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AND LIGHT

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& SUCCESSION:
PART 2

ADVANCEMENTS IN
FLOAT GLASS

FABRICATION INNOVATION

2016 TOP GLASS FABRICATORS

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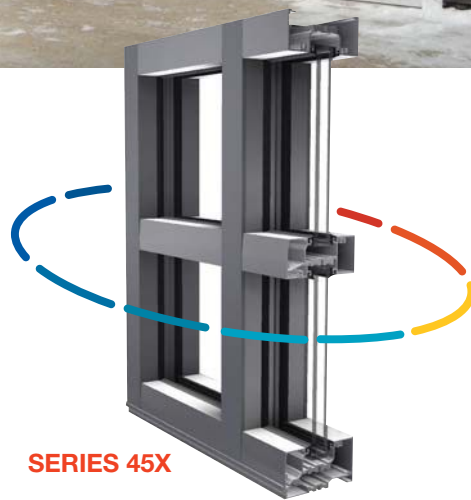
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On the cover: The Benjamin P. Grogan and Jerry L. Dove Federal Building in Miramar, Florida houses the southeast region of the FBI. Viracon fabricated laminated insulating glass units to control solar heat gain, protect against blast and hurricane, and mitigate cyber security issues. See page 44 for more information. Photo ©Nick Merck/Hedrich Blessing, courtesy of Viracon.

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Advancing technologies in glass manufacturing and fabrication increasingly push the envelope of the performance and aesthetic possibilities of glass. An example of this trend is the 34,000-square-foot addition to and renovation of the Wood Center at the University of Alaska Fairbanks. The project features triple glazed insulating glass units with high performance SunGuard SuperNeutral 68 low-emissivity coatings on the No. 2 and No. 5 surfaces. The colored portions of the façade were achieved with laminated colored glass. The glass manufacturer was Guardian Industries Corp., guardian.com; the glass fabricator was Hartung Glass Industries, hartung-glass.com; and the contract glazier and metal supplier was Bucher Glass of Fairbanks, Alaska. Photos by Kevin G. Smith Photography

The Future of Float Glass Points to Advancing Technologies

By Katy Devlin

Technological advances are changing the float glass industry. Market demands for higher performance glasses along with pressures to reduce the environmental impact of production have led to notable advancements in technology for both float products and processes.

Regarding the first, the push for more high performance glass products has helped many glass companies transition from commodity suppliers to producers of value-added products. This has offered growth opportunities for manufacturers during difficult economic times, says Patrick Dupin, president of the flat glass business for Saint-Gobain, saintgobain.com.

"You don't make a lot of money with a commodity product," Dupin says. Advancements in processing technologies in the last decade have increased the possibilities for glass companies in the value-added market. "Everybody has enjoyed the quest for added value, in large part to differentiate themselves," he says.

"The biggest change is the growing demand for high performance coated glass products," adds Chris Dolan, director of marketing, North America, for Guardian Industries Corp., guardian.com. This trend, which has been building in Europe and North America for many years, has come to emerging glass markets as well, he says.

"The research and development team at our Science and Technology Center works closely with sales and marketing to monitor customer needs, which closely parallel how energy efficiency demands are evolving," Dolan says. "We see the demand for high performance coated glass products growing around the world. Guardian is adding a magnetron sputter vacuum deposition coater in Saudi Arabia, projected to be operational in 2016."

Looking at improvements in manufacturing processes, leading glassmakers have also instituted efficiency improvements at float plants, as they seek to reduce emissions and environmental impacts of energy- and cost-intensive glass manufacturing.

One such improvement is the use of oxygen-fuel furnaces, describes Jeff Yigdall, director of engineering for PPG Industries, ppgideascape.com. "Compared to conventional glass furnaces, oxy-fuel-powered glass plants have demonstrated the ability to reduce the amount of fuel needed to make finished glass by more than 15 percent while cutting associated carbon emissions by 10 percent and nitrogen oxide emissions by up to 50 percent," he says.

Glass manufacturers say they expect the industry's technological advancements to continue in the next decade. More stringent environmental regulations around the world will require a move to more efficient float plants in all markets. And, the move to higher-performing end products will continue to drive growth.

