Low Environmental Impact Fabric Structures

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i. Scope

The presentation aims to demonstrate the positive environmental impacts of lightweight tension structures, incorporating architectural specification membrane fabrics.

The environmental performance of a building can be calculated in monetary terms and in BTUs and kilowatts. There is increasing interest in analysing architectural textile options in relation to community impact and sustainability. In doing so, issues arise such as:

- Is the material durable?
- Is the material recyclable?
- Is the material environmentally friendly?

Environmental impact can be delineated into 7 major elements:

1. Energy Efficiency
2. Cost Efficiency
3. Design Efficiency
4. Durability and Longevity
5. Solar Protection as Affected by Climate Change
6. Fire Safety
7. Recyclability

1. Energy Efficiency

Textile Process
Fabrication
Installation
Reduction in use of air conditioning

2. Cost Efficiency

Economy of material use
Lower raw material costs

3. Design Efficiency

Flexibility

Limitless flexibility of form and construction that architectural fabrics offer. The functional and aesthetic needs of a project design within lower budget parameters can be met with these very tailorable fabrics.

Compared to higher impact conventional construction materials, fabric clad structures offer the prospect of curvilinear 3 dimensional creations that are also inexpensive in relative terms.

Low impact tension membrane structures release elements which are evolutionary in their ability to alter the built landscape. What an exciting community or environmental dimension to use these structures to orchestrate change from hard, sharp surfaces and forms using cold, inorganic materials to forms which flow. To modify our environment prosperously away from the primacy of linearity.

Renowned Swiss architectural firm Herzog & de Meuron state as their ethos ”Architecture has to be sensual and intelligent, otherwise it is boring”.

4. Durability and Longevity

Subject to appropriate selection criteria architectural textiles are highly durable (sustainable) and long living. 15–20+ year life spans are increasingly common with the technology available from specialist textile mills.

5. Solar Protection / Climate Change

Designers will increasingly be challenged to find more passive means to cope with hot, dry climates rather than run with the seemingly unstoppable application of high energy consuming air conditioning systems.

6. Fire Safety

Architectural textiles range from non combustible (PTFE) to low combustability (PVDF/PVC).

7. Recyclability

Harvesting of raw materials for re–use.
Easily demountable material.
Light weight and easy to transport.

Example

The Arizona based Sonoran Institute, a non profit organisation, has as its focus the creating of ”lasting benefits, including healthy landscapes and vibrant communities”.

Last year, and Arizona USA Green Building Award was won by the Edith Ball Aquatic Centre in Tuscon. An architectural fabric was used in a classical ridge supported form that served as a large umbrella covering lap, recreation and wading pools and surrounding deck areas.

In summer, the fabric structure shades a larger portion of the pool and deck from the higher overhead sun. In the winter, the longer southerly sun penetrates deeper under the fabric membrane edge providing a large sun bathing area.

The most significant energy and resource conservation aspect of this project was the decision to abandon the original plan of placing all of the pools in mechanically conditioned enclosed interior spaces. This accomplished initial construction cost savings and will achieve a substantial operation and maintenance saving over the life time of the facility.

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