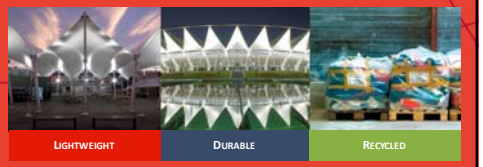
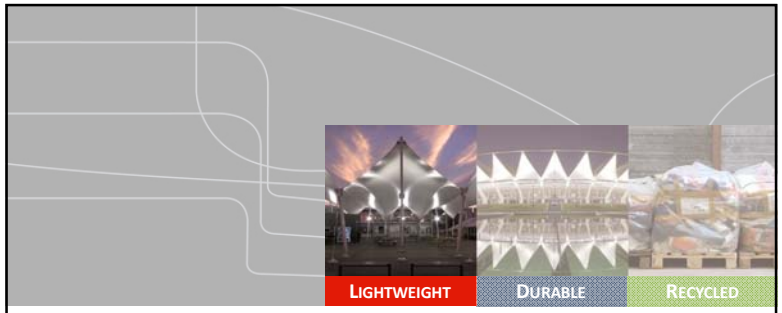
FERRARI

Sustainable development strategy in composite textiles!



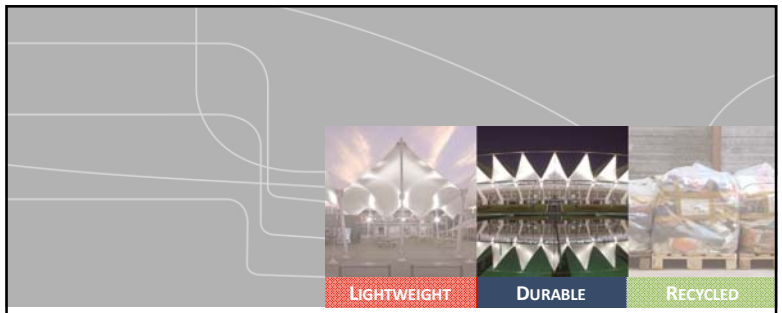


> LONGEVITY
> TEXYLOOP RECYCLING
> LIFE CYCLE ASSEMENT
> LONDON 2012
> LEED EVALUATION

> What is a flexible composite material in High Tenacity / Polyester Formulated PVC ?

- A high-tenacity polyester weave
- Coated under constant tension both in warp and weft throughout the whole manufacturing cycle
- A thicker layer of high-performance polymers on top of the yarn
- An anti-dirt surface treatment

FERRARI architecture



> DURABLE

- Long Term Structural Integrity
- Long Term Aesthetic

> Long Term Structural Integrity

PROJECT REFERENCES *Products*		Installation date	Usage duration	Residual tensile strengths
AIRBUS HANGAR *Précontraint® 1302*	Bremen, Germany	1982	22 years	Warp : 97% Weft : 84%
STORAGE STRUCTURE *Précontraint® 832*	France	1989	20 years	Warp : 91% Weft : 95%
EXHIBITION HALL *Précontraint® 1302*	Port-Gentil, Gabon	1982	18 years	Warp : 78% Weft : 76%
AIRPORT TERMINAL *Précontraint® 1202*	Lyon, France	1989	16 years	Warp : 78% Weft : 98%
LES HALLES CARPARK FACADE *Précontraint® 392*	Avignon, France	1994	12 years	Warp : 90% Weft : 80%
WALKWAY COVER *Précontraint® 1002*	Paris, France	1989	11 years	Warp : 97% Weft : 86%
RADISSON HOTEL *Précontraint® 1002*	Cape Town, South Africa	1996	10 years	Warp : 99% Weft : 100%
LADIES PAVILION *Précontraint® 1202 Fluotop®*	Abu Dhabi, U.A.E.	1996	10 years	Warp : 89% Weft : 98%
RIVERVIEW SCHOOL *Précontraint® 702*	Keri Keri , New Zealand	1999	10 years	Warp : 95% Weft : 87%
UNITED AIRLINES HANGAR *Précontraint® 1002 Fluotop®*	Miami, U.S.A.	1999	6 years (destroyed by a hurricane)	Warp : 97% Weft : 100%

> Long Term Aesthetic

- **Up graded formulation:**
  Natural outdoor weathering at ***Q-LAB*** ***(Everglades, Florida) and ATLAS WEATHERING SERVICE SINGAPORE***
- **Surface treatment: PVDF base treatment**
  High concentration /None weldable
- **Durable colours**
- **Maintenance**

