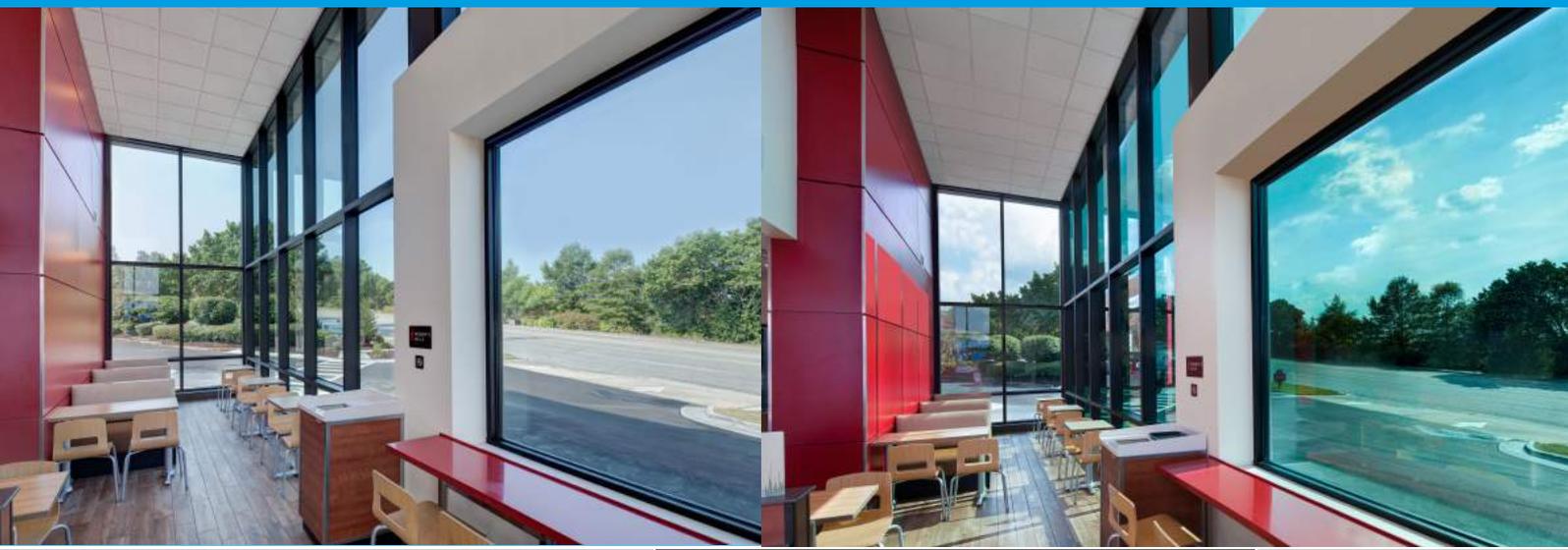


Self-tinting dynamic glass for optimised daylighting and thermal comfort



What is dynamic glass?

Dynamic glass is glass type that changes visible light transmission (VLT) and solar heat gain (SHGC) under the application of voltage, light, or heat.

Among the dynamic glass types are Electrochromic, Thermotropic, and Thermo-chromic. Electrochromic glass works on voltage, Thermotropic is activated by ambient heat while thermo-chromic is constantly variable using heat from direct sunlight. Being the most practical and suitable for the Australian climate, this whitepaper focusses on Thermo-chromic glass.

Solar Responsive Thermo-chromic (SRT) is essentially a PVB interlayer laminated between two panes of glass and incorporated into an Insulated Glass Unit (IGU).

