

CUSTOM FABRIC STRUCTURES



CONTENTS

THE MAKMAX AUSTRALIA DIFFERENCE
TENSOSKY ETFE PROJECTS
PTFE PROJECTS
STADIUMS & GRANDSTANDS
TENSILE MEMBRANE ROOFING
WALKWAYS & PUBLIC SHADE STRUCTURES
BESPOKE SHADE STRUCTURES
ATRIUMS & SKYLIGHTS
AWNINGS & FACADES
CABLE NET STRUCTURES
FABRIC ART INSTALLATIONS
TAIYO KOGYO GROUP
ARCHITECTURAL FABRIC COMPARISON





THE MAKMAX AUSTRALIA DIFFERENCE

Creating unique and iconic urban landscapes, MakMax Australia specialise in lightweight fabric structures with a signature high-level architectural style for a variety of applications and industries.

MakMax Australia has extensive experience delivering a wide range of quality, custom designed tensile membrane structures by combining cutting-edge modern architectural fabrics such as PTFE, ETFE and PVC, with our proprietary TensoShade membrane fixing system that has been engineered for premium quality, ease of installation and tensioning, and maximum durability.

FULL CIRCLE OF SUPPORT

19 20

21

22

With almost four decades worth of local experience, MakMax Australia is the market leader in the design, engineering, fabrication and installation of architectural tensile membrane structures.

We are proud to offer full turn-key solutions with a full circle of service and support for your project;

- » In-house designers, engineers & fabrication.
- » In-house project & construction managers.
- » Agents, resellers & installation crews in every state for continuity of service, even during COVID border disruptions.
- » In-house qualified engineering inspectors for regular routine maintenance programs.
- » In-house maintenance, cleaning and technical support.





CUSTOM FABRIC STRUCTURES

MakMax Australia provides premium shade and weather solutions for stadiums; sports clubs and recreation centres; retail and commercial developments; hospitality and entertainment venues; community spaces, schools, transport hubs; mining and industrial sites, and more.

The advantages of a MakMax TensoShade Custom Fabric Structure include;

MAXIMUM IMPACT

Function and aesthetics go hand-in-hand with our tensile membrane projects. Visually stunning and elegantly engineered forms create engaging, light, and comfortable spaces for people to enjoy.



LIGHTWEIGHT STRUCTURES

Architectural fabric structures are a fraction of the loadbearing weight of steel, slate, glass or aluminium roofing. This means less supporting structural elements and fewer overall building materials are required, making tensile membrane structures both cost effective and sustainable.

TRANSLUCENT (LIGHT-TRANSMITTING) PROPERTIES

We choose tensile membranes that are aesthetically beautiful and able to transmit natural light. The benefits of filling an indoor space with natural light range from reduced daytime power consumption, to minimal shadowing on sporting surfaces.

COMFORTABLE

MakMax membrane structures create comfortable spaces for our clients' patrons and customers. Fabric roofing and shade structures offer a high UV reflectivity rate, so they are much cooler underneath than conventional roofing materials.

DURABLE

Both strong and flexible, our architectural fabric structures can withstand anything that the environment throws at them, from the desert sands of Uluru to the monsoonal rains of Tropical North Queensland. MakMax projects have been built on 7 continents to withstand earthquakes, cyclones, sub-zero temperatures, and anything mother nature can deal out.



TENSOSKY ETFE PROJECTS

ETFE (Ethylene Tetrafluoroethylene) foil is durable, highly transparent, environmentally friendly and a lightweight alternative to glass structures. This modern fluoropolymer is quickly becoming one of the most popular materials in an architect's palette.

MakMax Australia boasts an international portfolio of TensoSky ETFE projects, including stadiums, shopping centres, roof canopies, educational facilities, walkways, and distinctive project feature designs.

SINGLE LAYERED APPLICATION

ETFE foil can be applied in a single layer to form a durable, lightweight glazed roof.

