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B.C. Institute of Technology's aerospace campus

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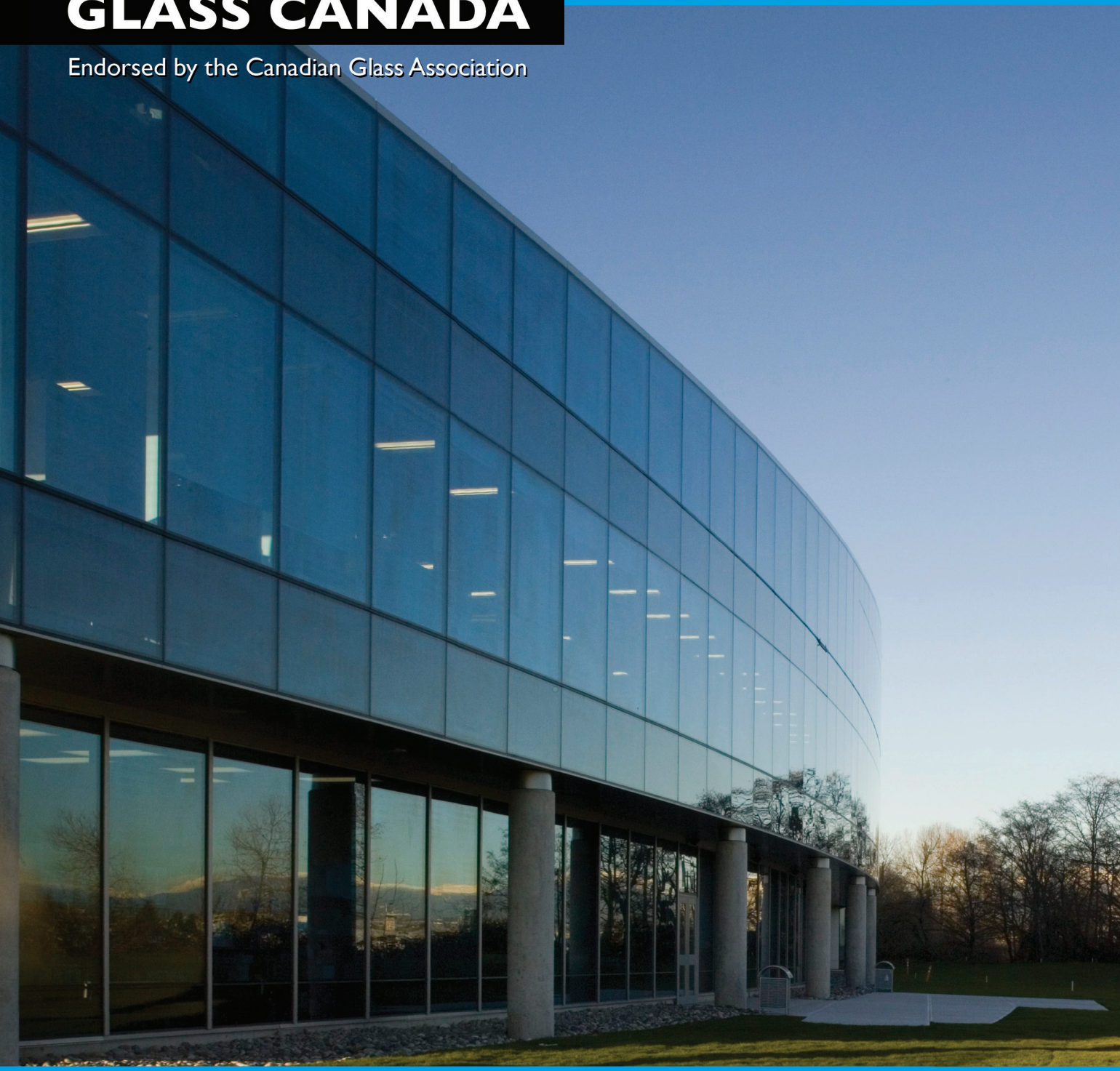

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The British Columbia Institute of Technology's Aerospace Campus has a story to tell. Find out what it is starting on page 12.

