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On The Panel

Thermal performance and architectural demands drive curtain wall and window wall innovations

by Godfrey Budd

A sleeker vision, involving more glass and an enhanced “wide-open” look, has been rippling through the curtain wall sector of late. In the view of David Borys, VP sales at Border Glass & Aluminum, manufacturers and architects these days are paying a lot of attention to esthetics. “Architects seem to want more glass and less aluminum, so curtain wall units are getting bigger,” he says.

Just over 20 years ago, four-by-five feet was the norm for modules or panels. Today, they measure up to seven-by-10 feet, he says. This makes for heavier units for installing. Most have double glazing, but some have triple glazing. The greater size imposes demands for more structural strength, so that thicker, stronger glass is needed. “At one time, the glass was five- or six-millimetres thick. Now, we’re looking eight to 10 millimetres, with a laminate on at least one layer, maybe both,” Borys says.

Add to this the likelihood that with less aluminum, what there is may indeed need to be strengthened with steel. The result is that today’s panels of 50 to 70 square feet can weigh orders of magnitude more than its predecessors of a decade or two ago.

Inevitably, another result is that the cost for the glass component of a curtain wall increases. But the incremental dollars for glass in construction could mean future energy cost savings on the operational side. “As you decrease mullions and increase glass in a curtain wall system, you see overall thermal performance increase,” Borys says.

The esthetics of big glass are not confined to curtain walled office towers, however. They have also been spreading to the upper reaches of the residential sector. “We’re seeing people in big houses who want larger modules that residential window suppliers cannot do,” Borys says.

The office building curtain wall market remains Border Glass’s primary focus, however, Borys notes that another result of the trend to bigger modules is that vertical structural mullions are getting bigger and deeper. On the thermal performance front, more composite materials are being used because of the thermal break properties.

Fibreglass composite technology is central to EFCO’s 8750XD unitized curtain wall, the latest addition to the company’s XTherm family of products, says Vince Harkins, a Canadian-based representative with EEBCon, which represents EFCO.

The 8750XD system was introduced about a year ago and is designed as a high thermal performance curtain wall. “It uses fibreglass composite technology that provides structural heft and support and a thermal break,” Harkins says.

The fibre, which is called Duracast, is made in-house to better control costs, quality and supply. “By integrating fibreglass into the system, we’re able to offer industry a leading U-value in thermal performance.



Above: The new residential wing at the Residences at The Ritz-Carlton, Montreal, is wrapped in an elegantly composed glass-and-steel envelope. Provencher Roy Architectes. Photo: Stéphane Groleau. Below: Before the renovation and expansion. Photo: Provencher Roy.

The system allows for double- or triple-glazed insulated glass,” Harkins says.

He suggests, though, that the 8750XD’s thermal performance could obviate any need for triple glazing. The frame or mullions have a 0.30 U-value and the centre of the glass (COG) a 0.24 U-value. “With this system, you get with double glazed what you get with triple glazed in some other systems. It’s better for both office and condo applications. You gain value from the thermal performance. EEBCon wanted to add to the offer of options for improving thermal performance,” Harkins says. EEBCon also has a “computer-based tool to assess precisely the potential thermal performance of this product within a specific design.”

From a standards and regulatory standpoint, the issue of envelope thermal performance varies in intensity across Canada. But, in Vancouver, thermal requirements are tighter than anywhere else in the country, says Warren Elmer, director of operations at Glastech Glazing Contractors Ltd.

This might seem strange to those unfamiliar with the intricacies of energy-related policy making, particularly in regions like the Prairies where envelope thermal performance can have a greater impact because of the harsher climate. But, Elmer says, builders and developers on the Prairies have taken notice of Vancouver’s push for energy efficiency and are putting more emphasis on thermally robust curtain wall.

One such option is the Kawneer 7500 series curtain wall. The system is made in North America and is known as a high-calibre product that is good at handling extreme temperature swings. “A quality product like the 7500 was hardly ever used until about five years ago,” says Elmer.

The 7500 can accommodate a range of window options, among them Kawneer’s AA 900 ISOWEB Window. The AA 900 window includes a polyamide

thermal break and is mostly used for curtain wall and ribbon window systems, says Chris Lambert, an architectural representative for Kawneer Company Canada Ltd. based in B.C. “One of the features of the AA 900 is its operable ventilation,” he says.

Kawneer’s 1600UT (ultra thermal) platform is another, more recent, curtain wall system that is also focused on thermal performance, as its name indicates. It is also less costly than the 7500 series, Lambert notes. Both product lines are made in North America.

