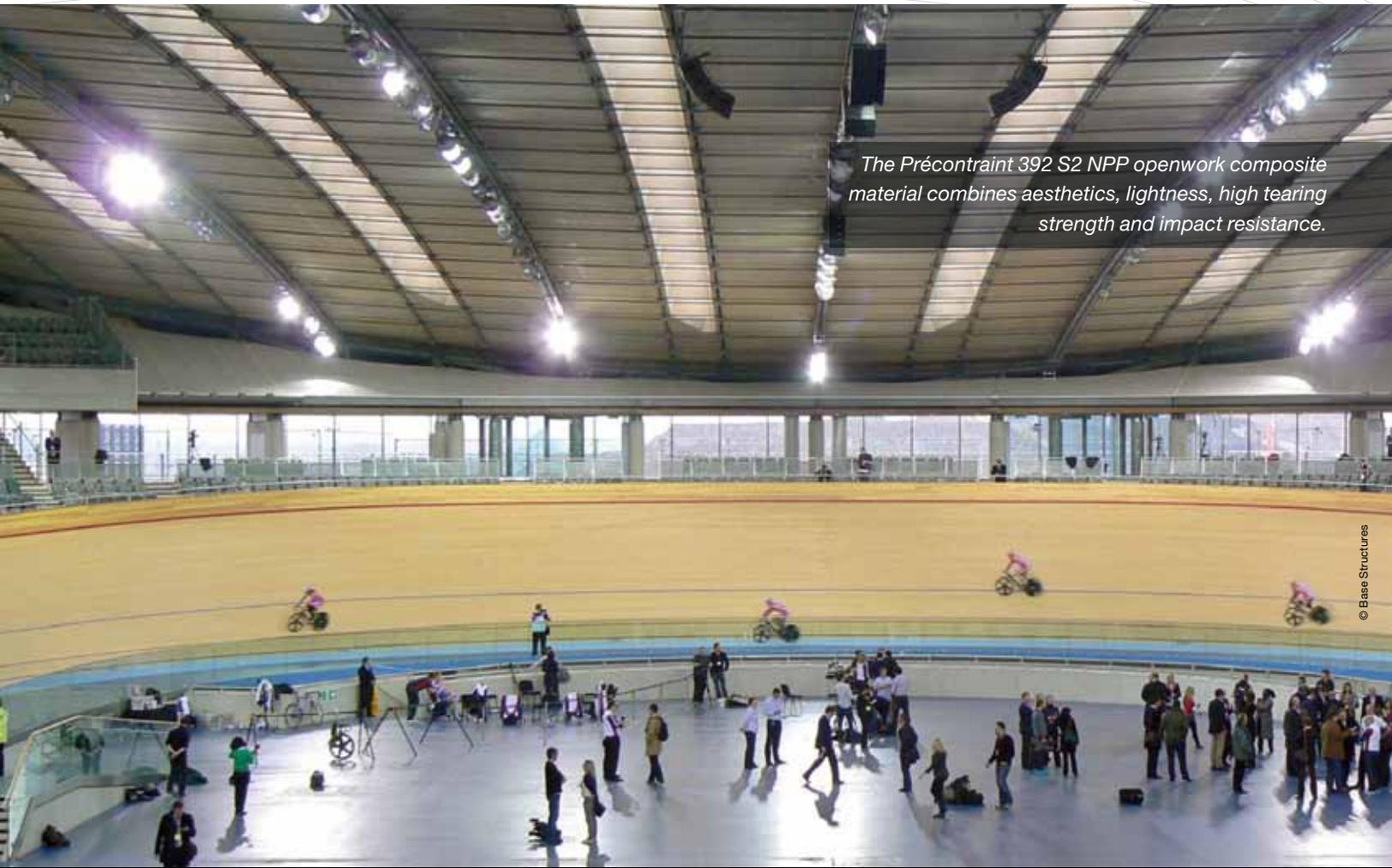


© Serge Ferrari

PROJECT DATA

- Client:
Marylebone Cricket Club
- Architect:
Michael Hopkins
- Consulting engineer:
MRN
- Fabrication/Installation:
Base Structures
- Serge Ferrari flexible composite material:
> Précontraint 1002 Fluotop T2

Velodrome – London – United Kingdom



The Précontraint 392 S2 NPP openwork composite material combines aesthetics, lightness, high tearing strength and impact resistance.

