

Visually Transparent Shading: An Analysis of Contemporary Shading Solutions



Solar Gain and View with MechoShade® Roller-Screens

Energy-Efficient Transparent Shading.

Over the past decade, a greater use of glass in buildings has returned. No longer is the widow considered the "energy culprit". New energy-efficient glazings with higher degrees of visibility are used at an ever expanding rate. The solar-shading that complements the contradictory requirements of solar protection while maintaining views to the outside. One of the effective solutions to the problem is to use MechoShade's in tandem with ThermoVeil™ shade cloth with its microscopic openings which occur between the yarns, a bi-product of the weaving process.

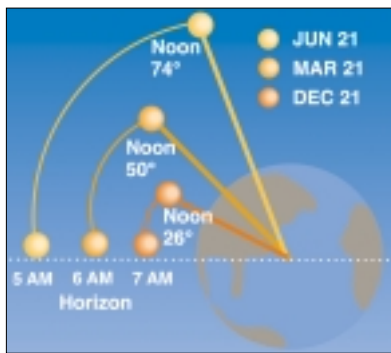
View and Solar Protection Opportunities.

ThermoVeil shade cloth is woven in densities from 0% to 18% to complement heat-gain requirements and solar transmittance of glazings. The greater the transmittance of visible light through the glass, the denser the fabric required. Shadecloths are woven with naturally occurring microscopic openings between the yarns, which assure a uniform view even in dense shadecloths and also provide appropriate solar protection. ThermoVeil shade cloth is available in all color values from light to dark in seven densities. Color selection is an important as density selection in controlling interior brightness, energy efficiency and glare.

The Alternatives.

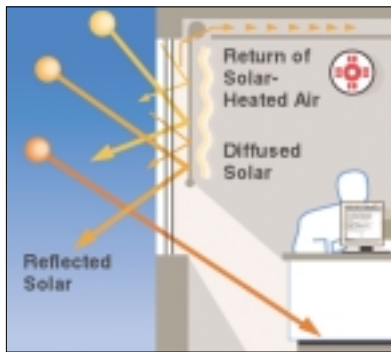
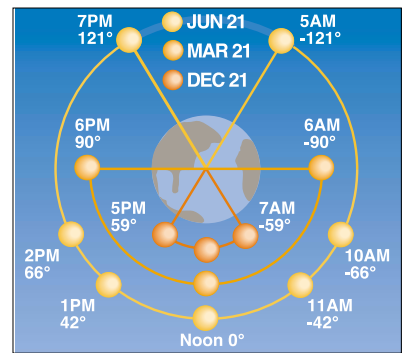
Venetian and vertical blind manufacturers offer mechanically perforated slats and louvers as an alternative to the MechoShade woven shade cloth program. With slats and louvers, a density change is created by altering standard size perforation spacing, but it becomes difficult to achieve an uniform scrim-effect when a low density factor of 3% - 18% openness (97%-82% closeness) is required to filter high visible light transmittance. ThermoVeil shade cloth's small openings is the dense weaves offer uniform transparency with less distortion of the view and appropriate solar control.

Calculations based on 40° N. Lat. and solar time to the nearest whole degree.



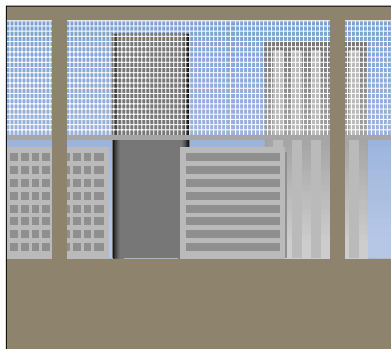
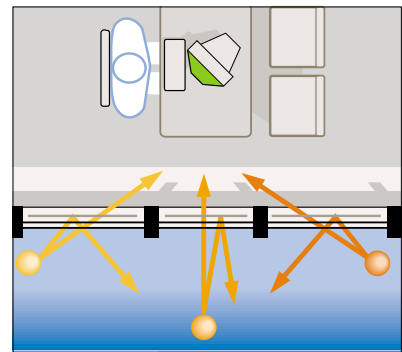
The Sun is dynamic.

The sun's effect on an interior space is best evaluated by looking at the components of the profile, or shadow, angles. Evaluate the vertical ray (altitude) and the horizontal ray (azimuth) and see how they impact on visual and personal comfort. Solar heat gain penetration is greatest in winter due to the low angle of the sun, which generates the greatest amount of discomfort. Visually transparent MechoShades utilize a flat woven shade cloth engineered to effectively complement the vertical and horizontal solar rays. Louvered shading products of opaque materials tend to be left open because people want a view to the outside.