> Natural outdoor weathering

Q-LAB (Everglades, Florida) **Direct exposure site**

> Natural outdoor weathering

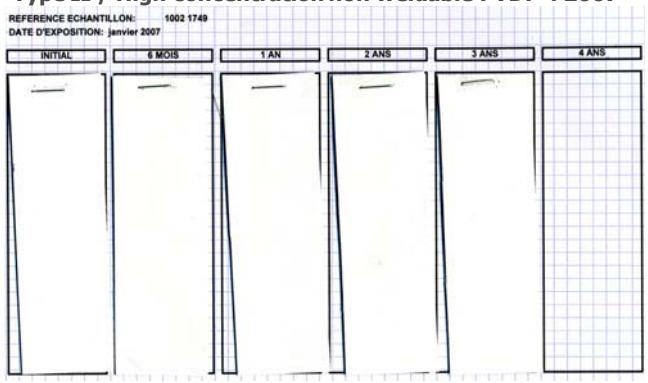
Q-LAB (Everglades, Florida) **Meteorological data**

2006	UV (MJ/M²)	Total (MJ/m²)	T	Humidity %
January	20	515	19	69
February	26	556	20	67
March	27	592	22	77
April	28	623	24	64
May	24	577	26	69
June	22	529	27	74
July	25	539	28	72
August	24	538	28	74
September	22	546	28	76
October	22	528	26	73
November	18	514	23	72
December	19	497	21	70
	277	6554	24.3	71.4

> Natural outdoor weathering

Q-LAB (Everglades, Florida)

Type II / High concentration non weldable PVDF : 2007



> Natural outdoor weathering

Q-LAB (Everglades, Florida) **Exposition data**

	initial	6 months	1 year	2 years	3 years
delta E (Lab)		2,21	2,09	2	1,8
Ts (EN410)	6	5,6	5,6	5,7	5,7
Tv (EN410)	4,4	3,9	4	4,1	4,1

> Natural outdoor weathering

LABORATORY ATLAS WEATHERING SERVICES (Singapore) **Direct exposure site**

> Natural outdoor weathering

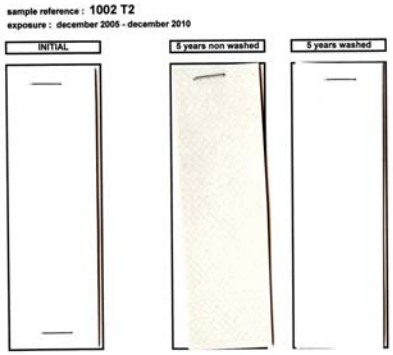
LABORATORY ATLAS WEATHERING SERVICES (Singapore) **Meteorological data**

Latitude	01º 22' North
Longitude	103º 59' East
Elevation	15 meters
Average Temp	27 °C
Avg. Relative Humidity	84 %
Total Rain	2300 mm
Total Radiant Exposure	6,030 MJ/m²

> Natural outdoor weathering

LABORATORY ATLAS WEATHERING SERVICES (Singapore)

Type II High concentration none weldable PVDF/ 5 YEAR EXPOSURE



> Sukan Negara Train Station

Kuala Lumpur, Malaysia

- **Type II**
- **Built in 1997 for 1998 commonwealth games**
- **Sample collection Dec 2010 / 13 year exposure**

> Projet Sukan Negara Train Station

Kuala Lumpur, Malaysia - Précontraint® 1002 Fluotop T2

NF EN ISO 846 With varnish

Highly fungistatic effect

TEST A: growth test
No visible growth, even under the microscope - **Degree 0** -
The material is not a nutrient medium for microorganisms.

> Ladies Pavilion

Abu Dhabi – Type III

1996 / 2006

- **Residual strength after 10 year exposure**
  - Warp 89%
  - Weft 98%

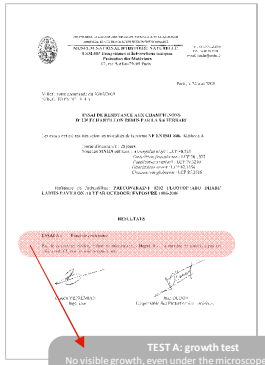
Ladies Pavilion – Peter Dew & Associates
Abu Dhabi – E.A.U.
Précontraint® 1202 Fluotop®

> Ladies Pavilion

Abu Dhabi – Type III

NF EN ISO 846

Highly fungistatic effect



TEST A: growth test
No visible growth, even under the microscope - Degree 0 -
The material is not a nutrient medium for microorganisms.