Reinforced with cables, lightweight steel or aluminium to maintain shape and stability, a single-layer ETFE structure is perfect for allowing natural light into a building through applications such as skylights and atrium roofing.

Flexible and able to form geometrically unique shapes, singlelayer ETFE foil is also popular as an architectural building façade.





DOUBLE & TRIPLE LAYER APPLICATION

MakMax's multi-layer TensoSky ETFE system makes use of airfilled ETFE pillows to create lightweight, thermally insulated and highly translucent roofing.

The ETFE pillows, or cushions, are created with a pneumatic system which maintains low-pressure air between 2 or 3 layers of ETFE film. The cushions are held in place with our unique aluminium extrusions and supported by a lightweight truss frame.

Under typical loading conditions, ETFE cushions can range from 1 to 5 metres wide and reach up to 60m in length.





BENEFITS OF ETFE

LIGHT TRANSMISSION

ETFE foil can be highly transparent - up to 90% to 95%, allowing natural sunlight and UV to shine through.

DURABLE

ETFE is robust and unlikely to degrade after exposure to environmental pollution, UV light, harsh chemicals, or extreme temperature variations. ETFE will not shatter like glass in earthquakes or intense storms.

SAFETY IN DESIGN

ETFE has beneficial characteristics in a fire situation, and unlike glass, will not shatter under hail, snow, or storm winds.

SOLAR CONTROL/THERMAL & ACOUSTIC INSULATION

Using different printed frit patterns, the amount of solar shading can be adjusted to suit the project. Multi-layer applications create cushions of air, providing temperature and acoustic insulation.

ENVIRONMENTALLY FRIENDLY

Compared to other cladding or glazing materials, less overall energy is consumed during fabrication and construction, thus reducing the overall carbon footprint.

RECYCLABLE

Easily recyclable, waste from the manufacturing process or even old structural elements can be remoulded into new products such as tubing components or wire coating.

COST EFFECTIVE

Due to the lightweight nature of the membrane material, the substructure support systems and concrete foundations often require significantly less materials.

COLOURS

Colour can be introduced in a variety of ways. It can be applied during the production process or by incorporating LED lighting.



An

8 E.

X X

YAYAYAYAYA

Ľ

SAA

1 - T-

2%

-

2.5



PTFE PROJECTS

PTFE (polytetrafluoroethylene) coated fibreglass fabric is an extremely durable and weather resistant membrane that lends itself to many bespoke architectural designs and structural applications.

Architectural PTFE membrane combines the strength, flexibility, and fire-resistant properties from the fiberglass mesh, with the unrivaled weatherability and chemical resistance from the polytetrafluoroethylene coating. Overall, PTFE provides the most aesthetic, durable, low maintenance, and translucent fabric option for membrane structures and tensile architecture solutions.

With a confirmed design life of at least 45 years, some of the first PTFE structures built in the 1970's are still standing. MakMax have undertaken mechanical testing of material from a dismantled structure that still exhibited a tensile strength greater than its specified value after 25 years in service.

Known for its strength, durability, and its ability to offer a range of translucency in custom fabric structure design, MakMax Australia chooses PTFE for a wide range of applications. As well as regular PTFE; blackout, low translucency and porous mesh options are available to allow architectural design freedom.

MEMBRANE ROOFING

High translucency, strength, aesthetics, and the self-cleaning properties of PTFE membrane, make it the perfect membrane for stadium roofing, bowling green canopies, sports court canopies, sporting club grandstands, and retail or commercial atrium roofing.

SHADE STRUCTURES & AWNINGS

Strong, long-lasting, stable, and with effective protection against UV, PTFE is ideal for retail walkways and shade areas; hotel and restaurant alfresco dining; COLAs (covered outdoor learning areas) for schools and universities; airport arrivals/ departure zones; and public transport waiting areas.



FAÇADES & INTERIORS

Prized for its sound absorption characteristics and noncombustible qualities, PTFE has the ability to create architecturally stunning façades and interior paneling or soffits. PTFE Mesh is especially suitable for façades, fostering extremely effective light transmission and heat control.







