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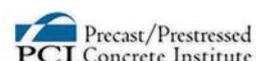
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Tighter energy-efficiency standards are driving us all to look for innovative new approaches. Fibreglass is less conductive than aluminum. Has the time come for fibreglass curtainwall? Cover photo: New Cambridge Lofts in Edmonton.

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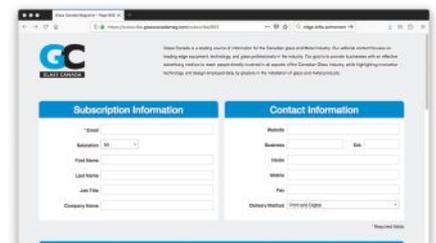
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The future of glazing

EDITORIAL

We need ideas to encourage the next generation.

Fenestration B.C. has shut down its Red Seal glazier training program and the Provincial Glaziers Association of Alberta has put its Master Glazier program on hiatus, in both cases due to lack of enrollment. Obviously, there is some kind of disconnect between what is said in public about the need for skilled workers and the actual situation on the ground.

Demand in our industry is strong. Contractors tell me all the time that their primary challenge is finding good people to do all the work on offer. Yet when the rubber hits the road, companies in this industry seem unwilling to make the slightest investment to address this issue. The PGAA Master Glazier courses cost around \$750 each and were offered after hours. That's the cost of a client dinner with a bit of drinking afterwards.

The trope that it doesn't make sense to train workers because they will soon leave is a self-fulfilling prophecy. Your only hope to retain good workers, or even find out if they are any good, is to show them you take your business and your employees seriously. If you think training and losing workers is expensive, try

not training them and keeping them on.

Maybe you have done that and maybe the equation still comes out on the side of using unskilled workers overseen by someone who knows what they are doing. Sure, we'd all like our inboxes to fill up with fully ticketed journeypersons ready to work at or below union wages every time we are hiring. While we're at it, we can wish for free beer at the bar. It ain't happen-

ing. I think this industry has quietly accepted a situation where we hire workers barely able to do the job, pay them the least we can get away with, cream off the occasional star, pay them a bit more as a supervisor then task them to keep the rest in line.

If that's the reality, fine. You know your business and how to make money in it. But we need to acknowledge that the above approach will never generate a pool of qualified tradespeople who can be relied upon to produce quality work. And we need to acknowledge that without such a pool the advance of technology, quality and corporate growth in this industry will be slowed because the innovative business owners of tomorrow come from the skilled workforce of today. I get it; those are big picture problems and you have company to run. And, what the heck, it's not as if Canadian skyscrapers are falling down.

But I guess I'm a dreamer. I can't help but wonder if there is some system that will attract competent young people to the trade, give them the training you want and see them rewarded with fulfilling and lucrative careers as glaziers. So I'm going to go ahead and host a discussion of this topic at Top Glass on April 17 in Mississauga. I'll be joined on stage by a panel with representatives from the Finishing Trades Institute, the German embassy and the new Architectural Glass and Metal Technician program to kick around ideas for how our recruitment and training in the trades might be improved. Hope to see you there for this thought-provoking conversation. •

NEXT ISSUE

- IUPAT
- Films and coatings



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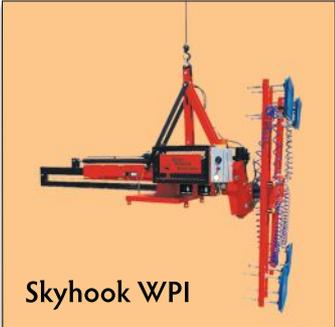
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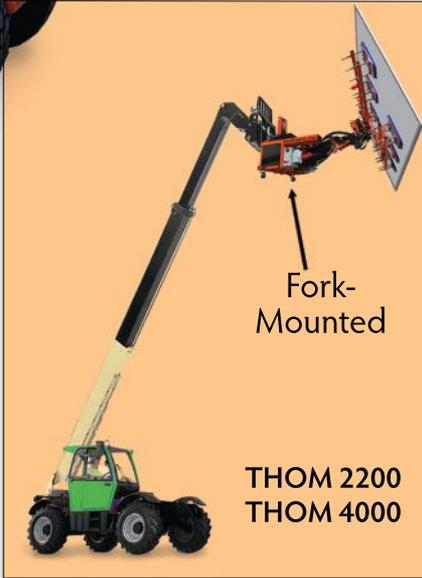
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Ben Beeler (right) of AGMCC shows a test apparatus to Noel Marsella of the Architectural Glass and Metal Contractors Association at the beta test demonstration in Buffalo, N.Y.

AGMCC holds inaugural general meeting

The Architectural Glass and Metal Certification Council held its first-ever annual general meeting in Chicago on Nov. 7 and 8. About 50 glazing contractors, union representatives, industry suppliers, general contractors, architects, consultants and trade media gathered in the Willis Tower at the offices of the AGMCC's law firm. Over two days of meetings, the group heard updates on the organization's progress in developing its third-party-accredited programs for certifying glazing contractors and individual glaziers to high standards of integrity and quality. AGMCC officers Jeff Dalaba, John Kent and Ben Beeler led the discussions.

Participants unanimously voted in a new board:

Jim Stathopoulos, Ajay Glass
Jim Maggiore, Royal Glass
Peter Neudorf, Ferguson Neudorf
Terry Webb, Eureka Metal and Glass
Felix Munson, Anchor Ventana
Jim Rathdone, Kensington Glass
Joe Ashdale, professional glazier
Paddy Byrne, professional glazier
Anton Ruesing, Finishing Trades Institute
Dale Fuhr, WJE
David Stutzman, Conspectus

Mark Coulis, Wheaton Sprague
Mike Spence, Kraus Anderson
Rodney Harvey, CDC
Yvon Chiasson, Morrison Hershfield
Jon Kimberlain, Dow
Raymond Roy, Guardian
Joe Schiavone, C.R. Laurence

AGMCC is a not-for-profit organization accredited by ISO to provide third-party certification services. Its two programs are North American Contractor Certification and Architectural Glass and Metal Technician. NACC commits glazing contractor companies to a rigorous program of quality assurance, business best-practices and safety compliance, including regular audits and documentation of adherence to the standards. AGMT uses written and physical tests to certify individual glaziers to a high level of trade competence, with regular recertification requirements.

At present, 18 companies are signed up to NACC and efforts to aggressively market the program across the continent are underway. AGMT anticipates full certification of its program by March of 2019 and final tweaks to its testing are being made.

Glass Canada editor Patrick Flannery volunteers on the AGMCC marketing committee.

COMING EVENTS

Dec. 3 - 5
WinDoor
Quebec City
windoorshow.ca

2019
Feb. 4 - 7
IGMA Winter Conference
Austin, Texas
igmaonline.org

Feb. 28
FenBC Technical
Conference
Surrey, B.C.
fen-bc.org

March 3 - 5
BEC Conference
Las Vegas
glasswebsite.com

March 18 - 21
Fensterbau Frontale
Nuremberg, Germany
frontale.de

April 17
Top Glass
Mississauga, Ont.
topglasscanada.com

May 16
FenBC Golf Tournament
Surrey, B.C.
fen-bc.org

June 6 - 8
AIA Conference
Las Vegas, Nev.
conferencearchitecture.com

June 16 - 28
Glass Performance Days
Tampere, Finland
gpd.fi

Oct. 23
FenBC Industry
Conference
Surrey, B.C.
fen-bc.org

Canadian Glass Association

National activities of the Canadian Glass Association are on hiatus pending discussions of a new direction for the association. To help chart a course forward, please contact David Langton at dlangton@compglass.com.

Fenestration Association of B.C.

Oct. 24 was the FenBC Industry Conference at Sheraton Guildford in Surrey. We had a great program featuring discussions on the Flexibility Provision in the city of Vancouver, updates from Fenestration Canada on the new Fenestration Installation Certification program and an update on the Canadian methodology for window U-values in Passive House buildings. The sessions continued with a presentation on code-compliant fire-rated glazing options in Canada and an update on the B.C. Energy Efficiency Act. Our keynote lunch speaker discussed cannabis in the workplace. The afternoon sessions addressed complying with CSA A500 and selecting windows for the Step Code.

