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Why do we ask?
Glass Canada complies with Canada’s laws for online communications (CASL). To maintain that compliance, we need your permission to send electronic messages.
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 happening. 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.
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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.
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 knowledge 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.

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.

Jonathan Greenland has graciously stepped up to chair the 2019 PGAA golf tournament and to breathe a little life into it. We greatly appreciate Jonathan 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 job sites, 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 bidding 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 chose 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.
Low-E lowdown

by David Heska

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 façade. 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 ultraviolet 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.

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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Fibreglass
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 fiberglass has 60 per cent less
per cent less to eutrophication when compared to aluminum. This is due in part to differences in the manufacturing process of the respective designs. FRP is 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 fibreglass-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. Fibreglass-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 advantages 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, fibreglass-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 fibreglass-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, fibreglass-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. Fibreglass 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...
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 to 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.
Heat it up
Electrically heated glass for comfort and efficiency.

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 Fermasteelisa 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.

A uniformly heated glass pane has 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.

FinnGlass’s technology, even shaped glass can be installed with heating to warm uniformly without transformers, saving on investment, usage and energy costs.
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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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 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 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 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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AUSTIN, TX / Feb. 4–7, 2019
Corners in any material

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

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 millimetres with an allowable package thickness for double or triple IG units of 150 millimetres. 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 spacers 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 millimetres, up to 1,000 millimetres 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

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 1 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

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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Computer-controlled production and the U-channel spacer design produces superior thermal performance and durability. Integrated software allows batch information downloading. Automatic muntin location punching and a touchscreen control station are additional features. Users can automatically change from Intercept Ultra to ThinPlate or BlackLine on the fly. The i3 allows automatic gas-hole punching of warm edge spacers for single or dual-hole filling. A simple graphical user interface screen reduces operator errors. The system is integrated with Intercept Corner Plus. Automatic remake capability allows the operator to remake frames with the push of a button. Multiple conveyor lengths are available.

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 spectoscopy. 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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Everlast
Glassopolis
Hi-Tech Energy Windows
Kits Glass
McGrory Glass Inc.
Metro Aluminum
Novatech
RPM
SAFTI FIRST
Verrage
Vetrotech
Vi-Lux
ZZ Construction

FIBERGLASS DOORS
AkzoNobel Coatings
Aribell
Everlast
Fenewood
Hi-Tech Energy Windows
Mastertech
Mennie Canada
Novatech
REHAU
Strassburger

GLASS DOORS
Accurate Glass Products
Alumicor
ASE Europe NV
C.R. Laurence
Eclipse Architectural
Hartung Glass
Hi-Tech Energy Windows
J.E. Berkowtiz
Kits Glass
McGrory Glass Inc.
Obata Studios
RPM
SAFTI FIRST
Security Glass Products
Slide Clear
Verrage
Westend
ZZ Construction

FIRE RATED DOORS
Aribell
ASE Europe NV
Euroverre
Everlast
FI Glazing Solutions
RPM
SAFTI FIRST
Technical Glass Products
Vetrotech

MIRROR DOORS
Accurate Glass Products
ASE Europe NV
Westend

PATIO DOORS
Alumicor
Bravura
C.R. Laurence
Clearview Industries
Distribution Pièces Expert
Eclipse Architectural
Everlast
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Mastertech
Metro Aluminum
Novatech
REHAU
RPM
SIL Plastics
Slide Clear
Strassburger
Westend
ZZ Construction

SUPPLIERS
ZZ CONSTRUCTION LTD.
Bay S. 2135-32 Ave. NE
Calgary, AB T2E 6Z3
Tel: 403-251-5121
Fax: 403-251-5121
Email: zzconst@shaw.ca
www.zzconst.com

YORK ALUMINUM
111 Westmore Dr.
Etobicoke, ON M9V 3Y6
Tel: 416-741-2470

WOOD’S POWR-GRIP CO., INC.
908 West Main
Laurel, MT 59044
Tel: 406-628-8231
Toll-Free: 1-800-548-7341
Fax: 406-628-8354
Email: contactus@wpg.com
www.wpg.com

WSP
582 Lancaster Street West
Kitchener, ON N2K 1M5
Tel: 519-743-8777
www.wsp.com
RESIDENTIAL DOORS
AkzoNobel Coatings
AmesburyTruth
Anbell
Bonnechere Valley Windows
Eclipse Architectural
Everlast
Hi-Tech Energy Windows
Mastertech
Mennie Canada
Metro Aluminum
Millcraft
Novatech
REHAU
RPM
Security Glass Products
Slide Clear
Stella
Strassburger
ZZ Construction