> Riverview School

New Zealand – Type I

1994 / 2008
Results after 14 year exposure

- **Residual strength**
  - Warp 95%
  - Weft 87%
- **ΔE** = 4.67
- **ISO 846**
  - Test A : Degree 0

Riverview School
Keri Keri – New Zealand
Précontraint® 702

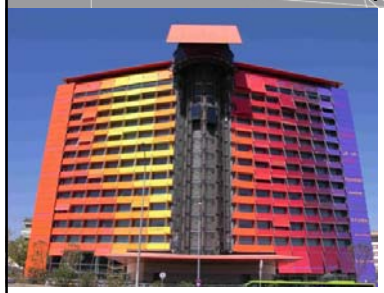
> Durable Colours

Accelerated weathering

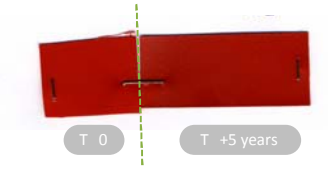
- **QUV machines**
- **UVA**
- **Water cycle for 8 H /24 H**
- **4.000 Hours (5 Month ½)**
- **Scale of Grey: 1 to 5**
  - 1 : major fading
  - 5 : hardly any change
- **Red 502-8250 shows a 3 to 4 rating on the scale of Grey**

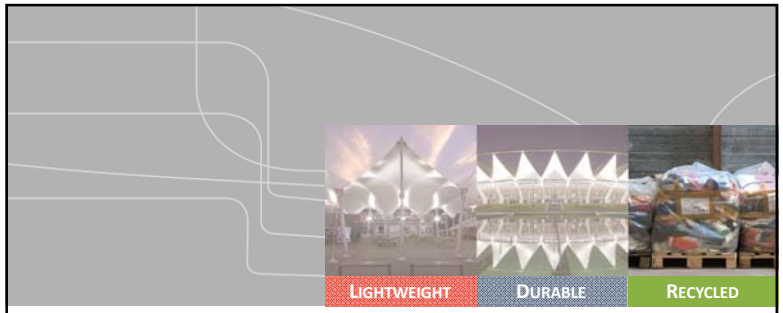
> Hotel Puerta de Americas

Madrid, Spain - Précontraint® 502 & 1002



- **Special colours**
- **2004 colour evaluation after 5 year exposure**
  - ΔE = 2.89





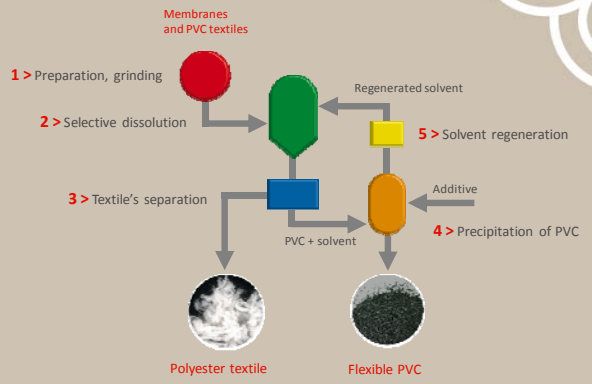
> RECYCLED

- Investment to produce new raw materials with low environmental impacts

TEXYLOOP®
A CLOSELOOP INDUSTRY

Texyloop® Process

5 closed circuit stages



TEXYLOOP® FERRARI architecture 22

1st batch: 10/10/2008

It is at Ferrara that Texyloop® produced its first industrial batch on its 2,000 t/year dedicated reactor

TEXYLOOP® FERRARI architecture 23

Clean PET fibres

TEXYLOOP® FERRARI architecture 24

Fibres are transformed by needle punching

> Unpacking

> Carding and bed forming

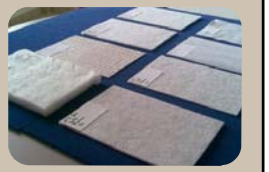
> Interlinking by needle punching

25

Non woven material

> Manufacturing a recycled fibre web

> Samples of non woven finished products



26

Oeko-Tex Certificate

CONFIANCE TEXTILE Contrôle de substances indésirables
d'après Oeko-Tex Standard 100
ASQUAL CQ 693/8 IFTH, LYON

sur les articles suivants:

Fibres 100% polyester, recyclées (procédé Texyloop®).

Les essais ont été réalisés sur les articles susnommés selon l'Oeko-Tex® Standard 100, **classe de produit II**, pour articles en contact direct avec la peau, et il en résulte que les conditions en vigueur et en respect avec l'écologie humaine stipulée dans le standard sont respectées.

Les articles certifiés satisfont aux exigences concernant l'utilisation des colorants azoïques de la législation européenne.

Le titulaire de ce certificat s'est engagé envers l'institut par une déclaration de conformité selon ISO 17050-1 d'apposer le label Öko-Tex® uniquement sur les articles qui sont conformes aux articles testés.

Cette autorisation est valable jusqu'au 30.06.2010

Lyon, 24.06.2009

27

PVC Cords

The new generation of PVC raw material is also used to make extruded cords for bolt ropes, etc...

and PVC eyelets soon?