Our keynote breakfast session "The Code Talkers" will be a recurring panel session at all our conferences. This session gives the audience an opportunity to discuss any and all code-related issues that the entire fenestration industry is facing. The focus of this session is to learn what the industry is facing in understanding code interpretation and if there are solutions based on the knowl-

edge in the audience and on the panel. If there are no solutions or answers provided then the technical committee will develop a task group to look into the question further with the goal of finding a solution that all the groups involved can accept. Save the dates:

- FenBC Technical Conference and AGM: Feb. 28 at Northview Golf Course in Surrey
- Golf tournament: May 16 at Northview Golf Course
- FenBC Industry Conference: Oct. 23

Provincial Glaziers Association of Alberta

We are working on a couple of initiatives right now. One of these is a request from the Alberta Construction Association (ACA) regarding post-election advocacy. They want us to distribute a simple scorecard to employees to have them keep a checklist of which candidates are most likely to protect jobs, lower tax burdens, add to quality of life, protect construction jobs and get Alberta oil flowing. Ideally, this input would flow back through employers to the PGAA and on to the ACA. An example of the scorecard is posted on the PGAA website in an article posing this question. We are awaiting member responses.

Jonathon Greenland has graciously stepped up to chair the 2019 PGAA golf tournament and to breathe a little life into it. We greatly appreciate Jonathon and we should all look for some communication on this early in 2019.

Architectural Glass and Metal Contractors Association

BILL 148: Our association is pleased with the Oct. 23 announcement by Premier Ford that his government will repeal this flawed piece of legislation. The Wynne Liberals introduced this controversial labour bill, which took effect Jan. 1. Our members had no problem with the minimum wage hike, but were very concerned with other aspects including the two paid emergency leave days, which had potential for rampant abuse, especially in a multi-employer setting such as ours. Our association lobbied Premier Ford and his minister of labour, Laurie Scott, and apparently our voice and indeed the voice of all our construction industry partners was heard.

COR: On Oct. 18, our association held a very informative breakfast seminar on Certificate of Recognition, or COR. COR is an IHSA national standard for workplace health and safety systems, and is a level contractors must achieve before being allowed to bid on projects in many jurisdictions in the GTA and beyond. Any interested members who were unable to attend are urged to contact us for further information.

CANNABIS: After becoming legal on Oct. 17, many of our members are struggling to update their company policies as they relate to cannabis in the workplace. Employers have the right to ban cannabis from their shops and jobsites, just as they have the right to ban alcohol. Please contact our office for more information, and for help in updating company policies.

More information about these topics can be found on our website, agmca.ca, and as always we can be reached by email at info@agmca.ca.

Our board of directors would like wish all our members a safe and healthy holiday season, and we look forward to a prosperous 2019!

Ontario Glass and Metal Association

FALL SEMINAR: The November seminar on demystifying the bonding process and Certificate of Recognition was hugely informative. The OGMA would like to extend our sincere appreciation to our presenters from bonding specialists, Petrela, Winter, and Associates, and COR trainers, 4S Consulting. Attendees picked up some critical information on bid bonding and how to comply with a critical safety standard.

BILL 148 REPEALED: In the August issue, we reported on the increase in Ontario's minimum wage as well as a long list of days off for employees that included 10 Personal Emergency Leave days per year, two of those being fully paid. Lobbying by numerous business groups was successful and the new PC government scaled back or cancelled many of these overly labour-friendly provisions.

ONTARIO "MODERNIZING" APPRENTICE SYSTEM: The government issued a press statement to notify their intention to remove many of the regulatory burdens on the apprenticeship system in order to increase entry into the trades. Part of the proposal includes winding down the Ontario College of Trades.

FenBC talks codes

The Fenestration Association of B.C. kicked off its enormously successful annual conference Oct. 24 at Surrey's Sheraton Guildford by recognizing four FenBC members who have been honoured this year in winning the Vancouver Regional Contractors Association (VRCA) 2018 Silver Awards of Excellence: Columbia Glazing Systems, Glastech Glazing Contractors, Phoenix Glass and Starline Windows.

This year marked the inauguration of The Code Talkers keynote panel who took a stab at decoding the ever-changing and sometimes conflicting building codes facing B.C. fenestration companies. "The Code Talkers is the brain child of David Goldsmith," said RDH Building Science's David Vadocz, chairperson of the FenBC Technical Committee. "It is our hope that these 'talkers' will join us at every conference. The talkers may change but the subject will always be the same: codes. It seems that every technical meeting or question we receive at FenBC is regarding codes. New or old, provincial, national or international they all seem to bear a degree of confusion. The real point of it is to bring out the coding issues, design issues and glazing issues."

"If a window is located within a wall, the window is considered part of the wall," said one Code Talker, Plygem's David Goldsmith. "Therefore, if the wall needs to meet guard rules and there's a window in the wall, unless it's above the guard height it needs to be capable of resisting guard loads." Which is why window suppliers in B.C. have to break the news to their customer that possibly all of the project's window lites, sometimes hundreds, need to have tempered glass in order to be able to meet guard loads. "This is very well understood in B.C. and it's not at all understood in Alberta," added Goldsmith.

Fire-rated glass is always a hot topic. Michael Keffer from Glassopolis provided an informative overview of the three forms of fire protection: passive, active, and education. Active fire protection is your sprinklers, extinguishers and shutter systems. Passive fire protection is actually glass, fire rated glazing, gypsum or intumescent paints. Passive protection controls the likelihood of ignition as well as growth, keeping flames contained in certain areas. Passive protection guards against fire, the gases and smoke. Active protection is actually where you have a physical and/or mechanical action to reduce the growth and spread of fire. Keffer told attendees that there are many benefits to passive fire protection. You do not have to depend on water or a functioning



communication network for those systems to work in containing the fire and keeping it to the point of origin. And passive protection systems don't require maintenance. Passive protection is a progressive system that actually reduces the likelihood of fire whereas active protection is reactive and does not activate until there is actually a fire. One of the problems with active protection is that most of the damage done in a fire is actually water damage.

Vadocz walked attendees through the CSA A500, which was developed to create a standard for materials, design, construction, testing and performance of building guards. Vadocz explained that the standard now provides clear direction for design and for construction of guards.

"CSA A500 eliminates the need for a top cap for free-standing glass with a stiff laminate interlayer," said Vadocz. "The new standard also addresses and defines balcony dividers. It talks about a post breakage design requirement and there's also risk assessment."

Vadocz added, "In the case of a conflict between the provisions of a standard and building regulations, the provisions of the regulations shall govern. What does that mean? That means that the CSA A500 has been accepted by the National Building Code of Canada but, here B.C., it has not been adopted by the B.C. Building Code or the Vancouver building bylaws."

According to Vadocz, should you choose to follow the CSA A500, it is a variance to the code which means an inspector could look at your free-standing, laminated glass balustrade with no top cap, as per CSA A500 standard, and say, "That's great. But that standard in this jurisdiction has not been accepted. Therefore, put a structural top cap on it."

"If you want what I would call the creme de la creme of guard rails, you would laminate heat-strengthened over heat-strengthened with a stiff interlayer," said Vadocz. "That's going to be your best."

— BY RICH PORAYKO

NSG TO OPEN NEW FLOAT GLASS PLANT IN OHIO

NSG Group has announced it has selected a location for its new glass production facility in the United States. The new plant will support the group's plan to expand production capacity of online TCO (transparent conductive oxide)-coated glass to support the growing solar market, as announced earlier in May 2018. The 500,000-square-foot facility will be located in Troy Township, Ohio, close to First Solar's Lake Township, Ohio, site. The area is commonly known as the Eastwood Commerce Center South. The site selection is pending approval of state and local incentive packages. Construction will begin in the spring of 2019 and it is expected the plant will be operational in the second half of 2020. The new float glass line is the first in the U.S. for the NSG Group since 1980.

"Our company has a rich tradition in the glass industry and strong roots in Ohio and we are pleased to expand our U.S. glass manufacturing here," said Richard Altman, regional director for Architectural Glass North America.

Vitrum opens new manufacturing facility

Vitrum Glass Group celebrated the grand opening of its new Calgary manufacturing facility in Rocky View County, Alta., located just 10 minutes north of Calgary's international airport, on Oct. 2. The new 65,000-square-foot facility currently employs 35 employees who manage and fabricate local orders for shower doors, railings, monolithic glass products and tempered glass. This highly automated facility currently houses a new tempering furnace with a capacity of 10,000 square feet per shift. The seaming equipment, CNC cutting, and edge polishing stations are highly automated, which allow Vitrum Glass Group to fabricate and finish a shower door in under five minutes. In-house fabricated products are being produced more rapidly than ever before with significantly less glass handling. In glass, this is important, as the more times glass is handled the greater the opportunity for damage or defects to occur. A state-of-the-art laminating line will be installed



in the very near future, with plans to have it producing laminated products for the spring of 2019. Vitrum Glass Group's full array of products continue to be available from the Langley, B.C., manufacturing facility, with most products shipping overnight (regular lead times apply). These include insulated glass units, heat-soaked glass, laminated glass, oversized glass, digitally printed, back painted glass, spandrel glass, curved glass and fire-rated glass as well as many other specialty glass types. Tours were hosted for clients and industry insiders in the

fully operating plant throughout the day by Vitrum Glass Group's branch manager, Brad Iverson. Other festivities included an official ribbon cutting by Vitrum Glass Group's president, Thomas Martini, and Vitrum Glass Group's CEO, Gemma Martini.

