

Building Envelope News



Two-component polyurethane foam was specified by architect Alex Talwood to prevent the migration of exhaust fumes from the underground parking into the units of this Toronto condominium complex.

Condo uses foam in air barrier and fire stop combo

Condominium owners in a Toronto complex will be able to breathe easier thanks to work performed by Canam.

Architect Alex Talwood was concerned that exhaust fumes from the planned underground parking area might migrate upwards into owners' units in the B.G. Schickendanz Homes complex he was designing.

He wanted to prevent air migration through 600 vertical penetrations for water, gas, power, telephone and cable television. These pathways are usually stuffed with fibrous material and mortar, which slows the transfer of heat, flame and smoke. He also felt that standard fire-stopping procedures would not be sufficient and therefore specified polyurethane foam as part of the fume and fire stopping package.

The Canam team injected two-component polyurethane foam into the vertical pathways to ensure a 100 per cent air seal. Foam, in combination with mortar, performs

better as a fire-stop, and also stops stack effect and the migration of the fumes from the parking lot.



Foam was injected into the vertical pathways to ensure a 100 per cent air seal.

Because this work required a 3-hour fire rating, permission had to be obtained from the City of Toronto. Don Falconer of A/D Fire Protection Systems, the company that supplied the mortar eventually used on the project, approached the Underwriters Laboratory of Canada.

His company revised some existing test designs to include foam as a component.

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Polyurethane Foam Sealants Receive Building Code Approval

Polyurethane foam sealants used by Canam and Zerodraft have been accepted as minor combustible components for use in non-combustible construction by the National Building Code Technical Committee in 2001. Recent testing of these foam sealants show flame spreads of less than 25 and smoke ratings of less than 50, meeting the requirements of the NBC for use in mechanical and plenum spaces.

As well, these foam sealants are covered by proposed new standards developed with the Underwriters Laboratory of Canada. Under these new standards, manufacturers must prove performance and durability. They also include applicator sections

Canam and Zerodraft both distribute and use foam sealants that meet all these new standards.

The implications of acceptance by both the NBC and ULC include an expanded range of options in dealing with air sealing and thermal bridging concerns for contractors and specifiers. Foam sealants can now be used more often, in more places. For example, before the testing and approval for fire protection, foam was not acceptable for use on mechanical systems such as return-air plenums within ceilings. Now, rated foam can be used in these applications, as well as in many others, such as vertical pathways.

Repairs to curtain wall caulking make office tower tenants comfortable again

When a major tenant of Cadillac Fairview's 20 Queen Street West property in downtown Toronto threatened to walk out over thermal discomfort, the building's management had to act fast.

Significant fluctuations in temperature from one side of the office tower to the other were a source of serious concern for the tenant, who occupied 17 floors. ECE



Prior to work done by Canam, fluctuations in temperature were a source of concern for tenants of this Toronto high-rise.

Engineering, responsible for the building's mechanical systems, investigated and was able to rule out mechanical failure as the cause. The engineers suggested the problem might lie within the building envelope and Canam was brought in to investigate. Canam then brought in Mark Brook of Brook Van Dalen Associates Limited as building science consultant.

A telephone room halfway up the building was pressurized with a blower door, while a technician inside operated a theatrical smoke generator. The investigating team was able to instantly identify the problem thanks to its vantage point on an adjacent roof. Smoke was filtering out of the building at the vertical and horizontal mullion joints in the curtain wall.

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15-Building retrofit nets \$52K annual savings

Building envelope upgrades performed by Canam for a Syracuse, NY, school district will mean estimated savings to the tune of US\$52,000 a year. The project was managed by Niagara Mohawk Energy Inc. (NME) of Syracuse, NY, a company that conducts energy audits

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The 134 buildings Canam worked on at CFB Cold Lake include the Maple Flag Quarters.

