Textiles in Architecture

Materials suppliers for building and construction

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By Claudia Ollenhauer

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Introduction

High-strength, high-modulus textile fabrics are increasingly being used in the building and construction industry as a replacement for more traditional materials, such as wood, concrete, masonry and steel. The mechanical properties of fabrics made with aramid, carbon and glass fibres, combined with cross-linking resin systems to form a composite, provide civil engineers with a range of new materials that offer high strength to weight, high stiffness to weight, and extreme flexibility in design and use.

Fabrics for sun protection made of polyester and combined with polyvinyl chloride (PVC) or polytetrafluoroethylene (PTFE) coatings offer many applications and provide function combined with design to modern architecture, where flexible roofs and wallcoverings are a feature.

Textiles in architecture have played a significantly important role since their first large-scale application in the Munich Olympic Stadium in 1972. German architects Frei Otto and Günter Behnisch conceived the tent-like roof of the main sports arena and launched a trend in architectural design. Using this concept, they adapted the age-old technique of tent design to a modern, large scale based on a new “tensile structure”.

Today, many sporting arenas and official buildings use the appealing lightness and intricate design of textile roofs and cladding – World Cup and Olympic Games stadia, high-end hotels, airports and corporate buildings offer a platform for spectacular textile architecture. Meanwhile, smaller projects, both commercial as well as residential, have profited from the technology developed over the past four decades. Design is an important factor, but lifecycle aspects, including cost, lifespan and recycling issues, have also played a key role.

Concept of the report

This report describes an international selection of highly innovative companies that weave, knit, coat, bond or finish fabrics used in architecture, mainly as tensile structures, but also in other building and construction applications. Among the profiled companies are leading producers of fibres, including glass fibres, and chemicals, such as PTFE, as well as finishing and coating providers.

Some of these fabrics are visible from the outside or inside; others are integrated into walls, ceilings or flooring. Sun and weather protection as well as light and temperature regulation are the main applications for the fabric materials produced by the companies featured.

Producers of nonwoven materials and foils (which are covered by other specialist publications) have been excluded from the report, as are most of the making-up manufacturers, steel construction developers, suppliers of accessories, and high-frequency or heat welding machinery suppliers.
Dense network

Modern textiles made of inert materials, such as glass fibre, can be coated with high-end, dirt repellent, electro-smog absorbing and ultraviolet (UV) reflecting finishes, offering a guaranteed lifetime of 20-30 years, while sophisticated software programs allow rapid design of roofs and other structures.

The sector is highly specialised: architects and designers, fibre and fabric producers, coating companies and cut and trim factories have built up a dense network with steel construction specialists. Often, the companies involved are small and medium-sized, with the exception of raw material suppliers of glass fibres, polyester fibres and yarns, as well as those producing resins and coating and finishing chemicals. The wide experience of all people involved and the reputation gained by finished projects make this a highly specialised sector.

Highly innovative application areas

Textiles are used in a wide range of applications in architecture, either outside or inside, either seen or hidden, as the following table demonstrates.

<table>
<thead>
<tr>
<th>Examples of textile applications in architecture</th>
<th>Outdoor</th>
<th>Indoor</th>
<th>Seen</th>
<th>Hidden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing</td>
<td>★</td>
<td></td>
<td>★</td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td>★</td>
<td></td>
<td>★</td>
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<tr>
<td>Cladding</td>
<td>★</td>
<td>★</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforcement for wall and roof coverings</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td></td>
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<tr>
<td>Sun protection</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Wind and weather protection</td>
<td>★</td>
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<tr>
<td>Noise protection for walls and ceilings</td>
<td></td>
<td></td>
<td>★</td>
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<tr>
<td>Light diffusion ceilings</td>
<td>★</td>
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<td>★</td>
<td>★</td>
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<tr>
<td>Floor reinforcements</td>
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<tr>
<td>Concrete reinforcements</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Shielding against UV rays</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Shielding with electromagnetic compatibility (EMC)</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Lighting effects with integrated light emitting diode (LED) or other electroluminescent materials</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td></td>
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<tr>
<td>Energy management of buildings</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td>★</td>
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<tr>
<td>In-lining for tubes</td>
<td>★</td>
<td></td>
<td>★</td>
<td></td>
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<tr>
<td>Fireproof wallpapers, floorcoverings</td>
<td>★</td>
<td>★</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and other decorative elements</td>
<td>★</td>
<td>★</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ferrari Group

Ferrari SA, F-38352 La Tour du Pin Cedex, France. Tel: +33 4 7497 4133. E-mail: info@ferrari-texyloop.com; www.ferrari-textiles.com

Ferrari Group is a leading European weaver and fabric coating specialist with three plants in France and Switzerland; a recycling facility, Texyloop, is located in Italy. The group covers the whole chain from spinning, weaving, coating, extrusion and logistics. The company was founded in 1973, the most recent annual turnover available was reported as €124.8m (2007), and the number of employees is 126 people. A network of sales offices operates worldwide from Europe to Asia, the Middle East, Australia to North and South America.

