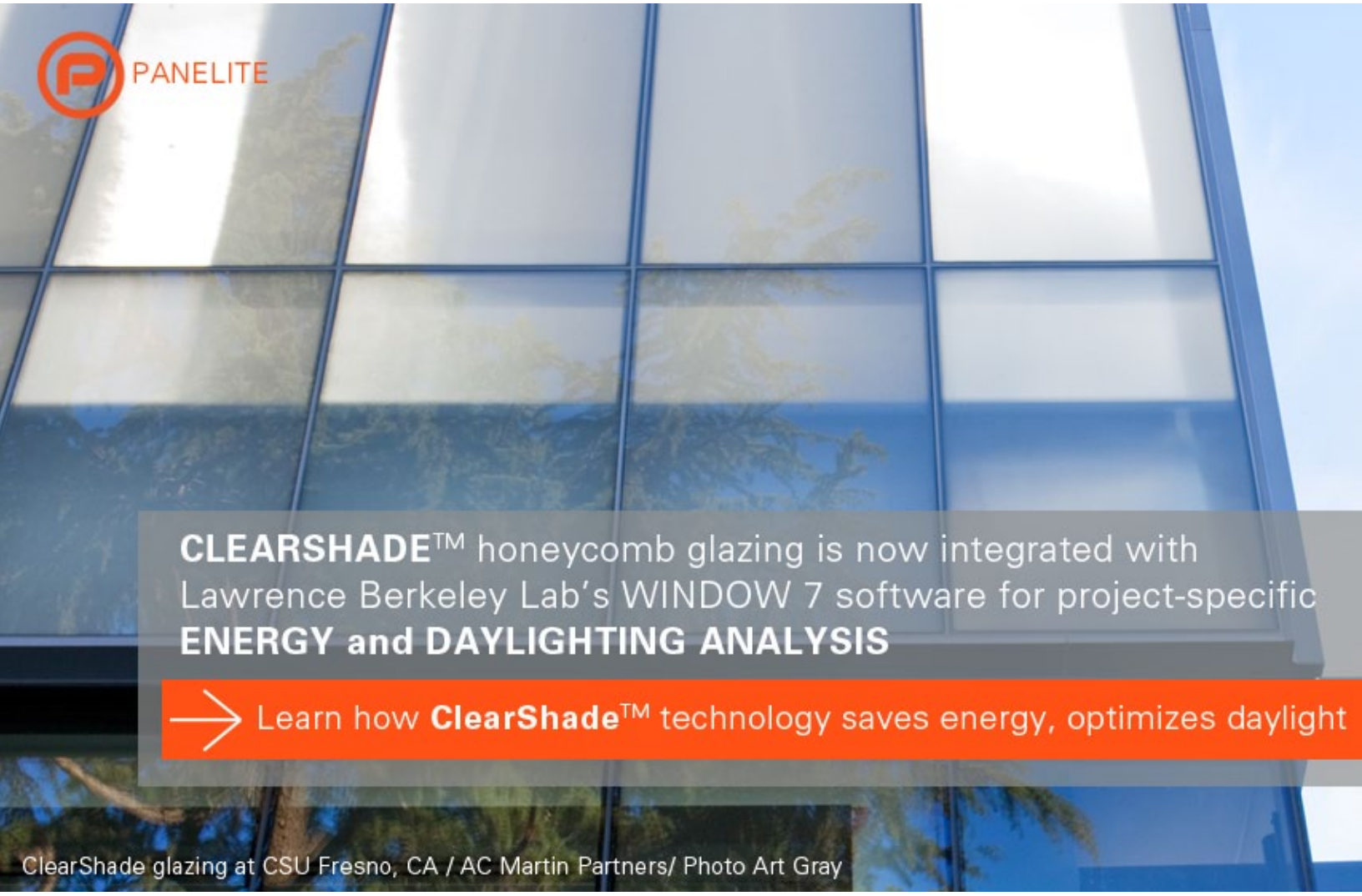
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CLEARSHADE™ honeycomb glazing is now integrated with Lawrence Berkeley Lab's WINDOW 7 software for project-specific ENERGY and DAYLIGHTING ANALYSIS
Learn how ClearShade™ technology saves energy, optimizes daylight
ClearShade glazing at CSU Fresno, CA / AC Martin Partners/ Photo Art Gray

CLEARSHADE™ HIGH-PERFORMANCE HONEYCOMB GLAZING

> ClearShade™ honeycomb technology optimizes both DAYLIGHTING and SOLAR HEAT GAIN CONTROL in a single product, by transmitting and diffusing valuable visible light while reflecting unwanted solar heat.
> Reduced lighting and HVAC loads result in significant energy and cost savings.
> ClearShade™ glazing units offer DYNAMIC PERFORMANCE to provide the most solar heat control at peak hours, but their luminous appearance stays consistent, WITHOUT DARK TINTS or shading devices.