SLIDING DOORS
Accurate Glass Products
Alumicor
ASE Europe NV
Bravura
C.R. Laurence
Clearview Industries
Commdoor
Distribution Pièces Expert
dormakaba
Eclipse Architectural
Everlast
Hi-Tech Energy Windows
Kawneer Co. Canada
Kawneer
Metro Aluminum
REHAU
RPM
SIL Plastics
Slide Clear
Standard Aluminum Products
Stella
Verrage
ZZ Construction

SCREEN CHANNELS
C.R. Laurence
Distribution Pièces Expert
MSA Screens

SCREEN DOORS
Aribell
C.R. Laurence
Distribution Pièces Expert
Eclipse Architectural
Everlast
Hi-Tech Energy Windows
MSA Screens
Slide Clear
Westend
York Aluminum
ZZ Construction

SHIMS
Accurate Glass Products
Aribell
C.R. Laurence
Fenwood
Grove Products Inc.
IMSENT
SIL Plastics

SHOWER DOORS/ENCLOSURES
Accurate Glass Products
ASE Europe NV
C.R. Laurence
Hartung Glass
IMSENT
J.E. Berkowtiz
Kits Glass
McGrory Glass Inc.
Security Glass Products
Verrage
ZZ Construction

EQUIPMENT & MACHINERY

BENDING MACHINES
Ameracan Equip.
Canadian Equipment Sales
Glaspotech
INT Machinery
Lothar's
Verrage
Witte

BRUSHES
Kear Fabrication

COMPUTER SOFTWARE
C.R. Laurence
Glaspotech
improve 360
Mainstreet

CORNER CLEANERS
Ameracan Equip.
Canadian Equipment Sales
INT Machinery
JSA Machinery

CRANES/HOISTS
Ameracan Equip.
Canadian Equipment Sales
Ergo
INT Machinery
Microcranes, Inc.
SALEM

CUTTING TABLES/CNC
Ameracan Equip.
Atwood Sales
Bilco Manufacturing
Canadian Equipment Sales
Glaspotech
INT Machinery
JSA Machinery
Kear Fabrication
SALEM
Verrage

DRIING/CURING OVENS
Glaspotech
INT Machinery
SALEM
Verrage

EDGING/BEVELLING/DRILLING/GRINDING
Adelio Latzuada Srl
Ameracan Equip.
Atwood Sales
C.R. Laurence
Canadian Equipment Sales
Glassline Corp.
Productivity Inc.
SALEM
Turtools
Verrage

FORKLIFT/HOOKLIFT SYSTEMS
Ergo
Microcranes, Inc.

GAS FILLING
Ameracan Equip.
Canadian Equipment Sales
J.E. Berkowtiz

GLASS ASSEMBLY TABLES
Ameracan Equip.
Bilco Manufacturing
C.R. Laurence
Canadian Equipment Sales
Kear Fabrication

GLASS FURNACES
Verrage

GLASS HANDLING/VACUUM CUPS/LIFTERS
Aggregate Equipment
Ameracan Equip.
Bystronic Glass
C.R. Laurence
Canadian Equipment Sales
Ergo
F.Barkow
INT Machinery
Kear Fabrication
Microcranes, Inc.
SALEM
Wood's Powr-Grip

GLASS PROCESSING CHEMICALS
SALEM
Turtools

GLASS WASHING MACHINES
Adelio Latzuada Srl
Ameracan Equip.
Atwood Sales
Bilco Manufacturing
Bystronic Glass
C.R. Laurence

IG MANUFACTURING
Ameracan Equip.
Bilco Manufacturing
Bystronic Glass
C.R. Laurence
Canadian Equipment Sales
J.E. Berkowtiz

INSTALLATION/CUTTING TOOLS/BLADES
IMSENT
SIL Plastics

LAMINATING
Bilco Manufacturing
J.E. Berkowtiz
SALEM
Verrage

LASER ETCHING
Productivity Inc.

METAL FABRICATION
Azon
Glassline Corp.
INT Machinery
JSA Machinery
Kear Fabrication

METAL FORMING
Glassline Corp.

POLISHING
Glassline Corp.
SALEM
Turtools
Verrage

SANDBLASTING MACHINES
Atwood Sales
SALEM
Verrage

SAWS
Ameracan Equip.
C.R. Laurence
Canadian Equipment Sales
INT Machinery
Kear Fabrication
SALEM
SCREEN PRINTING MACHINES
Glassline Corp.