LEED continues to dictate the trend and Starline Architectural Windows remains a leader in energy efficient design-built window wall systems, with its primary markets being Western Canada and the Western U.S. “Our most popular system continues to be our 9000 Series Window Wall due to its proven performance with excellent value for the price and is now available with an SSG [Structural Silicone Glazing] option,” says Mike Harrison, architectural representative at Starline. “The 9000’s energy efficiency is greatly enhanced in the 9003 Series, using triple glass and a much larger polyamide thermal break.”

Clients also have the option of the 9100 Series Flush Glazed Window Wall and the proprietary unitized curtain wall, that are all compatible with Starline’s swing



and sliding balcony doors. "In addition, we powder coat all of our profiles and flashings in house using Akzo Nobel powder coatings and are fully vertically integrated with our own glass and aluminum extrusion factories," adds Harrison.

The manufacturing location of curtain wall and window wall systems continues to be an issue for the industry, says Gary Lawrence, VP for business development at Inland Glass & Aluminum Ltd. After the U.S. and Canada introduced tariffs to stem the tide of cut-rate curtain wall knock-offs from Asia – mostly coming from China – a few years ago, industry had a bit of a respite. But not for long, as Chinese curtain wall manufacturers soon set up shop in Mexico to take advantage of the country's North American Free Trade Agreement (NAFTA) membership status and relatively low wages compared to those in the U.S. and Canada.

Fortunately, though, for North American manufacturers, China's Mexican beachhead doesn't necessarily amount to a magic bullet for the Asian giant's curtain wall export sector. "They have issues of product quality and China has a tough time meeting schedules," Lawrence says.

Keeping up with demand and maintaining a competitive edge are two key motivators for the continent's curtain wall and window wall sectors. As a result they continue to develop new products and be innovative. The recent spate of thermal break components, some of them using the latest composites, are a case in point.

But a major innovation, unitized curtain wall, which improved both product quality and on-site curtain wall installation efficiency, has no doubt played a role in maintaining the popularity of these systems for office and condo towers. "Unitized curtain wall started

to be used about 20 years ago. It gives you more control of quality because so much is done in the shop beforehand. Under the old, non-unitized system, cladding per floor could take three weeks or more. Now, with a unitized system, the same floor would take about a week," says Bill Djurovic, VP of sales and marketing at Far East Aluminum Works Canada Corporation, part of Gamma.

Djurovic points to another contrast between the curtain wall of today and that of decades ago, which underlines the current fashion of big glass. In the 1970s and 80s, curtain wall facades consisted of 60 per cent spandrel and 40 per cent glass. Today, he says, that ratio is reversed. Comparing window to curtain wall, he says the former is better suited to warm climates unless the system is modified in various ways to address the cold climes. "In Montreal, for example, we add extra insulation for R-value," he adds.

Window wall and curtain wall framing systems each offer distinct benefits, and one may be more suitable than the other on a given project, says Mario Maggio, sales manager with C.R. Laurence's U.S. Aluminum division. But, he adds, "The single most attractive benefit of window wall systems is price.

"Until the late 1980s, hung curtain wall was the only available product used in residential tower applications. The increased demand for a more economical solution to the issue of floor-to-ceiling windows created a huge market potential for new, innovative systems," Maggio says.

Few suppliers are dedicated to window wall alone. "The majority developed this system as an additional line to their existing business core – residential windows," Maggio explains.

Often, today's window wall systems are made, sold and installed by one company, which can reduce costs.

But if the residential construction sector, which tends to favour window wall, is going strong, and the more curtain wall-oriented ICI sector is relatively slow, Maggio says the cost structure on some projects might tip in favour of traditionally more expensive curtain wall.

Window wall is either face-sealed or, at best, uses a rain screen whereas curtain wall is both compartmentalized and pressure-equalized. "If somebody wants window wall based on price, they shouldn't expect curtain wall quality," Maggio says.

In places like Edmonton, window wall took off in the late 1980s and the 1990s, but windows and substrates were often poorly terminated, "resulting in air, wind and water failure," says Maggio, who is also an installation specialist.

The upshot is that C.R. Laurence is doing retrofits on several buildings, with window wall or punched openings from the 1990s, in the Alberta capital. "We're retrofitting them with a custom framing for the opening and then glazing it," Maggio says.

Both systems, however, are meeting the challenge of tougher codes. Phoenix Glass Inc. is installing a window wall system (3250 WT) made by a sister company, Columbia Aluminum Products, on a project that involves dismantling a former prison that offered very little natural light. "From a vacant former remand centre for prisoners, the building, which houses a community court on its lower level, will now be apartments with plenty of light for at-risk youth," says Jim Lebedovich, sales manager of Phoenix Glass.

Good thermal performance is also a focus of a window wall system from Quest Window Systems, called Ecowall. "This system is designed with today's more rigorous thermal standards in mind," says Martin Cash, president of Quest. ■



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