28

A worthwhile sales point

carmo
Your partner in plastic components

TEXYLOOP

CARMO PVC eyelets can be recycled with the PVC sheeting -
Costsaving - no separation needed

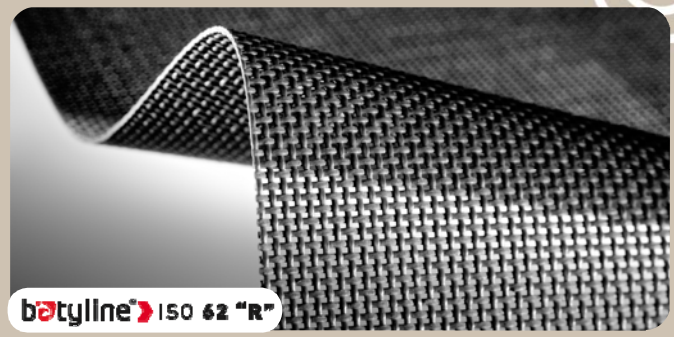
Textile 100% recyclable

THE GREEN SOLUTION

TEXYLOOP FERRARI architecture 29

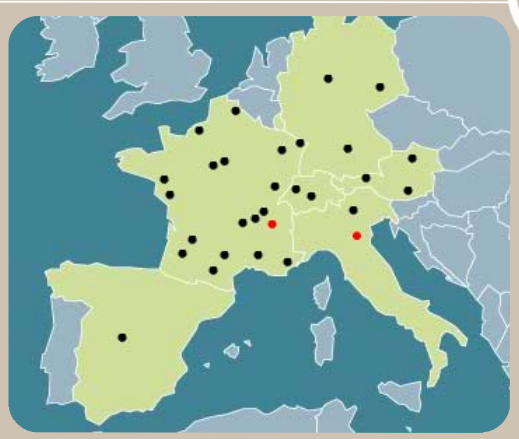
Batyline® "R"

The new generation of PVC raw material is also used to make Batyline® ISO 62 "R" fabric for furniture applications.



TEXYLOOP FERRARI architecture 30

European Network



TODAY
01 07 2010
WE'VE COLLECTED
2974
TONNES OF USED FABRICS

TEXYLOOP FERRARI architecture 31

Sorting and inspections

- **UPGRADE SORTING AND INSPECTIONS to eliminate...**

... Metal eyelets, bolt ropes, stiffeners, straps adhesive tape, zip fastners, staples, bungee cords, plastic film, pencils and pens, drink cans, metal tensioners, drawing pins, paper, cardboard, matting, water bottles, rags, newspaper, plastic or metal hoops, ashtrays, aspirin bottles, rilsan collars, rope and string ...

TEXYLOOP FERRARI architecture 32

Loading

Impossible to unload!

33

Compacting

- Compact machines at affordable price

34

Compacting

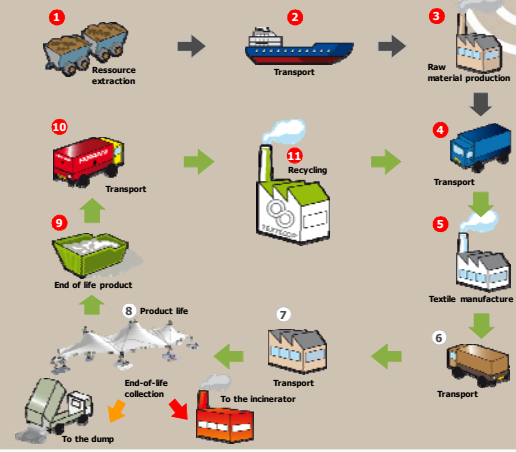
- **Compacting ensures**
  - Reduction of storage volume
  - Optimisation of truck filling
  - Ease of loading and unloading, even if pallets are stacked

35

> **RECYCLED**

- **LCA:** Cycle Assessment is a method for evaluating the environmental impact of products throughout their life cycle
It's standardized in ISO 14040-14043.