Weatherstripping and roof/wall sealing help CFB Cold Lake battle escalating energy prices

With 134 older buildings in need of attention, the Cold Lake Energy Retrofit project was launched through the Federal Building Initiative (FBI), a program designed to assist Canadian government departments in making investments to improve the energy efficiency of their buildings, in 1998. MCW Custom Energy Solutions Ltd. was awarded the project in early 1999 with construction starting in November 2000.

"Aside from the obvious environmental benefits, utility costs have increased dramatically in Alberta over the past year," says Janet Williams, Associate for MCW. "The utility savings achieved from this program will directly reduce the base's operational costs, allowing more funds to be directed to other worthwhile projects."

As an integral part of the project, Canam was brought in by MCW at the proposal stage to perform an energy audit. When MCW was awarded the project, Canam was contracted to install weather-stripping on the exterior and overhead doors, as well as sealing the roof/wall intersections on all 134 base buildings.

The work being performed by Canam will cost \$185,000, with an estimated utility savings of \$40,000 a year, for a simple payback of 4.5 years. The target completion date is May of this year.

Other portions of the project include a comprehensive lighting retrofit and redesign, an upgrade to the building automation system and central plant controls, a heat reclaim system, solar wall installation, steam trap maintenance and insulation of steam piping accessories, as well as compressed air modifications, submetering and training.

MCW and Canam have a long history of working together on various institutional projects including retrofits for the City of Stoney Creek and the Trillium Lakelands School Board in Ontario, as well as 17 Wing Winnipeg Defense Base in Manitoba.

"I've worked with Canam for the past 10 years," says Janet Williams. "We have always been happy with the quality of their work. They mobilize crews quickly on site and form great relationships with our clients."

Curtain wall repairs continued from pg. 1

To confirm their diagnosis, a swing stage was brought in, and several mullion caps were removed. It was at this point that they discovered the silicone caulk used at the vertical and horizontal junctions in the original construction of the building had failed.

"Most buildings are built to allow for some movement, so it's imperative that a suitable seal – one that can bend and stretch – is used," says Mark Brook. "In this case it wasn't a building error; the material just failed."

Although everyone hoped the work could be performed from the outside, it quickly became evident that it would be faster and easier to go inside the building for this job. In order to cause as little disruption to tenants as possible, the work was scheduled for after office hours.

The Canam team drilled holes on either side of the mullions and used two-component frothed-in-place foam to plug 3x6-inch areas of the vertical mullions, effectively closing off the vertical pathways in the air barrier. Although the crew decided that only every second floor needed attention in order to solve the problem, if any comfort complaints had come in from other floors after the project's completion, Canam would have dealt with each situation locally.

Canam's experts see one to three jobs a year where a curtain wall has failed. One recent example was a Halifax building where holes were drilled for the installation of a new heating system. These holes went straight through the mullions, causing air to whistle around the hot water convecter heating pipes.

Building retrofit continued from pg. 1

and develops efficiency programs, markets natural gas and electricity and provides on-site generation and co-generation services.

In 1996, NME approached the Liverpool Central School District, one of the Metropolitan Syracuse area's fastest-growing school districts, about a project involving extensive energy conservation measures at 17 facilities. They decided to bring in Canam during the second phase of the multi-phase project. According to David Kaczynski, Project Manager for NME, Canam was chosen for its expertise in evaluating building envelope and mechanical systems.

"We appreciate Canam's total system approach, which takes into account

A measurement and verification process that began on January 1st of this year confirms the forecasted savings, and predicts a simple payback of five years.

"Early indications reveal very favourable overall results, so we expect that the estimated energy savings will be exceeded if the trend continues," says Kaczynski.

Feedback from teachers, students and other Liverpool employees has been very positive, according to Kaczynski. Particularly from employees at the Bus Maintenance Garage and Transportation Center who have reported a clear improvement in interior comfort levels and working conditions for garage employees thanks to a significant reduction in drafts, frost and icing around the large overhead doors.



