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Textile structures for climate control

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Abstract

Climate control and energy saving are the key words for the latest design and enhancements on textile structures.

In the past, the improvements on energy savings in textile structures had already been taken into consideration. The first important examples can be found at the private clinic of Masserberg and at the swimming pool of Torres Novas. In those cases, traditional isolating materials and textile fabrics were utilised in combination, but total opacity to light was the resulting effect.

Today the same issues were studied in order to ensure that the natural light could pass through, by combining multilayer fabrics meant to obtain the best energy savings for heating and cooling.

The swimming pools and wellness centre of Splash & SPA in Switzerland and the walkway roof of the Centre Commercial Perpignan in France, were constructed by utilising the said materials.

The combination of fabric and structural design is the latest example of the Miami Brickell Centre covering: fitted with massive fabric-covered louvers, Swire's "Climate Ribbon ™"— thus named because it resembles a crumpled strip of ribbon — is designed to allow natural light while shading shoppers and channelling prevailing breezes from Biscayne Bay to cool them. The highly engineered canopy is the product of a collaboration between a Paris design firm Hugh Dutton & Associates and the universities of Carnegie-Mellon in Pittsburgh and Cardiff in the U.K.. It is believed to be the first of its kind in the country and possibly the biggest passive shading and ventilation device — i.e., not dependent on air conditioning.

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The primary objective is to provide optimization of environmental quality for the shopping centre.
The structure is designed to obtain three key benefits:

- ventilation (avoid the use of air conditioning)
- shelter from inclement weather
- shading from the sun

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Keywords: climate control; textile structures; energy savings;

1. First examples: Masserberg and Torres Novas

Climate control and energy savings are the key words for the latest textile structures design developments.
The purpose of this paper is to present the different design and building experiences the target of which is to obtain a climate benefit through the structures.
At the beginning, the utilization of fabrics with insulating materials (such as mineral rock materials) in the structures was put to test. Multiple layers of fabrics and films with different properties were investigated to ensure translucency to the structure, though mindful of the costs involved. The final approach has been to start from studying the climate conditions and on that basis, design a structure shape that would derive advantage from the climate benefit.
An example can be viewed at Masserberg (Germany), where Canobbio Company covered the reception area, the gymnasium and the swimming pool. The aim of the project was to minimize heat dispersions by combining isolating materials with fabrics. IPL Studio made the design and the installation took place in 1993: two layers of PVC coated polyester fabric type VII for the external side and type III for the interior. Between the two layers, 160 mm thick isolating glass fiber material. The cover measures approximately 3700 sq. meters.
Another example is at Torres Novas (Portugal) swimming pool, built in 2005. A survey of the climate conditions, with particular reference to the hours of maximum heat, was carried out and eventually averaged on a monthly basis. The influence of the heat condition, radiation and air convection (because of natural acclimatization of the air interspace fig.1) were taken into account.

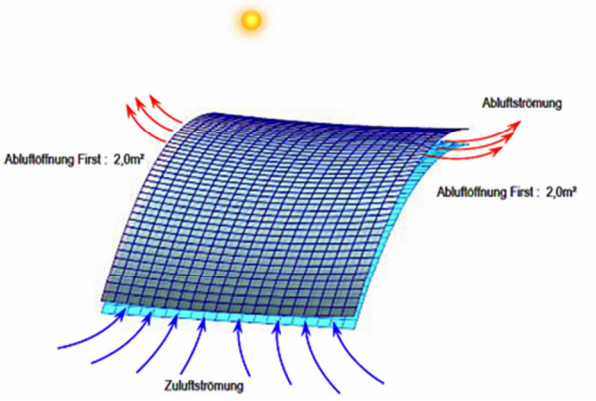

Figure 1