MORE LIGHT
Visible light is redirected
VLT up to 70%

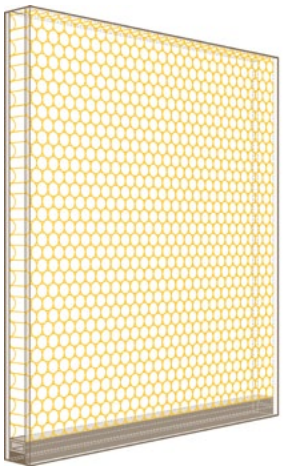
BETTER LIGHT
Visible light rays are diffused
Reduced glare
Consistent diffuse daylight

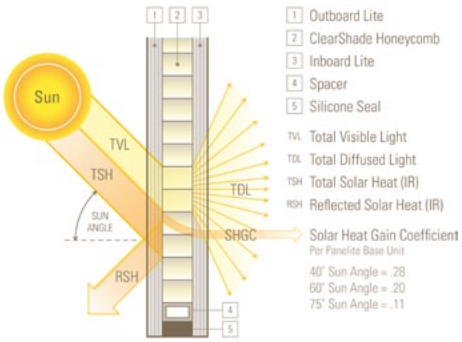
LESS HEAT
Solar Heat is reflected
Solar Heat Gain Coefficient as low as 0.05

CLEARSHADE™ is now integrated with Lawrence Berkeley National Lab (LBNL)/Dept. of Energy's Window 7, Energy Plus and Radiance software for DAYLIGHTING and ENERGY ANALYSIS of ANGULAR SELECTIVE glazing solutions.

WHAT IS ANGULAR SELECTIVE GLAZING?

> ClearShade™ is an angular selective technology whose honeycomb structure performs like a series of very small louvers, but in cellular rather than linear form. This structure combined with a proprietary polymer composition provides the unique advantage of dynamic performance - increased solar heat protection at peak hours - without the dramatic reduction in visible light that occurs with other dynamic technologies such as switchable glass.





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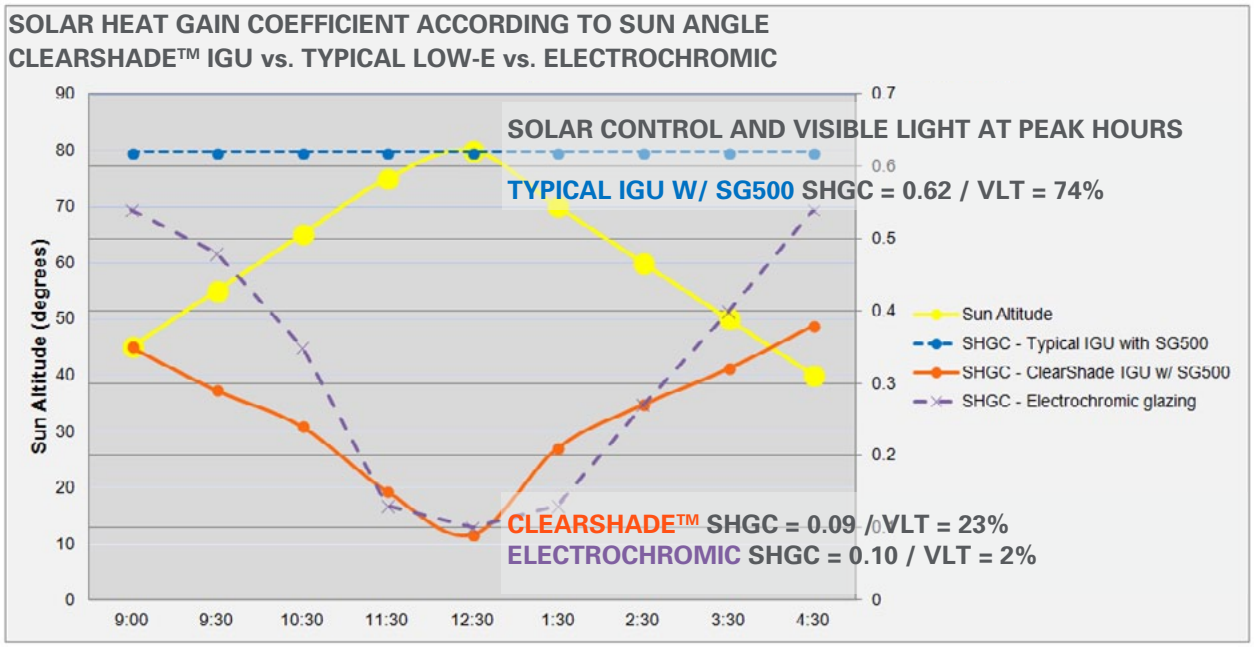
ANGULAR SELECTIVE GLAZING vs. LOW-E ONLY vs. DYNAMIC GLAZING