Thomas Martini stated, "This facility is a testament to our continued desire to service our clients in the most optimal manner. The Alberta and prairie market is an important one. Over time, our Alberta clients have continually supported us and we now look forward to contributing directly to the local market with enhanced services, even shorter lead times and industry leading quality."

Vitrum Glass Group would like to thank everyone who carefully navigated the roads to attend the event during an unseasonably early October snow storm. Their next event, to be held at the peak of summer 2019, should promise less snow, but that's one thing they weren't willing to guarantee.

WinDoor goes commercial in Quebec

WinDoor, Fenestration Canada's trade show taking place Dec. 5 to 7 at the Quebec City Convention Centre, will encourage architectural glass contractors and fabricators to attend with exhibitors and education sessions focused on the aluminum side of the industry in addition to the traditional lineup of residential window and door suppliers and educators. Working in partnership with the Quebec fenestration association, AVFQ, which serves both sides of the industry, Fenestration Canada will offer bilingual education sessions on such topics as fire-resistant glazing, new non-reflective glass treatments and other subjects of interest to those involved with storefront, curtain-wall and commercial windows and doors.

"WinDoor has always welcomed the commercial side of the business, but the natural differences between the sectors have made it hard to get everyone together in the same place," said Danielle Labrie of *Glass Canada*, WinDoor Committee co-chair. "With the event in Quebec, where they have a long history of effective partnership between both sides, we thought there was a great opportunity to get everyone together to find new ideas and opportunities. There's so much crossover in most companies these days that I think residential and commercial people probably have more to learn from each other than they think."



GPD seeks nominations for international award



The Jorma Vitkala Award of Merit was introduced at Glass Performance Days 2017 to recognize outstanding individual contributions to the glass industry. This prize was created for the GPDs 25th anniversary and Vitkala himself was the first recipient. GPD has announced its intent to continue this award for exceptional innovation and achievement in the development and application of glass. Future recipients will be screened through an international nomination procedure involving a selected group of media representatives. *Glass Canada* has been invited to participate in this process. The award will be presented to a new recipient every second year during the GPD opening ceremony. The nominee will be an outstanding contributor to the development of the international glass industry through innovative products, systems, construction, design or architecture. Nominations will be backed up by a brief description of the nominee's relevant merits and the final choice will be made by the nomination committee as a team.



by David Heska

David Heska, P.Eng. is a director with WSP's building sciences team in southwestern Ontario. He oversees the operation of the Hamilton, Kitchener and Windsor offices. David has been involved on window simulation projects as well as the design and replacement of windows in commercial and residential buildings. He can be reached at David.Heska@wsp.com

Low-E lowdown

The NHL season is in full swing, temperatures are falling and Canadians are getting ready for winter. At the same time, building owners are considering what projects may need to be completed in 2019 and preparing budgets accordingly. Projects for next year may include the replacement of a small number of insulating glass units or renewal of an entire curtainwall facade. Regardless of the project size, selection of the proper glass is critical.

There are many things to consider when replacing glass units. What is the thickness of glass required? What type of gas fill will be used? Will the glass be laminated, tempered, annealed or heat strengthened? What type of low-emissivity coating will be installed? And also which surface(s) will receive the low-E coating? This final question is the one that I'll consider briefly here.

I remember a few years ago arriving at a construction site only to have a very young foreman ask me, "Does it matter if I install the new glass with the sticker facing inward or outward?" To many of us this is a silly question; obviously, it matters. But why? Does it really matter if the low-E coating is on surface #2 or #3 for a double-glazed IGU?

First, let's state that a low-E coating is a metallic coating that minimizes the amount of ultra-violet and infrared light that can pass through glass without compromising the visible light that is transmitted. Surfaces are numbered from exterior to interior, with surface #1 always being on the exterior. For double-glazed IGUs, surface #4 is on the interior, but for triple-glazed IGUs it's surface #6.

A triple-glazed IGU with two low-E coatings has a U-value 15 per cent better.

THE ENGINEER

For double-glazed IGUs there is debate as to whether the low-E coating should be installed on surface #2 or #3. Regardless of which surface the low-E coating is on, the light transmittance and U-value of the unit will be the same. The benefit of installing the low-E coating on surface #2 is that the solar gain is absorbed by the outer pane and mostly rejected to the outdoors. As a result, the solar heat gain is reduced and the cost of air conditioning the building in the summer is reduced. The benefit of installing the low-E coating on surface #3 is that the coating absorbs incident solar energy and warms the inner pane of coated glass.

As a general rule for commercial buildings in most urban Canadian cities, the low-E coating should be on surface #2. This is because reducing solar heat gain and reducing cooling costs is a priority. Having the low-E coating on surface #2 also helps avoid overheating the south-facing parts of the building in the winter. If the HVAC mechanical systems are sophisticated enough that they can be tuned for different conditions, consideration may be given to installing the low-E coating on surface #3 on the north elevation. This is not popular on building restoration projects, but it is becoming more popular in new construction.

As the number of triple-glazed windows being manufactured increases, we are seeing more IGUs installed with multiple low-E coatings. Studies have shown that a triple-glazed IGU with two low-E coatings has a U-value 15 per cent better than the same IGU with only one coating. For triple-glazed IGUs the coatings are placed on surfaces #2 and #4 or #5.

So as you can see, multiple factors intersect to determine how your IG units should be coated. One design most definitely does not fit all, even within one project. In all cases, it's important for the engineer, manufacturer and owner to understand the orientation and daylighting of the building, how the glass is intended to function and the HVAC limitations. And, yes, if you install the glass backwards, it is installed wrong. •

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facts

Tighter energy standards drive appeal for fibreglass curtainwall.

by PETER DUSHENSKI,
managing director,
GlasCurtain

Recent advances in fibreglass reinforced plastics (also known as FRP, fibreglass composite or simply fibreglass) and the pultrusion process that manufacture them have only recently opened the door to exciting new uses for this material in a variety of applications. You are likely already familiar with FRP as a thermal break to replace conventional (and conductive) aluminum pressure plates with far more insulative composite material. This application of FRP has been used for over a decade in higher-performance aluminum curtainwall systems, but only much more recently has it been possible to pultrude an entire curtainwall mullion out of fibreglass. Over one million glass strands and a proprietary mixture of high-performance resins are required to make this 21st-century profile a reality. Since 2013, a fibreglass-framed curtainwall system has been commercially available – one made in Canada, no less. Pultruded as continuous lineals before being cut into stock lengths (up to 30 feet long) that are then fabricated to suit the project's design and installation requirements, there are a number of important advantages to FRP curtainwall frames, not least of which is price stability in a world increasingly characterized by tariffs and commodity fluctuations.

Of the five principle advantages of fibreglass-framed curtainwall systems the primary advantage is thermal performance, which we can further break down into conduction, convection and radiation. While we usually measure building envelope performance in terms of conduction, it is also useful to consider convection and radiation, particularly for the thermal comfort of occupants. After all, buildings are for people. Building owners and operators deploy far more capital on human resources than they do on the buildings themselves over the lifespan of the structure. In today's hyper-competitive labour market, even the tiniest advantage can help to attract and retain top talent, and a well-lit, thermally comfortable environment can make all the difference, particularly for the discerning Millennial generation now shaping the professional world. Convection is largely determined by the type of glass used. Low-E coated, argon-filled triple-glazing results in an air speed across its surface of 0.73 meters per second compared to a very drafty-feeling clear double-glazing at 1.39 meters per second. The curtainwall framing material plays more of a role in terms of radiation, with FRP being substantially less emissive than aluminum. Not that this will be news to any Canadian who has ever huddled away from a cold restaurant curtainwall when the mercury plunged in December. In terms of conduction, however, which is what energy codes and energy models primarily consider, fibreglass-framed curtainwall can readily achieve overall system U-values of 0.85 (R6.7) using the same glazing that high-performance aluminum systems use to achieve no better than 1.3 (R4.5). This delta is a simple material function. Fibreglass is a lot less conductive than aluminum, greatly reducing the thermal bridge that conventional curtainwall frames suffer from.

The second advantage is the ability of fibreglass to resist corrosion, which has obvious benefit in high-humidity or industrial environments. This is why we see FRP used extensively in marine applications. An attendant benefit of not requiring anodizing (as aluminum does to obtain its corrosion-resistance) is that span-limiting anodizing tanks are also not required for fibreglass. As such, FRP mullions can readily be pultruded and installed in lengths up to 30 feet, meaning that complicated and unsightly stacking and tower joints are only required on vertical mullions every two or three storeys.