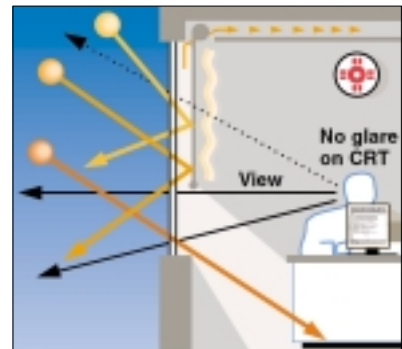
Visually transparent MechoShades.

MechoShades are a visually transparent system and most aptly complement solar geometry by providing a cut-off angle similar to an awning or overhang. To provide protection from the sun in a south facing window, the shade requires lowering only half way. This single position permits a greater amount of winter heat and lesser amount of summer heat to enter the space, thus aptly complementing the changing seasons. MechoShade's flat shade cloth design requires no continuous readjustment throughout the day. The hardware design permits convection air-flow around the shade, reducing thermal stress.

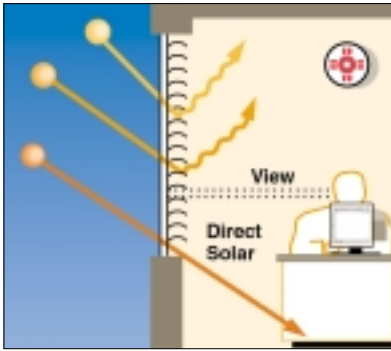


Glare and view with MechoShades.

Roll-down MechoShades provide effective shading of work stations, CRT's and people by reducing direct solar penetration. The woven shade cloth with density and color appropriately matched to the glass permits a view through the unshaded portion of the window as well as diminished view through the shade cloth, thereby creating a sense of the outside. Unlike horizontal or vertical blinds, at any angle, fully lowered Mecho-Shades offer a sweeping panoramic view. A fully raised MechoShade completely disappears with no stack which is a common occurrence with mini blinds and vertical drapery.

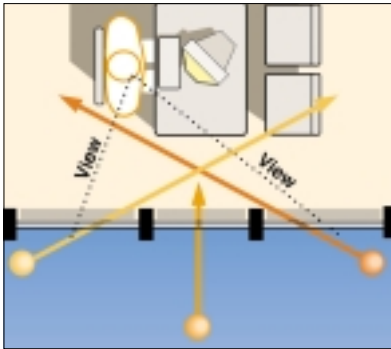
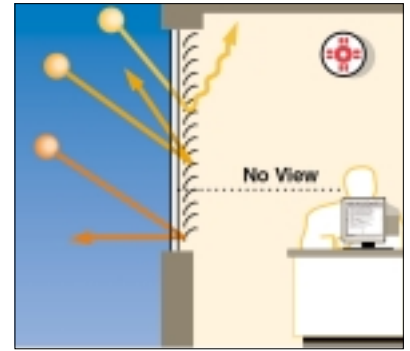


Solar Gain and View with Horizontal and Vertical Blinds



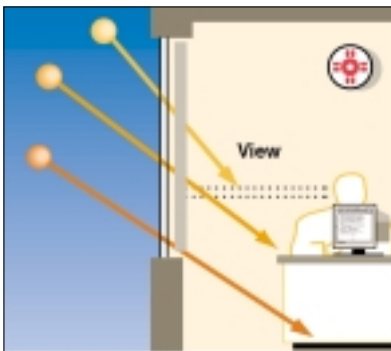
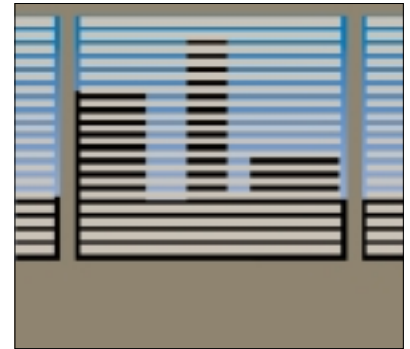
Solar gain and view with mini blinds.

An open mini blind is roughly equivalent to an unshaded window. The published shading coefficient of an open mini blind is similar to the shading coefficient of the same glass unshaded. A mini blind is open at 0°, fully closed at 69° and 2/3 closed at 45°. Heat gain is reduced by tilting mini blind slats, diminishing the view accordingly. Therefore, the reduction in heat gain and view occurs at an increasing rate and a substantially increasing reduction above the 25° tilt angle. Published data indicates that the effective heat gain is achieved when the view has been almost obliterated – especially for a seated person near the window wall.



