Interior Architecture – Taking textiles into new spaces

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EUROPEAN MARKET TRENDS AND OPPORTUNITIES FOR AUSTRALIA

The market for interior textile applications has been rapidly growing in Europe as fabricators and lightweight structure designers have looked to more non-traditional areas and applications to expand their businesses. A major U.K. customer of Ferrari S.A. now estimates their volume of interior work has increased to over 50% of their turnover in the last 2 years.

The use of fabrics and textiles in interior Architecture is not overly new in itself but the introduction into Australia of textiles, ideas and systems from Europe and around the world is now providing designers and fabricators with more scope than ever to expand their expertise into new spaces.

2008 saw the introduction and use of the tensile mesh system Batyline into 3 projects in Australia that previously would have been awarded to construction companies using more conventional materials.

This paper aims to highlight some of these new opportunities and touches on some of the unique benefits that these 'new' products bring to the lightweight fabrication industry.

APPLICATIONS AND ARCHITECTURAL SOLUTIONS

Textiles for internal applications have evolved from their external counterparts and provide some or all of the benefits normally associated with the use of textiles in architecture. Combined with other characteristics that lend themselves to interior applications, these newer materials can be used in interesting and unique ways.

Benefits usually associated with tensile architecture include:-

- Lightweight and cost effective
- Minimisation of components
- Fabrication in parallel with construction reduces overall project timeframes
- Rapid on-site installation decreases downtime and disruption to client/construction
- Ideal for re-birthing / renovation and retro fitting purposes

Applications where interior textiles characteristics are commonly employed include:-

- Acoustic dampening
- Light and Glare control
- Solar Energy control
- Spatial demarcation
- Communication
- Aesthetic and Artistic purposes

ACOUSTIC APPLICATION - Tweed Regional Pool - Case Study

When a Brisbane Architect was designing the Tweed Regional Aquatic Centre they sought a solution to 2 problems frequently experienced in indoor swimming pool environments.

They sought a method to disguise the intrusive ventilation services required for indoor pool facilities (the client requested that the "paint everything black" solution not be employed.)and the need to 'soften' the interior surfaces for acoustic purposes. High levels of humidity and the chlorine atmosphere also needed to be factored into the material selection.

Creating an air cavity by the use of a perimeter mounted tensioned mesh ceiling achieved the first aim of hiding the under-roof services, whilst the mesh and cavity insulation served to provide an acoustic dampening effect.

The use of mesh in this situation was important as a hard surfaced ceiling would have simply reflected sound back into environment whereas the mesh allowed for sound to pass into the cavity and the acoustic insulation behind.

Not all installations can utilise cavity insulation and a mesh with an air cavity alone can still provide some acoustic benefits which vary depending upon frequency. Graph 1 demonstrates the acoustic absorption of a 'stand alone' fabric in comparison to 50mm of rock wool material.

Tweed Regional Aquatic Centre

The material chosen for this application was an HM Batyline from Ferrari and installed by Universal Fabric Structures on a perimeter suspended system utilising hooks and silicon based elasticised cord.