"What will the world of glass look like in the next 10 years? We will see new technologies, exciting development," says Stephen Weidner, vice president at NSG Pilkington, pilkington.com. These advancements will be seen, in particular, down the supply chain, with the continued proliferation of high-tech value-added glass such as dynamic glass, he says. **S**



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Trulite Acquires RF Supply

Officials from Trulite Glass & Aluminum Solutions LLC, trulite.com, announced the company has finalized the acquisition of Bradenton, Florida-based RF Supply Inc., rfsupplyglass.com, a regional leader of fabrication and distribution glass products for architectural, industrial, commercial and custom applications. Financial terms of the private transaction were not disclosed. With the completion of this transaction, Trulite will expand its presence in the Florida market with a wide array of tempered, insulated, and mirrored fabricated offerings.

Novum Structures to Plead Guilty and Pay \$3 Million to Resolve Criminal and Civil Claims

The Department of Justice announced that Wisconsin-based Novum Structures LLC, novumstructures.com, has agreed to enter a guilty plea and pay \$3 million to resolve its criminal and civil liability arising from its improper use of foreign materials on construction projects involving federal funds. This use was in violation of contractual provisions implementing various domestic preference statutes, often referred to colloquially as the “Buy America” requirements.

The agreement resolves a criminal investigation alleging that Novum repackaged materials and falsified documents relating to some federally funded construction projects in order to hide that it was using noncompliant foreign materials. According to an agreement reached with the government, Novum will plead guilty to one count of concealing a material fact, in violation of 18 U.S.C. § 1001, and pay a \$500,000 criminal fine, according to the release.

Chinese Fabricator WHTB Glass to Build First U.S. Facility in Brookhaven, New York

Chinese architectural glass fabricator WHTB Glass LLC, whbtglass.com, an affiliate of Beijing Wuhua Tianbao Glass Co., plans to open its first U.S. operation in the Shirley industrial park in Brookhaven, New York. WHTB intends to build and equip a 44,000-square-foot building on a vacant 4.2-acre parcel of land, pending agreement to the sale by owner Triton Real Estate Co. The manufacturer anticipates employing 143 workers at the site, where window components shipped from China will be processed, assembled, and when necessary, adjusted. Construction is expected to start in fall 2016.

PPG Begins Repairs and Maintenance at Fresno Facility

PPG Industries, ppgideascape.com, began repairs at its Fresno, California flat glass facility, a \$20-million project it announced last September. According to a statement from the company, it is replacing the refractory linings of the facility’s furnace. This type of repair is necessary every 10-15 years. During the outage, PPG will make upgrades and handle maintenance tasks on other parts of the production line, says Rob Struble of PPG.

Pittsburgh Glass Works Ordered to Pay in Age Discrimination Case

A federal court jury has found that Pittsburgh Glass Works, pgwglass.com, retaliated against a former employee who planned to sue over age discrimination and has ordered the company to pay him more than \$900,000 in lost wages and benefits. In a verdict returned in U.S. District Court in Pittsburgh last week, the jury said PGW willfully violated federal age discrimination laws in 2010

when it fired Rudolph Karlo of Creighton, a former engineering specialist and production line supervisor who worked for PGW and its predecessor company, PPG Industries, ppg.com, for more than three decades at facilities in Harmar and East Deer.

Cifin Holding Acquires elumatec AG

Cifin, the holding company of the emmegi group, emmegigroup.com, signed an agreement for the purchase of elumatec AG, elumatec.com, and its subsidiary companies, bringing two leading companies in the design, manufacture and sale of machinery for processing aluminium, PVC and steel profiles under the same overall control, according to a company release. emmegi and elumatec will continue to serve their customers independently via their present sales networks.

U.S. House, Senate Pass Trade Enforcement Bill

The U.S. House of Representatives voted to approve the conference report to H.R. 644, the Trade Facilitation and Trade Enforcement Act, aefairtrade.org, of 2015, in support of American manufacturing, according to the Aluminum Extruders Council, aec.org. The U.S. Senate passed the bill the following week, and it awaits President Obama’s signature. The final conference report creates new procedures at U.S. Customs and Border Protection to effectively address the evasion of antidumping and countervailing duty orders within set deadlines.

**From December 15, 2015, to press time, February 16, 2016. To read these stories, and others, in their entirety, visit GlassMagazine.com*



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The Benefits and Legal Limits of Certification

By Matt Johnson

Company certification can prove a powerful testament to quality process and procedures. It has the potential to prove positive for both those hiring certified companies and for the certified companies themselves that are willing to take a magnifying glass to how they conduct business. In fact, the continuous review and quality improvement that can be realized through ongoing compliance with a certification program can prove valuable at limiting legal risk and decreasing insurer premiums. But, it's important to remember that certification alone is not a substitute for meaningful, prospective risk management steps and quality workman-

contractors maintain their certification with a program throughout a project term. Be proactive in managing expectations of the owners and architects with regard to certification.