STADIUMS & GRANDSTANDS

Boasting an impressive reference portfolio of membrane projects on iconic stadiums, our highly experienced local staff have a key understanding of practical design; manufacturing and logistics; as well first-hand experience managing the construction risks and opportunities involved in large-scale projects such as tensile membrane stadium roofing.

STADIUMS

From spectacular cable-grid supported stadium roofing to large-span spectator grandstand covers; from architectural façades to covered bar areas and amenities blocks, MakMax Australia and our global Taiyo Group family have been involved in some of the most stunning and iconic stadium projects around the world. Our value engineered solutions have delivered some truly innovative structures. Some of the major stadium projects within our reference portfolio are:

AUSTRALIA	INTERNATIONAL
Metricon Stadium, Gold Coast, 2010	Moses Mabhida Stadium, Durban, South Africa, 2009
Optus Stadium, Perth, 2017	Brasilia Stadium, Brazil, 2013
Anna Mears Velodrome, Brisbane, 2017	Mercedes-Benz Stadium, Atlanta, USA, 2017
Memorial Drive Tennis Centre, Adelaide, 2019	Khalifa International Stadium, Doha, 2017
Melbourne Park Tennis Centre Showcourt 3, 2019	Wanda Metropolitano Stadium, Madrid, Spain, 2017
Sydney Football Stadium, 2022	Zaozhuang Stadium, China, 2018



GRANDSTANDS & HOSPITALITY AREAS

Keep your spectators and patrons comfortable with a range of shade and weather solutions. From grandstands and corporate boxes, to sun and weather-protected entrance gates and bars, MakMax Australia has a proven track-record of delivering a widerange of membrane structures for sporting facilities.

COMMUNITY SPORTS CLUBS

MakMax Australia has worked with many sporting clubs and associations to provide shade and shelter for athletes and spectators. Our small spectator stand covers are strong, lightweight, and reasonably economical when compared to traditional buildings.

AQUATIC CENTRES

Letting in plentiful glare-free and sun-safe natural light, adding a tensile membrane roof to an aquatic centre helps to create a world-class facility for swimmers and spectators. A lightweight membrane roof can be built to comfortably cover an Olympic-size pool, diving tower and grandstand seating.







STADIUMS

E E Manar L





TENSILE MEMBRANE ROOFING

10 10

BIGTOP

Big Top Shopping Centre, Maroochydore QLD

wealthways

TENSILE MEMBRANE ROOFING

TENSILE MEMBRANE ROOFING

Highly visible and aesthetically beautiful, the use of tensile membranes in large-span roofing is a popular, cost-effective way to create a large, weather protected indoor area.

Lightweight tensile membrane roofing can cover large open spaces with minimal supporting structure.

Applications include;

- » Shopping Malls & Retail Precincts
- » Hotels & Convention Centres
- » Alfresco Dining Areas & Function Spaces
- » Stadiums, Grandstands & Aquatic Centres
- » Leisure & Recreation Centres

The most common tensile membrane roof shapes feature barrel-vault or conical geometries, although with flexible architectural membranes, there are limitless possibilities to the shapes that can be created.









WALKWAYS & PUBLIC SHADE STRUCTURES

Working with architects, retail developers, local governments, and community groups, MakMax Australia has created signature shade structures for walkways, retail spaces, transport hubs, parks, and performance areas.

Flexible design options, long life spans, and low maintenance structures made possible through tensile membranes lend themselves to public and community projects.





WALKWAYS & PEDESTRIAN AREAS

Lightweight, UV blocking and waterproof; fabric structures are easy to install and able to be shaped around existing buildings, making them perfect for connecting one place to another via covered walkways, or else providing shaded and weather protected pedestrian zones.

Some of the walkway structures we have created include;

- » Extended awnings or portes cochères, providing shelter for entering/exiting buildings.
- » Free-standing structures in pedestrian malls or outdoor shopping centres.
- » Covered walkways connecting a carpark or transit station to airports.
- » Passenger arrival zones and a covered concourse at airports.
- » Covered walkways connecting school and university buildings, can offer students protection as they move about campus.
- » Walkways that blur the lines between protection and art at major stadiums and events.