© Base Structures

■ Discreet, efficient protection for London's velodrome



© Base Structures

The circular stands overlook the track, just like an arena. 6,000 seats are fixed to two flights of terraces separated by a walkway running all around the building.

The top flight of terraces is located directly underneath the building



© Base Structures

technical components and a screen with a twofold objective was required: to aesthetically conceal the ventilation ducts and to prevent the possible risk of over-enthusiastic spectators falling backwards!

Base Structures, responsible for the project, opted for a solution implementing Serge Ferrari NPP* flexible composite material, whose lightness and flexibility combined

with exceptional strength allowed a totally safe protective liner to be manufactured and installed.

* Non Phthalate Plasticizer

PROJECT DATA

- Architect:
Hopkins Architects
- Design/Fabrication/Installation:
Base Structures
- Serge Ferrari flexible composite material:
> Précontraint 392 S2 NPP
Material area: 2,600 m²

SERGE FERRARI ADVANTAGES

- High strength
- Lightweight
- Easy maintenance
- 100% recyclable through Texyloop®
- Eco-efficiency proven by LCA

Robust and easy to maintain, Stamisol FT 381 combines aesthetics with building light and thermal control.



© Martin Deutsch

■ IBC opts for a lightweight facade

The International Broadcast Centre (IBC), a veritable 24-hour operational facility is the base camp for more than 20,000 media members. The building facade is clad in Stamisol FT 381 NPP* for the occasion.

As a combination of innovative temporary components and a permanent structure, the aim is that the IBC building can be reconverted for sale after the event and to therefore enable future operators and occupants to reconfigure its spaces in relation to their needs.

The Stamisol FT 381 NPP ventilated facade is one of many temporary components in this facility. It could though also very easily be a long term solution for energy reduction. This openwork composite material was manufactured based on Précontraint Serge Ferrari® technology. Its exceptional strength and lightness allows

large size single panels to be manufactured. Robust and easy to maintain, Stamisol FT 381 also provides the IBC facade with added aesthetic value by concealing outside technical equipment.

Stamisol FT 381's exceptional transparency enables visual contact with the exterior to be maintained (no enclosed effect) and optimises the natural light contribution, while preventing dazzling effects incompatible with the computer work of printed press and audiovisual journalists.

* Non Phthalate Plasticizer

PROJECT DATA

- Client:
Olympic Delivery Authority
- Architects:
Allies & Morrison
- Fabrication/Installation:
Architen Landrell Architecture (ALA)
- Serge Ferrari flexible composite material:
> Stamisol FT 381 NPP white
Material area: 4,500 m²

SERGE FERRARI ADVANTAGES

- Dimensional stability
- Transparency and outward visibility
- Resistance to UV rays and bad weather
- 100% recyclable through Taxyloop®
- Eco-efficiency proven by LCA



© Serge Ferrari

Temporary structures – London – United Kingdom



© Susan Matthews

■ Backstage...

Light, modular, transportable, durable and re-usable, temporary lightweight structures made of Serge Ferrari composite materials are installed on site at every major sporting event.

More than 400,000 m² of white translucent and opaque aluminium Précontraint 702 S2 have been implemented in London. Over 2,000 "A-Frame clearspans" - type structures have been erected to receive and inform visitors.

Nearly 300,000 m² of Serge Ferrari composites have been used for the 10 to 25 m long tents dedicated to storage and logistics. Serge Ferrari S2 surface treatment guarantees an aesthetic durability that makes the difference: extreme whiteness and brightness, exceptional cleanability. An imperative requirement for regularly erected and dismantled structures, which must appear new at each installation.

The VIP covered walkway

A 300 m long x 8 m wide temporary tunnel wholly covered with white translucent Précontraint 702 S2 composite material links the Olympic village and the training centre. This protected walkway, providing ample natural light, allows athletes and VIPs to walk from one to the other unobserved and in bad weather.



© Susan Matthews



© Susan Matthews

■ Renovation of Munich's iconic Olympiahalle

Flexible, strong, light and durable, Précontraint 1002 S2 composite meets all the functional, technical and aesthetic requirements of the structure.

38 years after the Munich Olympic Games, the mythical Olympiahalle still holds many international sporting and cultural events as well as concerts performed by the greatest popstars in the world.

Classified a historical monument, the 15,000 spectator capacity Olympiahalle was completely overhauled in 2010, including construction of a new double membrane roof structure.