Life Cycle Assessment

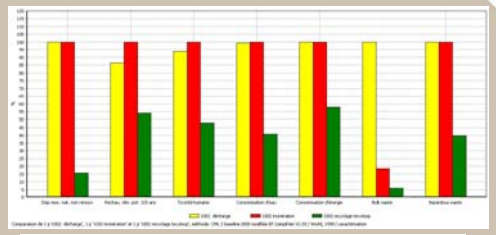


Life Cycle Assessment

Multi-criterion comparative assessment

- To the dump site
- To the incinerator
- Recycled by Texyloop®

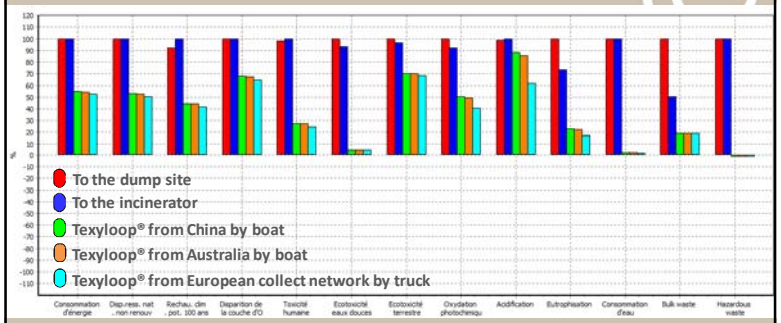
Life Cycle Assessment of TYPE II

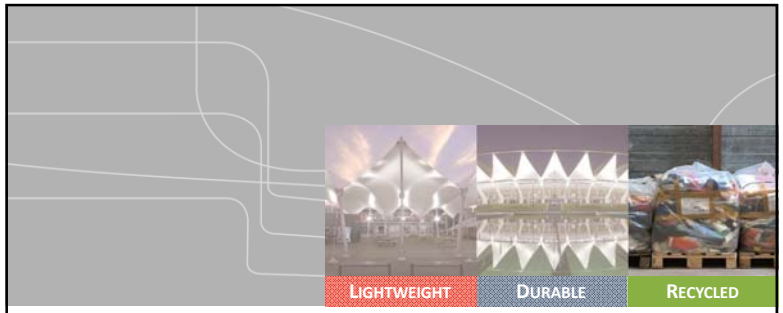


Type of impact	Unit	1002 Landfill	1002 Incineration	1002 Recycling TEXYLOOP®
Ressource depletion	kg Sb eq	0,151	0,151	0,024
Ressource depletion	kg CO2 eq	4,104	4,757	2,572
Human toxicity	kg 1,4-DB eq	1,326	1,414	0,679
Water consumption	litres	339,6	341,3	139,6
Energy Consumption	MJ-Eq	103,3	103,3	59,7
Bulk waste	kg	1,358	0,252	0,081
Hazardous waste	kg	0,0029	0,0029	0,0011

The results indicate that the recycling via TEXYLOOP® process reduces significantly the impact of the product on the environment.

Measured impacts comparing transport from overseas





> RECYCLED

- Cost / Added Value Strategy

TEXYLOOP®
A CLOSELOOP INDUSTRY

Example : Sail Shades

TEXYLOOP® FERRARI architecture
> New strategy

Example 1. Shade sails

- In practice, for a **6,600 €** quote (installation of 2 shade sails at a residential hotel), the extra value represented by the recycling-related share is of the order of

30 € excl. VAT *

  - for the final customer, this is totally acceptable (0.5% of cost),
  - for the manufacturer, it represents an income/ton of more than 1,500 €, which covers the required preparation services and recycling cost!

- Thereby paying for the service, while conserving a margin.

** For a 24 m2 area and 800 g fabric*

TEXYLOOP® FERRARI architecture
> New strategy

Texyloop® European Charter

• The Texyloop® European Charter constitutes an bona fide undertaking on the part of Texyloop® network members.
• It is signed by all network members.
• It is renewable by tacit agreement each year and is reviewed every three years.
• Use of documents claiming Texyloop® network origin, in particular identifying elements (brand and logotype), is strictly restricted to signatories of this charter.

ARTICLE 1
This charter details the principles and objectives, on and to which the signatories give their binding agreement in view of implementing a policy of recycling Polyester PVC fabrics through the Texyloop® network.

ARTICLE 2
Members of the Texyloop® network act to reconcile economic development, environmental protection and social progress.

ARTICLE 3
Through their initiatives, Texyloop® network members commit themselves to a progressive approach to conserving and enhancing the environment and to limit their impacts.

ARTICLE 4
Aware that recycling is the best way to reduce significantly their environmental impacts*, network members undertake to use recyclable materials whenever possible.
* Life Cycle Analyses conducted on Ferrari® textiles in compliance with ISO Standard 14067-42.

ARTICLE 5
Network members propose systematically a recycling service for short-term installations.

ARTICLE 6
Network members are capable of designing environmental offers, which may integrate fabric dismantling, collection, sorting and transport to collection points or the Texyloop® recycling facility.

ARTICLE 7
When technically possible, Texyloop® network members propose the use of components resulting from the recycling loop by public or private clients.

ARTICLE 8
Texyloop® network members undertake to provide clear, accurate information on fabric collection conditions and transformation method: recycling or controlled reuse.

ARTICLE 9
Texyloop® network members undertake to facilitate auditing of their fabric collection practice. Furthermore, they undertake to adhere to acceptance criteria applicable to fabric cutting waste and worn fabrics (cf. document entitled "Texyloop® Acceptance Criteria").

ARTICLE 10
Texyloop® network members commit themselves to a communication, awareness and information strategy directed not only towards their partners and clients, but also towards their personnel, which is informed and trained in relation to Texyloop® practices.