WALKWAYS & PUBLIC SHADE STRUCTURES



PUBLIC TRANSPORT & TAXI RANK SHELTERS

Train Stations, Bus Stations, Taxi Ranks and Ferry Terminals; these people-moving hubs need to be memorable and recognisable places, while protecting and directing patrons to their destination. Taking advantage of bold colours, unique shapes and smart design, a transport hub can be made iconic by the use of a custom TensoShade public shade structure.

Some examples of our work on Transport Hubs include;

- » Brisbane Airport ground-transport stations & parking links.
- » Gold Coast Light Rail stations: Helensvale, Parkwood & Parkwood East stations.
- » Perth Airport taxi rank.
- » Chadstone bus interchange.
- » Split Airport (Croatia) Bus Terminal.



PARKS & PLAYGROUNDS

We have a long history of creating unique and inviting TensoShade structures for community spaces, such as playground shade, BBQ and picnic area cover, public stages and amphitheatres.

These smaller structures are often a chance to explore our creative freedom by including different elements, such as wooden/glulam framing, alternating translucency fabric designs and printed patterns.









BESPOKE SHADE STRUCTURES

If you need to create shade with a difference, the MakMax Australia TensoShade system can be adapted into almost any shape to suit your setting. Our in-house design ability enables the TensoShade structures to complement the architectural intent and atmosphere of the area you are designing.

Together we can make a bespoke fabric structure that will make your project stand out.



RECREATION SPACES

Working with local councils, as well as private plannedcommunity developers, MakMax Australia has created some of our most unique structures in private and community parks and outdoor recreation spaces.

THEME PARKS & TOURIST ATTRACTIONS

Challenging the imagination and creating exciting spaces for theme parks and tourist attractions, architectural fabric structures can be incorporated into a wide range of theme park and tourist attraction applications.

From enchanting shade cover for patrons waiting in line for the latest thrill ride, to one-of-kind fabric roof and skylight structures at a visitor's centre, the ability for membrane structures to add form and function to public spaces, help to create memorable tourist experiences.











BESPOKE SHADE STRUCTURES

RETAIL CENTRES & ALFRESCO DINING

Outdoor shopping centres and pedestrian malls need cover to protect shoppers from sun and rain. We work closely with retail centre management and local councils to attract new customers by creating retail spaces with a difference. We can also help add a touch of elegance to outdoor dining precincts with bespoke shade and weather protection for alfresco diners.





INDUSTRIAL & AGRICULTURAL APPLICATIONS

Our in-house design capabilities can provide a range of custom-designed industrial and agricultural solutions using tensile membrane structures.

We've worked on projects including livestock auction yards, evaporation control shades, bio-gas reactor tank covers, radar domes, cooling towers, truck-wash canopies, aircraft hangers, and large scale hail net protection canopies.

The ability to creating bespoke fabric structure solutions for any industry is something we take great pride in.







ATRIUMS & SKYLIGHTS

The abundance of natural light creates a welcoming feel to any indoor space. The translucent nature of tensile membranes, combined with their strength and flexibility, make them a superior building product for atriums and skylights.

Whether you choose a bright-white PTFE or PVC material that allows natural light to filter through or opt for a transparent ETFE (a lightweight alternative to glass) structure, incorporating a membrane atrium or skylight can be an attractive and energy saving addition to an architectural design.









AWNINGS & FACADES

AWNINGS

Incorporating awnings into a design extends the usable space around the exterior of a building. The lightweight nature of tensile membranes offers superior strength and stability when used in cantilever awning applications.

Custom fabric awnings can incorporate different geometries for aesthetic appeal and make use of alternate translucency fabrics to provide different levels of light transmission into a building.

MakMax Australia has used membrane awnings to great effect to provide shade and weather protection to hotels, restaurants, cafes, schools, universities, and commercial buildings.