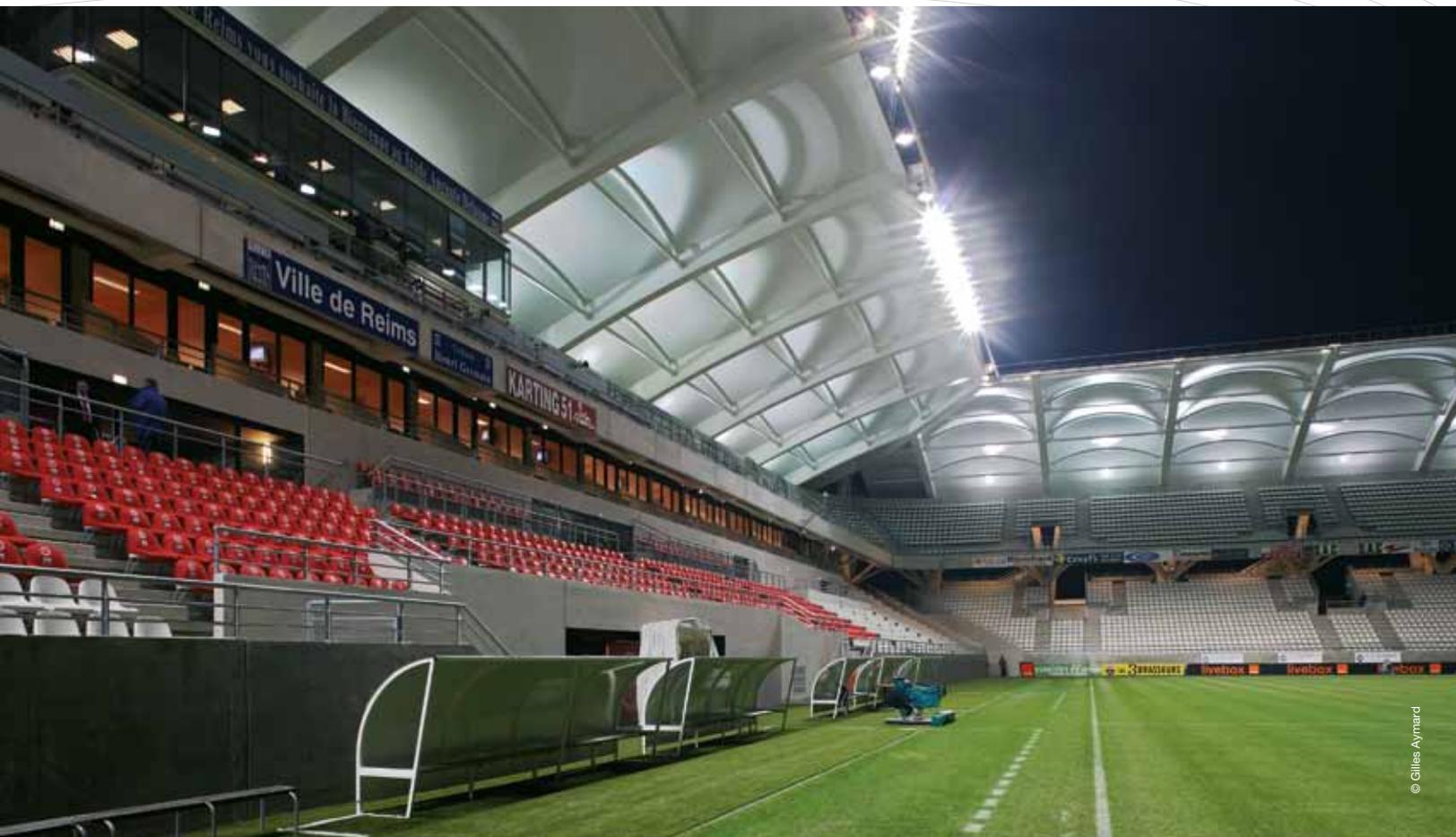
The unique performance characteristics of Précontraint 1002 S2 composite material proved convincing for the internal membrane:

- remarkable dimensional stability and excellent tearing strength provided by Précontraint Serge Ferrari patented technology,
- aesthetic durability thanks to the S2 surface treatment to give greater resistance to soiling,
- high degree of strength imposed by temperature variations,
- Euroclass B-s2,d0 fire rating.