As the sun changes intensity and position in the sky the glass self-tints, going from a minimally tinted state to a heavily tinted state as needed. This adaptability ensures:

- ✓ Increased comfort
- ✓ Optimised daylight
- ✓ Controlled solar heat gain
- ✓ Connection to the outdoors

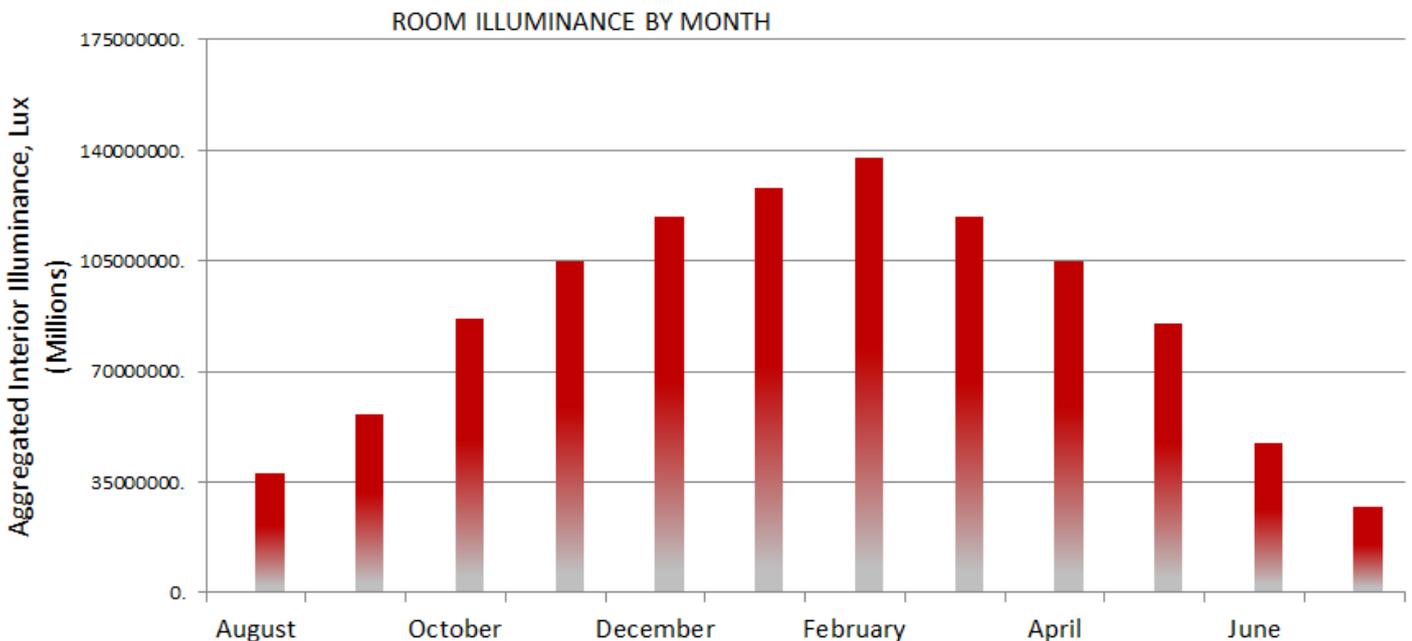


The dilemma of traditional glass

In a constantly changing environment, traditional glass is fixed all day long and all year round, meaning there is an inherent trade-off between light transmission and heat gain ratios. That is, clear glass may optimise the view and daylight but at the expense of heat gain. While permanent dark tints control glare and heat gain but inhibit daylight and the view.

To combat this, buildings may opt for blinds, overhangs or louvers. Not only are these solutions inefficient but they are unappealing and restrict design freedom. In some environments such as hospitality and healthcare, blinds might not be a plausible option for reasons such as hygiene and upkeep.

The below diagram demonstrates how glazing that is efficient in one season might not be in another. Changes in intensity of the sun can completely flood an area with too much daylight, heat and glare when it's not needed or not enough when it is. Dynamic glass boasts the unique ability to adapt to it's environment.