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Reach for

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At BCIT Aerospace Campus, all paths lead to the hangar.

by RICH PORAYKO

The British Columbia Institute of Technology's (BCIT) Aerospace Technology Campus (ATC) stands at the gateway to British Columbia's Vancouver International Airport.

A cutting edge centre of learning, the $77-million, 305,000-square-foot campus houses 40 classrooms and labs, 36 faculty offices, a cafeteria, a gym, a theatre, a lecture hall and an enormous hangar complex. The ATC officially opened on Oct. 12, 2007, and was designed to propel BCIT's aerospace programs into the future. Much more than a technical training campus, it is a facility that has revolutionized the nature of knowledge sharing in the training of students graduating into the multibillion-dollar aeronautics industry.

BCIT decided to replace its aging aerospace campus by building a world-class campus at Vancouver International Airport. Designed by Kasian Architecture Interior Design and Planning Ltd., and built by Ledcor Construction Ltd., the building features more than 1,700 insulated glass units and more than 11,000 cubic metres of concrete. The largest aerospace training school in Canada, the ATC more than doubles BCIT's student capacity for aerospace training, to 1,000.

All paths lead to the hangar. Ultimately, this facility emerged as a series of intelligent, interconnected geometric forms that flow naturally together through a central hub that steers students in the direction of the classrooms, labs and workshops; all of which look into the massive 40,000-square-foot glass-walled hangar. Students remain in constant contact with the practical component of their education – the academic and practical experiences of learning become fused. The design keeps the entire campus under one roof while placing lessons within inspired context.

The architect was surrounded by inspiration. On one side, the Fraser River. On the other, Vancouver International Airport. Directly above, the flight path of the airport's south runway. Students can watch planes land one minute, and work on a massive jet engine the next.

Collaborative design and manufacturing process

Through a unique collaborative design process, stakeholders agreed that dynamic forms in combination with metal and glass building materials respond better to their vision than wood structures, finishes or complex, irregular forms.

The design for this project was the result of a creative process of co-operation and discovery. A team of architects, interior designers, project managers, a large BCIT stakeholder group and a full consultant team – including the sub-trades – all contributed input through workshops and other inclusive forums. Many of these meetings were held up front with the architect, the contractor and the glazing teams: glazing teams included Advanced Glazing Systems, the glazing contractor; Garibaldi Glass Industries, the IG manufacturer; and Lami Glass, the laminator.

Division 8

These project stakeholders recognized that the noise of passing aircraft would be an exciting and exhilarating element that reinforced the building's sense of place. However, in order to ensure

The distinctive and highly refined curve of the Learning Zone's exterior shield translates into a three-storey interior space that gently transitions students toward 40-plus classrooms and laboratories wired with the latest wireless and multimedia technology.

that the noise did not become overbearing, they specified laminated glass for this project due to its superior acoustical properties. Laminated glass is highly effective in reducing sound and noise transmission, in addition to having inherent strength, safety and ultraviolet reduction characteristics.

"The insulated units were manufactured with laminated glass supplied by Lami Glass with varying thicknesses of 6 mm and 5 mm as well as the large 19 mm air space," says Arthur Chan, VP design and engineering for Advanced Glazing Systems (AGS). "By altering the glass thicknesses and increasing the air space, you can enhance the sound control efficiency. The entire glazing system was tested by the University of Alberta, where it was classified as a Sound Transmission Class (STC) 40."

The make-up

Manufactured by Burnaby-based Garibaldi Glass Industries, the insulated glass units are made up of 5 mm Versalux Blue heat-strengthened on the exterior laminated via 0.060 clear PVB Interlayer to 6 mm clear heat-strengthened lites. There is a 19 mm air space with dark aluminum bar that is sealed via double seal silicone to lites of 6 mm Pilkington Energy Advantage Low E on the interior. Many of the units also had a spandrel type black frit dot pattern on surface three of the exterior laminated lite.