FACADES

Making use of the latest tensile membrane technology, adding a fabric façade is a way to add an artistic and energy efficient feature to building.

A sustainable way to cool a building, the translucent properties offered by lightweight membranes can reflect or absorb most solar energy, allowing natural light in, while minimising the influx of heat.

Buildings such stadiums, which require large, lightweight structures and eye-catching and exciting exteriors are perfect for architectural fabric or ETFE foil façades.

Creating beautiful buildings out of functional public spaces, such as concrete carparks and warehouses, fabric façades are an economical alternative to conventional cladding.

SOFFITS

From fully covered ceilings to small reverberation-blocking panels, the excellent sound absorption properties offered by membranes make them ideal for soffits and ceilings in grandstands, convention centres and live music venues.

One of the more unusual custom fabric projects MakMax Australia has completed was the creation of a fabric soffit on the underside of Perth's Matagarup Bridge. The custom-made black PTFE soffit hides unsightly drainage and support beams, while also providing excellent sound absorption, helping to create a more pedestrian-friendly overpass.









CABLE NET STRUCTURES

Cable Net Structures offer minimalistic, light, and aesthetically unique roofing or shade solutions and can be used to obtain larger spans by reducing the number of columns or other conventional structural elements.

While most tensile membrane structures use cables to tension fabric over a rigid steel-frame, cable net structures use tensioned cables as the main support grid, allowing innovative and lightweight alternatives to standard structures.

A common application is to create an anticlastic support grid of cables, which in turn provide support for a tensioned membrane surface. This helps to develop aesthetically pleasing and iconic architectural membrane structures and architectural features that almost seem to float over the covered area.

MakMax Australia also has experience in creating parallel cable grid structures for shade and artwork elements, such as the stunning Arbour Walkway which snakes its way alongside the Perth stadium.



CABLE NET STADIUMS

With the ability to achieve large spans with minimal support elements, cable net structures have been used in multiple MakMax and Taiyo Kogyo stadium roof designs.

Making use of either a self-supporting inner tension ring connected to an outer superstructure via a radial cable grid (on projects such as the Jawaharlal Nehru Stadium or the Wanda Metropolitano Stadium), or by employing a radial cable grid supported by a central arch on stadiums such as Moses Mabhida Stadium, gravity-defying stadium membrane roofing is made possible through innovative cable net structures.







FABRIC ART INSTALLATIONS

EVENTS & FESTIVALS

Short-term temporary structures for festivals and events or permanent community amphitheaters for annual outdoor concerts are no strangers in the MakMax Australia project portfolio. Among our varied projects, we've created innovative Lycra sculptures for VIP marquees for the Melbourne Cup and a stunning set for the live MTV awards, we've created stages in the Sydney Domain, and fabric and light sculptures for the Myer Music Bowl in Melbourne.

Some of our favourite works include;

- » Moet & Chandon Pavilion at the Melbourne Cup Carnival 2005
- » The Green Void at Sydney Architecture Exhibition in 2008
- » Trailfinders Australian Garden Chelsea Flower Show 2011









THE TAIYO GROUP

THE WORLD'S LEADING TENSILE MEMBRANE COMPANY

The MakMax brand name is a combination of the Japanese word "maku" meaning membrane, and "max" as in maximize. Together they symbolise our continuous pursuit of the limitless possibilities of membrane architecture.

MakMax Australia is proud to be part of the Taiyo Kogyo Group, ensuring our clients benefit from the global experience, knowledge, and technology of the largest tensile membrane structure company in the world.

Founded in 1922 in Japan, Taiyo Kogyo Corporation is the leader of the Taiyo Group of Companies, which includes MakMax Australia (Australia-Pacific), Taiyo Europe GmbH (Europe), Birdair Inc. (USA),

Shanghai Taiyo Kogyo Corporation (China), Taiyo Middle East (UAE) and 24 other companies worldwide. Supported by our global network of offices and production facilities, as well as a cutting-edge R&D testing centre in Japan, and with projects completed in more than 50 countries, and on all seven continents, we dynamically merge global solutions to local individual regional needs.