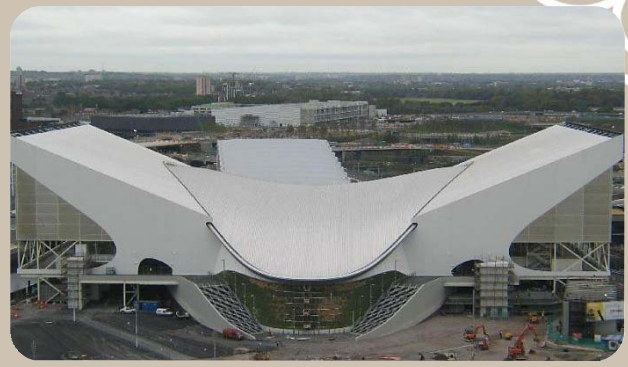
Texyloop® Chairman: Texyloop® Network Member: Company: Manager's Signature:

Drawn up at _____ On _____

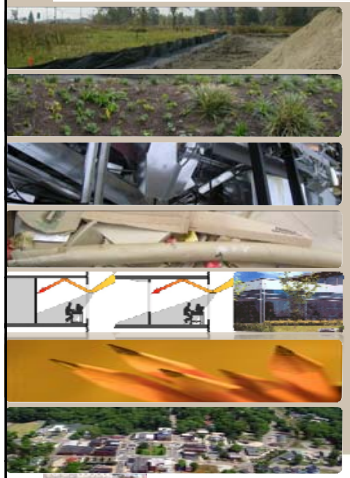
TEXYLOOP® FERRARI architecture 44

London 2012

Green & Legacy / NPP formula

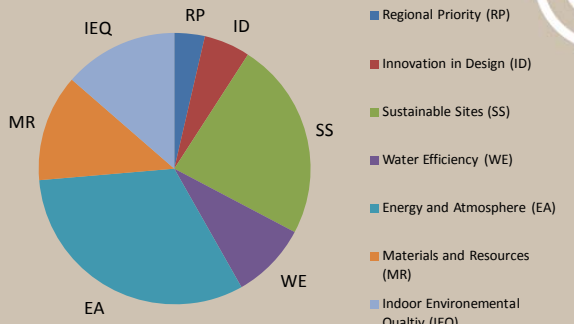


LEED point categories



- Sustainable Sites (SS)
- Water Efficiency (WE)
- Energy and Atmosphere (EA)
- Materials and Resources (MR)
- Indoor Environmental Quality (IEQ)
- Innovation in Design (ID)
- Regional Priority (RP)

LEED point distribution



Certification levels	
Base Certified	40-49 POINTS
Silver	50-59 POINTS
Gold	60-79 POINTS
Platinum	> 80 POINTS

- 110 possible points
- 8 pre-requisites, all mandatory to meet in order to obtain a certification

LEED credits per Ferrari product group	
TEXTILE ARCHITECTURE	• SS c7.2/GIBc9 (ND) Heat island effect, roof (direct) • IDc1 Innovation and design (indirect)
TEXTILE ARCHITECTURE (INT)	• MRc4/MRc2.2 (EB) Recycled content (indirect) • MRc5.2 (CI) Regional manufacturing (indirect) • IEQc4.5 (CI) Low emitting materials – systems furniture and seating (indirect) • IDc1 Innovation and design (indirect)
SOLAR PROTECTION (EXT) ** only when integrated into the structure, or when motorised*	• SSc8 Light pollution reduction (indirect) • EAp2/GIBp2 (ND) Minimum energy performance – pre-requisite (indirect) • EAc1/GIBc2 Optimize energy performance (indirect) • IEQc7.1 Thermal comfort, design (indirect) • IDc1 Innovation and design (indirect)
SOLAR PROTECTION (INT) ** only when integrated into the structure, or when motorised*	• SSc8 Light pollution reduction (indirect) • EAp2/GIBp2 (ND) Minimum energy performance – pre-requisite (indirect) • EAc1/GIBc2 Optimize energy performance (indirect) • IEQc7.1 Thermal comfort, design (indirect) • IDc1 Innovation and design (indirect)
FACADE	• SSc8 Light pollution reduction (indirect) • EAp2/GIBp2 (ND) Minimum energy performance – pre-requisite (indirect) • EAc1/GIBc2 Optimize energy performance (indirect) • IEQc7.1 Thermal comfort, design (indirect) • IDc1 Innovation and design (indirect)
FURNITURE	• MRc4/MRc2.2 (EB) Recycled content (indirect) • MRc5.2 (CI) Regional manufacturing (indirect) • IEQc4.5 (CI) Low emitting materials – systems furniture and seating (indirect) • IDc1 Innovation and design (indirect)

TEXYLOOP FERRARI architecture

Ferrari roof covers provide ONE LEED point and can contribute to more

Lyon - Palais des congres - France , REVOLUTION®
Pre engineered structure, Précontraint 702 opaque

MingHang Gymnasium, Shanghai - China, Précontraint 1202 T2

The LEED roof credit requires an SRI >78 for flat roofs and >29 for steeped roofs.

