

From Top To Bottom

Building envelope products for high-performance buildings

by ROBIN BRUNET

As 2019 progresses, a host of experts who could be described as building envelope specialists are involved in a wide array of projects aimed at maximizing energy efficiency, as well as creating building exteriors that are esthetically pleasing.

While there are many ways to achieve this, Brian Hall, managing director of the Canadian Precast Prestressed Concrete Institute (CPCI), thinks the best method is precast – whether the system is solid, thin shell, or insulated sandwich wall panels. “With the advancement of energy codes, designers are approaching envelope design differently,” he says. “In a growing number of regions, envelopes must provide continuous insulation and a continuous air barrier. Envelopes are also required to provide a vapour barrier to control condensation and indoor humidity, as well as avoid compromising the insulation system.

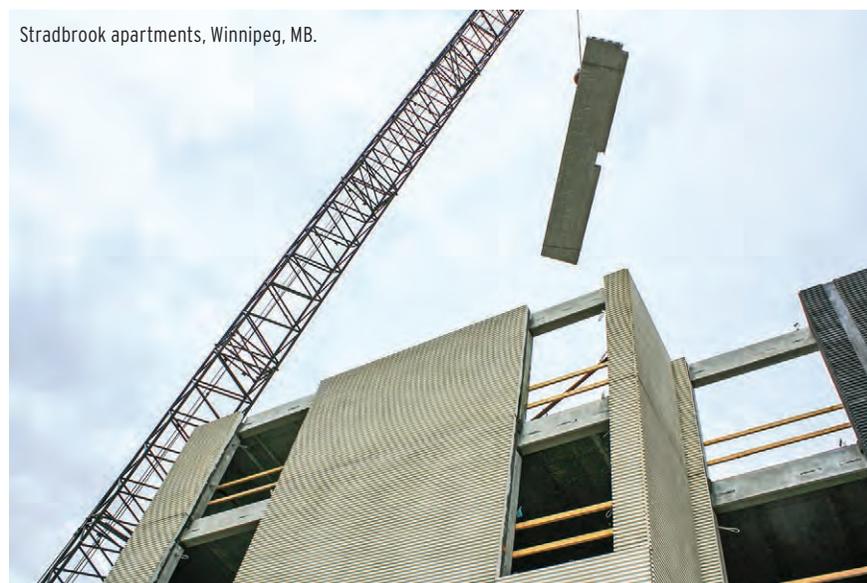
“Precast concrete’s edge-to-edge insulation, combined with the non-conductive connectors between the interior and exterior concrete layers, can create an efficient thermal break that prevents heat and moisture from penetrating the building and eliminates thermal loss and vapour transmissions present in other wall assemblies.”

Fred Edwards, an associate at RJC Engineers, describes his firm’s Calgary office as routinely being involved “in the lifecycle renewal of envelopes, and we use the knowledge we gain from such projects and apply it in other projects that require the development of new envelopes.”

One project of note is the new SODO apartments in Calgary, which consists of two 30-storey towers (one for the apartments, the other a hotel) on a four-storey podium. “The podium is noteworthy in that on the residential side it contains a parkade and on the hotel side it contains amenity space,” says Edwards. “We used precast concrete sandwich panels to provide a uniform cladding around the entire base, with a custom fabricated form liner for a random stone masonry finish. This type of envelope gave the parkade the durability it required, and for the amenity side we used interior finishes on the reverse side of the sandwich panels.” RJC Engineers also ensured that the joints would function as a rainscreen, something that was accomplished by developing dual stage sealant joints with weep holes.

Another noteworthy project for RJC Engineers was the Christine Meikle School, a special needs facility that features a full-sized swimming pool in the centre of the building. “This presented a sizable envelope challenge,” says Edwards. “We wound up using a conventional roof with a traditional rainscreen wall cladding, increased the amount of exterior insulation from the standard four inches to six inches, and installed thermally broken cladding supports in order to increase energy efficiency.”

Jason Rabasse, business development manager, precast, Western Canada, for Lafarge, cites the Stradbrook apartments in Winnipeg as an example of his company using precast as the envelope system of choice. “The Stradbrook’s 18-storey apartment building plus three storeys of parkade is what the industry refers to as a total precast structure entirely made up of precast elements, including the stairs, stair shafts, elevators shafts, floors, and exterior insulated wall panels,” he says. “We can use two types of panels: precast as a cladding panel tied back to the floor structure, or as load bearing insulated wall panels to transfer building loads down through the building’s exterior to the foundation. The owners opted for a smooth finish with minimum reveals, although with precast a huge variety of finishes, formliners, and even photo etching are possible.”