Building envelope repairs performed for the Liverpool Central School District in Metropolitan Syracuse have received positive feedback from teachers and students, as well as other employees.

the entire building, not just individual components," he says.

The crew used single and two-component polyurethane foam to seal window and door frames, roof and wall intersections, penetrations through walls and floors in mechanical rooms, and roofing penetrations such as mechanical equipment curbs, relief dampers and skylights. They also installed weather-stripping on doors and windows.

Canam worked on 15 buildings in total, most of them older schools that had been exposed to a lot of traffic.

"Upgrading weather stripping on the doors and windows was a large part of the project," says David Kaczynski. "The old weather stripping on the door frames was all exposed where the kids come in and out – and where they can grab it, swing from it, kick it and generally just be kids. It caused a lot of wear and tear."

This was the first time NME and Canam had joined forces on a project, but David Kaczynski doubts it will be the last. "I hope to continue our working partnership with Canam on other projects that are currently under development," he says.

Condo complex continued from pg. 1

These include ULC FP229, which already used 50mm thick foamed polyurethane sealant in the backer rods, and ULC FP230 which specifies a maximum 38 mm thickness for polyurethane foam.

Until now, foam has had an air barrier rating, but has not had fire protection ratings. Mortar has had a fire rating, but has not been tested as an air barrier.

As a result of the efforts of Canam and A/D Fire Protection Systems, six different fire-stop details using foam as a component have now been approved and listed by the ULC for up to three-hour fire ratings.

Apartment overhaul improves tenant comfort



Solving stack effect addressed comfort problems for residents of Forest Laneway and helped save the owners over \$200,000 a year in energy bills.

The owners of Forest Laneway, a three-tower, 1000-plus unit apartment complex in Toronto, faced steadily escalating energy costs, 27-year-old heating and air conditioning systems that had reached the end of their useful life, and spiralling maintenance requirements.

Fortunately, their consulting team recognized the need to review building envelope performance and brought in Canam.

Stack effect in these buildings was found to be extreme and it was causing comfort problems, particularly with lower units. Canam informed the building owners that controlling stack pressures would improve comfort, energy efficiency and odour control."

At the top of the building, the Canam team isolated and compartmentalized mechanical rooms by weatherstripping doors, fire stopping appropriate penetrations through

rated walls, reducing the size of cable holes in the elevator shafts and door controller cable penetrations, as well as busbar and other electrical penetrations through the floor of the elevator rooms.

At the bottom of the building, the team effectively sealed the many penetrations found in the underground parking areas. Doors were weatherstripped and a large number of unsealed cable conduit duct and pipe penetrations and gaps

between block infill and slabs were sealed.

Vertical shafts, where doors with two-inch gaps underneath were prevalent, were weatherstripped. This decoupled floor to floor and reduced stack pressures.

Other areas dealt with included fire cabinets, garbage disposal rooms, electrical rooms and other service shafts. The highest quality, durable Zerodraft brand weatherstripping, together with appropriate one- and two-component polyurethane foam and fire stopping sealants were used throughout the project.

The combined efforts of Canam and a major HVAC upgrade resulted in big savings.

"Our goal was \$200,000 a year," says Evelyn Visconti, Vice President, Residential Division for the Tandem Group, property managers for Forest Laneway. "We did much better in our first year and considerably surpassed projections. In fact, we might very well reduce our estimated payback target."

ZERODRAFT Residential Comfort Zone

Moisture in the attic and ice-damming

Of \$50 million worth of claims received by insurers in South West Ontario during a January 1999 storm, much of the property damage involved ice-damming and seepage, according to the Insurance Bureau of Canada.

Moisture in the attic can be a serious problem. It arrives from two directions: from the inside of the house as warm air rises and condenses on the underside of the deck and from the outside as water leakage through failed shingles, or from underneath the shingles as melted snow backs up as a result of ice damming at the eaves. In addition

to water damage, any moisture in the attic can be the start of a serious mold and roof deterioration problem – dangers both to your health and to your investment.

