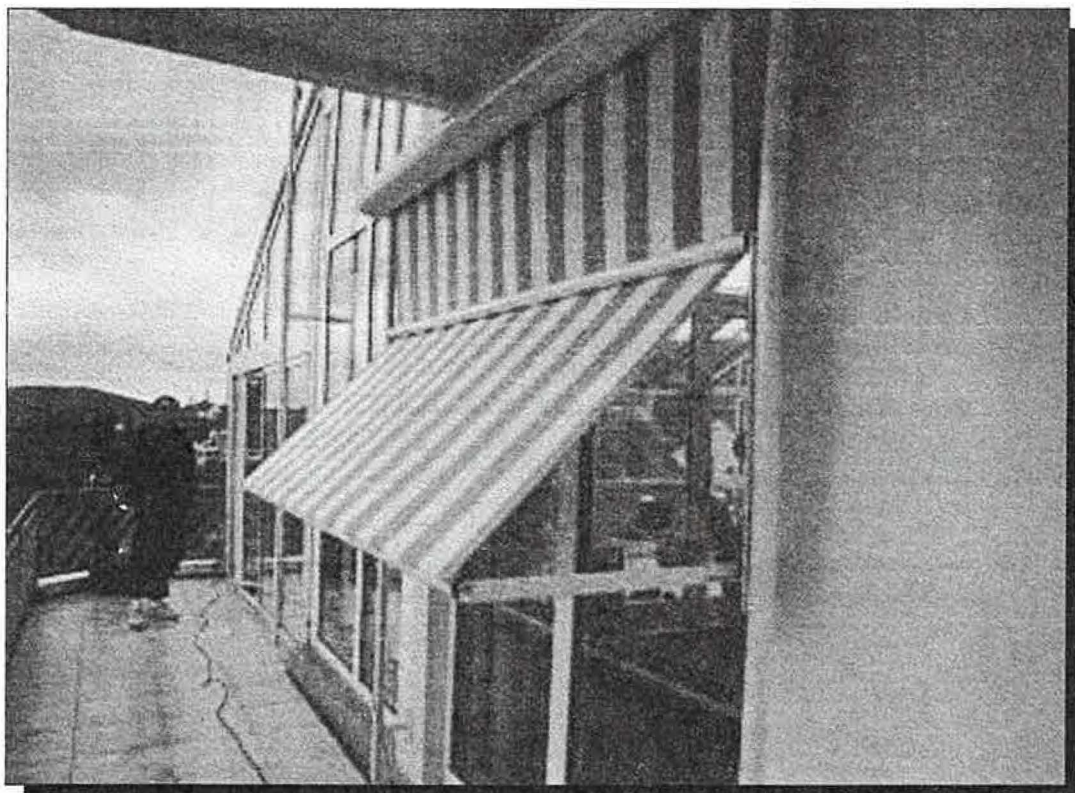


# Snapshots of Shading Options



EUROPEAN ROLLING SHUTTERS

*by Jill Mayfield*

*Today a wide range of products are available that help keep the hot sun out of a home. Here is an A to Z of almost instant shading options to use in the homes you design and build.*

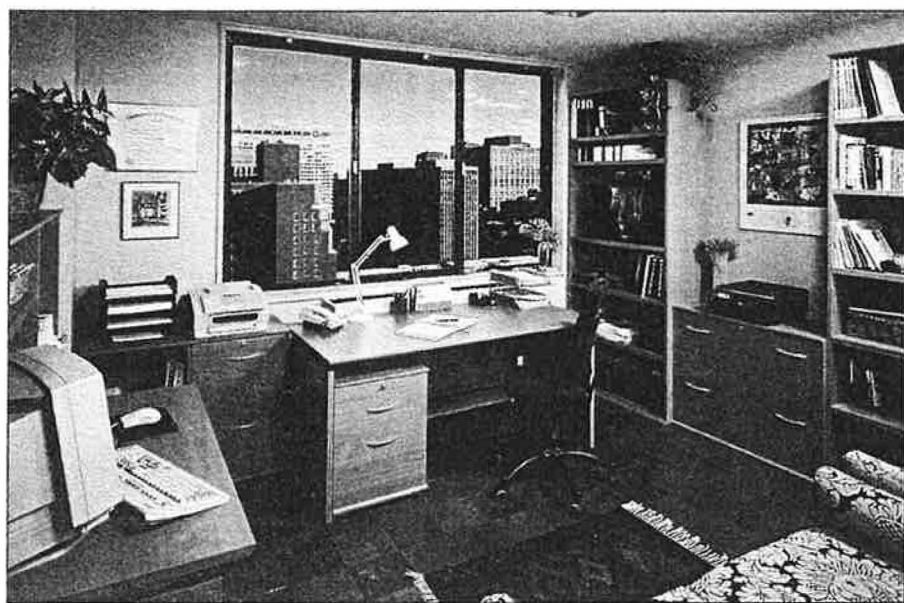
**D**rive through any rural setting and look at the old farmhouses. With their covered porches, shutters, and awnings, most of these homes are consciously and effectively using shade to make the indoor temperature comfortable. Before the advent of air conditioning, designers and builders had to be keenly aware of the position of the sun when deciding where to site a home or place windows. That awareness has been lost as air conditioning's popularity has risen.