Next, don't rely on certification as a guarantee.


The temptation upon receiving certification may be to suggest it as a guarantee of quality performance or to use certification as a means to get a job beyond a company's scope. Caution is due in both scenarios.

The North American Contractor Certification program, for example, is intended to distinguish glazing companies that have taken the effort

Certifications can be evidence of good business practices, but not necessarily a job-specific warranty.

Finally, comply, document and preserve.

Certification processes have various documentation and policy requirements. Companies will need to meet these requirements in order to obtain certification. But in the context of a legal claim, any certification—for product or business—is only as valuable as the ability to prove historic compliance.

Renewals of certification may make older records and policies seem needless, but such is not the case. Even though certification is not a legal shield, it can be evidence of good internal controls and business practices. Keeping submittal packets and validation records for each certification and independent renewal can prove valuable when a legal claim or workmanship challenges arise five or ten years after completion. Being able to document compliance, and preserving evidence of compliance as part of an established document management policy, can provide a strong foundation for a legal defense. 

It's important to remember that certification alone is not a substitute for meaningful, prospective risk management steps and quality workmanship.

ship. Keep the following cautions in mind once your company receives certification.

First, don't oversell or over-represent the scope of a certification.

When bidding projects, companies can use certification to help distinguish themselves, but should avoid contractual ties to the certification, if possible. While not intended, mistakes do happen. Where a lapse in company policies or processes leads to a corrective action with the certification, such action should not risk a job contract. Watch for express requirements that

to validate their job performance and have internal policies meeting the program's requirements. It has criteria addressing how a business is run and how work is performed, but it does not specifically mandate performance on a given job. The certification is not a substitute for ensuring quality workmanship on each installation, and it cannot serve as a complete shield when work quality is challenged. Failure to monitor job performance, or accepting a job that exceeds capacity, can lead to workmanship issues that may risk a legal claim, and ultimately jeopardize the certification itself.



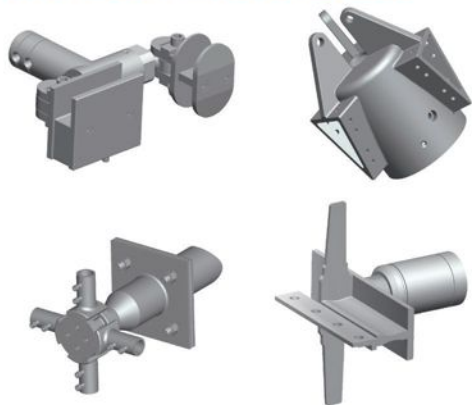
The author is a member of The Gary Law Group, prgarylaw.com, a Portland-based firm specializing in legal and risk issues facing manufacturers of glazing products. Write him at matt@prgarylaw.com.

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ICC Code Development Active on Multiple Tracks in 2016

By Julie Ruth

State and local jurisdiction adoption and enforcement of the 2015 International Building Code, 2015 International Residential Code and 2015 International Energy Conservation Code continues to grow. As of January 2016, the International Code Council website reports that the 2015 IBC is being enforced either statewide or locally in six states, the 2015 IRC in four states, and the 2015 IECC in five states.

At the same time, as code development activities begin to build up steam in 2016, the ICC finds itself in a rather unique situation. This time around, instead of having just published new editions of the International Codes

(I-codes) and continuing with their normal development of Group A, Group B and Group C codes, each one year at a time, the ICC finds itself involved in multiple code development activities at the same time. Normally, Group A proposals would have been concluded in 2015, Group B proposals would be in development now and Group C proposals would not begin until 2017. Instead, there is activity for all three Groups in 2016.

First, the nonstructural provisions of the 2018 IBC (ICC Group A), which were originally scheduled to be finalized in October 2015, were pushed out to March 2016 due to a glitch in the electronic voting system used during the 2015 Public Comment Hearings (PCH). Approximately two-thirds of the votes taken had to be reconsidered. Permitting the governmental voting representatives to vote remotely online was new to the ICC. Developing a system to fairly and accurately reconsider the votes involved in the glitch understandably took some time.

Ultimately the ICC developed a two-step process for reconsideration of the votes involved in the voting glitch.

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Voting on the items that needed reconsideration was limited to only those governmental member representatives who had been issued electronic voting devices at the 2015 PCH.