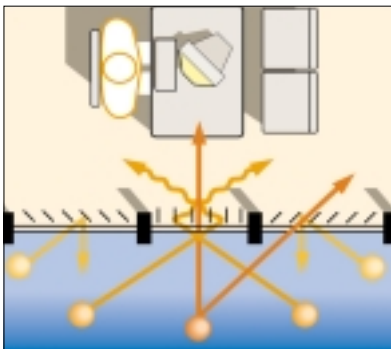
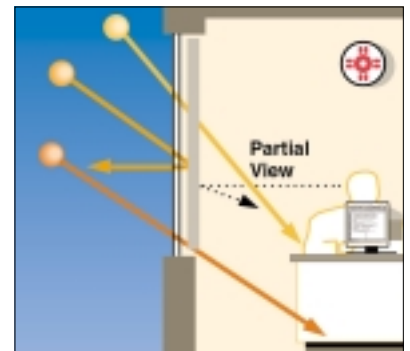
Glare on CRTs and view with mini blinds.

Office interiors require CRT operation near window walls. Direct and diffused illumination through and off surface mini blinds tends to cause disturbing patterns on the screens of the CRTs. The solution is to tilt the surface of the blind closed, which makes the window wall opaque, blocking the view to the outside. To create a view to the outside, the blinds must be raised half-way up, effectively closing off the upper half of the window and leaving the bottom half unshaded; in this configuration, the mini blinds simulate a half drawn roller shade. Generally, for mini blinds to be effective, the entire view to the outside must be sacrificed.



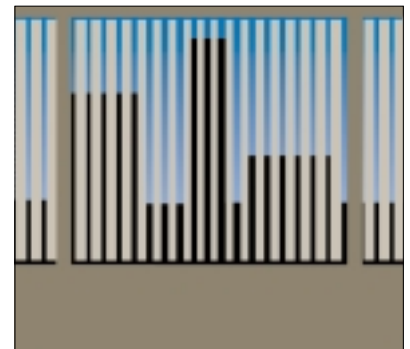
Solar gain and view with verticals.

Open vertical louvers are roughly equivalent to an unshaded window with similar glazing. Vertical louvers are impacted by the horizontal solar ray similar to the vertical ray on mini blinds. The sun is dynamic and moves rapidly around a window as much as 30° between 11 A.M. and 1 P.M. on June 21. It is difficult, if not impossible to manually adjust vertical louvers hourly so that they are efficiently used. More often than not, vertical blinds are left open. As shown in the plan view (left), the sun is above the 41° cut-off angle where a reduction in solar gain is not possible. Below the 41° angle solar gain is indirect but not diminished.



Glare on CRTs and view with verticals.

The average person's field of vision is about 160° horizontally and 60° vertically. Because vertical blinds have a cut-off angle of about 41° the exterior view is dramatically diminished as people move closer to the window wall. Solar-lit vertical louvers create linear shadows on the screens of CRTs. To reduce or eliminate the effect, the louvers need to be closed, thereby obliterating the exterior view. The sun is so dynamic and moves so quickly around the typical south facing window of a building that the louvers must be constantly be adjusted. As the louvers are rotated closed, the occupant's field of vision narrows to zero.



ThermoVeil® ShadeCloths

ThermoVeil™ Shadecloths provide the highest quality, woven FR-vinyl sunscreens in a variety of densities and colors which assure protection as well as glare and brightness control on work surfaces and computer screens. ThermoVeil shades offer maximum protection while maintaining a view to the outside. Independent laboratory testing has shown ThermoVeil to be extremely resistant to bacteria and fungal organisms.

Openness Factor

| | | |
|------|-----------------------|------|
| 0900 | Translucent Weave | 0-1% |
| 1000 | Dense Vertical Weave* | 2-3% |
| 1800 | Open Vertical Weave | 15% |
| 1300 | Dense Basket Weave | 5% |
| 2100 | Open Basket Weave | 13% |
| 3000 | Satin Textures | 1-2% |
| 3200 | Diamond Pastels | 1-2% |
| 3300 | Diamond Earthtones | 1-2% |
| 5300 | EuroVeil | 5-6% |
| 6000 | EuroTwill | 3% |

* Increased Density

Dark colors (left) provide optimal see-through visibility while diminishing interior brightness. Light colors illuminate the interior, lower heat gain and offer a daylighting opportunity. Appropriate shadecloth densities (1-15%), when matched to the visible transmittance of the glass, combine to control excess brightness and glare on computer screens while maintaining a view to the outside.



ThermoVeil™, EuroVeil™ and EuroTwill™ Shadecloth Selector Guide

| | 90 > 60% | 50 > 35% | 30 > 22% | 20% > |
|------|----------|----------|----------|-------|
| 0900 | • | • | • | • |
| 1000 | ✓ | • | • | • |
| 1800 | X | X | X | ✓ |
| 1300 | X | ✓ | • | • |
| 2100 | X | X | X | ✓ |
| 3000 | ✓ | • | • | • |
| 3200 | ✓ | • | • | • |
| 3300 | ✓ | • | • | • |
| 5300 | X | ✓ | • | • |
| 6000 | ✓ | • | • | • |

- ✓ = Minimum Density Recommended
- = Extra Density For Critical Tasks
(Color dramatically affects visual tasks.)
- X = Not Recommended