The third advantage of FRP is a reduction in environmental impact and carbon footprint relative to aluminum. Often this is referred to as embodied energy, and fibreglass has 60 per cent less

embodied energy than an equivalent profile of aluminum. This is due in part to differences in the manufacturing process of the respective designs. FRP is pultruded by drawing up to a million glass strings through a hot bath of resins. Then the coated threads are pulled through a heated die in a continuous process that is limited only by the length of the spooled glass strings. Aluminum extrusion manufacturing requires an incredible amount of pressure to transform solid ingots of material into a slender profile by pushing it forcefully through a die. The lion's share of the difference in environmental impact and carbon footprint, however, is in the manufacturing of virgin aluminum ingots. While some recycled aluminum is incorporated into new curtainwall mullions, on average it's only 17 per cent. A lifecycle assessment completed by the Athena Sustainable Materials Institute determined that FRP curtainwall profiles contribute 60 per cent less to global warming, 50 per cent less to acidification, 40 per cent less to smog and 10 per cent less to eutrophication when compared to aluminum.

A fourth advantage is in the expansion

and contraction of fiberglass relative to the glazing. Unlike aluminum, with a linear temperature expansion coefficient of 21 to 24 per unit of length and temperature, plate glass and fiberglass framing expand and contract with the same coefficient of expansion of about nine. This benefit results in gaskets that last longer and seals that are more durable than those in aluminum systems

The fifth advantage of FRP is the esthetic experience. Readers can of course decide for themselves at one of the eight completed fiberglass-framed curtainwall projects located in Edmonton, Calgary, Red Deer, Slave Lake, Winnipeg and Iqaluit, but your author is smitten. Better still, painting the mullions is readily accomplished at modest cost, allowing for a near-infinite colour range for designers. Fiberglass-framed curtainwall systems are also designed to accommodate FRP pressure plates and conventional aluminum caps, which allows for the usual range of anodized aluminum colour choices for the exterior caps while protecting the fiberglass from ultraviolet light.

Where can these five primary ad-

vantages be put to best use? Fiberglass framing works well for institutional, government and corporate projects with demanding owner-occupiers where envelope performance and returns on human capital are top priorities. The exclusively triple-glazed, exclusively stick-built, fiberglass-framed curtainwall systems out there now are not going to win race-to-the-bottom bidding wars against the double-glazed aluminum systems that make up the bulk of the market in the low- to mid-rise segments and utterly dominate the high-rise segment. That said, the new energy step codes in place in some Canadian provinces (B.C., Ontario) require better thermal performance from their glazing systems and will become dramatically more demanding in the next decade. Projects seeking certification from LEED, Living Building Challenge, WELL Building Standard, Passive House or other stringent performance standards would do well to consider fiberglass-framed curtainwall systems for their superlative thermal performance and comfort, low environmental impact, and competitive price point in the segment. Compared to curtainwall systems with similar thermal performance to that offered by FRP-based systems, European options such as Raico Therm Plus, Schuco FW 50 Plus, and Reynaers CW 50-HI are offered only at much higher price points, upwards of double what high-performance curtainwall systems can sell for in North America. Sales and technical support for these sophisticated European systems are also an ocean away.

Still, fiberglass-framed systems are not a magic bullet and they are not the best choice for every application. Multi-family residential and retail, for example, may be better suited to window wall or lower-performance curtain wall to satisfy the budget-oriented needs of these types of buildings. High-rise buildings or buildings on very tight construction sites are better served by metal-framed curtainwall because they require unitized systems, of which there are currently none using FRP. Fiberglass framing is also not suitable for buildings requiring blast ratings, hurricane-resistance ratings, fire ratings, non-combustibility ratings, or such designs as skylight frames and four-sided structural silicone glazing. Some of these limitations will be overcome with future advances, but some simply cannot due to the material properties of

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FRP, such as fire ratings and non-combustibility ratings. That said, while fire ratings and non-combustibility ratings are beyond FRP's scope, this does not necessarily preclude fibreglass-framed curtainwall from being used on buildings requiring non-combustible envelopes. The Canadian National Building Code makes allowance for otherwise combustible materials to be used as if they were non-combustible if the buildings are a) sprinklered throughout, or not more than three storeys in height; b) use appropriate interior thermal barriers; and c) the combustible materials conform with the criteria laid out in CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies." Recently, this stringent test was achieved by GlasCurtain and we are unaware of any other FRP curtainwall systems that have achieved this rating.

Another limitation of FRP is the cost of new pultrusion dies and the impact of this on project-specific customization. While aluminum extrusion dies can be cost-effective to customize for a single project, permitting several custom dies to be reasonably absorbed by a larger project with unique design requirements, pultrusion dies are more expensive and it may therefore be cost-prohibitive to customize more than one new FRP shape, even on larger projects.

So these are the more measurable pros and cons of FRP curtain wall systems, but what about the nuts and bolts?

For fabrication, compared to aluminum, additional precautions must be made to handle the dust created when cutting fibreglass stock lengths. Although fibreglass dust is not toxic or carcinogenic, it is an irritant. As such, full-body personal protective equipment is required for cutting the stock lengths, though only breathing masks and eye protection are required when notching and attaching spigots.

For installation, additional care and attention is required due to the added weight and size of the fabricated mullions. Not only are the mullion walls of fibreglass framing thicker and heavier than comparable aluminum ones, but the pieces can also be longer because of the aforementioned corrosion resistance and lack of need for smaller lengths to fit inside anodizing tanks. Failure to handle longer pieces of fibreglass from both ends can result in cracking. As such, ropes, ratchets, straps, hoisting equipment and more-patient-than-average

installers are important to protect the material from damage. Furthermore, the pull-out and shear values of fibreglass are lower than those of aluminum, requiring a "measure twice, cut once" approach to screwing into the material because the same hole, once screwed into, cannot be reused. That said, there are overall far more similarities than differences when installing fibreglass-framed curtainwall and experienced installers might even enjoy the new challenge. Hey, why not? Learning is fun!

As to structural performance, there is little edge to give or take between fibreglass-framed curtainwall and aluminum curtainwall. Both handle wind loads and dead loads comparably and both can be reinforced with high-strength steel internally for added stability and greater wind load resistance.

As to air/water ingress performance, fibreglass-framed curtainwall receives top marks under ASTM E283 and E331, with negligible air infiltration observed at 300 Pascals, only 0.52 air exfiltration observed at 300 Pascals and negligible water penetration observed at 720 Pascals. These are best-in-class figures.

Long-term air/water performance is expected to be better than aluminum as well due to the expansion and contraction characteristics described above, as seen with the fibreglass-framed punched openings that have been on the market for decades now.

Lead times are competitive as well, with pultrusion taking three to six weeks and fabrication taking two to four weeks. While painting of the FRP frames is not required - the dyed material is UV-resistant without further protection - factory-applied spray paints are available and add two to four weeks to lead times with only a nominal increase in cost.

While still not suitable for every application, the early success of fibreglass-framed curtainwall systems shows just how well they are adapted to life in the Great White North. •

Peter Dushenski, BSc, BEH, CPHI(C), is the managing director of GlasCurtain. The Alberta-based firm has completed eight projects across Canada with many more in the pipeline. GlasCurtain is Canada's only manufacturer of fibreglass-framed curtainwall systems.

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Much like Canada, Finland experiences long and harsh winters. Days are short and in the northernmost parts of the country temperatures can drop as low as 50 C below zero. You know it just as well as we do, when weather conditions get tough, solutions have to get creative. Finnglass has more than 30 years' experience in providing innovative, custom-made structural glass facades and window solutions suitable to withstand frigid climates with a leading-edge innovation: electrically heated glass.

Electrically heated glass eliminates the uncomfortable "cold wall effect" caused by convection and manifested by drafts and cold radiation experienced when close to traditional, non-heated glass walls and windows. It provides an energy-efficient way to enhance the comfort and utility of indoor spaces by eliminating space-consuming heating devices, such as radiators or fan coil units, usually installed all along the base of glass walls. Removing such devices releases space for operations, which can be used for workspace in offices or more tables in restaurants. Heated glass can cut down

construction costs of new buildings and offer energy efficiency and a modern look to old buildings. Before getting technical about how these can be achieved, let's have a look at how this technology has benefitted real-life projects.

Glass igloos

The glass igloos at Kakslauttanen are a prime example of how Finnglass helped a Finnish entrepreneur realize his vision of transparent accommodations to drive tourism for northern lights above the Arctic Circle. Finnglass manufactured electrically heated glass panes mounted on tailor-made steel frames to achieve unobstructed views of nature while providing the utmost comfort.