In 1960, 12% of American homes had air conditioners. By the early 1990s, that figure was 64% and Americans were spending \$10 billion per year to operate them. Air conditioners were

installed in 77% of the single-family homes built in 1989. Today, many homes are built with no attention paid to site orientation and window location. The builder simply hands over the plans for the house to the mechanical contractor, who superimposes cooling equipment to make a poorly conceived structure livable.

Unfortunately for the residents of these structures, blocking the sun's rays from striking and heating up a home is much more efficient than using air conditioning to cool down an already overheated house. According to Oikos, an on-line green building information guide, shading can cut solar heat gain by anywhere from 10% to 50%.

Incorporating shading methods into the home during the design phase ensures that a home receives the most effective shading, but a house that lacks appropriate shading can always be retrofitted with shading technologies. Landscaping—trees, shrubs, and vines—not only blocks sunlight, but also can cool the nearby air beneath the canopy or behind the plant by as much as 15°F because of natural evaporation from the plant's leaves. However, sometimes a more immediate shading product than a tree or even a fast-growing vine is needed to cool a home. For those applications, a wide range of shading options are available. Ease of installation varies widely. A general contractor can handle some of these products, while others require installation by product representatives.



Vista window film reduces energy consumption by cutting heat gain and loss through glass.

## Overhangs

By extending the roofline just a few more feet, you can create excellent shade for a home's windows. Solar-conscious roof overhangs extend the eaves farther than normal. The drawbacks of overhangs are that they are difficult to add unless the remodel includes plans for work on the roof, and that there is no way to retract them. Well-designed overhangs shade

the walls and windows in summer, when the sun angles are high. When sun angles drop in the winter months, the overhangs will let the warming sun into the home. Some cities with aggressive energy codes assist designers with shading formulas (see "Calculating Overhangs," p. 22). The cost of an overhang depends on the size of the roof, on the area of the country where the house is being built, and on

whether it's a new house or a new roof with an expanded overhang.

## Decks and Porches

Adding a covered deck or porch is an excellent way to shade a home and to add living space, too. Porches and covered decks should have enough of an overhang to shield the area from the high sun and still offer a view outside from the interior spaces. A deck is generally built with a south or west orientation, but the actual placement will depend on location and sun angles.

## Shielding the Windows

Windows let in light—and heat. Current window technology can partly compensate for poor orientation and/or poorly placed windows (see "Today's Wonderful Windows," p. 13). However, even high-tech windows cannot bring the benefits that shading can. Because of that, there are many products on the market to keep the heat off windows. If shading devices are to be used to supplement high-performance windows, consider the following suggestions. First, select light-colored shading devices to minimize solar heat gain. Light-colored shades can reduce a window's solar heat gain coefficient (SHGC) by as



A retractable screen helps keep this home cool.

## SHADING

much as 43%. (Dark blinds and shades will soak up more sun, releasing the energy as heat inside the house.) Then, specify overhangs, exterior awnings, or the planting of deciduous trees and shrubs to shade south-facing windows during the summer while allowing beneficial solar heat gain during the winter. Here are the most widely used products for shading windows.

### Awnings

Awnings block the sun during the hottest parts of the day, when it is high in the sky. Awnings can be made of many materials and come in an endless array of colors and designs. Awnings can be stationary, or retractable.