TEMPERING/BENDING OVENS
Atwood Sales
Glasstech
SALEM
Verrage

TESTING EQUIPMENT
CAN-BEST

TRUCKS/TRANSPORTATION
Ergo
F. Barkow
Kear Fabrication
Klaas Swaving
Verrage

WATERJET CUTTING
Atwood Sales
Glassline Corp.
INT Machinery
SALEM
Verrage

WHEELS/DRILL BITS
C.R. Laurence
Glassline Corp.
JSA Machinery
SALEM
Turtools

GLASS PRODUCTS

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

BEVELLED/EDGE/GROOVED
Accurate Glass Products
ASE Europe NV
Hartung Glass
Kits Glass
Novatech
Verrage

BULLET RESISTANT
ASE Europe NV
FI Glazing Solutions
Glassopolis
Hartung Glass
Technical Glass Products
Tri-Temp Glass
Verrage
Vetrotech

CERAMIC FRIT GLASS
AGC Glass Company
AGNORA
ASE Europe NV
Euroverre
Hartung Glass
J.E. Berkowitz
Kits Glass
Obata Studios
Security Glass Products
Verrage
Vetrotech
Vitrum Glass

CHANNEL GLASS
Euroverre
FI Glazing Solutions
J.E. Berkowitz
Pilkington
Technical Glass Products
Verrage

CHANNEL GLASS - DECORATIVE
AGG Glass Company
AGNORA
Aribell
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
Laurelwood Millwork
McGroory Glass Inc.
Novatech
Obata Studios
Pilkington
SAFTI FIRST
Technical Glass Products
Verrage
Vetrotech
Vitrum Glass
ZZ Construction

COATED
AGC Glass Company
AGNORA
ASE Europe NV
Hartung Glass
Hi-Tech Energy Windows
J.E. Berkowitz
Laurelwood Millwork
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage

COATED - DECORATIVE
AGG Glass Company
AGNORA
Aribell
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
Laurelwood Millwork
McGroory Glass Inc.
Novatech
Obata Studios
Pilkington
SAFTI FIRST
Technical Glass Products
Verrage
Vetrotech
Vitrum Glass
ZZ Construction

COATED - DECORATIVE - MIRROR - HEAT
AGC Glass Company
AGNORA
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
Laurelwood Millwork
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitrum Glass
Walker Glass

FLOAT
Accurate Glass Products
AGC Glass Company
ASE Europe NV
IGP
Kits Glass
Pilkington
Security Glass Products
Verrage
Vitro

GLASS BLOCK
ASE Europe NV
Euroverre
Technical Glass Products

GLASS BLOCK - DECORATIVE
AGC Glass Company
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitrum Glass
Walker Glass
ZZ Construction

GLASS BLOCK - MIRROR - HEAT
Verrage

GROOVED
AGC Glass Company
AGNORA
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitrum Glass
Walker Glass

HEAT RADIANT
FI Glazing Solutions
Glassopolis
SAFTI FIRST

HEAT RADIANT - DECORATIVE
AGC Glass Company
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitrum Glass
Walker Glass

HEAT RESISTANT
Euroverre
FI Glazing Solutions
Glassopolis
J.E. Berkowitz
McGroory Glass Inc.
SAFTI FIRST
Technical Glass Products
Verrage
Vetrotech
Vitruum Glass

HEAT RESISTANT - DECORATIVE
AGC Glass Company
ASE Europe NV
Euroverre
Everlast
Hartung Glass
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Novatech
Obata Studios
Pilkington
SAFTI FIRST
Technical Glass Products
Verrage
Vetrotech
Vitrum Glass
ZZ Construction

HEAT RESISTANT - MIRROR - HEAT
Verrage

LAMINATED
AGC Glass Company
ASE Europe NV
Euroverre
Hartung Glass
J.E. Berkowitz
Kits Glass
Laurelwood Millwork
SAFTI FIRST
Technical Glass Products
Tri-Temp Glass
Verrage
Vetrotech
Vitrum Glass
ZZ Construction

LAMINATED - DECORATIVE
ASE Europe NV
Euroverre
Hartung Glass
J.E. Berkowitz
Kits Glass
Laurelwood Millwork
Obata Studios
SAFTI FIRST
Technical Glass Products
Verrage
Vitrum Glass
ZZ Construction

LAMINATED - DECORATIVE - MIRROR - HEAT
Verrage

MIRRORS

MIRRORS - FLAT
Accurate Glass Products
ASE Europe NV
Euroverre
Kits Glass
Tri-Temp Glass
Verrage
Vitrum Glass
Walker Glass