Before finding the perfect solution, we considered insulated glass without heating and insulated glass with electric heating only on the interior glass, but both had their problems. With insulated glass without heating, water condensed on the glass, froze and collected snow on the outside. In addition, the glass radiated cold inside and did not provide sufficient comfort. When we added heating on the

interior glass, we achieved comfort, but the outside surface of the glass globes still had to be brushed and scraped manually, which would have generated labour costs and breached the privacy of customers inside the igloos.

The perfect solution was found in installing electric heating on both the interior and exterior panes of the triple-glazed glass. This way we achieved comfort indoors and had snow and ice melt on the outside surface. The interior glass is heated to just one or two degrees higher than room temperature, eliminating all sensation of the cold wall effect. Thanks to smart sensors, heating on the exterior glass is on only when it snows, making it energy-efficient and highly reactive to changing weather conditions. Electrically heated glass is the only architectural solution that can prevent condensation and convection, provide unobstructed views at all times and maintain customer comfort even if the outside temperature drops 15 degrees in less than an hour.

Construction costs increased with the use of heated glass, but the investment paid back within a year thanks to the international attention brought by the incredible comfort in Arctic conditions that led to a new, very profitable business. Pictures of the Arctic resort have been viewed online over a billion times.

Comfort and safety in high altitudes

Josef Gartner (a Permasteelisa company) contracted Finnglass to manufacture glass for Mercury City Tower's crown. At 338 meters, it is the second-tallest skyscraper in all of Russia and Europe, situated in Moscow. Sloped roofs were built by Yuanda, also using Finnglass products. Again, cold climate played a role in challenging energy efficiency, indoor conditions and health and safety. Weather conditions called for heating on both the interior and exterior glass, which Finnglass provided to meet requirements.

Electrical heating on the interior glass brought comfort indoors from glass wall to glass wall. It optimized the utility of the indoor space without the need for additional space-consuming radiators or fan coil units in proximity to the glass to prevent convection.

When constructing skyscrapers in cold climates, the prevention of ice and snow build-up on rooftops is crucial in ensuring the safety of all people around. Snow and ice must be melted with heating on exterior glass to prevent it from falling to the street from over 300 meters above. We built roofs with sensors to detect snowing, which turned the heating on to melt the snow. Water from the melted snow and ice is directed to gutters, also featuring heating, to ensure that

the water gets all the way down without freezing on the way, blocking passageways. Since the heating is on only when it snows, costs are minimized, windows are kept unblocked and daylight gets in.

The secret is in the coating

Electrically heated glass differs from normal glass both in structure and features. In the example provided, the window consists of two tempered glass panes with the interior glass installed with heating. However, heating can also be installed on the exterior glass, or even both, depending on customer requirements, climate and conditions. Both glass panes feature low-E coating, but in the example, only the interior coating is connected to electricity, making it a heating coating. Low-E coating acts as a uniform resistance element warming the glass evenly all across the pane.

The second low-E coating on the exterior glass reflects escaping heat back towards the indoor space. According to a study by the Technical Research Center of Finland, 100 per cent of electric power is converted to heat when using heated glass and over 90 per cent of that heat can be directed indoors, making heated glass superior in efficiency to any other system or technology.

The edges of the interior glass pane have electrode strips, which lead electric current from a highly flexible double-insulated cable to the heating coating. The glass panes have air or argon in between and are held together with a sealant. Standard polyurethane sealant is used for glazing window solutions and silicone sealant for structural glazing. The use of point fixations is also possible for structural glazing. With Finnglass's technology, even shaped glass can be installed with heating to warm uniformly without transformers, saving on investment, usage and energy costs.



Heated glass by the numbers

There are no wires crisscrossing the glass. Instead, electricity is conducted through a low-E coating. The only way to tell that the glass is electrically heated is that it is always clear, even in cold climates. The example illustrates a double-glazed window, however, triple-glazing is predominant in Finland.

U-factor: standard: 0.5 to 1.0 W/m²K

Efficiency: over 90% of heat produced directed indoors

Comfort heating consumption: 20 to 30 W/m²

Snow melting cost: less than one Euro/m² per year in Finland

Power: zero to 700 W/m²

Voltage: zero to 400 V

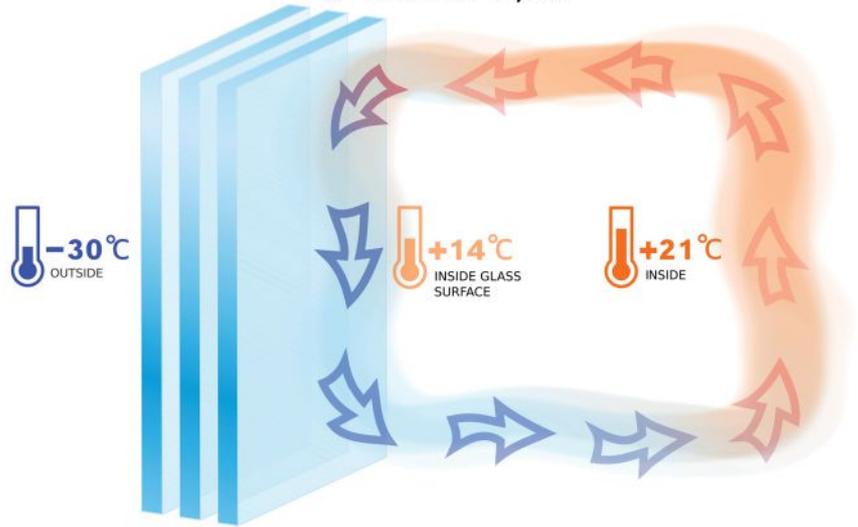
U-VALUE 0,90

Energy-efficient comfort

To heat glass just enough to prevent convection and cold-wall effect consumes only 20 to 30 Watts of energy per square meter of glass. When convection and cold radiation asymmetry are eliminated, the room temperature can be lowered without compromising comfort.

We showcased increased comfort with our cold-wall effect simulator at the semi-annual Glasstec trade fair that took place in Düsseldorf, Germany, in October. Visitors were astonished at the incredible difference in comfort when standing next to heated glass with a U-factor of 0.5, compared to normal insulated glass with the same U-factor.

Another typical problem is condensation on the surface of the glass. The key here is to warm glass right above its dew point. When heating is installed on the exterior glass, it prevents condensation, ice formation and snow build-up. When heating is installed on the interior glass, it can be used in humid environments such as swimming pools to prevent condensed water from leaking into structures, causing damage. •



Convection is caused by the air temperature close to windows being lower than room temperature. Cold air descends, moves across the floor and rises back up, causing a sensation of draft and cold radiation. With our product, glass is heated one or two degrees higher than room temperature, stopping convection, draft and cold wall effect.

About the author

Finnglass has over 30 years of experience in developing and manufacturing electrically heated glass for structural glass facades and window solutions to achieve comfort and beauty in the face of the most challenging

climates and conditions. Technical solutions are designed and tested using unique simulators and highly advanced analysis tools developed in collaboration with leading universities. For more information, visit finnglass.com

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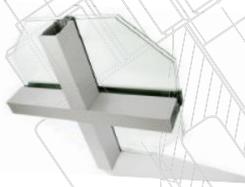
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Do we need Canadian standards?

Despite a previously robust system for development of standards in Canada, the federal government's current cost-recovery policy for standards development could be endangering the future of Canadian standards. In prior years, the Canadian government underwrote all costs for standards development, except direct costs such as travel and translation. In the case of the CAN/CGSB 12.8 standard, the direct costs were funded by the Insulating Glass Manufacturers Association of Canada. In 2002, the Canadian government shifted to a cost-recovery policy of developing and maintaining only standards for which all costs were fully underwritten by the sponsoring industry.

As a result, the cost to industry for maintaining and/or developing Canadian standards has increased dramatically. In 2002, IGMA approached the Canadian General Standards Board to exercise a memorandum of understanding between CGSB and ASTM (the American equivalent) to designate the new insulating glass standards as a dual-designated standard bearing both the CGSB and ASTM designation. IGMA was extremely disappointed when CGSB advised us they no longer were participating in the memorandum with ASTM and that harmonizing the new insulating glass standard would require \$114,000 in funding.

Fast forward to today. IGMA has learned that CGSB is now seeking funding from industry to do two things: administer the Canadian ISO committees (for all types of glass standards) and maintain the secretariat of the Canadian glass standards. Currently, Canada is an active participant at ISO, the International Standards Organization. Canada's participation at this level allows Canada to vote on ISO standards and to have input into these international standards with the

With respect to glass standards in Canada, most standards have been withdrawn.

IGMA

intent of opening markets and reducing artificial trade barriers. CGSB is seeking funding of \$10,000 from industry to remain the ISO administrator and for Canada to maintain active participation status and a vote at ISO, or \$4,000 to participate in ISO as an observer, which would allow access to documents but no vote for Canada on ISO standards. Without this funding, Canada will lose any influence it may have on ISO standards.