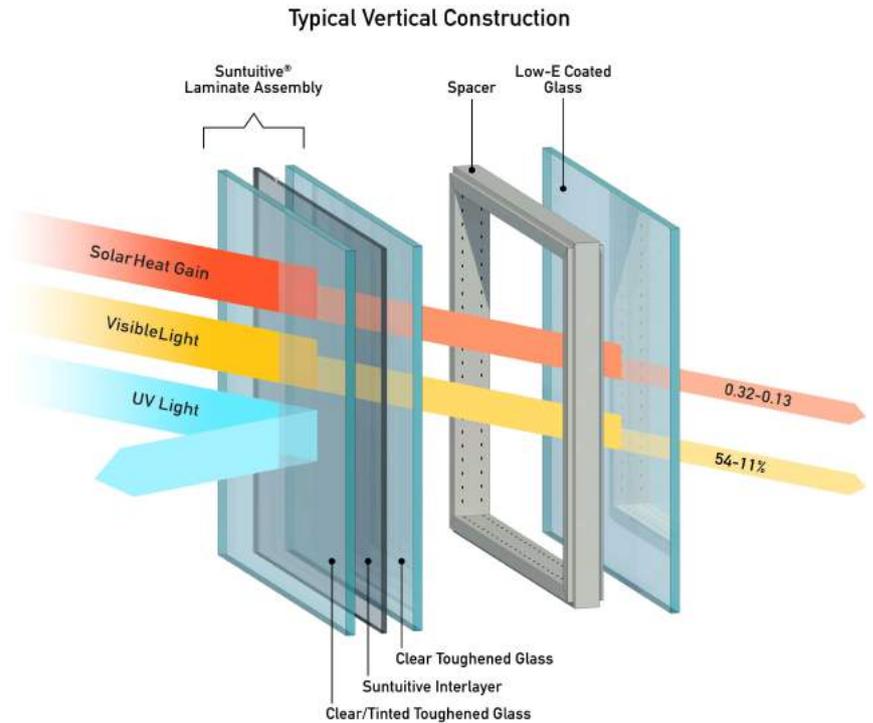
Variable VLT & SHGC

This diagram shows a typical make-up of SRT glass technology in an Insulated Glass Unit (IGU) with a low-E coating.

The only dynamic glass of its kind on the Australian market is Suntuitive® SRT supplied by Glassworks (Aust.) teamed up with a high performing low-E glass of choice,

Such a configuration is able to block UV and Infrared light whilst producing a constantly variable VLT of 11-54% and an SHGC of 0.13-0.32 depending on intensity of the sun. No other IGU adjusts daylight/visibility as needed and helps naturally control building temperatures throughout the seasons.

Depending on building requirements, the aesthetic and performance can be manipulated using different glass in the laminate assembly, see 'glazing options & performance' below. The type of spacer and low-e coating chosen also affects the performance.



Cost & comfort benefits



The initial investment of dynamic glass is offset by blinds and overhangs as well as a year on year saving on energy bills thanks to a 15% reduction in air-conditioning loads at peak demand times¹.

A study was conducted on this building during a Melbourne heat wave in February 2015. When outside ambient temperatures rose to 42 degrees, the windows receiving the most sunlight measured at 77 degrees on the external surface at 3pm, while the internal surface kept it's cool at 32 degrees. The building was able to be air-conditioned at 24 degrees as normal with no discomfort to employees, saving costs on energy and productivity.

Glazing options & performance

Suntuitive is completely flexible, being able to be laminated with clear, grey or green glass to alter the appearance and performance as desired and is always double glazed in an IGU with the choice of an air or argon gap and any low-E glass.

The below performance table shows the difference in performance of a regular IGU, versus high performing low-E IGU, LoE-366®, versus the dynamic performance of a Suntuitive SRT with LoE-366 in an IGU in either clear or crystal grey.

IGU configuration	Regular IGU	LoE-366®	Suntuitive® SRT + LoE-366®			
	6mm clear 12mm Argon 6mm clear	6mm LoE-366 Clear 12mm Argon 6mm clear	8.5mm Suntuitive Clear 12mm Argon 6mm LoE-366 clear		8.5mm Suntuitive Crystal Grey 12mm Argon 6mm LoE-366 Clear	
Outside Glass Temp	N/A	N/A	10°C	65°C	10°C	65°C
VLT	78%	63%	50%	7%	38%	5%
SHGC	0.71	0.27	0.32	0.13	0.24	0.11
U-Value	2.5	1.35	1.32		1.32	

*Calculations based on Windows 7.2 NFRC 100-2010 conditions

REFERENCES

¹ AIA Course P101 "Self-tinting dynamic glass for daylighting & energy efficiency" *Pleotint*, LLC



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