Ice-damming occurs when melting snow on the roof refreezes at roof edges and forms dams. These cause further melting snow to back up under shingles and enter the attic where it leads to moisture damage to ceilings and walls.

Melting is caused by warm air rising from the interior of the house and from poorly insulated and/or sealed ducts located in the attic.

Spores of mould and mildew are showing up far too often in too many homes, sometimes in houses not yet two years old. Families with small children, elderly family members, or people with respiratory or allergy problems are at risk. Asthma levels in Canada have increased three-fold in the last twenty years, blamed largely on the increase in bacteria, mould and chemicals in the atmosphere. Health, comfort, structural durability, asset



Ice damming can not only ruin a roof; icicles like these can be dangerous if they break off and fall.

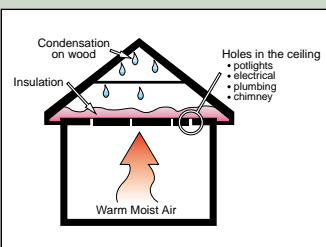
value, energy costs are all issues surrounding attic problems.

All these problems, both visible and invisible, are related. Ice-damming and attic condensation, or 'wet attics', are symptoms of similar problem conditions in the home. They can be blamed on a whole range of 'usual suspects' – from inappropriate design, poor construction techniques and workmanship, poor communication

between trades, location of heating/air conditioning ducts, botched renovations and a high humidity lifestyle, to a confusing combination of all of these.

To prevent condensation and ice-damming, we must make the attic a completely separate space from the rest of the house. Warmth and warm air containing moisture in the living space must not rise into the non-conditioned space in the attic (see drawing). Insulation by itself is not enough. It is also necessary to seal the many air leakage pathways between the two spaces. These include access hatches, plumbing stacks, recessed light fixtures, ducts, electrical wiring, dropped ceilings and bulkheads, exhaust fans, top plates and many other penetrations between the two spaces.

The traditional belief is that roof ventilation is a cure-all. It isn't. It can make the problem worse. Here's why: Passive ventilation doesn't move much air through the attic. In winter, outside air has little ability to pick up moisture in an attic. CMHC research shows this. Active ventilation tends to draw more warm moist air into the attic. This air may not leave the attic at all; it often stays behind and condenses on the wood -- leading to mildew, mould and rot.



Moisture in the attic arrives from inside the house as warm air rises, and from outside as water leakage from failed shingles or ice damming.

ARENA MANAGERS: Stop brine header icing and cut energy bills

Spray two-component polyurethane foam insulation offers ice rink facility managers a financially and environmentally sound solution to the costly and persistent problem of brine header icing.



Insulating brine headers with foam prevents condensation on the surface, reducing corrosion, icing and frost heave.

Brine headers are the tubes that feed the refrigerant to maintain the ice surface, usually steel pipe construction, run in a trench from the mechanical room. As the temperature of the fluid is around -7°C (or 20°F), the headers will "sweat" and moisture will freeze on the pipes.

Condensation can cause rust and corrosion of the pipes - eventually leading to leaks - as well as creating slippery surfaces around the perimeter

of the rink at the gates and the header trench cover, an obvious danger to patrons. Frost heave, a phenomenon occurring as a result of the freezing and expansion of the condensation, can create "ploughed" surfaces and uneven distribution.

Insulating with foam provides a moisture tight "cocoon" that encapsulates the lines and prevents moisture forming on the surface. Benefits include: reduced energy and maintenance costs, return on investment achieved in two to three years and increased safety to patrons. The insulation will last the life of the system and implementation is fast and straightforward. Insulation out-performs the traditional stop-gap methods of replacement and repainting, is environmentally friendly and equally effective for both new construction and retrofit projects.

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Building Envelope News, 'BEN', is published occasionally by:

Canam Building Envelope Specialists Inc.,
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Materials and ZERODRAFT Residential
Comfort Contracting.

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