> Angular selective glazings are designed to attenuate direct solar radiation, the main source of solar heat gains and glare, while transmitting a significant amount of diffuse skylight.[1]
> Glazings that use low-e films to achieve solar heat control often do so at the expense of visible light, and this performance is static throughout the day, blocking daylight even when the sun is not at its peak.
> Dynamic glazings vary over the course of the day to reduce solar heat at peak hours. Technologies such as electro-chromic glass do this by darkening to nearly opaque, blocking both visible light and solar heat.
> ClearShade™ is an angular selective technology whose patented honeycomb structure and polymer composition ensure consistent, diffuse daylight throughout the day and the highest level of solar heat control at peak hours.



CLEARSHADE™'S ANGULAR SELECTIVE TECHNOLOGY PROVIDES OPTIMUM SOLAR HEAT CONTROL WHEN SOLAR HEAT IS AT ITS PEAK, WHILE MAINTAINING HIGH-QUALITY DIFFUSE

CLEARSHADE™ PERFORMANCE DATA (FOR TYPICAL UNITS - RESULTS VARY PER SPECIFICATION)

ClearShade™ IGU	Inboard Lite	Outboard Lite	Solar Angle	Double Glazed				Triple Glazed			
				Diffuse VLT	SHGC	U-Value	LSG Max	Diffuse VLT	SHGC	U-Value	LSG Max
CS-TC7	1/4" Clear	1/4" Low-E	40	68%	0.33	0.33	3.29	54%	0.20	0.14	4.38
			75	46%	0.14			37%	0.08		
CS-TTW3.8	1/4" Clear	1/4" Low-E	40	34%	0.20	0.33	2.22	27%	0.13	0.14	3.20
			75	20%	0.09			16%	0.05		
CS-TTW7	1/4" Clear	1/4" Low-E	45	44%	0.24	0.33	2.18	35%	0.14	0.14	3.84
			75	24%	0.11			19%	0.05		
CS-TTW10	1/4" Clear	1/4" Low-E	40	52%	0.28	0.33	2.45	38%	0.15	0.14	4.20
			75	27%	0.11			21%	0.05		

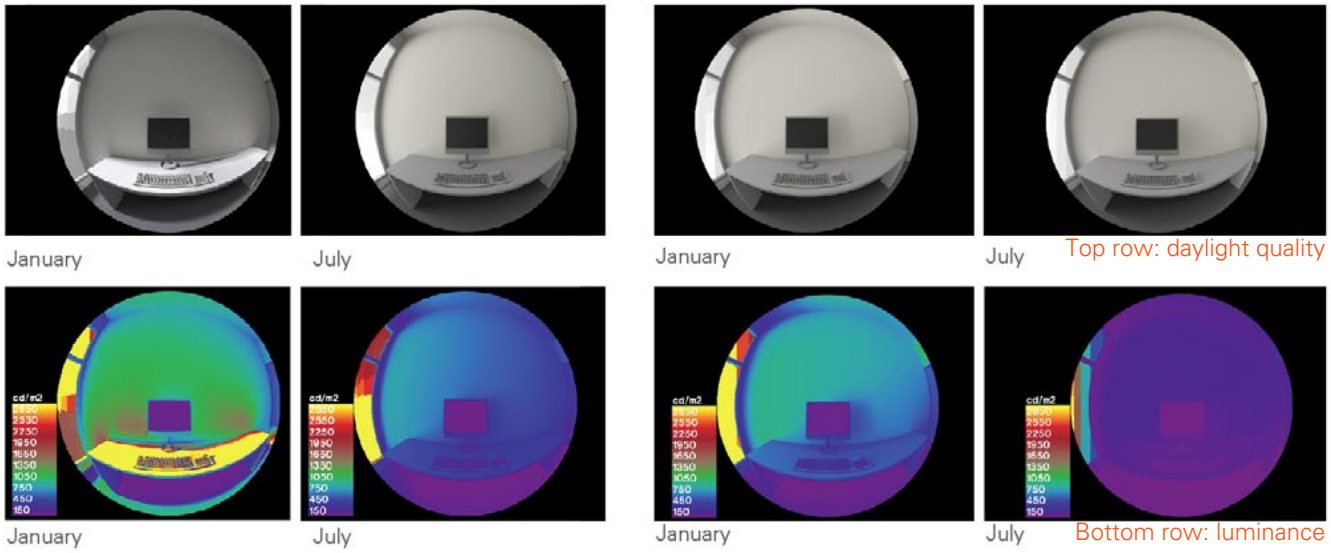
[1] R. Sullivan L. Beltran E.S. Lee M. Rubin, Ph.D. S. E. Selkowitz. "ENERGY AND DAYLIGHT PERFORMANCE OF ANGULAR SELECTIVE GLAZINGS," Building Technology & Urban Systems Department, Berkeley Lab, <http://buildings.lbl.gov/sites/all/files/lbnl-41694_0.pdf> (November 1998)