Awnings provide excellent shading—on a south-facing window, awnings will block as much as 65% of the summer sun's heat; on an east- or west-facing window, 77%—but they have the disadvantage of blocking the top half of the view from the window. Retractable canvas awnings can overcome this problem to some extent because they can be extended only when they are needed. This is especially helpful in winter months, when occupants want to let the



Retractable awnings can be extended when needed.

sun in to warm their home. Retractable awnings can be very elaborate; some models have wind and solar sensors that automatically extend or retract the shutters during sunny days or high wind. Prices vary depending on the type and size of the awning and on the fabric used, but they start at around \$750 per window. If you must penetrate

the building shell to install an awning, seal the envelope against water and air infiltration.

### Low-e Films or Coatings

Low-emissivity (low-e) coatings and films block heat but allow the penetration of natural light. A low-e coating is a microscopically thin, virtually invisible,

## Calculating Overhangs

Overhangs can provide a house with winter sun and summer shade. The optimum size of an overhang will depend on the climate and the home's location. Two computer software programs—PC-Solar 2.0 and Sun Angle—are available to help calculate sun angles and overhang

lengths. PC-Solar 2.0 displays shadows of overhangs and trees on buildings, draws sun charts, and looks up latitudes of building sites. It costs \$55. Sun Angle calculates sun angles for different locations, dates, and times, and is available as shareware (see below).

The Department of Energy's Energy Efficiency and Renewable Energy Clearinghouse (EREC) has produced guidelines for calculating an appropriately sized overhang for shading. The guidelines are listed by climate type, for solar noon (when the sun reaches its maximum altitude for a given day). Solar noon is rarely the same as noon in local standard time.

#### For more information:

PC-Solar, contact  
3-D Software  
P.O. Box 1187  
Tualatin, OR 97062

Tel: (503) 972-5813  
E-mail: [info@3dsoftware.com](mailto:info@3dsoftware.com)  
Web site: [www.3dsoftware.com](http://www.3dsoftware.com)

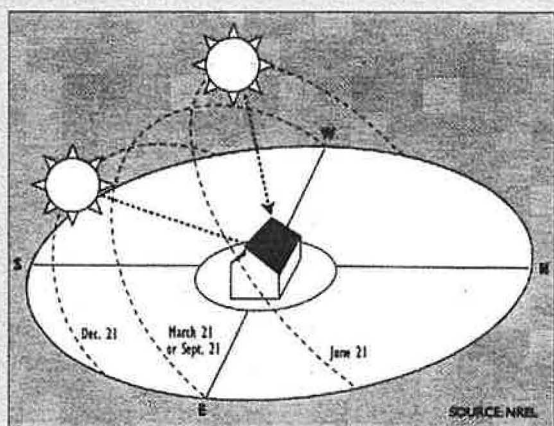
Sun Angle is available on the Web as shareware at [www.susdesign.com/sunangle](http://www.susdesign.com/sunangle). The shareware fee is \$25 for commercial use, and \$10 for personal use. For more information or for payment instructions, contact the developer, Christopher Gronbeck, 1020 NE 68th St, Seattle, WA 98115; Tel: (877) 734-7638; Fax: (770) 497-9234.

To obtain a copy of EREC guidelines, contact the Energy Efficiency and Renewable Energy Clearinghouse

P.O. Box 3048  
Merrifield, VA 22116  
Tel: (800) DOE-EREC

For more information on calculating overhangs, contact the Center for Renewable Energy and Sustainable Technology, [www.susdesign.com/overhang/](http://www.susdesign.com/overhang/).

Fax: (703) 893-0400  
Web site: [www.eren.doe.gov](http://www.eren.doe.gov)



The sun's angle at different calendar dates.



metal or metallic oxide layer deposited on a window or skylight glazing surface primarily to reduce the U-factor by suppressing radiative heat flow through the window or skylight. A low-e film can cut heat gain by up to 25% without changing the window's appearance. Several brands of film are on the market, mainly for use in retrofit situations. Be aware, however, that not all of them are low-emissivity. Retrofitting with low-e film is recommended for windows that receive intense heat, not for windows that are already physically shaded or that face south or north.

Many films are professionally installed by distributors. The advantage of having a factory representative apply the film is that the installation and the product are guaranteed. However, low-e film and low-e film installation kits are available at most large home improvement stores and through some on-line catalogues, so general contractors should find them fairly easy to install.