With respect to glass standards in Canada, most glass standards have been withdrawn. Only five glass standards are currently effective, subject to review every five years: safety glazing, flat sheet glass, flat float glass, heat absorbing glass and insulating glass units. Because CGSB will only review and maintain the standards if industry provides the funding for them, the above standards are in danger of being withdrawn once the review period passes. In addition, some industry members have expressed interest in revising standards for spandrel glass and structural design of glass for buildings. Those standards would require funding of approximately \$56,000 and \$85,000, respectively. Funding for maintenance of any glass standards is well beyond what IGMA alone can provide to CGSB. If Canadian glass standards are to be maintained, a different funding mechanism must be developed.

IGMA would like to determine if there is industry interest in maintaining the Canadian glass standards and in maintaining Canada's active participation at ISO. If the glass industry expresses strong interest, then industry-wide discussions could be launched on possible funding mechanisms that spread the cost across many companies, maintaining affordability of support, especially for the continuation of Canadian glass standards.

It has been difficult to gauge the interest of Canadian industry in maintaining or revising Canadian standards. ASTM and ANSI standards already are increasingly referenced in the National Building Code of Canada. In order to determine if there is interest in maintaining Canadian glass standards, or simply relying on the ASTM and ANSI processes for glass standards development in North America, IGMA has developed a survey. Please take five minutes now to complete the survey and express your view on industry support of the continuation of Canadian glass standards. The survey can be found at igmaonline.org/certification/igma-canadian-codes-survey. The survey will be open until mid-December and the results will be published to the IGMA website. •

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Corners in any material

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LiSec has completely redesigned the BSV-B45NK bending machine to accommodate the new developments in spacer materials. Previously used technology for spacer bending has been further refined, allowing familiar spacers as well as new products to be bent for top quality. A new function of the bending machine is the integration of zero-radius corner technology. In addition to the familiar bent corners, spacers can now also be processed with this technology. LiSec has successfully brought to serial maturity a newly patented process, which allows tension-free, material-displacement manufacturing of 90-degree corners. The highlight of the zero-radius technology, which LiSec has developed specially for fibre-reinforced spacers, is the self-stiffening corner. It produces a dimensionally stable and perfectly formed 90-degree angle. A further advantage of this technology is the maximized butyl application area in the corner. The zero-radius corner uses fibreglass-reinforced plastic spacers. The bending process is supported by a robotic arm. Processing of aluminium, steel, stainless steel, hybrid and fibreglass-reinforced profiles is possible with easy operation via touchscreen. The BSV-B45NK can produce shapes appearing in the LiSec shape catalogue. It uses a six-, eight- or 15-slot profile magazine.



Automate the big stuff



bystronic.com

The B'Jumbo XXL insulating glass production line from Bystronic glass measures 165 metres long and can automatically produce insulating glass up to 18 metres long, 3.3 metres high and a weight of up to 10 tonnes. Equipped with an edge-deletion robot, a glass plate washing machine, a turning

station, six inspection and frame positioning stations, five assembly, gas-filling and press robots, a sealing robot and numerous conveyor belts, the B'Jumbo XXL is a complete line. Maximum individual glass thickness is 60 millimeters with an allowable package thickness for double or triple IG units of 150 millimeters. The integrated turning station can turn glass measuring up to 12 metres in length. The semi-automatic frame positioner can be used to position spacers measuring 18 metres onto the glass. In addition to rectangular formats, the machine is also able to produce all shaped formats as well as free shapes in accordance with the Bystronic glass shape catalogue. Despite the large dimensions, the line can be installed on a standard industrial floor so that special foundations are not required. The B'Jumbo XXL can also be used to produce up to four-sided stepped double or triple insulating glass units. In doing so, the maximum frame setback on the fourth step is 250 millimeters, up to 1,000 millimeters on the first step on the front edge of the glass and there are no dimension limits whatsoever on the second and third steps. Kinetic energy generated during the line's braking processes is transformed into electrical energy then fed back into the system and distributed to the axles to save energy. The semi-automatic frame-positioner eliminates the human effort needed to place large-format spacer frames, automatically positioning them in the station and using grippers on the upper bar to

automatically press the upper edge of the frame onto the glass. The integrated Jumbo'sealer XXL sealing robot uses a dynamic mixing system at reduced material pressures. With a flow rate of up to six litres per minute, it makes the utmost material volume available. The Jumbo'sealer XXL is able to seal even deep spacer setbacks on rectangular units and shaped formats considerably quicker than other robots. The automatic material-changing system allows for operator-free changing of the sealing material – from polysulphide to silicone, for instance – inside of two minutes.

Handles non-planarity

forelspa.com

The market is moving more and more towards insulating glass with higher quality as well as large sizes. In response, Forel has developed its new Jumbo line for insulating glass, aimed at the production of glass for facades and special glass types with particular and dedicated requirements and construction features. The result of this project



is a line from Forel with improved performance and features in terms of weight, thicknesses and compensation for non-planarity of the processed glass sheets, aligned or stepped. The line is able to adapt itself to glass sheets that are not perfectly flat by as much as centimeters. Made up of a loading area, a coating removal station, a washing machine, an inspection and frame-mounting area, a 180-degree glass turning section, an assembling press with gas filling (argon and krypton) and an automatic sealer, the line was designed and built following a precise list of aims to be achieved. It can process single glass sheet of up to 40-millimeter thickness and insulating glass up to 100 millimeters. This requires a load capacity for finished products of up to 550 kilograms per linear meter. Structural stepped units can have a vertical offset of up to 250 millimeters and a leading horizontal offset of up to a meter. Processing of bowed glass up to 2.5 millimeters per linear meter is possible (adding up to 15 millimeters on six meters' glass length). The sealing unit has the flexibility to use three different materials with a high continuous material flow rate of four litres per minute. Stepped units are assembled with the smaller glass in the front and unloaded via a dedicated glass unloading section.



Fast and full of features

gedusa.com

The Intercept i-3 from GED allows for just-in-time production in the order required without operator errors. It also eliminates internal muntin grid misalignment with precise notching and snap-in muntin clips. Users can produce spacers at a rate of up to 95 feet per minute (eight spacers per minute without muntins). Automatic width adjustment on all elements of the system gives fabricators lean manufacturing and flexibility while providing accurate, consistent high quality throughput with no manual intervention. Patented technology ensures the integrity of the fourth corner is identical to first three corners for a consistent product. The 10-station material uncoiler with automatic width adjustment uses a one-piece flow design to provide a spacer width changeover in as quick as 30 seconds.



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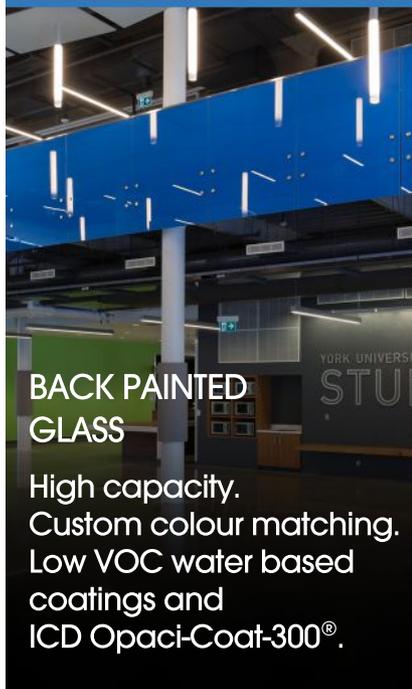
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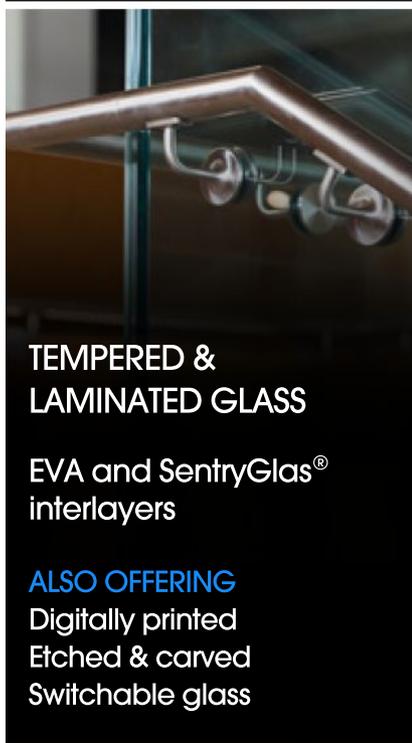
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Interface to any software

thermosealgroup.com

Warm edge spacer bar bending machines from Thermoseal are designed to reduce waste and improve productivity. They can bend aluminum and warm edge spacers creating triangle, pentagon, trapezium, a mix or any specific shapes desired. The machine has two corner finish options with the same bend tool: one for a traditional bend finish with a dished corner, and another to simulate a corner key joint on plastic spacer bars. The machine can optimize up to 500 different measures of work, considering the type, colour and width of spacer. The program can be interfaced with most glass cutting optimization programs, for instance, Perfect Cut, Optima, and Albat-Wirsam. Gas drilling is selectable and automatic.