Step one was to replicate the votes taken on the committee action. The vote made by the committee during the committee action hearings in April 2015 was the standing motion on each proposal going into the Public Comment Hearings. A simple majority of those voting was needed to uphold the committee action. This vote took place in late January 2016.

Step two was to replicate the votes taken on any allowable motions based upon the committee action votes. Only those motions that were brought forward during the Public Comment Hearings were eligible for consideration on this ballot. This vote occurred in February 2016.

Upon the completion of this two-step process, an online governmental


consensus vote was taken of all the eligible representatives of governmental members. The options available to the voter were either “approve a proposal as submitted or as modified via committee action or public comment,” or “disapprove the proposal.” The online governmental consensus vote was to be completed in March 2016.

During the same time period, the normal ICC Group B cycle began. Code change proposals for Group B were submitted in January and posted in early March 2016. The ICC Group B codes include the structural provisions of the IBC, as well as the IRC and IECC. These code change proposals will be considered by the respective ICC Code Change Committees during the ICC Group B Committee Action Hearings being held April 17-24, 2016 in Louisville, Kentucky. Group B proposals submitted for consideration can be viewed at iccsafe.org.

Lastly, ICC is working to merge the

IgCC with ASHRAE 189.1 Standard for High Performance Green Buildings. The resulting document will apply to commercial buildings, as well as multi-family buildings and care facilities that are more than four stories in height.

Normally, changes to the IgCC would be considered as Group C and would not start until the third year of the ICC code development cycle, which would have been in 2017. However, due to the merger, a comparison between IgCC and ASHRAE 189.1 has already been made, and proposed changes to ASHRAE 189.1 based upon existing provisions of the 2015 IgCC have been submitted. These proposed changes are currently under consideration by the ASHRAE 189.1 committee. These activities will continue through 2016 and 2017.

Development of the 2018 International Codes will certainly keep code representatives and interested parties on their toes during the next two years. 

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Let There Be Daylight

The benefits of daylighting and what glaziers stand to gain

By Jeff Phillips

Daylighting is often an underutilized component to increasing a building's energy efficiency and overall sustainability. When incorporated correctly, it can lead to energy savings ranging from 15 percent to 40 percent. By enhancing the diffusion of natural light and complementing it with a task lighting approach, an interior space can significantly reduce energy consumption. Daylighting also has the added benefit of creating more

A key influencer for new construction in the Division 10 demountable wall sector is LEED qualification. Projects targeting IEQ LEED 8.2 credit (daylighting and views) must comply with minimum visible light transmittance values and window-to-floor area ratios (WFR) as set forth by the USGBC. A glazing contractor that can address these factors and incorporate them into their communications and product offering will have a distinct advantage

as there will be higher exposure to direct UV rays. Low-emissivity glass is recommended because it is specifically designed to minimize the amount of ultraviolet and infrared light that can pass through glass without compromising the amount of visible light transmittance. This in turn reduces dependency on a building's cooling system for additional energy savings.

Another practical way to increase daylighting is to install interior light shelves on windows. Light shelves work by projecting sunlight deeper into a building and evenly distributing it towards the ceiling. This balanced ambient light reduces artificial lighting costs and helps earn points to meet LEED requirements. Light shelves offer aesthetic appeal and also block direct sunlight during peak hours to minimize glare and prevent high-contrast situations that could impede visual tasks.

When it comes to building interiors, transparency is key for effective daylighting. That is why glass plays the important role that it does in the exterior envelope. There are several architectural systems that can be utilized to increase transparency. Principal among them are demountable glass-wall partition systems. These systems come in various configurations to meet a wide variety of interior application needs. They include movable walls, frameless and framed office partitions, and sliding glass doors. Demountable glass-wall partition systems maximize visible light transmittance and have the added benefit of producing an in-demand all-glass aesthetic. This makes them the ideal alternative to solid partitions and permanent walls.

Year after year, we are seeing growth in the interior glass segment as architects and owners continue to seek out solutions that offer frameless designs for unobstructed views and open workspaces. This shift from segregated office layouts to more collaborative environments presents an excellent opportunity to incorporate an effective daylighting strategy.



The CRL Cascade Glass Wall Office System maximizes daylight diffusion via minimalist hardware.

open and vibrant interiors, which can lead to higher employee productivity and well-being.