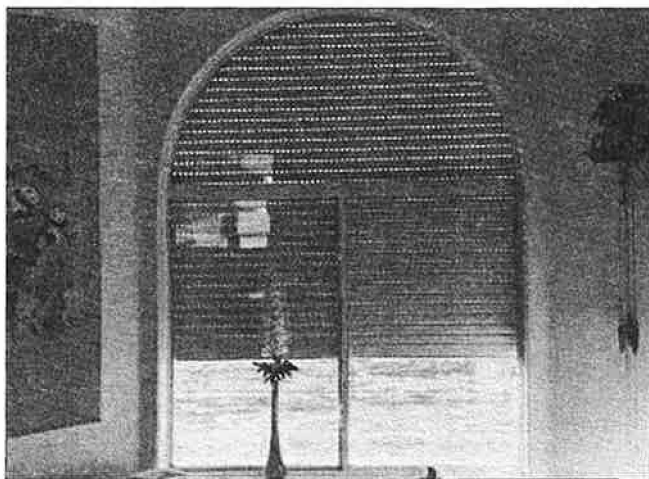
### Shade Screens

Retractable shade screens are a good choice for windows that receive direct sunlight. They work much like an inside window shade, except that they are attached to the outside of the window. Most shade screen manufacturers offer automatic controls for these products. The screens are installed at the top of the window and can be lowered during sunny days and retracted when not needed. Shade screens are generally custom-made. They are a good choice for a homeowner who wants to retrofit for energy efficiency but still wants to see out of a window that gets lots of sun throughout the day. Most manufacturers claim 25%–40% savings on air conditioning costs. The downside of shade screens is that they can darken the view when pulled down. Price varies, depending upon the size of the screen and therefore on the hardware needed to operate it. For a typical

window, prices start at around \$500.

### Solar Screens

Solar screens are another excellent way to shade a window. Solar screens



Rolling shutters help keep this home shaded, private, and secure.

differ from shade screens in that they are fixed, not retractable. Like shade screens, they are attached to the outside of the window. They can be removed in the winter months when solar heating is beneficial for warming the home. When first introduced, solar screens were very dark and obscured the view. Today, solar screens can be very effective without being very dark. Solar screen prices will depend upon the size of the window. They last about as long as a regular screens—about 10 to 15 years with normal use.

### Rolling Shutters

Once popular only in coastal areas subject to hurricanes, rolling shutters are gaining popularity in other areas as well because they take care of many needs at once. They provide shading, privacy, and security; they reduce noise; and they protect the home during stormy weather. Rolling shutters are usually made of aluminum; are installed on the outside of the house; and are operated from the inside with a strap, crank, or motor. Motorized shutters are available with manual override, remote control, and timers. Though rolling shutters are useful against heat gain, their obvious drawbacks are that they completely block view, ventilation, and


daylighting, and they can be expensive to order and install.

### Making the Choice

When considering which shading option would be most appropriate for a given home, first consider the cost and the longevity of product, and how much your clients are willing to pay for the increased comfort, performance, and efficiency that any given option can provide. While some options may cost more initially, it is important to factor in the life expectancy of the product. Keep in mind that certain shading options may be more or less suitable for a given problem. For example, an expensive rolling awning would not be cost-effective for just one window. However, it might be an excellent choice to cover a deck or patio area that has several windows.

In choosing among films or shade screens, consider the SHGC. The SHGC is the fraction of solar radiation admitted through a window or skylight, both directly transmitted and absorbed and subsequently released inward. The SHGC has replaced the shading coefficient as the standard indicator of a window's shading ability. It is expressed as a number between 0 and 1. A window with a low SHGC transmits less solar heat and provides better shading.

Another factor to consider for films and screens is the amount of light that the product lets through; this is often expressed as visible light transmittance, or VT. The optimum product would have a high VT and a low SHGC. According to data from the Florida Solar Energy Center, an appropriate window film or solarscreen has a SHGC of no more than 0.4 and a VT of at least 0.6.

When it comes to shading, myriad techniques and options are available to the homeowner and builder. New shading choices can lead to increased comfort and lowered energy costs. They can also protect curtains, carpets, furniture, and paintings from the fading and damaging effects of ultraviolet radiation. 

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