Main activities

Ferrari is fully integrated from yarn preparation to weaving, coating and finishing. The central know-how consists of the patented Précontraint technology, which consists of applying several layers of coating under constant warp-wise and weft-wise tension (1 t/m) throughout the manufacturing cycle. According to the company, this ensures that textiles have exceptional dimensional stability and resistance. The supporting material consists of a weave of micro-cables made from high-tenacity polyester, glass fibre and similar high-tenacity fibres.

Main departments

Ferrari Industry

This supplier of composite textiles and membranes has a production unit, Stamoid, in Switzerland, which produces:

- environmentally friendly membranes;
- silicone membranes;
- transfer coatings;
- infrared finishings (anti-radar and protection);
- re-positionable adhesive fabrics for the sign market.

Brands

- Batyline, coloured and patterned fabrics for indoor and outdoor heavy-duty furniture, for wall and ceiling coverings, and interior architecture;
- Soltis, a high-performance range for indoor and outdoor applications, including blinds, awnings, canopies, screens and shade sails.

Other fabrics

Other fabrics include:
**Batyline**

Batyline is a group of composite textiles designed for indoor applications. The fabrics are divided into three families: plain fabrics with a choice of nearly 40 colours; patterned fabrics with up to 30 variations in structure and colours; and “outstanding” materials with 15 different structures and functions. They include:

- Batyline Canatex, with hemp;
- Batyline R, made of materials resulting from Ferrari’s Texyloop recycling business;
- Structural 7763, a reinforced material with steel;
- SK series: glass/silicone membranes.

![Batyline: selected versions and applications](image)

**Soltis**

Soltis is a range of solar protection fabrics for outdoor and indoor use. Manufacturing is

![Soltis: selected versions and applications](image)
Nittobo

Nitto Boseki Co Ltd, 4-1-28, Kudankita, Chiyoda-Ku, Tokyo 102-8489, Japan.
Tel: +81 3 3514 3810. Fax: +81 3 3238 4588. www.nittobo.co.jp

Nitto Boseki (Nittobo) is active in several fields from textiles to real estate, and had a global workforce of 3,607 people in fiscal 2009, when turnover for the whole group, including subsidiaries in Asia, North America and Europe, was ¥114.8bn (US$1.4bn). The company is known for its ultra-fine yarn and ultra-thin fabrics made of glass fibres, which are used for electrical circuits, industry and architecture.

Main activities

Nittobo works in the field of:

- glass fibre spinning and weaving;
- environmental business;
- textiles for apparel;
- medical and beverage;
- property management.

Main departments

Glass fibre products

This division accounted for approximately 39% of turnover in fiscal 2009. Products range from ultra-fine fibres to yarns and fabrics made of glass. Customers are from the electronics-related industries worldwide. Nittobo has also developed non-electronic materials, including glass fibre for fibre reinforced plastic (FRP) and fibre reinforced thermoplastic (FRTP), as well as a range of industrial-use materials in the automotive and electronic appliance fields.

Textiles division

This division accounted for approximately 9% of turnover in fiscal 2009. With an ongoing business restructuring, the portfolio has moved to high value-added products. A new product integrates garment interlinings with Nittobo CSY stretch fabric. The division produces elastic yarns, textiles, interlinings, apparel and other finished goods, as well as Nittobo dishcloths.

Other operations

This division accounted for approximately 12% of turnover in fiscal 2009. The company also works in the fields of medical (clinical diagnostic reagents in biochemistry, haematology and immunology), beverage (PET bottle beverages and manufacture of large PET
bottles), speciality chemicals (Danrix brand dye fixative), and office building leasing and sports facilities businesses.

**Activities in the building sector**

The building materials division accounted for approximately 40% of turnover in fiscal 2009. Although Nittobo is streamlining or withdrawing from unprofitable businesses in the building materials sector, it is expanding its activities in environmental, acoustic and plant engineering. The division offers:

- thermal, acoustic and fireproof materials insulation, including rock wool and glass wool;
- engineering operations, including sound and noise abatement systems and plant construction;
- environmental services.

**Products**

*Verre screen*

This is the product name of glass cloth for roller blinds woven by original resin coated yarn. Verre screen is a double width cloth with a maximum width of 3.1 m. (Nittobo claims to be the sole provider worldwide.)

<table>
<thead>
<tr>
<th>Nittobo: Verre screen</th>
</tr>
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<tbody>
<tr>
<td><strong>Style</strong></td>
</tr>
<tr>
<td>WL 5092B</td>
</tr>
<tr>
<td>WL 5011B</td>
</tr>
<tr>
<td>WL 5058B</td>
</tr>
<tr>
<td>WL 5348</td>
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<tr>
<td>WL 5405</td>
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</tbody>
</table>

*Source: Nittobo*

*Light Shade*

This is a new type of illumination cover, made of fluorine coated glass fibre that is laminated with fluorine resin film. The resulting diffused light provides a soft and calm atmosphere, says Nittobo. It is generally produced in a standard size within 1500 × 1500 mm, but is also available in larger sizes.

**Major shareholders**

- Japan Trustee Services Bank (trust account): 9.48%;
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