How does this affect glaziers? Simple. Daylighting is critical to the design of a space for end users and architects. Because it is important to them, it is important to the glazing community. A sound understanding of daylighting concepts, paired with the ability to “talk shop” with Division 10 project teams, validates a glazier’s work and product recommendations.

when working with property management organizations and designers.

Using glass to maximize daylighting

The most effective way to increase daylighting is to incorporate more glazing into a building’s design. For example, using taller panes of glass on the exterior envelope will lead to a higher WFR and visible light transmittance. If this tactic is employed, however, it is important to take the proper steps to reduce the amount of solar heat gain,

Complement daylighting with a task lighting system

Traditional office spaces feature a uniform electrical lighting scheme. The problem with this configuration is that the building consumes unnecessary amounts of energy because areas of the floor that are not always in use are being artificially lit.

A more energy-efficient alternative to uniform electrical lighting is task lighting. With task lighting, the amount of overhead luminaires is reduced and replaced with smaller lighting modules in task areas only (e.g., employee desks). This more focused approach ensures artificial lighting is being used only where needed, resulting in a more sustainable building.

Where applicable, skylights are an ideal complement to task lighting. Because they are located overhead, they are very effective at diffusing daylight, and can light center areas of office spaces that are sometimes difficult to reach with standard daylighting practices; in addition, skylights create another glass opportunity for glaziers.

Effects of daylighting on employee well-being

Although energy savings and sustainability are the main reasons a company should maximize daylighting, it can also have a positive impact on the well-being of employees. Organizations know that a comfortable work environment leads to fewer sick days, lower turnover rates, and better performance. In fact, research from a Gallup study shows that, compared to employees with low wellness factors, employees with high wellness factors experience 41 percent lower health-related costs and 35 percent lower turnover rates.

Daylighting softens the psychological impact of small workspaces—a concept known as real estate compression design. Workspaces seem brighter and larger to employees, making them feel less physically confined, and thus raising their well-being.

The benefits of daylighting are

many. It is important for glaziers to become well-versed in daylighting procedures not only to help customers meet energy codes and achieve LEED goals, but also to differentiate themselves and gain an edge in a competitive marketplace.

As daylighting experts, glaziers can become problem solvers by addressing the business issues that general contractors face. This will allow them to

be perceived as a valuable resource instead of an everyday installer because they will be providing solutions that matter to project stakeholders. ■



The author is director of sales and marketing, Office Partitions Division, C.R. Laurence Co., crlaurence.com. He can be reached at Jeff_Phillips@crlaurence.com.

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How to Build a Cash Reserve

By Marco Terry

Although we are in early 2016, the Great Recession of 2007-2009 is still fresh in the memories of many companies in the construction industry. Put bluntly, it nearly decimated the industry in many regions.

Unfortunately, there is no way to guarantee that any company will survive a recession. There are too many factors at play. But I believe that some of those companies that failed during the recession could have survived if they had a well-planned cash reserve in place. Actually, companies with a solid reserve would have been well-positioned to gain from the market momentum that followed the recession.

Let's explore the details of how to build a cash reserve.

Operate a lean business

The first step in preparing yourself for a recession is to operate a lean business. A lean business wastes little money. Although most business owners like to think they run lean businesses, the reality is that most don't.

Review all your expenses—one by one—and determine if they are really needed. If they are not necessary, consider cutting that cost. If they are needed, evaluate if you can outsource that function at a cheaper cost.

For example, many glass companies manage their own payroll. That is fine, but managing payroll can be complicated and time-consuming. And there are penalties if you get it wrong. Payroll is easy to outsource. Many providers offer inexpensive and reliable payroll services.

The next step is to assess the products and services that you offer. Are any products contributing little to the bottom line? Or, worse, are they creating a loss and costing you?

Don't wait until a recession hits to review which products to cut. It will be too late. The right time to cut costs

is when things are going well and you have room to maneuver.

Determine cash reserve size

After you cut costs, you need to plan your reserve. A cash reserve is an essential tool for surviving business downturns. Your glass company must have a reserve. Without one, in an emergency, expenses will pile up before revenue comes in. This scenario will drive you to bankruptcy.

Your first step is to determine your monthly expenses. With this information, you can now determine the size of the cash cushion. There is no exact science for this process. Some businesses keep three months of expenses, while others

A cash reserve is an essential tool for surviving business downturns. Your glass company must have a reserve.

set aside as much as six months' worth of expenses. I favor higher reserves.

During this process, get advice from your finance department and from your CPA. Consider this guidance a business-saving investment.

