JANUARY/FEBRUARY 2007

Fabric ARCHITECTURE

THE ARCHITECTURAL RESOURCE FOR DESIGNING WITH FABRIC

TRAVELING LIGHT

An IFAI PUBLICATION
Industrial Fabrics Association International

DURABLE

FIRE RESISTANT

MAINTAINABLE

AFFORDABLE

SUSTAINABLE

Air Power

A busy rail station in Montreux, Switzerland, is outfitted with a lightweight, dramatically lighted new parking structure

BY Andrew Bacskai

PHOTOS BY Airlight Ltd.

On Nov. 26, 2004, Airlight Ltd. unveiled the first large-scale application of Tensairity, the Swiss engineering firm's innovative, and trademarked, pneumatic beam concept, a hybrid technology of the simple air beam and conventional beam structures. The installation, a 1,700m^2 fabric cover for a parking structure at the Montreux, Switzerland, rail station makes a convincing case for the heavyweight potential of lightweight fabric structures.

The Montreux project was initiated when the parking structure's ownership team decided to add surface parking on the roof of its existing facility, which featured two below-ground levels and served the highly trafficked Montreux-Oberland-Bernois train line. Montreux, a resort town situated on the north shore of scenic Lake Geneva, is perhaps best known as the site of the renowned Montreux Jazz Festival, held every July since 1967. The town also attracts scores of shoppers to its annual Christmas Market, which is open the weeks leading to the December holiday. What's more, the station also features daily trips up the 2,000m Rochers-De-Nayne

Daytime in Montreux is almost as interesting as nightime for patrons of the Montreux-Oberland-Bernois station interchange with this lighted parking structure. Low-pressure fabric air beams support fabric roof panels, in effect a truss without vertical or diagonal elements that is three to five times lighter than a traditional steel truss.

peak in the pre-Alps region, as well as to the picturesque nearby Les Avants wildlife area.

The parking structure's owners commissioned designs for the space, and Airlight's concept was selected for a trio of key reasons, according to Andrea Pedretti, engineering project manager for Airlight. First, he says, the project's estimated costs were competitive with brick-and-mortar solutions. Next, he says, the lightweight yet sturdy air beam girder system allows for an open span of 30m without the use of the obtrusive intermediate support columns that would necessarily be incorporated into a traditional solution. Finally, Pedretti says, the structure's translucent fabric roof negates the need to electrically light the surface-level parking area. "Our air beams were an extremely novel solution for this space," says Pedretti.

Airtight's basic Tensairity structure includes a cylindrical air beam (a low-pressure fabric tube), a compression strut that's connected tightly to the membrane the entire length of the air beam, and a pair of cables that spiral around the air beams and attach to the strut at either end of the beam. The cables and struts share the responsibility of bearing the loads; the compressed air in the tubes provides pretension to the cables and stabilizes the compression struts so they don't buckle. Consequently, the compression elements can be loaded to the material yield limit.

"At the end, what you have is a truss without vertical or diagonal elements," Pedretti explains. "And you have a structure that is basically three to five times lighter than a traditional steel truss."

Airlight decided to build the parking cover with a silicon-coated fiberglass fabric from UK-based PD Interglas Technologies Ltd. Not only did the silicon-coated fiberglass offer the translucency that was essential to the project, but its elasticity and airtight qualities would ultimately simplify installation and make for a more structurally sound structure. Plus, the product offers a lifespan of more than 25 years, so it provided the kind of durability the parking garage owners demanded.

To build the structure, Airlight fabricated the vertical steel supports in a workshop and installed them in place on site. The overhead air beams, which have spans of roughly 27m, were built in house, then transported to the site and installed at night, so the installation team could shut down the power to the station and avoid interfering with daily rail-station traffic. The construction crew installed four air beams nightly, so the structure's skeleton was all but assembled in just three nights. "It went very smoothly," Pedretti recalls.

Next, the fabric, which was tensioned in 11-saddle shaped structures between the dozen Tensairity beams. "We installed two saddle elements every day," Pedretti says. "So in about eight or nine working days, we completed the roof. We took very little time on site," he adds, in part because of the extreme light weight of the entire installation. "We transported 9kg/m^2 of steel. The weight of a traditional project would be 30 or 35." Overall, Pedretti continues, the lightweight structure meets the heavy snow and wind loads for the region.

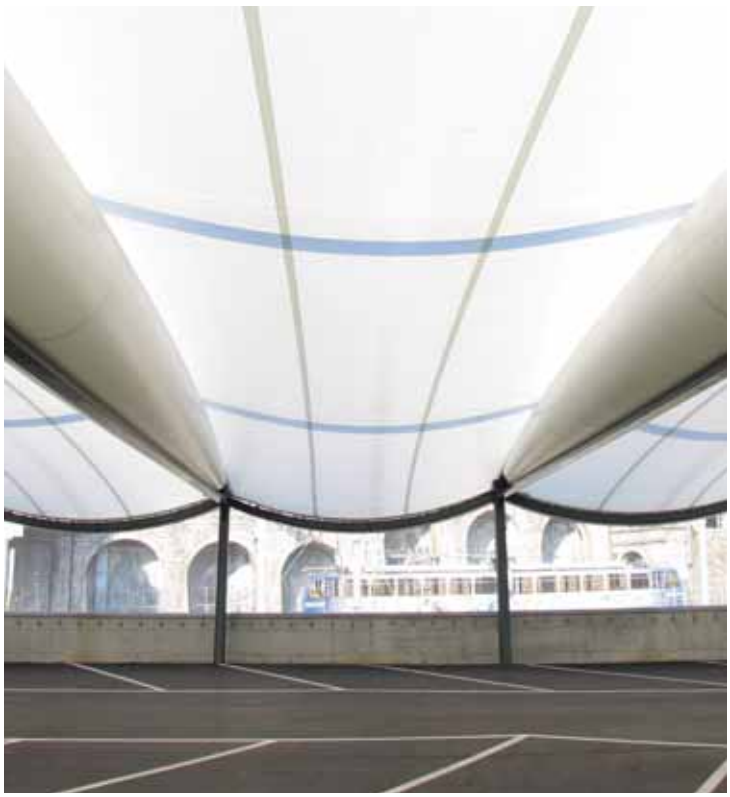
Two years later, the garage park structure has injected functional, visually striking form to an already treasured region of Switzerland. Each night, the rooftop parking area is dramatically illuminated with an ever-changing array of colors and patterns, compliments of a theatrical spotlight system that was incorporated into the structure's design. Theater spots were inserted into either end of each of the structure's 12 air beams; they provide all the nighttime lighting needed in the structure, and generate well-received visual appeal for those entering and exiting the station. "The lighting is computer controlled," says Pedretti, who explains that the system can respond to a sensor, which detects wind, rain or other weather changes and initiates random color changes.

"Every night there is a show—color changes or waves or stars—in the parking area," he says.

Andrew Bacskai is a frequent contributor to Fabric Architecture. *His article on the interiors of British Telecom appeared in the May/June 2005 issue.*

PROJECT DATA

Client: Parc Montreux Gare SA
Architect: Luscher Architectes SA, Lausanne
Structural engineer: Airlight Ltd., Biasa, Switzerland
Fabrication (roof): Canobbio SpA
Fabric: Atex 5000 Aero, silicone-coated luminescent fiberglass, P-D Interglas Technologies



Above, top: An ever-changing display of colors adds drama to the car park roof at night, compliments of an integrated theatrical spotlight system. Computer-controlled lights (within the air beams) respond to wind, rain or atmospheric changes and generate random color changes.