PROJECT DATA

- Architects:
Auer + Weber
- Consulting engineer:
Schlaich Bergemann
- Fabrication/Installation:
Hightex GMBH
- Serge Ferrari flexible composite material:
> Précontraint 1002 S2
Material area: 20,000 m²



© Gilles Aymard

■ Delaune stadium: endorsing lightness and light

The iconic Reims Football Club returned to professional level in 2002, so it became urgent to renovate its Delaune stadium, inaugurated in 1934 and now run-down, uncomfortable and cramped. In 2008, the new stadium unveiled its Serge Ferrari composite material roof, which quickly became a major landmark in the city's geography.

Architect Michel Remon, winner of the competition, designed a "English style" stadium: a rectangular layout with four stands (22,000 seats), each integrating two flights of terraces, protected by 10,000 m² of Précontraint 1302 and characterised by its lightness and translucence.

The 8.50 m x 20 m Précontraint 1302 panels are bow-tensioned and laced on a peripheral steel structure located at the back of the stands.

Junctions with steel channels provide inspection access to the rear.

The material roof, diaphanous during the day and radiant on match evenings, envelopes the terraces like a canopy, which softens the light, prevents deep shadows at sunset and diffuses artificial light during matches at night, thereby ensuring the comfort of players, spectators and televised broadcasts.

PROJECT DATA

- Architect:
Atelier Michel Remon
- Client:
Ville de Reims
- Consulting engineers:
Arcora, Ginger
- Fabrication/Installation:
Esmery Caron
- Serge Ferrari flexible composite material:
> Précontraint 1302
Material area: 10,000 m²

SERGE FERRARI ADVANTAGES

- Exceptional dimensional stability
- Resistance to UV rays, aging and pollution
- Maintenance performance
- 100% recyclable through Texyloop®
- Eco-efficiency proven by LCA

■ A tensioned ceiling baptised the "thermo-cloud"

Venue for the 2011 World Speed Skating Championships, the Inzell infrastructure in Germany was designed based on a dual principle of offering athletes the best competitive conditions and exhibiting economical, sustainable building operation. In this context, the Soltis SK 20 LowE composite membrane used on this project met those goals.

Soltis SK 20 LowE's composition, micro-aerated texture and metallized surface endow this Serge Ferrari flexible composite material with unique intrinsic performance characteristics.

Installed as a ceiling on a timber and steel structure, the Serge Ferrari composite membrane meets the three fundamentals required by the building:

- ensure a maximum natural light contribution without the effect of dazzle and direct solar radiation on the ice. This challenge was met

by the translucence and reflective power of the metallized material combined with its light diffusion performance.

- limit usage of air-conditioning, which is usually essential to prevent condensation and dampening of the timber surfaces. Soltis SK 20 benefits from the Serge Ferrari LowE advantage, obtained by applying an aluminium treatment to create a real thermal barrier that protects the wood from cold and the ice's cold radiation.

- provide an acoustic gain. Soltis SK 20 achieves reverberation

times exceeding DIN standard recommendations.

SERGE FERRARI ADVANTAGES

- LowE low emissivity treatment
- Thermal protection
- Non-combustible
Non-flammable
- Light control
- Acoustic absorption
- Eco-efficiency proven by LCA

PROJECT DATA

- Architects:
**Arbeitsgemeinschaft
Behnisch Architekten/
Pohl Architekten, Munich**
- Climatic design:
Transsolar, Munich
- Consulting engineer:
**Konstrukt AG,
Rosenheim**
- Serge Ferrari flexible composite material:
> Soltis SK20 LowE
Material area: 22,000 m²





Soltis SK 20 LowE optimises the building's internal thermal, light and acoustic environment.

Sepang Formula 1 circuit – Kuala Lumpur – Malaysia



■ Serge Ferrari in pole position for last 14 years!

Each year, the Sepang International Circuit hosts the Malaysian Grand Prix. The circuit structures are extraordinary with expansive technical and press complexes which encompass 70,000 square meters of protected spectator stands. This structure has stood wrinkle-free and without folds since its debut in 1998 thanks to its Serge Ferrari composite material.

The aesthetic durability of Serge Ferrari composite membranes is due to high performance polymer formulations enhanced with fluorinated treatments. The Preconstraint Serge Ferrari® manufacturing technology process assures excellent dimensional stability and structural sustainability of the project. Grand Stand, offering a 53,000 spectator capacity, and of the giant parasols have therefore maintained their remarkable dimensional stability, bright aspect and original colour,

despite the extreme climatic conditions and aggressive atmosphere

(pollution, tropical humidity, UV, etc.).