Ferrari white roof covers have an SRI value between 88 and 99.

These roof covers represent >90% of the Ferrari market.

If these roof covers make up at least 75% of the roof surface, one LEED point is achieved directly.

TEXYLOOP FERRARI architecture

FACADE
Générale des Eaux - France
Stamisol FT 371

- SSc8 Light pollution reduction (indirect)
- EAp2/GIBp2 (ND) Minimum energy performance (indirect)
- EAc1/GIBc2 Optimize energy performance (indirect)
- IEQc7.1 Thermal comfort, design (indirect)
- IDc1 Innovation and design (indirect)

SUN SHADE PROTECTION
Hotel Puerta de Americas
Madrid - Spain
Précontraint 502 & 1002

- MRc4/MRc2.2 (EB) Recycled content (indirect)
- MRc5.2 (CI) Regional manufacturing (indirect)
- IEQc4.5 (CI) Low emitting materials - systems furniture and seating (indirect)
- IDc1 Innovation and design (indirect)

TEXYLOOP FERRARI architecture

> Précontraint® demonstration

"Marsyas" Sculpture - Anish KAPOOR

- **Tate Modern London**
  - 4000 sqm in one piece
  - 150 m long x 40 m high
  - 3 static metal rings (6 T. each)
  - no retension possible
  - complex patterning
  - ARUP / TENSYS / HIGHTEX
- **Vital membrane characteristics**
  - Consistent & predictable dimensional stability
  - Reasonnable and consistant compensation

London - England
Précontraint® 1002 Special red

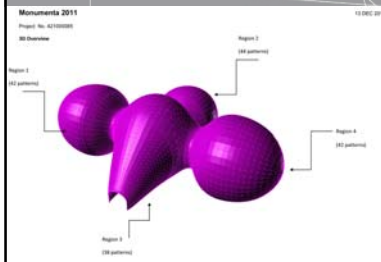
FERRARI architecture

> Précontraint® demonstration
"The Farm" Sculpture - Anish KAPOOR

- **New Zealand**
  - 85 lm long
  - 27 m elliptical metal ring
  - 15 T Pres stress
  - COMPUSOFT / STRUCTURFLEX

Kaipara Bay – New Zealand
Précontraint® 1002 Special red

> Précontraint® demonstration
"Leviathan" Sculpture - Anish KAPOOR



- **Monumenta Grand Palais 2011**
  - 12,000 sqm of Précontraint® 1002
  - 100 m Length x 72 m width x 33 m Height
  - **Special red colour**: Dark by reflexion / Bright red by translucency
  - 1 week installation / 40 man crew
  - HF welding on site of the 4 pieces
  - Approx. 2 hours inflation with 2 x 20,000 m³/hour air generator
  - Pressure : 350/400 Pascal
  - 1 air lock rotating door

- **Précontraint® Technology**
  - Consistency of performance from batch to batch
  - Consistency in the compensation values from batch to batch
  - Reasonable levels of compensation

Paris - France
Précontraint® 1002 Special red "Leviathan"

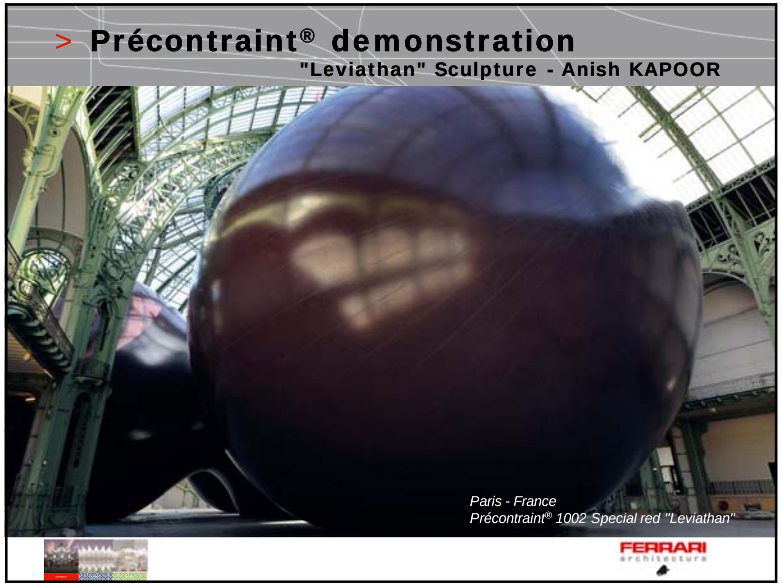
> Précontraint® demonstration
"Leviathan" Sculpture - Anish KAPOOR

Paris - France
Précontraint® 1002 Special red "Leviathan"

