INNER BACK PANEL WHEN FOLDED

OUTER VIEW EXPANDED HEAD

OUTER FRONT PANEL WHEN FOLDED

LSAA

LIGHTWEIGHT STRUCTURES ASSOCIATION OF AUSTRALASIA INC.

The Lightweight Structures Association of Australasia (LSAA) is a multi disciplinary group of companies and individuals working directly or peripherally in the field of lightweight structures.

Membership is comprised of architects and engineers, academics, artisans and fabricators, materials and service companies and construction groups. It marries pure theory with practical building know how in a coherent organisation in support of this developing sector of architecture, engineering and construction.

The business of the Association is conducted by the Executive comprising the President, Vice-President, Secretary and Treasurer. The Executive is assisted by an elected Committee and a part time Executive Officer.

The LSAA was founded in 1981 as the Membrane Structures Association when tension fabric structures were first being designed and built in Australasia. In 1994 the MSAA was extended to cover other forms of lightweight structures such as cablenets, spaceframes and high tech glazing.

Membership Categories

Company Membership costs $480 pa. Individual Membership $300 pa and Full time Students $25pa

Companies may promote their experience and achievements through company profiles and project articles on the LSAA website. Discounts for LSAA events apply.

Application forms available from the website **www.lsaa.org**

LSAA Design Awards

The LSAA Design Awards are held every two years in conjunction with a Conference. For members this is a chance to gain peer recognition as well as promote completed projects.

Entries represent structures completed in the previous two years and must contain a significant Australasian content for design, fabrication or construction. There is a growing number of iconic international projects being designed or constructed by LSAA members as evidenced in the 2007 and 2009 Awards.

Categories cover small, medium and large structures with a category for special applications. Entries often comprise large span roofs or wall systems constructed from lightweight materials such as high strength engineered fabrics.

LSAA Conferences and Seminars

Two day conferences are held every two years combined with the Design Awards Dinner. One day workshops or seminars are held in alternate years. Lectures are given to architecture and engineering students at a number of Universities.

Members share experiences, discuss industry issues and network with colleagues in addition to interacting with distinguished local and overseas experts.

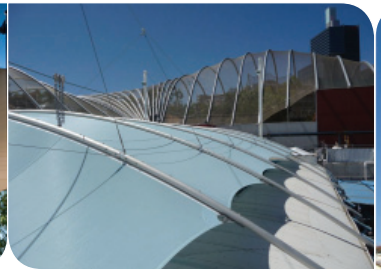
The LSAA is working closer with the Engineers Australia and RAIA

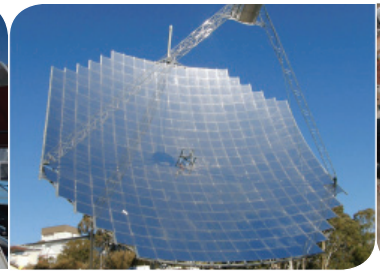
Tension Membrane Structures

Surfaces ideally need to be anticlastic or “saddle shaped” with the membrane under a degree of prestress. Hypars, cones and barrel vaults are common forms. The edges of a surface often involves steel cables to gather the forces from the fabric and carry these to corner anchorage points.

To obtain the curvatures, major support elements such as masts and arches are used. Fabric materials include teflon or silicon coated glass, PVC coated Polyesters, foils and shadecloth.

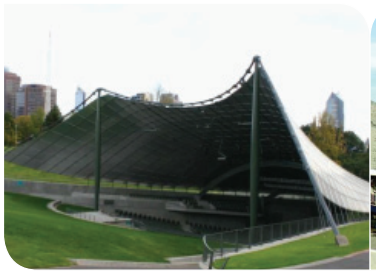
The main design loadings are the initial prestress in the fabric and wind loads - dead weight is very small. Prestress is generated by patterning the fabric from standard width rolls to be a smaller size. The fabric is stretched to its supporting system by adjusting the length of edge cables, tensioning of side guys, jacking up of internal masts or a combination of methods.





Cable and Cablenet Structures

Cablenet structures need saddle shaped surfaces - like tensioned fabric structures. An early example was the Sidney Myer Music Bowl in Melbourne. Edge cables gather the large forces and transfer these to substantial ground anchorages.



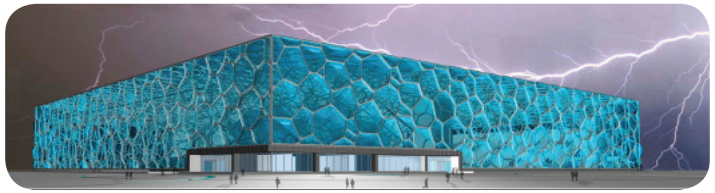

Frei Otto's German Pavilion at Expo 67 was the fore runner to his famous Munich Olympic Stadiums. Many large modern stadia have been built using a cable structure supporting, and giving form to tensioned fabric roof panels. With a complete stadium, the inner opening has a large tension ring made from cables. The radial cables are tensioned and resisted by an outer compression ring which in turn is supported by many outer columns. Connections and cable end fittings are a vital part of the design.

Spaceframe & Other Lightweight Structures

Traditional spaceframes where individual members are small compared to the spans are combined to form towers, reticulated domes, shells, hypars as well as two way double or multi layered flat roofs.



Prestressed cable rod systems are great for supporting large areas of glazing. The application of new materials such as foils in conjunction with new geometric forms and the use of modern 3D computer modelling has enabled the iconic Watercube structure to become a reality.



Overhead cable supported roofs are an efficient load carrying mechanism. Most lightweight structures have interesting geometric forms resulting from the optimization process. Many require the use of large displacement analysis.

A Team Effort

Our members derive enormous pleasure from the realization of a design. It is essential in these forms of structures to approach the design bearing in mind the unique behaviour of modern materials such as engineered coated fabrics.

In almost all cases, the connection details are exposed and these are often the key to a good design.

Erection of lightweight structures also requires careful planning as cables, fabric and rods are flimsy but difficult to handle in large panels. Wind gusts and heavy rain can cause havoc during erection of a tensioned fabric structure.

All components are fabricated off-site and it is generally not easy to rectify mistakes. The use of accurate 3D computer modelling and detailing has reduced errors. Compensations for fabric stretch and long term creep are important.

The reduced quantities of materials used for lightweight large span structures where the form has been optimized is helping the environment.

The materials - cables, fabrics, foils etc. - are now being used in newer applications such as facades that are effective in reducing the energy requirements of more traditional "box" buildings.

Interested in becoming a member of LSAA?
Visit our website and download a membership information pack.

www.lsaa.org
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