Darren Smith, national sales manager Canada/U.S. for Engineered Assemblies, discusses how his firm is providing a full thermally broken facade for ViewStar, a series of six high-rise buildings in Richmond designed by W.T. Leung Architects Inc. “We have 84,000 square feet of facade materials on the project, and about half that amount features our Equitone Tectiva high-density fibre cement,” he says. “The other half features our Tonality ceramic clay tiles.”

With a full assembly, including the TcLip to provide a thermally broken sub-structure, the six towers will exhibit a mix of three colours in Tonality utilizing a vertical stacking joint to allow for a quick install. The lower levels will feature the robust Equitone Tectiva in primarily larger panels, with the use of colour-matched rivets. “Tonality is ideal for high-rise projects, and in the right design it can be installed extremely quickly, thus reducing labour costs,” says Smith.

Another residential project of note for Engineered Assemblies is 8X On The Park in downtown Vancouver, designed by GBL Architects. This 35-storey tower will feature over 31,000 square feet of eight-millimetre (mm) Equitone Tectiva high-density fibre cement. "As was the case with ViewStar, we became involved in this project in the very early planning stages, which was important because the design group developed details and sizes to help maximize the use of the material," says Smith. "Ultimately they wanted a low-maintenance and high-performance facade that made a statement."

The design incorporates a staggered running bond vertical joint using panels measuring 190mm by 1,500mm, laid out in a horizontal fashion as it climbs up the building.

Two different colours within the panel layout accentuate the natural variation within the Tectiva, which has a directional linen sanded finish. Face fastened colour matched rivets will be used to attach the facade panels. "It's a challenging project in that this is a very busy site, so the panels are being pre-cut in Europe and installers Keith Panel Systems and construction manager Ledcor are relying on just-in-time deliveries," says Smith.

Greenstone Structural Solutions provides a building envelope that addresses the challenge of thermal bridging. Greenstone ICE Panels [Insulated Composite Envelope] can be used in wall, roof, and floor applications and can be designed to have zero thermal bridging throughout the entire building envelope.

ICE Panels were recently utilized in Rankin Inlet, Nunavut – a region with a short construction and materials shipping season. Rodney Penner, sales manager for Greenstone says, "A four-man crew was able to close in the building in 40 days



8X On The Park, Vancouver, B.C.



(Here and above) construction using Insulated Composite Envelope panels, Rankin Inlet, Nunavut.



and turn on the heat. Due to the nature of our ICE Panels with their built-in insulation and vapour barrier, once the building is erected and windows and doors are installed, the heat can be turned on and construction can continue.

"This means that everyone at the post framing stage of construction is working in a controlled environment. This is similar to the idea of constructing modular in a factory. With a controlled environment, there is better quality control, and fewer variables to go wrong, specifically with the building envelope."

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Soprased Stick VP self-adhesive vapour-permeable air-barrier membrane.



Innovation in the building envelope realm is constant, and Soprema is a company that develops products that surpass the competition in several aspects. For example, its Soprased Stick VP is a self-adhesive vapour-permeable air-barrier membrane with a tri-laminated polypropylene complex on its surface. It's noteworthy for its unmatched adhesive properties, and its width and self-adhesive underface make it very easy to install. This product is ideal for hybrid wall construction in which insulation is in wall cavities

and on the cold side of the permeable air barrier: the membrane offers good protection against air leaks and water infiltration into the building envelope and allows the diffusion of water vapour.

Soprased Stick 1100T is a self-adhesive air/vapour barrier membrane for walls composed of SBS modified bitumen and a tri-laminated woven polyethylene facer. It is also used as a masonry and through-wall flashing membrane, as well as a waterproofing membrane at openings and transitions. Soprased Stick 1100T is recommended when constructing walls with a continuity of the insulation, because the membrane is resistant to air leaks, water infiltration, and diffusion of water vapour.

Denis Gingras, national sales manager for Hydrotech Membrane Corp., says that a related component of building envelopes – blue roofs – is “becoming increasingly in demand in high-density cities, as these roofs have excellent water retention and discharge capabilities. We’re currently providing a blue roof for a hospital in Chicago and expect to supply another for a Canadian university whose identity I can’t yet disclose.”

A Hydrotech PMR (Protected Membrane Roof Assembly) Blue Roof is ideal for utilitarian roofs that are not designed for tenant use. The simplest of such roofs can be created on a typical Hydrotech PMR with standard loose stone for ballast. The water in the blue roof is stored within the void spaces of the stone and to the

required level above the ballast. A heavier than typical application of stone ballast is designed to keep loose-laid Styrofoam insulation from floating during rainstorms.