WHAT ARE THE BENEFITS OF WINDOW 7 INTEGRATION?

> Analysis of angular selective glazing materials is complex because Solar Heat Gain Coefficient (SHGC), Visible Light Transmission (VLT) and other key performance factors change according to the sun's angle.
> Before now analysis software such as Energy Plus and Radiance did not account for data that vary with the angle of the sun, but this variance powerfully impacts performance, especially when optimum solar heat control occurs during peak solar and energy-usage times, as is the case with ClearShade™.
> LBNL's Window 7 software is the first to integrate angular selective options to enable analysis and optimization of building envelope solutions for energy savings, user comfort and productivity.
> Window 7 generates a BSDF (Bi-directional Scattering Distribution Function) angular performance data file which is executable in Energy Plus and Radiance for more precise energy and daylighting models.
> This enables curtain-wall, MEP and daylighting engineers to run **PROJECT-SPECIFIC ENERGY AND DAYLIGHTING ANALYSIS** for the ClearShade™ unit types specified on their project.
> Window 7 provides LBNL-verified performance data for ClearShade™ units using any ClearShade™ honeycomb insert specification and any glass type included in the International Glazing Database.

DAYLIGHTING ANALYSIS SHOWS BETTER LIGHT TRANSMISSION, REDUCED GLARE

> The renderings below show a daylighting analysis done through Radiance in the Window 7 module. Analyses were run for January and July at mid-day for each glazing type.



TYPICAL TRANSPARENT GLAZING UNIT

> Glare and significant light quality variation over the course of the day and the year.
> In January, when the sun is low in the sky, glare "hot spots" are visible on the desk and luminance levels are above 1050 candela/m2 in the space and as high as 2850 on the desk itself.
> In July, at the same time of day, when the sun's angle is high and its rays are indirect, the level of brightness and glare drops, improving user comfort and productivity, but only when the sun is high.
> Added shading devices are necessary for times of day/year when the sun is low.

CLEARSHADE™ HONEYCOMB GLAZING UNIT

> Optimized quantity and quality of light year-round and all-day.
> No glare or hot spots occur, regardless of sun's angle. Luminance levels remain below 750 candela/m2 and are remarkably even throughout the space.
> Light is evenly diffused whether the sun is high or low in the sky, providing consistent, optimum light quality to increase user comfort and productivity, eliminate the need for shades, and reduce the energy usage required for artificial lighting.

