The Results Are In: Our First Ever Glazier Outlook Index

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Let’s start with a few things to think about:

1. Architects love transparency.
2. Active façade components can be optimized for energy consumption and cost.
3. Integrated, intelligent control systems are making building envelopes smarter every day.

Located in Sydney, Australia, the 200 George Street project incorporates 215,300 square feet of the mfree-Sccf constructed with timber blinds from Accoya, vertical timber shading elements and three layers of performance glazing.
Given these considerations, glazing has a big part to play. While dynamic glass is one option, glazing itself doesn’t have to be active to achieve the desired performance results. Passive glass will continue to have a place in façades. The key, however, will be incorporating it with other dynamic elements for the highest performance.

Interest in automated shading devices, for example, has grown as a solar control option. Double skin façades (DSF) are another high-performance glazing technique. A recent development from the Italian Permasteelisa Group incorporates both automated shading within the cavity of a DSF for a holistic design and performance solution. The company’s mfree-SCCF closed cavity façade (CCF) system is a DSF where the cavity between the inner and the outer skin is completely sealed. Solar shading is also integrated within the cavity. Originally developed in 2008, the system has been used in a number of projects around the world, but has not yet entered the U.S. market.

“We’ve done a lot of work and research in this evolution of double skin façades … our intention is to now bring it to the U.S,” says Alberto Franceschet, executive vice president of business development and sales - North America for Permasteelisa North America Corp., which has U.S. headquarters in Windsor, Conn.

Great Expectations
What’s the difference in a traditional DSF and this new evolution? Less maintenance for one.

“The principle is the same — two façades, typically one is double glazed (interior) and one single glazed (exterior) and between the two there is a shading device,” says Franceschet. “In a standard DSF there’s a flow of ventilation between the skins. The problem we’ve seen is that … there is a maintenance issue from the owner’s perspective, as they have to maintain two surfaces. [Plus] the cavity between the two needs to be cleaned so the interior typically must be operable. We heard these issues [and thought] … if we closed the cavity, what will happen? How can we avoid having to maintain the cavities one to two times a year?”

The result is a system designed so that dust and condensation contamination are not permitted inside the cavity, creating a moisture- and dust-free system. This is achieved by creating a slight over-pressure between the

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exterior single glass and interior IGU using dry and clean air.

“The pressure in the cavity is calculated so either interior or exterior pressure is always lower in absolute value,” says Franceschet. “This prevents a negative pressure differential that keeps dust and moisture from flowing into the cavity.” There is no regular access into the cavity, though it is possible on an emergency basis.

The unitized system is constructed within the company’s factory environment, “pressurized from the moment we complete assembly,” he says. “These façades combine the positive [energy performance] of a DSF, but with an integrated shading system [installed] entirely in our facility. This is not typical in the U.S. This is done early in the design phases.”

He explains the shading system is integrated into the building management system to enhance performance from a solar heat gain perspective.

Benefits and Usage

As far as the system’s energy performance, the U-values are similar to those of a triple-glazed unit. “And you have extremely better solar heat gain coefficient (SHGC) performance,” Franceschet says. “This is not a fixed value because it’s something you create with the use of solar shading.” For example, on cloudy days it’s not necessary to use the shading.

Alex Cox, business development manager - West Coast with Permasteelisa, adds, “In some northern climates, SHGC is a more appropriate predictor of overall building energy use than U-value. The mFreeS system works well in these situations to moderate solar heat gain and create a building envelope that is both highly transparent and energy efficient.”

Another benefit is increased acoustical performance.

“This is a very high improvement because we are adding the deep cavity in the glass creating a sound-dampening effect,” says Franceschet.

Cox points out that architects are also interested in designing buildings so that each façade and each elevation is built specifically to respond to its incident radiation. “This system allows the designer to create adaptive elevations that respond to cloud coverage, weather, shadows, etc. to optimize performance of the building through the programming of the blinds,” he says.

While aesthetics and energy performance are important, so is occupant comfort. Both Franceschet and Cox agree that this type of system has the most potential for use in owner-occupied buildings.

“In an owner-occupied building, there is a desire to retain workers and make sure they’re comfortable in the office space, so often these clients are more willing to spend more on a building skin to ensure user comfort,” says Cox.

Franceschet adds that over the past seven to eight years they’ve seen more DSF projects come to the U.S., with organizations that own their buildings being most receptive. “And from an owner’s perspective, [these projects] are a larger investment, but the payback [is greater] . . .”

Viewpoints

Steven Selkowitz, with the Building Technology and Urban Systems Division at the Lawrence Berkeley National Laboratory, has spoken at a number of industry events, including GlassCon Global in 2016, about the advantages of active façades.

“This new ‘closed cavity façade’ is in some ways a logical extension of the growing architectural interest in having highly transparent, large-area glazed façades with excellent thermal and visual comfort, and with low energy and carbon impacts,” says Selkowitz. “The continued client and occupant desire for large glazed areas with views and daylight can only be achieved with active management of solar gain and daylight by either dynamic shading or smart glass . . . We have seen several generations of solutions—starting with low-E, gas-filled, low-conductance IGUs (double and triple) with more sophisticated spectrally selective, low-E coatings—maximizing daylight vs. total solar gain. But even with the best triple silver coatings you need active control—so the pure IGU route can add electrochromics or traditionally an active shading system (e.g. blinds or roller shades).”

He continues, “If added inside the glass, the thermal comfort and cooling load control is challenging. If added to the exterior, cost, maintenance, operation with wind and snow etc. provide some challenges. The next generation of solutions placed the active shading between the glazing—a double envelope—with active air flow to the outside in summer to reject the collected heat, and a supply of warmed air in winter to the building interior.” He says while these systems have been used over the last 10-20 years, they do require cleaning and maintenance and are susceptible to condensation under some flow conditions.

“The new closed cavity concept places the active shading in the cavity as with double envelope, but the cavity is kept clean under positive pressure with a central, sealed dry air supply system to all windows,” says Selkowitz. “The active shading in the glazing system will heat up, but if the shading and glass coatings are selected and placed properly, the system is engineered to deliver good energy performance and comfort.”

He adds, though, that such a system has its own cost and maintenance challenges, “which have been demonstrated to be acceptable for the first generation of buildings using the system . . . These require design, construction, commissioning and operations that go beyond the norm for a conventional curtain-wall, but they are solvable with the will, interest and investment.”

Selkowitz adds “We are hopeful that new solutions like the CCF will add interest and motivation to continue to address new, aggressive performance goals for advanced façades.”

The Author

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