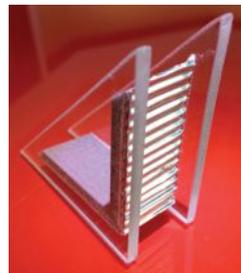
Cycle time on Thermobar is approximately 35 to 45 seconds dependent on the size of the spacer frame and the type of spacer, inclusive of cycle time for joining the ends together. The bending machine can bend four corners or three corners (cycle time quoted is for three bent corners). The system virtually eliminates waste spacer bar and uses only one standard corner key per frame (or a gas key if manual gas filling is required). Automatic loading and joining is possible using a straight steel connector. Workable spacer sizes are 200 by 280 millimeters minimum and 1,500 by 2,450 millimeters maximum, though larger sizes are workable in two steps. The software link is bespoke to run with whatever software

the buyer is already using. Data can be sent over a LAN, Wi-Fi or memory stick and an inkjet printer can be fitted if required. A gas-hole drilling option is available.

No silicone

glasslam.com

WorldSpacer flexible spacer is a flexible polyurethane tape spacer that provides superior warm-edge performance for insulating glass production. Worldspacer is a stainless steel, polyurethane flexible warm edge insulating glass spacer that holds heavy glass for commercial IG with excellent warm edge performance. It produces no outgassing of process oils and clean sightlines with an excellent moisture and gas barrier. Precision sizing is achievable from five to 50 millimeters. The stainless steel design provides excellent adhesion to all sealants. It may be used on automated lines or with hand applicators. WorldSpacer creates no silicone contamination inside the insulating glass units or on the moisture barrier.



Instant gas testing

sparklike.com

Sparklike Handheld devices enable non-invasive analysis for standard double-glazed insulating glass units. The device is portable and battery-operated, making it practical and quick-to-use with a measurement time of two seconds. The Sparklike Handheld (formerly known as the Gasglass Handheld) has become widely accepted for non-invasive measurement and used by IG manufacturers, window and door manufacturers, testing laboratories, building quality inspectors and construction consultants worldwide. The Handheld is a practical and quick method to test IG gas concentration. The technology is based on plasma emission spectroscopy. A high-voltage spark is launched into the IG unit's cavity causing a light emission that is observed and analyzed further. Thanks to its small size, it is easy to get a fast reading of gas concentration, whether it's argon or krypton. The user can simply place the device against the unit, press the button and receive an instant result with high accuracy. The machine dimensions are just 265 by 190 by 90 millimeters, with a weight of 2 kilograms.

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Kawneer
Metro Aluminum
RPM
ZZ Construction

EXTRUSIONS/ PULTRUSIONS

AkzoNobel Coatings
Alumicor
Apex Facade Systems
C.R. Laurence
Commdoor
Eclipse Architectural
Metro Aluminum

FIRE RATED METAL PRODUCTS

AkzoNobel Coatings
Euroverre
FI Glazing Solutions
Glassopolis
RPM
SAFTI FIRST
Spandrel Tech
Technical Glass Products
Vetrotech

FLASHING

Metro Aluminum
Rimac
RPM
Spandrel Tech
ZZ Construction

PREFORMED ALUMINUM WALL PANELS

Spandrel Tech

SLOPED GLAZING SYSTEMS/SKYLIGHTS

Alumicor
Bravura
Kawneer Co. Canada
Kawneer
Metro Aluminum
RPM
Stella
Technical Glass Products

STRUCTURAL GLAZING SYSTEMS

AkzoNobel Coatings
Alumicor
C.R. Laurence
Eclipse Architectural
J.E. Berkowitz
Kawneer Co. Canada
Kawneer
Metro Aluminum
Stella
Technical Glass Products
Verrage

SUNSCREEN SYSTEMS

C.R. Laurence
Eclipse Architectural
Metro Aluminum
SIL Plastics

SEALANTS**BUTYL**

C.R. Laurence
Construction Distribution & Supply
Distribution Pièces Expert
Haseda Holding
SALEM
Sika Canada
Tremco Canada

GASKETS

C.R. Laurence
Cooper Standard
Eclipse Architectural
Fireprotect Chester
Frank Lowe
IMSENT
Intertex Textiles
Renko Rubber
Tremco Canada

HOT MELT

C.R. Laurence
Haseda Holding
RPM
Sika Canada
Tremco Canada

POLYSULPHIDE

Haseda Holding

POLYURETHANE

C.R. Laurence
Construction Distribution & Supply
Cooper Standard
Distribution Pièces Expert
Eclipse Architectural
SALEM
Sika Canada
Tremco Canada

SILICONE

Accurate Glass Products
C.R. Laurence
Construction Distribution & Supply
Cooper Standard
Distribution Pièces Expert
Eclipse Architectural
Haseda Holding
Hi-Tech Energy Windows
Renko Rubber
SALEM
Sika Canada
Tremco Canada
Verrage

TAPE/GLAZING

Accurate Glass Products
C.R. Laurence
Construction Distribution & Supply
Distribution Pièces Expert
Eclipse Architectural
Fireprotect Chester
Frank Lowe
Hi-Tech Energy Windows
Intertex Textiles
SALEM
SIL Plastics
Tremco Canada
Verrage

TAPE/MUNTIN MOUNTING

Aribell
C.R. Laurence
Distribution Pièces Expert
Eclipse Architectural
Frank Lowe
SIL Plastics

SERVICES**ANODIZING/PAINTING**

Alumicor
Apex Facade Systems
Kawneer Co. Canada
Kawneer
Verrage

BENDING, GLASS

J.E. Berkowitz
Tri-Temp Glass
Verrage

BEVELLING, GLASS

Hartung Glass
Kits Glass
Verrage

BUSINESS COMMUNICATION/ MARKETING SERVICES

glasstec/Messe Düsseldorf
Mainstreet
RPM

DIAMOND WHEEL

REDRESSING
Glassline Corp.

DIGITAL-BASED GLASS DECORATION

Hartung Glass
Verrage

DRILLING, GLASS

Accurate Glass Products
Hartung Glass
Security Glass Products
Tri-Temp Glass
Verrage

EDGING, GLASS

Accurate Glass Products
Hartung Glass
J.E. Berkowitz
Security Glass Products
Tri-Temp Glass
Verrage

FINISHING

Accurate Glass Products
American Renolit
Caldwell
Verrage

HEAT SOAKING

J.E. Berkowitz

LASER CUTTING

Laser Magic

MACHINERY REPAIR

JSA Machinery
SALEM

METAL BENDING/ STRETCHING

Klaas Swaving
Rimac
Spandrel Tech

METAL CUTTING

JSA Machinery
Klaas Swaving
Rimac
RPM
Spandrel Tech

METAL PUNCHING

Rimac
RPM
Spandrel Tech

PROFESSIONAL ENGINEERING/ CONSULTING

Building Envelope Engineering
Glassline Corp.
Keller Engineering
Pro-Active Fenestration Solutions
Prohaska Engineering
RPM
UL CLEB
Veridis
WSP

ROLLFORMING

Rimac
RPM
Spandrel Tech

SANDBLASTING

J.E. Berkowitz
Kits Glass
Tri-Temp Glass
Verrage

TESTING LABORATORIES/ SERVICES

CAN-BEST
Pro-Active Fenestration Solutions
UL CLEB
Veridis
WSP

THERMAL IMAGING

CAN-BEST
Veridis

SUPPLIES & HARDWARE**ABRASIVES**

C.R. Laurence
Construction Distribution & Supply
Distribution Pièces Expert
SALEM
Turtools

ADHESIVES

C.R. Laurence
Distribution Pièces Expert
Fireprotect Chester
Frank Lowe
Haseda Holding
Lothar's
SALEM

ARCHITECTURAL METAL PAINTS

AkzoNobel Coatings

COOLANTS/LUBRICANTS

C.R. Laurence
INT Machinery
SALEM

CURTAINWALL ANCHORS/ FASTENER SCREWS

C.R. Laurence
IMSENT
Spandrel Tech

DECORATIVE GLASS SUPPLIES

Aribell
C.R. Laurence
Hi-Tech Energy Windows

DECORATIVE STRIP/ GRILLS/ACCENTS

Aribell

GLASS CLEANING

C.R. Laurence
Construction Distribution & Supply
Distribution Pièces Expert
SALEM
Verrage