MIRRORS - MIRROR - HEAT
Verrage

OVERSIZED
AGNORA
J.E. Berkowitz
SAFTI FIRST
Vitrum Glass

PATTERN
Agc Glass Company
ASE Europe NV
Euroverre
Hi-Tech Energy Windows
IGP
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitruum Glass
Walker Glass

SCREENED/ETCHED/FRIT
AGC Glass Company
ASE Europe NV
Euroverre
Hartung Glass
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitrum Glass
Walker Glass

SPANDREL
AGC Glass Company
ASE Europe NV
Hartung Glass
J.E. Berkowitz
Tri-Temp Glass
Verrage
Vitrum Glass

STAINED
ASE Europe NV
Kits Glass
Laurelwood Millwork
Obata Studios

STAINED - DECORATIVE
ASE Europe NV
Kits Glass
Laurelwood Millwork
Obata Studios

STRENGTHENED/TEMPERED
Accurate Glass Products
AGC Glass Company
ASE Europe NV
Euroverre
Hartung Glass
Hi-Tech Energy Windows
IGP
J.E. Berkowitz
Kits Glass
McGroory Glass Inc.
Pilkington
Technical Glass Products
Verrage
Vitruum Glass
Walker Glass

STRENGTHENED/TEMPERED - DECORATIVE
ASE Europe NV
Kits Glass
Laurelwood Millwork
Obata Studios

SUPPLIERS BY CATEGORY
SUPPLIERS BY CATEGORY

TRANSLUCENT GLAZING
ASE Europe NV
Bravura
Hartung Glass
J.E. Berkowitz
Technical Glass Products
Verrage
Walker Glass

WIRED
AGC Glass Company
ASE Europe NV
Euroverre
Glassopolis
IGP
Kits Glass
McGrory Glass Inc.
SAFTI FIRST
Sec-Glass Products
Tec-Glass Products
Tri-Temp Glass
Verrage
Vitrum Glass

MULLIONS
Anibell
Fenewood
Metro Aluminum
Renko Rubber
RPM
SAFTI FIRST
Verrage
Vi-Lux
Z2 Construction

MUNTINS
Anibell
Hi-Tech Energy Windows
Metro Aluminum
RPM
Vi-Lux

PHOTOVOLTAIC SYSTEMS
ECO Insulating Glass

PLASTIC SHEET
American Renolit
Brauvra

RADIATION SHIELDING
Euroverre
FI Glazing Solutions
Glassopolis
McGrory Glass Inc.
Technical Glass Products

METAL PRODUCTS

ALUMINUM BACKPANS
Alumicor
Metro Aluminum
Spandrel Tech
Verrage

ARCHITECTURAL METAL PANELS
AkzoNobel Coatings
Alumicor
C.R. Laurence
Eclipse Architectural
Metro Aluminum
Rimac
RPM
Spandrel Tech
Verrage
ZZ Construction

EXTERNAL SHADING SYSTEMS
C.R. Laurence
Kawneer Co. Canada
Kawneer
Metro Aluminum
RPM
ZZ Construction

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

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

GLAZING MATERIALS

FILM, ARCHITECTURAL GRAPHIC
Courage Distributing
Verrage

FILM, DECORATIVE
American Renolit
C.R. Laurence
Courage Distributing
SAFTI FIRST
Verrage

FILM, EDGE RETENTION SYSTEMS
Verrage

FILM, SAFETY/SECURITY
Accurate Glass Products
C.R. Laurence
Courage Distributing
SAFTI FIRST
Technical Glass Products
Verrage

FILM, SOLAR CONTROL
ASE Europe NV
Courage Distributing
ECO Insulating Glass
Verrage

FIRE RATED GLAZING
Cooper Standard
FI Glazing Solutions
Fireprotect Chester
Glassopolis
McGrory Glass Inc.
SAFTI FIRST
Technical Glass Products
Vetrotech

MIRROR BACKING, SAFETY
Accurate Glass Products
C.R. Laurence
Verrage

MIRROR BACKING, SAFETY

INSULATING GLASS & SUPPLIES

CORNER KEYS
C.R. Laurence
RPM
TruForm

DESICCANTS
C.R. Laurence
Haseda Holding
RPM
TruForm

IG UNITS
AGNORA
ASE Europe NV
Eclipse Architectural
ECO Insulating Glass
Elton Manufacturing
EverLast
Hi-Tech Energy Windows
IGP
IGMA
J.E. Berkowitz
Kits Glass
LiteZone Glass Inc.
SALEM
SIL Plastics
Technical Glass Products
Vetrotech
Vitrum Glass