PROJECT DATA

- Architect:
Hermann Tilke
- Client:
Malaysia Airport Authority
- Consulting engineer
Buro Happold
- Fabrication/Installation
Alom Building System.Bhd.
- Serge Ferrari flexible composite materials:
> **Préconstraint 1002 T**
> **Préconstraint 702 T**



© CIDELSA

■ Estadio Germán Becker: the largest of structures renovated for the Chilean World Cup

Chile hosted the FIFA U-20 Women's World Cup in 2008. For this event, earthquake-resistant reconstruction of Temuco's Germán Becker Stadium was entrusted to architect Sergio Ferreira and is today considered one of the most beautiful in Chile.

The athletics track was removed and the 22,000-spectator stadium is now equipped with individual seats. Another major change comprises the structure's roof, whose design combines protection of both stands and the facade.

This assembly is composed of 117 independent double-curved modules made of Préconstraint 902 S2 and Préconstraint 702 composite materials for the roof and façade respectively, which were installed in only 45 days.

"The Temuco region is subjected to difficult climatic conditions including abundant rainfall, very strong winds and major seismic risks", explains architect Aurora Perez, in charge of the project at Cidelsa, the company ensuring membrane manufacture and installation. "In this context, Serge Ferrari composite materials guarantee the long-term dimensional stability and durability essential to this type of structure. Moreover, their surface treatment ensures pollution resistance; thus, more than 4 years later, the roof and façade's aesthetics and structural integrity have stood up to not only bad weather, but also the terrible earthquake of 2010".

PROJECT DATA

- Client:
Temuco city
- Architect:
Sergio Ferreira & Arquitectos / Roberto de la Madrid
- Consulting engineer:
SOCOVESA
- Fabrication/Installation :
CIDELSA / Aurora Perez
- Serge Ferrari flexible composite materials:
> Roof: Préconstraint 902 S2
Material area: 19 100 m²
> Façade: Préconstraint 702
Material area: 9 100 m²



© CIDELSA

For "Chili 2008", Serge Ferrari flexible composite materials were also implemented within the scope of Santiago's La Florida (above) and Chillán's Nelson Oyarzun Arenas stadium renovation projects.



■ The Cloud: semi-permanent architecture for the 2011 Rugby World Cup

The Cloud is a multipurpose infrastructure located in the historic Queen's Wharf area of the Auckland waterfront. An ultra-modern ephemeral building, which was built for the 2011 Rugby World Cup and received the LSAA* Design Award 2011. A true economic and cultural showcase during the event, the Cloud was designed to be removable, transportable and re-deployable after the competition.

As famous now as the Skytower or the Waitemata Harbour bridge, the Cloud is characterised by a pureness and aesthetic delicacy only possible through the lightness of Serge Ferrari composite materials.

The 180 m long structure is covered by a Précontraint 1002 Fluotop T2 flexible composite. During the day, the composite

membrane reflects heat and its translucence optimises natural light diffusion. At night, the material reveals the play and movements of light, transforming the building into a distinctive luminous landmark.

The building's southern end is lined with Précontraint 502 composite material, which conceals the reinforcement and steel frames

and gives the final touch to the cloud shape created by the roof.

Inside, Soltis 92 micro-aerated membrane clads the 500 m² ceiling of the mezzanine reserved for the media and VIPs during the Rugby World Cup. Flexible, light and robust, Soltis 92 allowed many HVAC technical components to be safely incorporated: the material conserved all its

strength and aesthetic qualities. An additional advantage was its sound absorption performance characteristics, which contributed to enhancing the structures acoustic environment.

* Lightweight Structures Association of Australasia



© FFS



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PROJECT DATA

- Client:
**Waterfront Auckland
NZ Government**
- Architect:
Jasmax
- Consulting engineer:
Wade Design Engineers
- Design/Fabrication/
Installation:
Fabric Structures Systems
- Serge Ferrari flexible
composite materials:
 - > **Roof:**
Précontraint 1002 Fluotop T2
Material area: 6,000 m²
 - > **Atrium: Précontraint 502**
 - > **Tensioned ceiling in VIP
area: Soltis 92**
Material area: 500 m²

SERGE FERRARI ADVANTAGES

- Exceptional dimensional stability
- Fluotop T2 surface treatment
- Excellent micro-organisms resistance
- Resistance to UV rays, bad weather and soiling
- Easy maintenance
- 100% recyclable through Texyloop®
- Eco-efficiency proven by LCA



■ Dive into the heart of a durable aquatic complex

The “Les Vagues” aquatic centre in Meyzieu, France was designed based on a High Energy Quality (HEQ) approach aimed at creating a healthy, comfortable environment for users by controlling environmental impacts of building construction and operation. Among the materials implemented to achieve this objective, Batyline composite membrane was installed as a tensioned ceiling.