GLASS SHOWCASE

Accurate Glass Products
C.R. Laurence
Distribution Pièces Expert
Kooiman Industries
Verrage

GLAZING TOOLS

C.R. Laurence
Construction Distribution & Supply
Distribution Pièces Expert
Hi-Tech Energy Windows
INT Machinery
SALEM

INSULATION

Frank Lowe
Hi-Tech Energy Windows
Intertex Textiles

MIRROR HARDWARE

Accurate Glass Products
C.R. Laurence
Distribution Pièces Expert
IMSENT
Verrage

MIRROR MASTIC

Accurate Glass Products
C.R. Laurence
Construction Distribution &
Supply
SALEM

POLISHING COMPOUNDS

C.R. Laurence
SALEM
Turtools

SAFETY EQUIPMENT

C.R. Laurence
Construction Distribution &
Supply
Intertex Textiles
JSA Machinery
SALEM

SEALANT/ADHESIVE DISPENSING EQUIPMENT

C.R. Laurence
Construction Distribution &
Supply
Haseda Holding
SALEM

SETTING BLOCKS/SHIMS

Accurate Glass Products
C.R. Laurence
Construction Distribution &
Supply
Cooper Standard
Distribution Pièces Expert
Fenewood
Frank Lowe
Renko Rubber
SIL Plastics

SHELVING/TABLE CONNECTORS

C.R. Laurence
RPM

STIFFENERS, STEEL

RPM

WEATHERSTRIPPING

AmesburyTruth
Aribell
C.R. Laurence
Construction Distribution &
Supply
Cooper Standard
Distribution Pièces Expert
Elton Manufacturing
Fenewood
Frank Lowe
IMSENT
Renko Rubber
Verrage

WINDOW PROFILES

ALUMINUM

Alumicor
C.R. Laurence
Commdoor
Distribution Pièces Expert
Eclipse Architectural
Everlast
Kawneer Co. Canada
Kawneer
Metro Aluminum
SAFTI FIRST
Slide Clear
Standard Aluminum Products
Verrage
York Aluminum
ZZ Construction

FIBERGLASS

Metro Aluminum
REHAU

PVC/VINYL

Distribution Pièces Expert
Everlast
Hi-Tech Energy Windows
Integral Window Systems
Laurelwood Millwork
Millcraft
REHAU
Vi-Lux
Westend
ZZ Construction

WOOD

Aribell
Eclipse Architectural
Fenewood
Laurelwood Millwork
Millcraft
ZZ Construction

WINDOW STYLES

DOUBLE-HUNG

Alumicor
AmesburyTruth
Bonnechere Valley Windows
C.R. Laurence
Caldwell
Euro Vinyl Windows and Doors
Everlast
Global Windows and Doors
Kawneer Co. Canada
Kawneer
Metro Aluminum
REHAU
SIL Plastics
Strassburger
Westend
York Aluminum

DRIVE-THROUGH

Alumicor
C.R. Laurence

EXTRUCTIONS

Alumicor
AmesburyTruth
Commdoor
Eclipse Architectural
Hi-Tech Energy Windows
Metro Aluminum

FIRE RATED

Hi-Tech Energy Windows
SAFTI FIRST
Technical Glass Products
Vetrotech

FIXED

Alumicor
Bonnechere Valley Windows
C.R. Laurence
Commdoor
Everlast
Global Windows and Doors
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Metro Aluminum
Millcraft
Obata Studios
REHAU
Strassburger
York Aluminum

HISTORIC RETROFIT

Bonnechere Valley Windows
Kawneer Co. Canada
Kawneer
Millcraft
REHAU

INJECTION MOLDING

Hi-Tech Energy Windows
SIL Plastics

PROJECTED

Alumicor
Bonnechere Valley Windows
C.R. Laurence
Caldwell
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Metro Aluminum
REHAU

ROUND/SHAPED

Bonnechere Valley Windows
Eclipse Architectural
Everlast
Global Windows and Doors
Laurelwood Millwork
Millcraft
REHAU
Strassburger

SLIDING

Alumicor
AmesburyTruth
Bonnechere Valley Windows
C.R. Laurence
Eclipse Architectural
Euro Vinyl Windows and Doors
Everlast
Global Windows and Doors
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Laurelwood Millwork
Millcraft
REHAU
Slide Clear
Strassburger
ZZ Construction

SOLARIUMS

Metro Aluminum

TILT-TURN

AmesburyTruth
Bonnechere Valley Windows
Euro Vinyl Windows and Doors
Kawneer Co. Canada
Kawneer
Laurelwood Millwork
Millcraft
REHAU
Roto North America
Strassburger
ZZ Construction

WINDOW CASEMENT

Alumicor
AmesburyTruth
Bonnechere Valley Windows
C.R. Laurence
Caldwell
Commdoor
Eclipse Architectural
Euro Vinyl Windows and Doors
Everlast
Global Windows and Doors
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Laurelwood Millwork
Metro Aluminum
Millcraft
REHAU
Roto North America
SIL Plastics
Strassburger
Westend
York Aluminum

WINDOW HARDWARE

Alumicor
AmesburyTruth
C.R. Laurence
Caldwell
Commdoor
Distribution Pièces Expert
Eclipse Architectural
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IMSENT
Metro Aluminum
Roto North America
SIL Plastics
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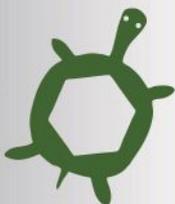
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by FRANK FULTON

Frank Fulton is the president of Fultech Fenestration Consulting, a director with the OGMA and a former principal in Fulton Windows.

Show me the money

If you and your company pay taxes in Canada and read the newspapers, you must often feel that every special interest group in the country and those who know how to play the system are gorging at the public trough that you have to keep filling up. Today, I'm going to provide a few tips about how a legitimate businessperson like you can benefit from a long list of government incentives available to improve and grow your business.

Of particular interest to glazing contractors, and one I only recently heard of, is the Storefront and Renovation Grant program offered by municipalities across the country. There is a growing trend of providing grant money to businesses to fund building renovations, repairs and improvements to commercial facades and storefronts. The replacement of windows and doors and the re-design of the storefront are typically eligible for funding with amounts varying by region.

As a business owner, the question of "Can I afford to hire additional staff and will they increase my business if I do" is always a tough call. There are a number of programs available to you to take some of the risk out of bringing on new staff.

There are hiring grants available to employers to offset the costs of training new employees that apply to both salaried and hourly positions. It may be a fixed dollar amount grant or a percentage of the hourly rate and provides up to 50 per cent of the new employee's salary for up to four months to a maximum of \$6,000 per new employee.

In Ontario, the Hire An Apprentice program provides up to \$19,200 in funding to companies to train an apprentice and is payable upon the achievement of key milestones such as on-the-job and classroom training and final certification.

The money is out there for the taking and anybody can go after it.

YOU BET YOUR GLASS

The Federal Apprenticeship Job Creation Tax Credit is a non-refundable tax credit equal to 10 per cent of the eligible salaries and wages payable to eligible apprentices up to a maximum of \$2,000 per year for each eligible apprentice. If your business hires an apprentice, you qualify to claim the credit.

The Apprenticeship Incentive Grant is a cash grant of \$1,000 per year to registered apprentices in a Red Seal trade. Upon completion of the apprenticeship program and obtaining their journeyman certification, the successful trainee is eligible for a one-time grant of \$2,000 under the Apprenticeship Completion Grant program.

Maybe you're not sure about bringing on more staff but would like to improve the skills of the ones you already have. In this case there are some very generous programs out there for upgrading and training. The Canada Job Grant Program is available across the country and provides up to \$10,000 of funding per new or existing employee for all types of training. You can get grants for upgrading the skills of your outside workers but can also use the grants toward many of the other areas of your business such as estimating, drafting, Autocad, accounting, project management, COR certification or salesmanship, to name a few. If you are a small business with under 50 employees, the CJGP covers 80 per cent of your costs of training, including wages during the training time, up to the maximum. This particular grant fund is replenished every April and is limited so the timing of your application is very important. Now would be a good time to start working on it.

Bonny Koabel with AKR Consulting Canada (an OGMA member) has worked with a number of companies in the architectural glass and metal field and has been successful in securing grants for many companies in our industry. "Our experience is that most companies aren't aware of the grants and tax credits that are out there available to them. Some who have applied were turned down because they couldn't navigate their way through the paperwork and application process."

So, the money is there for the taking, and anybody can go after it, but the application processes can be time consuming and frustrating. If you've dealt with government organizations you know what I mean. You're busy running your business and that's where bringing in people with the expertise who know where to go, where the money is available, who to talk to and how to submit a winning application makes sense. So, talk to a specialist in sourcing grants, let them do all the work, and tell them "show me the money." •

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