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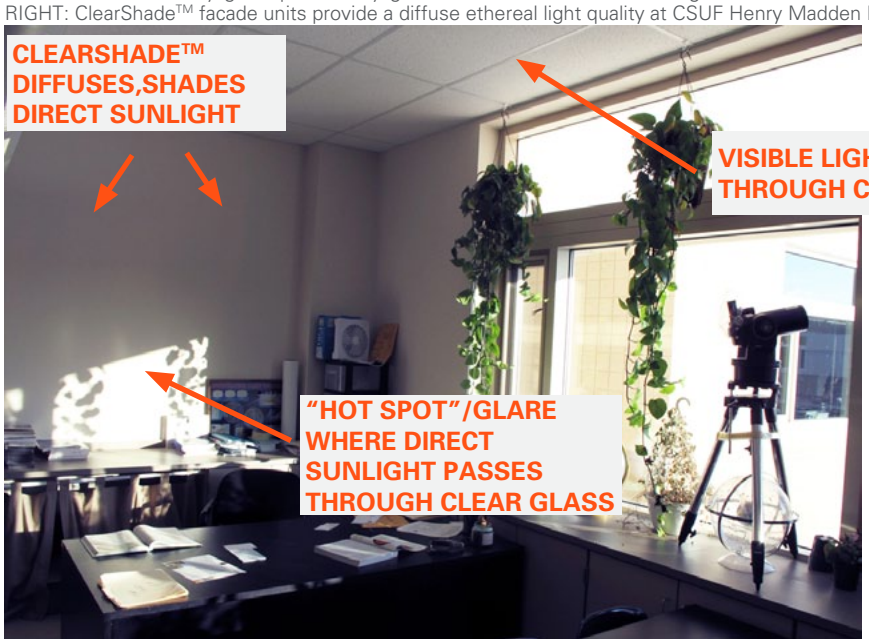
MORE LIGHT. BETTER LIGHT. LESS HEAT.

Panelite ClearShade™ glazing has been successfully installed in the field for more than 10 years, optimizing daylight and solar heat control in applications such as skylights, facades and clerestories.

LEFT: ClearShade™ skylights optimize daylight at Parrish Art Museum/ Herzog & de Meuron / Photo:Iwan Baan
RIGHT: ClearShade™ facade units provide a diffuse ethereal light quality at CSUF Henry Madden Library / AC Martin Partners / Photo: Art Gray



LEFT: ClearShade™ clerestories diffuse light at Harriton High School / KCBA Architects + photos
RIGHT: ClearShade™ facade units illuminate Champaign Library / Ross Barney Architects + photos

DESIGN IT YOUR WAY, PERFORMANCE CERTIFIED FOR PROJECTS WORLDWIDE

> Double-glazed, Triple-glazed and low profile Triple-glazed units available
> Curtain wall, clerestory, skylight, hurricane and security glazing configurations
> Extensive glass and coating specifications available to meet design and performance goals, including colors, ceramic frit patterns and low-e coatings from PPG, Guardian, Pilkington, Cardinal and St. Gobain.
> ClearShade™ performance is backed by Panelite's **"ClearShade™ IGU Performance Certification".** Data is certified by independent testing labs and by the Windows 7 glazing analysis software which is developed solely by Lawrence Berkeley National Laboratory, a division of the US Department of Energy.
> IGCC certified manufacturing in USA and in Dubai UAE for high quality, cost-effective local supply to US, EU and Middle East projects.
> 10 year warranty.

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LEARN MORE/ LINKS

Daylighting - The Whole Building Design Guide / National Institute of Building Sciences
http://www.wbdg.org/resources/daylighting.php

Optimize Energy Use - Minimize Consumption - The Whole Building Design Guide / National Institute of Building Sciences http://www.wbdg.org/design/minimize_consumption.php

Lawrence Berkeley National Lab Windows and Daylighting Group: http://windows.lbl.gov/

Lawrence Berkeley National Lab WINDOW 7 software information and download:
http://windows.lbl.gov/software/window/window.html

U.S. Department of Energy site on Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/

R. Sullivan L. Beltran E.S. Lee M. Rubin, Ph.D. S. E. Selkowitz. "ENERGY AND DAYLIGHT PERFORMANCE OF ANGULAR SELECTIVE GLAZINGS," Building Technology & Urban Systems Department, Berkeley Lab, (November 1998): http://gaia.lbl.gov/btech/papers/41694.pdf

> CLEARSHADE™ CASE STUDY: Fuller Library by William McDonough and Associates

> PANELITE CLEARSHADE™ OVERVIEW

> REQUEST A PRESENTATION, OR A CLEARSHADE™ CONSULTATION Click here to email or call us at 323.297.0115. Panelite can assist with analyzing the daylighting and energy performance for your exact unit specifications, or a variety of possible unit specifications, to determine which will best meet your project's aesthetic, daylighting- and energy-performance goals.

ABOUT PANELITE:
Panelite provides energy- and resource-efficient material solutions for architecture. The company offers ClearShade™ Insulating Glass Units for exteriors and Bonded Series™ panels for interior applications. Both product lines provide exceptional aesthetics and technical performance reflecting the company's passion for material innovation and architectural design. Panelite is based in Los Angeles, USA and has been providing innovative sustainable materials for architecturally significant projects since 1998.

INSULATING GLASS IGCC CERTIFICATION COUNCIL

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