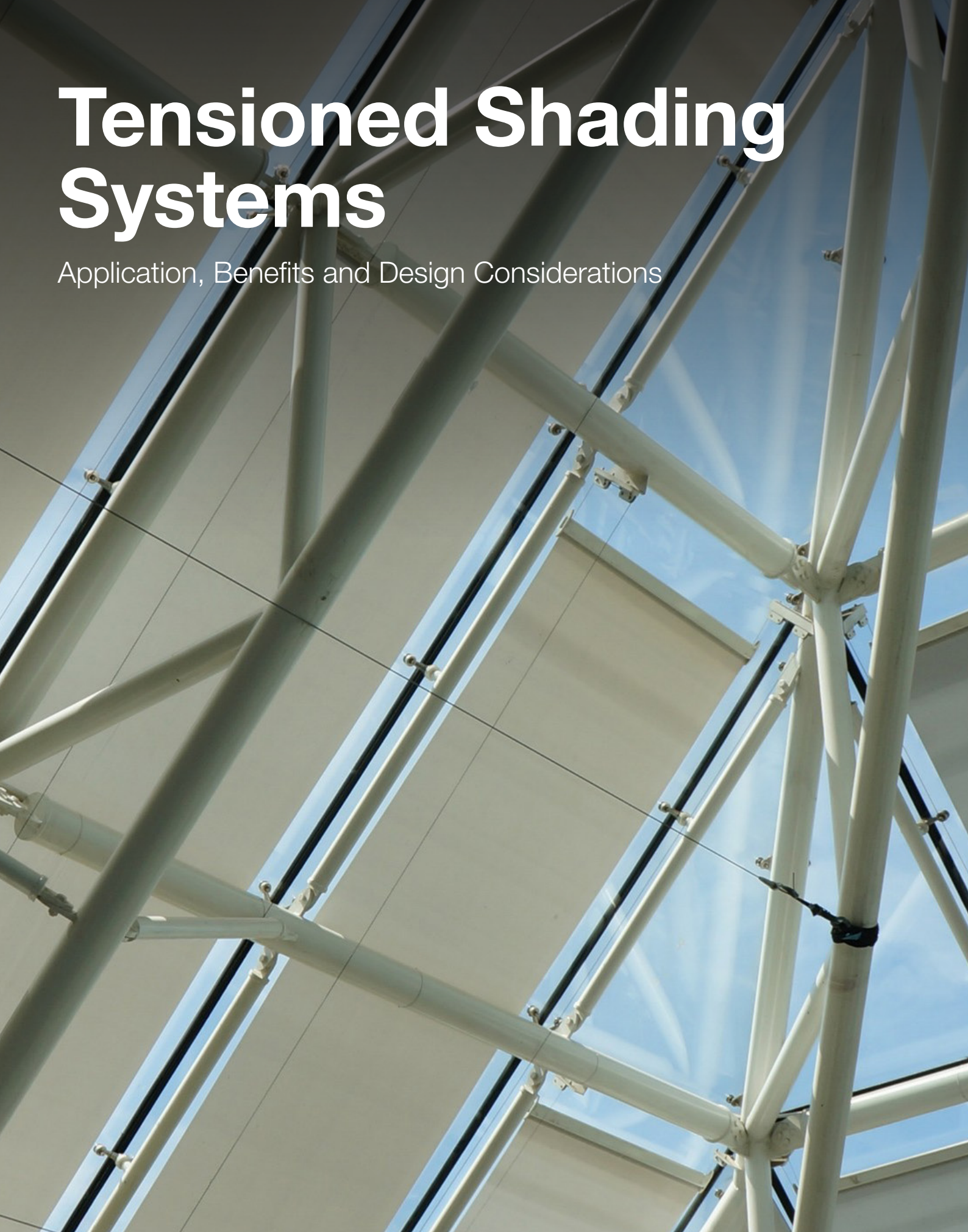




Tensioned Shading Systems

Application, Benefits and Design Considerations

INTRODUCTION

With the current focus on green and sustainable construction, effective sun shading is one of the most important passive design strategies to be aware of when minimising energy use over a building's operational lifecycle. There have been reports of 5% to 15% reductions in annual cooling energy use, depending on the type and location of shading.¹ When these shading systems are automated, they can be programmed to respond to the position of the sun to maximise thermal and lighting efficiency regardless of the season or time of day.

