

A GLIMPSE OF THE FUTURE BUILDING WITH FABRIC

There's a certain fascination for many of us with structures and buildings made using fabric – from early memories of the traveling circus tents to the awe-filled first glimpses of the staggeringly beautiful modern fabric structures like the Millennium Dome, the Denver, Jeddah and Bangkok Airport roofs, an ever-increasing clan of fabric-clad sports and entertainment venues, and the scaled-down versions of the domestic and retail markets.



Denver Airport

What is it about fabric structures which draws the breath and widens the eye? Perhaps, as one expert surmised *“it’s their shamelessly and voluptuously curved shapes in a world of right angles their high-tech forms boldly displaying the machinery of their construction in an architectural environment preoccupied with the artful use of fascia and finishes to hide all traces of a building’s working”*. Or maybe that’s just a long way of saying “eye catching”, which they certainly are. A cunning use of architecture to fill a restaurant, attract shoppers or provide that all-important “point of difference” to a commercial property.



Concaved Restaurant, Patong Beach, Phuket

Not just beautiful, fascinating and eye-catching, fabric structures are, after all, mostly there to keep the sun and rain off those below them. Hence the development of “shade sails”, an innovative Australian application of the concept to provide shade where there is none, or not enough, over such locations as outdoor restaurants, playgrounds,

patios, swimming pools, and rooftops. Applications limited only by the imagination, and certainly ideally suited to tropical living and architecture.

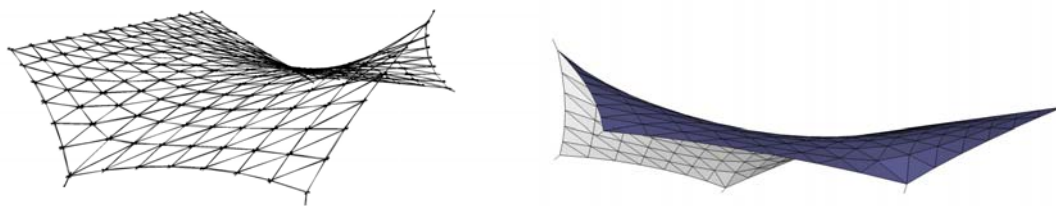


Shade sails at Twinpalms Resort, Phuket

Although first developed in Europe over 40 years ago, the technology of building with fabric is still in its infancy and is most certainly “future oriented”. It has taken giant leaps as a result of advances in fabric manufacture and computer power.

The first fabric structures were built from cotton and PVC, materials which have been replaced since then by more versatile and long-lasting fabrics like PTFE coated fibre (“Teflon”), non-stretching architectural PVC, and high density polyethylene (HDPE) weaves (shade cloth).

The calculations required to predict the surfaces of the structures and design the fabric panels in the early days were labouriously performed countless times by hand. These days even a small structure may require several thousands of calculations to define the final shape, all done in a matter of seconds by modern form-finding software.



Design models for the Concaved Restaurant structure

So how are these unconventional and life-filled forms held in place and how are their often radical shapes retained under the ravages of weather and time? What prevents them from flapping, flogging, stretching out of shape or worse, failing altogether? The short answer is tension and shape. The membranes are pulled tightly towards their attachment points creating the carefully designed surface on which forces applied to it from any direction are compensated by resultant opposing forces within the structure. To achieve this, the membrane perimeters contain steel cables, attached to steel corner plates built into the membrane, and carefully adjusted to ensure tension is distributed evenly along the edges and across the surfaces. Corners are tensioned under

sometimes huge loads by tensioning devices ranging from simple turnbuckles in smaller structures to hydraulic rams in large ones.

Competently designed, manufactured and installed fabric structures are as sound and permanent as conventional roofing structures. Many of the now iconic fabric structures of Europe were constructed with less advanced technology and fabrics as early as the 1970's and still stand serviceable in testament to their viability and longevity.

Sure to be embraced more and more by developers and architects in the tropics and elsewhere as visually exciting components of their buildings, the design possibilities of fabric structures are as boundless as they are exciting. They have the magical ability to add that "something special" to an otherwise conventional structure, to round off and soften all those sharp and very correct right angles, all the while performing their task of providing shade and shelter.

A client recently requested at the design stage of his tensioned fabric structure – *"make it laugh for me"*.

Try doing that in colourbond.

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