Batyline is an openwork material of remarkable lightness and flexibility: it allows very large tensioned areas to be covered just one piece without the need for heavy supporting structures. As a lightweight construction system, economic in raw materials and 100% recyclable, it is quick and easy to install, thereby reducing congestion during construction.

A durable investment

Batyline's life expectancy is over 20 years in warm, humid, and chlorinated environments. This was one of the determining factors in material selection. No specific upkeep of the membrane and Silcord tensioning cables is required. The material is quickly and easily removed, so plenum access is simple: building maintenance operations and costs are therefore limited.

An efficient acoustic solution

Batyline's acoustic performance characteristics are remarkable for such a thin, lightweight material. The composite membrane's intrinsic absorption characteristics significantly curtail reverberation effects without installing additional insulating material, which can be aesthetically constraining, cumbersome and voluminous.

PROJECT DATA

- Architect: **Thierry Nabères Architectes (TNA)**
- Client: **Ville de Meyzieu**
- Fabrication: **SGTP**
- Installation: **Entreprise Stéphane Meunier**
- Serge Ferrari flexible composite material: **> Batyline**

Sports complex – Malabo – Equatorial Guinea



© ACS

■ Malabo Stadium: between the tropics of Capricorn and Cancer

The presence of Serge Ferrari composite membranes at the Malabo sports complex, which was used for the Africa Cup of Nations 2012, once again demonstrates their strength and durability qualities in a hot, humid equatorial climatic environment.

With a capacity of 12,500 seats, the stands at the Malabo stadium have been covered (since 2007) with 11,000 m² of Précontraint 1502 T2 composite material. The double curvature panels are bow-tensioned and laced in large channels to cantilevered beams.

Difficult climatic conditions

With a mean temperature of 27°C and heavy rains between 2,000 and 2,500 mm/year in Malabo, the structure is severely tested. For this reason, the client opted for the Fluotop T2 surface treatment, a unique concept resistant to adverse conditions. Resistance to microorganism

growth, bio-deterioration, UV rays and aging, all of which have been measured after more than 10 years on major structures in Abu Dhabi and Kuala Lumpur, prove the membrane long-term aesthetic durability under extreme atmospheric conditions. It should be noted that, since

2009, this membrane has also been implemented for presidential canopies, the stadium's main entrance and the new indoor swimming pool.

PROJECT DATA

- Architect:
INGEROP AFRICA
- Main contractor:
BOUYGUES International
- Consulting engineer:
Arup
- Fabrication/Installation:
ACS
- Serge Ferrari flexible composite material :
> Précontraint 1502 Fluotop T2



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© Serge Ferrari

■ Foshan Stadium : Lotus of the Century

Translucency, lightness, shape dynamics, Foshan stadium meets every requirement in terms of comfort and aesthetics as an emblematic structure in its region. The cable tensioning system operates from two steel segments supporting the Serge Ferrari flexible composite material covered roof.

This building has been named “Lotus of the century”. It is quite simply the largest cable-tensioned flexible composite material structure in the world. Designed by the german GMP

Architekten studio, the new Foshan stadium was built for the 12th Guangdong Province Sports Meeting in 2006.

“We decided on a plant shape, V-shaped petals combined with

the white of the composite membrane to symbolise the lotus flower.” explains the architect.

The stands, with their 45,000 spectator capacity, are fully covered by tensioned Précontraint 1502 Fluotop T2 composite membrane.



© Serge Ferrari

PROJECT DATA

- Architect:
GMP Hambourg
- Client:
Foshan City Council - China
- Consulting engineer:
SBP Stuttgart
- Fabrication/Installation:
Schlaich Bergemann
- Serge Ferrari composite material:
**> Précontraint 1502
Fluotop T2**
Material area: 75 480 m²



© Serge Ferrari



For a decade, the Précontraint Serge Ferrari flexible composite roof has kept all its original structural and aesthetic qualities without the need for any specific maintenance.

© ACS

■ A covered rugby stadium and... a converted try!