Today's architects and designers are looking for shading systems that offer dependable functionality without sacrificing aesthetics. One often overlooked solution in this category is tensioned shading.

Tensioned shading systems, for the reasons we explain below, are more versatile, effective and aesthetically pleasing than traditional shading solutions. Their suitability for complex structures makes them a valuable tool to help new buildings achieve their sustainability goals.

The development of strong, long-lasting architectural textiles and hardware has greatly advanced tensioned shading technology over the past few years. Advanced tensioned fabrics offer light filtering and enhanced heat protection in a wide selection of colours and finishes. These devices now offer the opportunity to create completely customised solutions, providing a striking design element that can span entire buildings or stretch across large expanses of glazing.





SHADING IN ARCHITECTURE

Sunlight can be a helpful ally in supplying buildings with natural light and heat, but too much solar radiation can cause glare and overheating. If the right balance is not struck, during the warmer months, energy-intensive cooling will be required to maintain a comfortable indoor environment. In light of increasingly stringent energy efficiency requirements in Australia, solutions are needed to control solar heat gain without creating dark, gloomy interiors devoid of natural light.

Sun shading is effective at reducing unwelcome heat gain when used externally because it stops heat from entering the building in the first place. Standard double-pane windows allow 76% of the sun's energy to enter a building as heat.² A good exterior shading system can block 90% or more of that heat.³ As a result, there will be less demand for mechanical cooling of the building's interior, which over time will lead to lower capital and operational costs.

The solar orientation of a specific building facade will affect how effective shading devices are designed. The

shading system will need to consider the position of the sun at different times of the day and season. A fixed shading device that blocks the high midday sun may be ineffective during the afternoon when the sun is lower.

Shading can be used to control the amount of total light entering the room to reduce glare while ensuring natural illumination and outside views. There are types of shading devices that can function as light reflectors, bouncing natural light into building interiors. Other types of shading, such as tensioned shading systems, provide light-filtering capabilities to create comfortably daylight indoor environments.

Thermal comfort and natural light are two requirements for healthy spaces. Being in a comfortable indoor environment increases your productivity, mental health and physical wellbeing. There are numerous studies linking thermal comfort to productivity and other positive health impacts.⁴ The restorative effects of natural light are also well documented.⁵

WHAT ARE TENSIONED SHADING SYSTEMS?



Cable Guided Tensioned Shading System

TESS Systems are built around a unique single barrel tension mechanism which makes them strong and capable of shading windows that are up to 6m in width and 18m in drop. Motor, spring, gearbox and control cable work in harmony to consistently hold fabric flat and intelligently adapt to the surrounding environment, regardless of angle or system direction.

The foundation of tensioned shading systems is a special spring mechanism that maintains the tension of the fabric.

Types of tensioned shading systems include:

- guided and unguided systems;
- external or internal systems;
- vertical drop systems for extra large spaces;
- compact systems for small spaces; and
- bespoke systems for unique shapes.



A tensioned shade system is both lightweight and flexible, allowing for the creation of unusual geometric shapes that look stunning in natural or artificial light.

ARCHITECTURAL BENEFITS

Durability. When designed and installed correctly, tensioned shading systems are strong, flexible and durable. Tensioned shading can provide effective cover over large spans of glazing with minimal structural support. High-quality components, made in corrosion-resistant stainless steel, ensure the system will have an exceptionally long lifespan.

High-performance fabrics. While there may be some concern over the durability of fabrics under tension, the leading products in this category have been rigorously tested under the most demanding conditions to ensure consistent, long-term performance. These architectural fabrics will not deteriorate or fail even under prolonged exposure to ultraviolet (UV) light, rain and wind. In addition, the fabric stays taut and in place in a tensioned shading system, reducing movement and noise and assisting with the longevity and maintenance of the system. Some fabrics are recyclable, which improves the overall environmental impact of the structure.

Comfortable interiors. In addition to thermal comfort, tensioned shading systems can be customised to

meet different user requirements. For example, where visual comfort is a priority, tensioned shading are designed to provide natural light transmission through the fabric, providing evenly diffused light with minimal shadowing.

