

DOME STRUCTURES AND ATRIUM SPACES

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----- SYNOPSIS -----

The architectural philosophy of Malone Buchan Laird and Bawden in relation to retail has created a need which has been imminately answered by the use of fabric roof structures. By reviewing the design and the physical qualities of fabric roofs the reason for the success is evident.

Malone Buchan Laird & Bawden Pty Ltd architects, planners and interior designers, are predominantly involved in retail leisure, tourism and hotels to carry out our work. We have developed design philosophies around the above groupings.

PHILOSOPHY

Our philosophies are based on the extremely competitive nature of these uses. Our clients are looking for strong identifiable developments which have a point of difference and are memorable in design.

Our philosophy regarding retail suggests the following features -

- . volume spaces
- . natural light
- . planting
- . colour
- . movement
- . exciting design effects
- . landscaping, especially taller trees to assist in the understanding of scale
- . water features
- . seating and eating
- . stage

The list above helps to provide visual excitement. Most of the sparkle that forms part of this visual excitement comes from natural light. The natural light element then becomes an intrinsic element to the visual impact of the retail environment.

A number of our retail developments are also multi levels. Part of our philosophy to deal with multi levels is the use of atrium spaces. These spaces usually follow the footprint of the volume space of the roof. As you can see, as our philosophy develops into design solutions, the roofs over the public spaces begin to define themselves.

- A. Natural Light
- B. Volume Spaces

This is where our clients start to become a little concerned the dollar sign appears in their dreams. They usually like the idea but are mindful of the initial capital cost and also the running costs.

Now the reasons for the use of fabric structures to create volume spaces over atria become evident.

Reasons for the Use:

DESIGN ASPECTS

- Aesthetic evaluation
- Visual impact
- Colour rendering
- LA Footprint definition

PHYSICAL ASPECTS

- Heat load
- Light level
- Fire and smoke properties
- Landscape valuation
- Cost
- Life span

DESIGN ASPECTS

To create these sorts of impacting spaces, we need the opportunity to be different.

Our normal environments are generally square and regular in shape - fabric on the other hand offers a freedom of shape and profile. There is something natural and complimentary about the fabric shape and how it relates to a landscaped water features within a built environment.

Aesthetic Evaluation

The Aesthetic Evaluation rates well in terms of the visual comfort provided by the curved lines of fabric, the colour of fabric - obviously used in context, the light transmission, the general rendering of the space.

One fact we have found is that the use of a small amount of clear polycarbonate provides a good contrast to the fabric - we call it "the blue sky effect". We find that we get good comment about the feature.

Visual Impact

Visual Impact is obvious. These roofs usually create a volume space either on a single level centre or a multi level centre. The light rendering supports the impact by bringing out the vivid colours of landscape, water, etc.

Most importantly people love volume spaces.

Colour Rendering

Natural light has the optimum mix of spectrum and the benefits are related to the real impact of retail - the products for sale. There is no better prop for the sale of

goods than good lighting - either natural or artificial.

We use expensive props in retail malls such as planting, water, banners, etc. We should support them with good light.

Footprint Definition

Partly a practical consideration and partly a design consideration but none the less an important side benefit especially in a complex centre - the definition of the footprint of the mall layout by the use of the fabric roof - the volume space can carry over a lot of impediments that end up in malls.

The Myer Centre in Brisbane is an excellent example of the use of a fabric roof in a complex retail centre and how the roof relates to the footprint.

The fabric roof has an important external effect. It usually provides a striking focus to the external scope of the building thereby marking a point of recognition.

PHYSICAL ASPECTS

The fabric mostly used by MBLB has been a teflon coated fibreglass - however we have had experience with polyester

fabric - we provided Harald Muhlberger with architectural support for his work on the Queensland Expo roofs. Also carried out work with the port-a-mod and work on pneumatic structures in the seventies.

Fabric

The Fabric is a teflon coated fibreglass fabric, Sheerfill II - made by Chamfab.

Sheerfill I - darker fabric - used only for larger than normal spans where a very high strength is required

Sheerfill II - most common fabric
Light - hi translucency - admits 13% of visible light
Heat - Summer shading co-eff. of 0.18

73% heat reflected
 13% re-radiated
14% transmitted to inside
100%

Sheerfill III - not yet on Australian market
 - a lighter fabric which is

cheaper but not as yet a proven material

Fabrics widths - 3850mm (4100 available as special)

Cost - 80% is in material

- 20% is in seaming

Early Fire Hazard Indicator

	=	Rating
Spread of flame (0 - 10)	=	0
Smoke developed (0-10)	=	4
Ignitability (0 - 20)	=	0
Heat evolved	=	0

Heat Load and Light Level

From the above figures teflon coated fibreglass has external and beneficial heat load penetration figures but good translucent qualities to support the visual impact qualities that we require.

Landscape Valuation

The 13% visible light transmission translates as about 2000 lux at the bottom of 6 level atrium (about 30m). This gives ample light for planting to survive and flourish - however the correct plant condition is necessary because of the lower light levels. Regarding the visible light factor, the amount of light inside the atrium is rather deceptive especially on a dull overcast day. It acts like a prism or diffuser - clearly working better than a flat glass or polycarbon roof. With the introduction of a small clear polycarbon section at the top of the vault as per the Logan Hyperdome roof, we can introduce a small amount of direct sunlight.

This amount of direct light does not greatly effect the heat load but has positive landscape assistance as well as value in terms of visual impact.

Cost

We have found the cost to be cheaper than a glass or polycarbon vaulted roof, both in an initial capital cost and especially in the long term running costs.

A note re costing - be clear as to who will provide the steel frame - figures have looked bad on a number of occasions until it was realized that the steel frame had been costed twice.

Life Span

Makers claim 25 years as anticipated minimum life but the real figure is not yet known - some of the polyester fabric roofs that we did some years ago in Florida in the USA are still standing despite being there for geater periods than their expected life span. Developers see the life span situation as not important in retail because most centres are renovated about every 10-12 years. The fabric roof is an easy change to make to a centre.

SUMMARY

Fabric structures and atrium or volume spaces answer a need generated by our design philosophy in relation to retail, leisure, tourism and hotels.

There are other materials that can do a similar job in design terms but the physical properties seem to strongly support the use of fabric in these conditions.