Variations of this system are the Plaza Deck Assembly and the Garden Roof Assembly Blue Roof. The former uses the void spaces that exist beneath concrete pavers in Hydrotech’s Plaza Deck Assembly to store large quantities of stormwater: pavers are installed on pedestals in a normal fashion but at an elevated height to generate the needed water storage volume.

Paul Lowes, technical sales architects and builders, for Building Products of Canada, reports that his company is continuing to spread the word throughout the provincial and municipal inspection community about the benefits of its Excel and new R-5 XP Exterior Structural, Continuously Insulated Sheathing. “Awareness of this product is vitally important, especially given the changing and volatile weather communities across Canada have experienced due to climate change. Many homes are being lost due to structural damage or blown down at various stages of construction, during violent wind storms. Ontario alone saw costs exceeding \$1 billion in damages, between January and September 2018 alone,” he says.



ILLUSTRATION COURTESY SOPREMA; PHOTOGRAPHY COURTESY BUILDING PRODUCTS OF CANADA

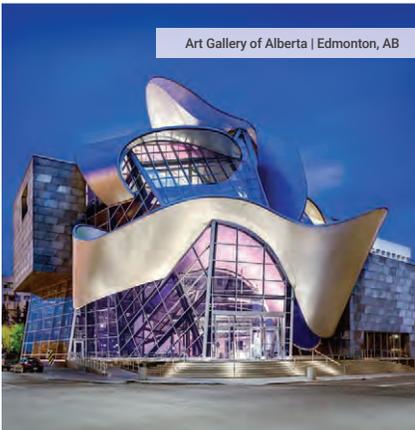


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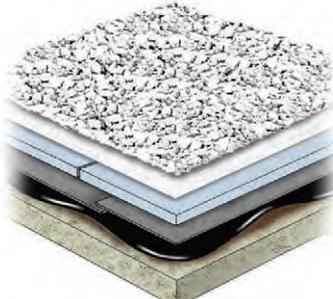
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Excel's 1.5 R-value is three times that of Oriented Strand Board (OSB), and its use instead of OSB can negate the need for drain water heat recovery units. Excel's built-in air barrier also negates the cost of wrapping a house, which also translates into substantial time and labour savings. Both Excel and R-5 XP (installed blue side out) offer an integrated external air barrier after the joints are taped. "This is a structural wall in addition to being an external air barrier," says Lowes. "The product has undergone extensive strength testing at an independent laboratory, with amazing results."

Both Excel and R-5 XP are light and easy to work with, come in four-by-nine foot sheets and can be installed on an eight-inch foundation, negating the need and cost of larger foundations, while offsetting additional CO2 emissions associated with larger pours.

According to Demi Christou, operations manager at Flexstone Coatings, 2019 is significant for his company because "this is the first year our product is starting to get specified more frequently by engineers: we're starting to attract the attention of developers, and we're currently busy working with our dealers on a number of projects as a result."

The product Christou refers to is Flexstone's sundeck and flat roof membranes, which are versatile, seamless, flexible, reflective, UV stable, and designed for harsh climates and traffic. Also, they are CCMC approved, which sets them apart from other liquid coatings on the market. "The CCMC approval is one of our biggest selling points, as this is not an easy designation to obtain and means that our membranes are approved across Canada for new construction projects," says Christou.

PHOTOGRAPHY COURTESY BUILDING PRODUCTS OF CANADA, CUFCA

The Flexstone four-ply membrane relies on the foundation of its solvent-free base coat, which adheres to nearly any substrate and is installed thick, with a v-notched trowel or squeegee. The finish coats are not only esthetically pleasing, they provide a tough outer shell that keeps the membrane safe from heavy traffic and UV damage. "Our membrane is best used for deck applications over living spaces and a far more versatile alternative to torch-on roofing with heavy pavers," says Christou.

Finally, Andrew Cole, executive director of the Canadian Urethane Foam Contractors Association Inc. (CUFCA), points out that "underslab basements are the forgotten part of building envelopes but deserve equal attention, because the build up of radon – the second largest cause of lung cancer in the country – is a naturally occurring element and a major concern for developers."

The CUFCA actively promotes spray-applied polyurethane foam as a solution to this problem, and Cole notes that due to his association undertaking extensive research, "we have a Canadian Construction Materials Centre number for our foam as an effective radon barrier, and the application is actually more affordable than alternative methods of code compliance because it consists of a one piece assembly, two inches thick – with no heat loss or moisture transmission." ■



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