Inaugurated in 2002, The French National Rugby Centre in Marcoussis features a 80 x 50 m synthetic pitch, covered by Précontraint Fluotop T2 composite membrane, allowing the French XV and trainees to practise in all seasons. Architects Pierre Ferret and Françoise-Hélène Jourda recall the advantages of this Serge Ferrari-designed material.



© ACS

“Stadiums require us to go for quality and the Précontraint Fluotop T2 material is simply ideal”, says Pierre Ferret. “In bad weather, the Précontraint patented material ensures excellent watertightness and wind resistance. With the Fluotop T2 surface treatment, the covered structures resist much better the effects of aging, soiling and UV radiation... Maintenance is facilitated and more efficient. The composite membrane also conserves longer its original whiteness and brightness”, explains the architect.

Another essential asset is its translucence. “The luminosity and transparency of this composite prevents any areas of shadow”, adds Françoise-Hélène Jourda,

PROJECT DATA

- Architects:
Pierre Ferret (Bordeaux) and Françoise-Hélène Jourda (Paris)
- Client:
Fédération Française de Rugby
- Fabrication/Installation:
ACS
- Serge Ferrari flexible composite material:
> Précontraint 1002 Fluotop T2
Material area: 6,000 m²

“there is neither backlight nor contrasting levels of light and we thereby avoid the need for artificial lighting.”

Sustainable development

■ What solutions for tomorrow's sports and event-related infrastructures?

The Olympic Games represent the ideal context for promoting the *low physical intensity/high functional intensity* winning equation upheld by Serge Ferrari composite materials. Company General Manager Romain Ferrari describes his vision of the future for event-related infrastructures.

In an era of sustainable development, is there still a future for event-related infrastructures?

Very fortunately, we're entering a functional economy, in other words "the age of lightweight things... that last a long time"*. The principle is simple: it involves promoting materials that combine consumption of small quantities of resources (the definition of low physical intensity) and a long, multiple life. If we add to that, 100% material recyclability and harmlessness, our materials' performance is remarkable from a sustainable development standpoint.

What are the real benefits of recycling?

Recycling generates a major environmental benefit since it acts directly on extraction of raw

materials, which represents 60 to 80% of impacts, depending on the case. In reality, it is efficient in relation to almost all criteria: water, energy natural resources. But, to be absolutely right, it should be stated that recycling is necessary but insufficient. Forecasts reveal that recycling strategies "push back" the problem for several decades. To implement a true sustainable development policy, we must not only recycle, but also adopt a logic based on functional savings, a logic that effectively tackles the physical intensity/functional intensity equation.

From this angle, what are the potential benefits?

They're very significant: up to a factor of 30 between a permanent building and a flexible composite material structure! But, you also

need to include the energy savings generated by a "just-in-time" heating or lighting system, which a flexible composite material structure allows. To summarise, the choice lies between a little used, heavy, rigid solution involving high fixed costs and a light solution

deployed based on the principle of providing the right quantity at the right time, involving optimised, shared costs and high usage.

** The age of light things is arriving - Design and sustainable development. Thierry Kazazian*



Serge Ferrari composite material solutions can reduce the physical intensity of construction and increase the functional intensity of resources.



Texyloop®: the Serge Ferrari recycling chain

To limit its impacts, the Serge Ferrari Group has been committed to an environmental strategy for the last 14 years, specifically developing an exclusive patented process for recycling its composite materials: Texyloop®.

RECYCLING: HOW EFFICIENT IS IT?



> Life Cycle Assessment (LCA) of Serge Ferrari composite materials shows that most impacts (80% on average) involve raw material extraction and production. Recycling significantly reduces environmental impacts by creating new raw materials that save natural resources and curtail the extraction and transformation phases.

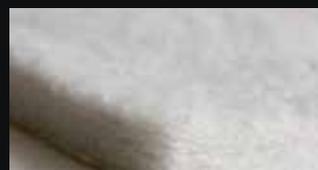
THE TEXYLOOP®

> Involving five stages and a closed system, the Texyloop® process ensures 100% recycling of components and creation of a PVC compound (granules) as well as very high quality, homogeneous polyester fibres.

The Europe-wide collection network supplies Texyloop® since 2004.

SECOND GENERATION READY-TO-USE RAW MATERIALS

> Texyloop® allows us to obtain raw materials of high intrinsic value, compatible with multiple processes. Polyester fibre is extensively sought for thermal and acoustic insulation applications and flexible PVC granules are integrated into waterproof liner production.