ACOUSTIC PROPERTIES OF TEXTILES

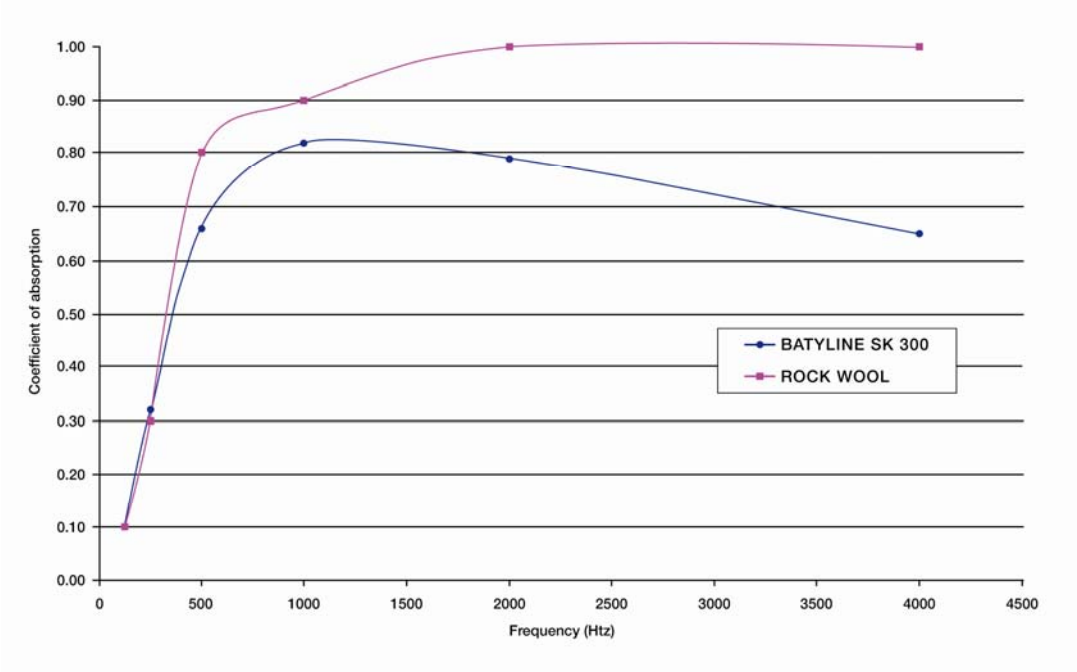
Depending on the frequencies making up the emitted sound wave and depending on the characteristics of the structure, the various components (reflected, absorbed, transmitted) take on variable proportions but the energy sum is always equal to that of the original sound wave.

Total incident = transmitted + absorbed + reflected

OCTAVE BAND	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**
SK 300 + AIR 50 mm	0,1	0,32	0,66	0,82	0,79	0,65
ROCK WOOL 50 mm	0,1	0,3	0,8	0,9	1	1

This table and the following graph compares the coefficient of absorption of SK300 a woven glass silicon coated textile installed with a 50mm air cavity to that of a insulation material 50mm in thickness. The data clearly demonstrates the similarities of the two materials in absorbing sound across a variety of frequencies. A coefficient of 1 represents total sound absorption and 0 is total reflection of the sound frequency.

Graph 1



SK300 vs 50 mm Rock wool acoustic absorption comparison

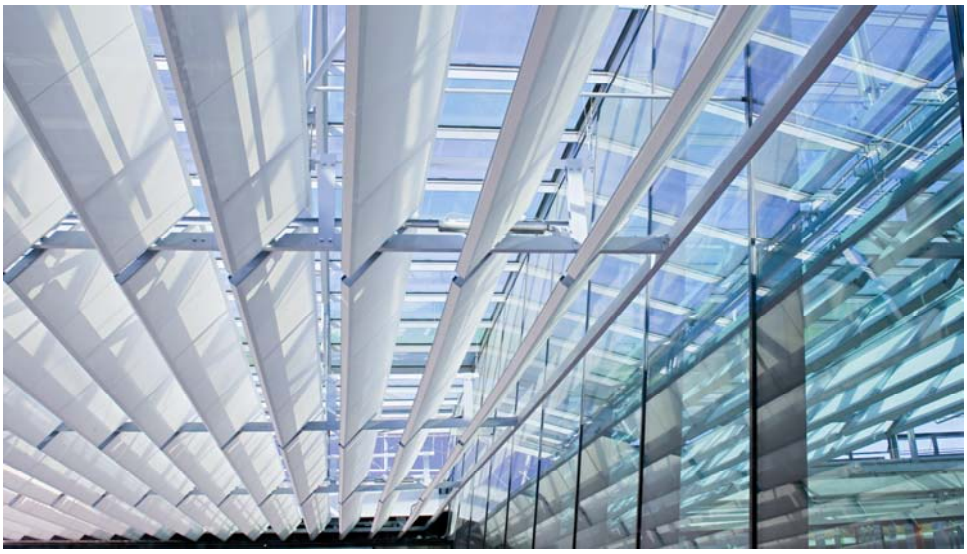
Retro fitted acoustic solution

The photograph above shows a tensioned SK300 mesh fitted around a stairwell in the atrium of this office building where the hard surfaced roof and walls resulted in noise reverberation from the stairwell. This post construction solution solved the reverberation issue and also acted as a sound dampener within the atrium as a whole.