PACKAGING/LABELLING MATERIAL
Frank Lowe
Turtools

PLUGS/RIVETS
TruForm

SPACE BARS/WARM EDGE
C.R. Laurence
Haseda Holding
RPM
Tremco Canada
TruForm

ENTRANCES/STOREFRONTS
Cooper Standard
Fireprotect Chester
Glassopolis
McGrory Glass Inc.
SAFTI FIRST
Technical Glass Products
Vetrotech

SLOPED GLAZING SYSTEMS/SKYLIGHTS
Alumicor
Bravura
Kawneer Co. Canada
Kawneer
Metro Aluminum
RPM
Stella
Technical Glass Products
### Suppliers by Category

#### Structural Glazing Systems
- AkzoNobel Coatings
- Alumicon
- 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
- Stella
- Technical Glass Products
- Verrage

#### Sealants
- BUTYL
  - C.R. Laurence
  - Construction Distribution & Supply
  - Distribution Pièces Expert
  - Haseda Holding
  - Salem
  - Sil Plastics

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

#### Hot Melt
- C.R. Laurence
- Construction Distribution & Supply
- Distribution Pièces Expert
- Haseda Holding
- Salem
- Sil Plastics

#### Polysulphide
- Haseda Holding

#### Polyurethane
- C.R. Laurence
- Construction Distribution & Supply
- Cooper Standard
- Distribution Pièces Expert
- Eclipse Architectural
- Salem
- Sil Plastics
- 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
  - Alumicon
  - Apex Façade 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
- Glassline Corp.
- 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 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
  - Turktools

- 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
  - Aribell
  - C.R. Laurence
  - Hi-Tech Energy Windows
  - 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

- Drilling, Glass
- 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 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
  - Turktools

- 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
  - Aribell
  - C.R. Laurence
  - Hi-Tech Energy Windows
  - 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
### Suppliers by Category

#### Insulation
- Frank Lowe
- Hi-Tech Energy Windows
- Intertextile

#### 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
- Intertextile
- 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
- Fenwood
- Frank Lowe
- Renko Rubber
- SIL Plastics

#### Shelving/Table Connectors
- C.R. Laurence
- RPM

#### Stiffeners, Steel
- RPM

#### Weatherstripping
- Amesbury Truth
- Aribell
- C.R. Laurence
- Construction Distribution & Supply
- Cooper Standard
- Distribution Pièces Expert
- Elton Manufacturing
- Fenwood
- Frank Lowe
- IMSENT
- Renko Rubber
- Verrage

### Window Profiles

#### Aluminum
- Alumicor
- C.R. Laurence
- Commodo
- 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
- Fenwood
- Laurelwood Millwork
- Millcraft
- ZZ Construction

### Window Styles

#### Double-Hung
- Alumicor
- Amesbury Truth
- 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

#### Fixed
- Alumicor
- Bonnechere Valley Windows
- C.R. Laurence
- Commodo
- 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
- SIL Plastics
- Strassburger
- Westend
- York Aluminum

#### Round/Shaped
- Bonnechere Valley Windows
- Eclipse Architectural
- Everlast
- Global Windows and Doors
- Laurelwood Millwork
- Millcraft
- REHAU
- Strassburger

### Extrusions

#### Aluminum
- Alumicor
- Amesbury Truth
- 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
- Milcraft
- REHAU
- Slide Clear
- Strassburger
- ZZ Construction

#### Solariums
- Metro Aluminum

#### Tilt-Turn
- Amesbury Truth
- Bonnechere Valley Windows
- Euro Vinyl Windows and Doors
- Kawneer Co. Canada
- Kawneer
- Laurelwood Millwork
- Milcraft
- REHAU
- Roto North America
- Strassburger
- ZZ Construction

#### Window Casement
- Alumicor
- Amesbury Truth
- Bonnechere Valley Windows
- C.R. Laurence
- Caldwell
- Commodo
- Eclipse Architectural
- Euro Vinyl Windows and Doors
- Everlast
- Global Windows and Doors
- Hi-Tech Energy Windows
- Kawneer Co. Canada
- Kawneer
- Laurelwood Millwork
- Metro Aluminum
- Milcraft
- REHAU
- Roto North America
- SIL Plastics
- Strassburger
- Westend
- York Aluminum

### Window Hardware
- Alumicor
- Amesbury Truth
- C.R. Laurence
- Caldwell
- Commodo
- Distribution Pièces Expert
- Eclipse Architectural
- Hi-Tech Energy Windows
- IMSENT
- Metro Aluminum
- Roto North America
- SIL Plastics
- ZZ Construction
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Frank Fulton is the president of Fultech Fenestration Consulting, a director with the OGMA and a former principal in Fulton Windows.

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.

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 journeyperson 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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