"The ceramic frit supplied by Garibaldi was used as a spandrel effect to cover some of the structural elements," says Chan. "These elements are still visible from outside when standing close to the building, which was part of the design from Kasian. It has an industrial look where you can see the structural steel behind the glazing."

The overall thickness of the units is 1-7/16 inches. Not quite the thickness of a triple unit; however, the exterior lite is nearly 12 mm and, given the size of the units – many of them 60 by 140 inches – they were big and heavy to work with.

One of the benefits of the design collaboration is that most of the glass was designed to be uniform shapes and sizes, which reduced waste, increased efficiency and inevitably provided an economical solution for manufacturing the glass components.

The process

Advanced Glazing Systems awarded the glass contract to tempering fabricator Garibaldi Glass, who partnered with Lami Glass to laminate the outboard lites that Garibaldi was fabricating. This was a process that required precise timing.

"We had several pre-project meetings with Garibaldi to figure out the logistics," says Claudia Navarrete, sales and estimating for Metro Vancouver-based Lami Glass. "The co-ordination and communication in this project was vital to its success. There were more than 3,400 lites, many of them very large, that needed to be paired, laminated and tagged correctly. Because of the pre-project meetings, Garibaldi was able to supply everything paired up and we would literally roll their dolly right up to our washer and begin the production process. Because of the meetings, we

knew what was expected. Rather than just sending in a purchase order, we had visibility and could see what was coming down the pipeline."

"There can be a huge complexity when you are working with another supplier," says Roland Rossman, project leader for Garibaldi Glass. "The manufacturing was straightforward. The edges of the envelope were all unique rakes; however, the rest was high volume. We simply had to cut, print, heat strengthen and pair the glass before we shipped it to be laminated."

Because the exterior lites were laminated, Garibaldi needed to cut and heat-treat three lites for each of the 1,700 double units.

"We were in touch throughout the process, so Lami Glass knew exactly when the glass was coming. It was tough at the outset as we had worked together for years; however, not on a scale of this level. The meetings were important to get to understand expectations and get to know one another's needs. As the building progressed, the pressure increased significantly and the companies pulled together to make it happen."

Pulling it together

"One of the largest challenges of glazing the BCIT ATC project was lining up the curtainwall along the reverse slope on the south end," says Chan. "Most of the ATC curtainwall is a four-sided structural glazed (4SSG) system; in particular, the reverse slope where we wouldn't rely solely on structural silicone to hold the units in place. After we received the completed IGUs from Garibaldi, we would install perimeter retainer clips, which fasten to the inboard lite, as well as the framing member of the curtainwall panel. The outboard lite is then adhered to the clips with structural silicone, which helps ensure the longevity of the perimeter seal. Since the unit is mechanically secured in place, it doesn't matter if it is in a reverse slope or vertical glazing, the risk of glass fallout is greatly reduced."

The glazing system, which is patented and proprietary to AGS, has been used for the last 20 years throughout Canada and the United States and is similar to hanging a picture frame off of another frame.

Chan explains: "The IGU inset necessary for the system is a challenge for some insulated glass manufacturers because we want the spacer bar inset into the edge of the sealed unit by up to 5/8 of an inch. This creates a void around the perimeter of the sealed unit, which is where the perimeter retaining clips are fastened."

The remainder of the building was glazed by AGS using its two-sided structural glazing system (2SSG), which is horizontally captured by a pressure plate.

"Overall, the project wasn't very difficult. Installation-wise, there were some large panels that required some specialized equipment; however, the whole job was built on CAD drawings. All the trades worked with the same drawings, so onsite measuring and fabrication was minimized. It worked out very well and we are pleased with the performance and the look of the building." •