LIGHT, GLARE AND SOLAR ENERGY CONTROL

The topic of tensile textiles in the fields of Light, Glare and Solar control would warrant a paper in its own right so I will touch only briefly on the topic of ideas and applications for interior use. With glass dominating the Architectural skyline the possibilities for tensile materials to provide shade, glare and energy control in a variety of forms is extremely broad.

With the recent growth in environmental building codes these features take on more importance in assisting the Architect to achieve targets in these areas.



Solar mesh fabric tensioned across automated system of louvers. Stuttgart

Solar mesh sails within vaulted atrium.

AESTHETIC AND ARTISTIC APPLICATIONS

The application of textiles in aesthetic and artistic ways has developed into a fascinating area for fabrication and design. Complex patterning and shapes are possible as the Architect is not necessarily restricted by the need for functionality in the overall design.

Both architects and artists alike have discovered the freedom of 3 dimensional form using tensile materials, Anish Kapoor, world renowned for his pieces Marsayas, Taratantara and Chris Bosse of LAVA in Sydney in conjunction with MakMax with Greenvoid and other striking installations.

Greenvoid courtesy of MakMax (in Lycra)

Another aesthetic installation that utilised a tensioned mesh fabric was the Shoreline restaurant at SeaWorld in Queensland. In this particular application the Architect sought to modernise an existing structure whilst minimising the impact upon existing lighting and air conditioning services.

The Architects statement regarding the project can be found at the end of this paper.

COMMUNICATION

Albeit an application that requires minimal engineering the use of tensile textiles as a medium for communication is another area in which the use of tensile materials have moved indoors.

SHORELINE RESTAURANT CEILING FEATURE: - ARCHITECTS STATEMENT

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Since its completion in the mid 80's the Shoreline Restaurant at the then known "Sea World Nara resort" hotel had become a landmark buffet restaurant on the Gold Coast for guests and local residents alike. Blessed with a fantastic location with views across the landscaped hotel grounds to the Broadwater the challenge presented to the designers was how to bring the popular restaurant a fresh new look with expanded facilities but keep the original character and theme of the restaurant but give it a new tilt towards the exciting new materials now available 25 years later.

The concept for this restaurant had always been "Shoreline" given it proximity to the Surf Beach and the Broadwater but just painting the existing large vaulted ceiling that was completely lined with lime washed timbers with a new paint would not fool the patrons into thinking that this was something new and special.

Many concepts were tried including baffles made of fabric hung from the ceiling, different built forms attached to the ceiling but due to the lightweight structure of the roof framing this proved challenging structurally and visually. Also this approach to the design interfered with the successful functioning of the existing air conditioning, early warning systems and restaurant lighting that were, if possible to remain in place and functioning.

Sometime during the design process this office was introduced to the Batyline system. A unique fabric that was lightweight, dimensionally stable, available in a range of colours and relatively untried in this country (hence something different).

Further research of this product gave us the realization that it could be used as a false ceiling but didn't inhibit the function of the existing lights, air conditioning and early warning systems. The fire indices were also excellent and consultation with the local authorities gave us the green light on its potential application.

The vaulted nature of the ceiling and the availability of a series of vertical steel posts enabled us to create a lightweight frame in which the Batyline fabric could be fixed. Using ropes and eyelets a lashed sail was evoked.

Further design tweaking of the frame gave us the wave effect we were looking for whilst filling up a large ceiling space. Not altering the ceiling services proved extremely cost effective and funds allocated for that exercise and the feature ceiling were used to provide a better quality of finishes to the tables, chairs and buffets. The new structure could also hide a multitude of water marks and deterioration that have ravaged the existing acoustic ceiling tiles that even painting would not disguise.

The final challenge was how to service the lights, early warning systems and air conditioning systems that were above the ceiling. This in the end proved to be the simplest of all. By simply using a hinge on the perimeter columns and a motorized pulley/wire system internally the panels can be swung out of the way to gain access. If all that failed then the fabric could be simply unlashed and re fixed after ceiling services were maintained.

In summary the Batyline system proved innovative, cost effective, functional and in the end, a simple solution to a complex set of problems.

Acknowledgments

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