> Précontraint® demonstration
"Leviathan" Sculpture - Anish KAPOOR

Paris - France
Précontraint® 1002 Special red "Leviathan"


> Précontraint® demonstration
"Leviathan" Sculpture - Anish KAPOOR
Paris - France
Précontraint® 1002 Special red "Leviathan"
FERRARI
architecture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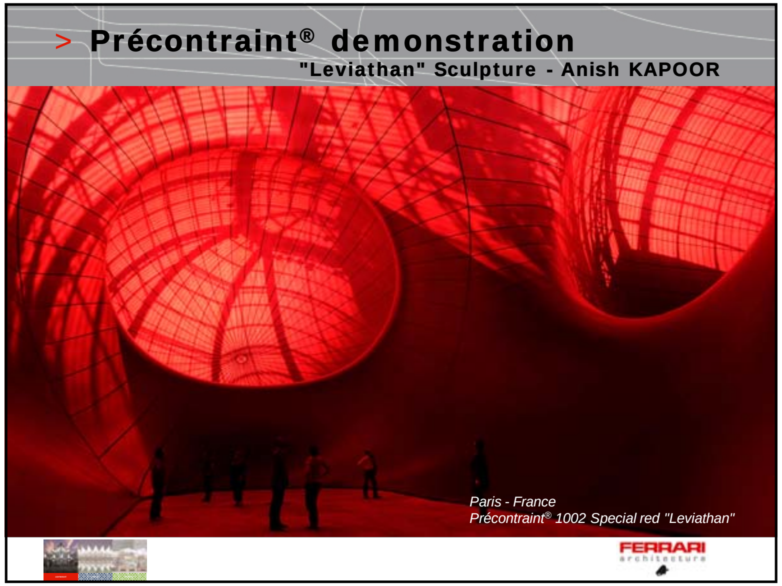
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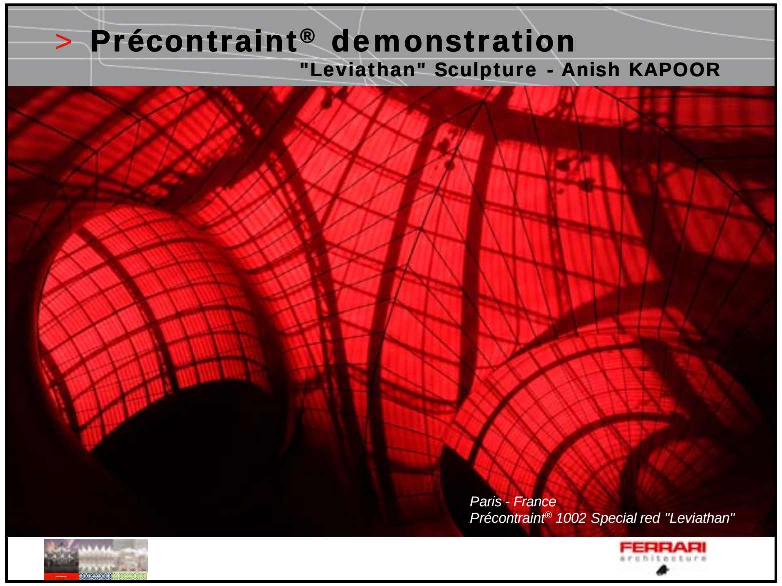
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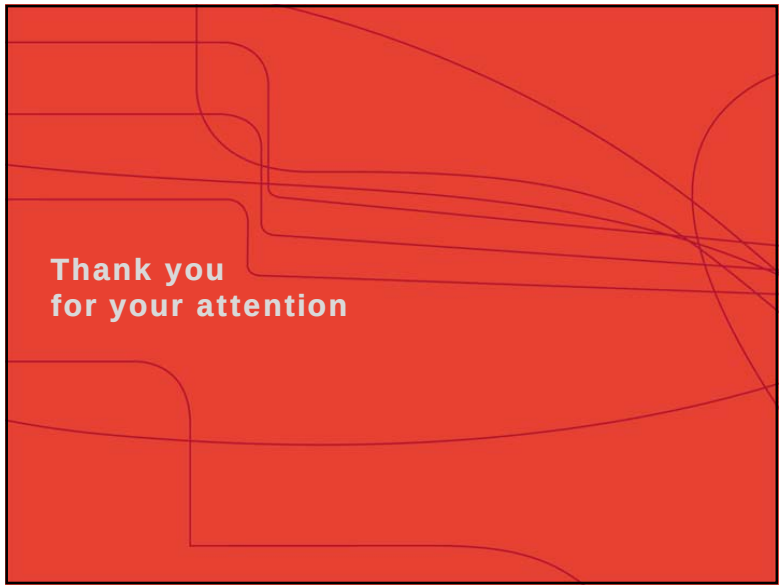
Thank you
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