RESEARCH & DEVELOPMENT

Major investment is placed into research and development of new materials, technologies and innovations at the Taiyo Kogyo testing facility in Japan. We perform our strict testing procedures on an innumerable number of materials and mock-up structures: only this way can we ensure that our tensile structures adhere to the highest standards of quality.



The latest developments can be seen first-hand at the MakMax Flex Experience Centre in Osaka.

We also focus on sustainable product developments, including the usage of recyclable materials, which can not only provide the expected lifespan and performances, but can also actively reduce the environmental impact and carbon footprint of the construction industry.

ARCHITECTURAL FABRIC COMPARISON

MakMax Australia uses only the very best fabrics, sourced directly from some of the world's best membrane manufacturers. While there are many manufacturers and products available within each material type, MakMax Australia only use materials from premium quality suppliers. Our expert knowledge, continued research and development, and in-house fabrication of our projects ensure your fabric structure or tensile membrane project is delivered beyond your expectations.

		HDPE Shade Cloth	PVC Polyester Open Weave Mesh	PVC Coated Polyester	PTFE Teflon Coated Open Weave Mesh	PTFE Teflon Coated Fibreglass	ETFE FOIL
	Means of Fabrication	Sewing/Overlocking	RF Welding	RF Welding	Heat Sealing	Heat Sealing	Heat Sealing
10 20 30	Life Expectancy (years)	10+	20+	20+	45+	45+	30+
*	Translucency	3–50% Colour dependent	5-40%	6-8%	30-40%	12-14%	0–90% Colour & print dependent
<u>(</u>	Waterproof	×	×	\checkmark	×	\checkmark	\checkmark
W	UV Protection	••	•	••	•	•••	● – ● ● ● Colour & print dependent
THE STATE	Cleanability	••	••	••	••	•••	•••
	Recyclable	×	\checkmark	✓	×	×	\checkmark
	Colours Options	Large colour range	Large colour range	Large colour range (Umbrellas) / Limited colour range (large structures)	Limited colour range	White only (after sun bleaching)	Variety of patterns, printing & film colour
	Maintains Colour	Dependent on colour	Some yellowing over time may occur	Some yellowing over time may occur	\checkmark	\checkmark	\checkmark
<u>\$\$</u>	Price Comparison	•	•(•(••(••(•••
	Additional Options Available	Different knit patterns available for strength and density of weave	Top coats in fluropolymers and TiO2 coatings to improve durability & surface cleanliness	Top coats in fluropolymers and TiO2 coatings to improve durability & surface cleanliness	Top coats in fluropolymers and TiO2 coatings to improve durability & surface cleanliness	Top coats in fluropolymers and TiO2 coatings to improve durability & surface cleanliness	Film can be printed to vary translucency & the number of layers can be adjusted to vary the translucency

The Fabric Comparison Table is provided as a guide only, individual project details, such as environment, application and the brand of fabric will be considered when selecting a membrane for your structure.



MakMax Australia is the market leader in the design, engineering, fabrication, and installation of Architectural Umbrellas, Standard and Modular Shade Structures, and Custom Fabric Structures for a variety of applications. We combine architectural designs with engineering solutions, ensuring your project quality is second to none.

THE MAKMAX AUSTRALIA DIFFERENCE;

- » We provide you with an in-house engineering and design team.
- » Global Reputation, Local Expertise; operating in Australia for almost 40 years, MakMax is also part of the Taiyo Kogyo Group, global leaders in tensile membrane structures.
- » A commitment to Quality, Safety and the Environment; ISO certification ISO 9001, ISO 14001, ISO 45001.

For more information on our capability and design solutions contact our team.

Design. Engineer. Fabricate. Install.

Mak/ax Australia

OTHER MAKMAX AUSTRALIA BROCHURES





© Taiyo Membrane Corporation / MakMax Australia. RevO - October 2021