Design flexibility. A tensioned shade system is both robust and flexible, allowing for the creation of unusual geometric shapes that look stunning in natural or artificial light. The adaptability of fabric-based systems supports a range of geometric shapes and design element layering. A key differentiator is the ability of tensioned shading to span large areas not typically possible with traditional shading systems.

Versatility. Systems can be installed internally and externally and can accommodate glazing of any size and shape, including horizontal, sloped and curved structures. The Tension shading system can only be supplied as a motorised system. Systems can be operated individually or in groups. Motorised retractable systems are available. Draw directions can also be specified, including from bottom to top, top to bottom and side to side.

Installing tensioned shading systems on the building facade gives designers and architects the chance to create a striking architectural facade element. Completely customised designs can make buildings more desirable and present a marketable differentiator that can help attract buyers and tenants.

FABRIC SELECTION

Material properties play a key role in the durability of tension fabric. For tensioned shading systems, technical fabrics that meet environmental and aesthetic design requirements while also being strong, stable, and versatile are required.

There are special fabrics to suit different requirements for visual comfort, privacy, light control and thermal efficiency. Most screen fabrics come in a range of openness factors for optimum visual comfort and heat protection. Advanced materials and finishing techniques are available to enhance thermal efficiency, glare control and aesthetics. Blackout fabrics may be specified for complete light control and privacy.

The common fabric types for tensioned shading are the following:

- high tenacity polyester micro-cable reinforced fabric;
- fibre reinforced polymer;
- PVC free polymer;

- laminated polymer;
- metal coated fibre-reinforced polymer;
- metalised PVC free polymer; and
- ocean bound recycled PET.

High-performance polymer fabrics, woven or set and heat-treated, provide strength and stability under tension. Composite construction offers low stretch characteristics at high tensile loads, resulting in longer life and service intervals. Some specialist fabrics offer a finer woven appearance to match interior designs.

Metallising techniques are used to apply metals on fabric surfaces for aesthetic or protective purposes. When compared to traditional shading fabrics, metalised fabrics have higher heat and light reflectivity and provide exceptional heat and glare reduction. In addition, the metallic layer provides uniform light transmittance and reflectance values throughout the entire colour spectrum.

OPPORTUNITIES FOR CUSTOMISATION

Installing tensioned shading systems on the building facade gives designers and architects the chance to create a striking architectural facade element. Completely customised designs can make buildings more desirable and present a marketable differentiator that can help attract buyers and tenants.

A notable example of a custom-made tensioned shading system is at Sydney's Darling Quarter. The dramatic triple-height atrium, which forms a breathtaking feature in Commonwealth Bank Place, included a curved ceiling design with shaped glass panels that required solar control. The project required a carefully designed shading system to accommodate the unique ceiling design.

Together with the project's stakeholders, Horiso developed a special tensioned blind system that could retract precisely, preventing any fabric sagging or operation issues along its entire length. When the blinds were extended, the openness of the fabric provided light filtration without allowing excess solar gain to enter the building.

Demonstrating the advantages of tensioned shading, the actual size of Horiso's custom system has never been achieved before on a building worldwide at the time of construction; 14 metres long by 3.2 metres wide. The Southern building's blinds were also custom-made to match the curve of the skylight panels on the ceiling.

HORISO TENSIONED SHADING SYSTEMS

Retractable fabric-based systems for horizontal and sloped glazing

Horiso is a distributor of technical shading systems by Guthrie Douglas, the global leader in automated retractable shading systems for extraordinary spaces.

Horiso collaborate with architects and design teams as early in the process as possible, to specify an interior or exterior shading system specific to your project, that will disappear into its surroundings when not in use, harnessing the power of light and shade as positive architectural features.

Tensioned Shading System features include:

- Motorised retractable systems
- Various draw directions including bottom to top, top to bottom, side to side operation
- Suitable for internal and external installations on a range of shaped glazing including rectangular, triangular, trapezoidal and curved shapes
- Operated either individually or controlled as a group across large glazed areas
- Single-barrel mechanism that keeps the fabric constantly under tension and produces a smooth and silent operation
- Durable high-quality components
- Return pulleys that are manufactured from stainless steel
- Bespoke systems that can be customised to specific structures

Horiso's Tensioned Shading Systems use only pre-approved, pre-tensioned fabrics.



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