Non-woven for insulation, stuffing, reinforcement or filters...



Polyester yarns and fabrics



Flexible profiles

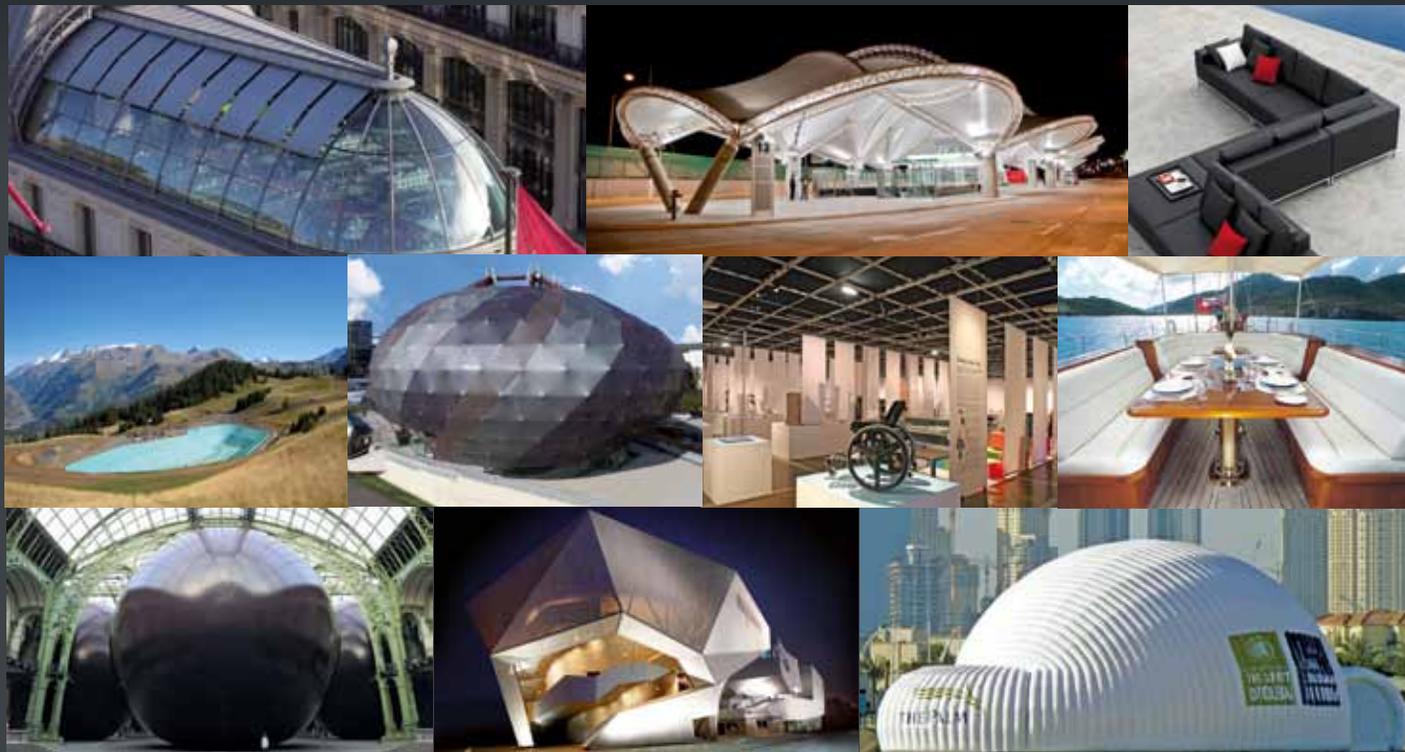


Impervious membranes for water storage ponds

The Serge Ferrari Group

■ Multi-market presence

Lightweight, durable, eco-efficient and recyclable, Serge Ferrari flexible composite materials are implemented in many fields:
Architecture, Furniture & Design, Yachting, Signs, Industry & Environment, Arts & Performances.



■ Internationally located

Present on every continent, Serge Ferrari has set up specialist teams, active in 80 countries to provide project support for its partners and clients.



→ Contact

- Headquarters: + 33 (0)4 74 97 41 33
- Your local representative:
www.sergeferrari.com

→ TEXYLOOP®

- The Serge Ferrari operational recycling chain
- Secondary raw materials of high intrinsic value compatible with multiple processes
- A quantified response to combat depletion of natural resources

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