Start building the reserve

Building the cash reserve is the simple part, though it is not easy. It requires dedication and discipline. Open a new bank account in which you will keep the reserve funds, and start making deposits.

Send a portion of your profits to the reserve account regularly until you reach the desired amount. Once you reach the limit, don't touch the money unless there is an emergency.

Balance growth and safety

Money held in reserve cannot be used to grow the business during normal times. Unless there is a downturn or an emergency, you can't use it to pay employees, suppliers and other expenses.


This restriction can be frustrating for companies that are growing. Imagine passing on a large order because regular cash flow cannot cover the costs. Meanwhile, you have six months' worth of expenses sitting in a bank account apparently "doing nothing."

The bottom line is that holding a cash reserve can and will affect your ability to grow. And the larger the reserve, the larger the impact on growth. It's the tradeoff between safety and growth.

There is, however, an alternative for managing this problem.

Use financing to grow while you build a reserve

One way to keep a reserve and grow at the same time is to use external financing. For ideas on how to finance your company, read my previous article, "Eight Ways to Finance Your Glass Business" (August 2015 issue, page 26). With this strategy, your company builds a cash reserve from profits, while using external financing to help with new orders. If the economy takes a downturn, you can dial back the financing and use your cash reserve.

Keep in mind that financing does come with a cost. Therefore, it will affect your profit margins. Use financing strategically. Fund low-margin projects and orders using your own cash flow. Meanwhile, deploy external financing only for more profitable orders. 



The author is managing director of Commercial Capital LLC, comcap-factoring.com/products/construction-factoring/, a factoring company and leading provider of invoice financing to companies in the glass industry. He can be reached at 877/300-3258.



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Tool Calibration and Best Practices for Vertical Edgers

By Steve Brown

When glass fabricators use vertical edging machinery, they frequently ask about tool calibration and best practices.

First, how often should I calibrate the tooling?

Depending on your daily run average, you should recalibrate your wheels every 75,000-100,000 inches, or when you have replaced a diamond/resin wheel. After determining how often to calibrate, follow these eight simple steps to properly calibrate tools for vertical edgers.

Step 1: Make sure all spindle positions are in a lower position to ensure no contact can be made between the glass and the wheels. Make sure all coolant lines are free from obstructions, have adequate flow and are positioned properly.

Step 2: Lower the entrance conveyor to a removal of 2.5 millimeters. This would require a clockwise rotation to set the full stock removal for positions 1 to 6.

Step 3: Select a sample piece of glass

long enough to cover positions 1 to 6 at the same time (approximately 6 feet). Start the conveyor so that the sample travels into the machine, stopping across the first 6 positions.

Step 4: Turn each spindle knob in a clockwise motion to advance the spindle position upward to slightly touch the surface of the sample glass. The level at which each spindle currently resides is considered the “Start Position.”

Step 5: From the “Start Position,” turn all six spindle knobs counter-clockwise one full turn each, which will lower the wheel position from the sample glass.

Step 6: Reverse the conveyor direction so that the glass will move left to right and return to the entrance conveyor.

Step 7: First, turn each spindle knob clockwise one full turn each to return to the “Start Position.” Second, turn each spindle to represent the appropriate increase value, as seen in Table 1.

Step 8: Adjust the cerium impregnated wheel gently as the glass is passing



through the machine. The amp reading should only show a slight variation from a static load to that of full pressure.

Second, what are the best practices for avoiding hazards?

Often, glass fabricators overlook common issues with their equipment. Insufficient and misdirected coolant flow, and wheel alignment are two practices frequently missed in factories. By overlooking these machinery maintenance practices, fabricators run the risk of excessive diamond wheel wear, as well as slowing processing speeds and lowering finished edge quality standards.

For vertical edger maintenance, it is important to know the proper pitch of each spindle during the calibration process. Diamonds should have a slight pitch to only touch on the leading edge; resins and polishing wheels should touch evenly on both sides where there are points of contact. The amp reading should only show a slight variation from a static load to full pressure. And finally, it is important to have adequate coolant flow, but it is even more important to have the coolant lines in the correct positions.

By adhering to certain best practices for vertical edger calibration, fabricators maximize diamond wheel life, and ultimately increase production. ⁵

Table 1: Grinding Wheels Increase

Wheel	Increase	Removal
1st grinding wheel	1.1 mm	1.1 mm
2nd grinding wheel	2.1 mm	1.0 mm
3rd grinding wheel	2.3 mm	0.2 mm
4th grinding wheel	2.4 mm	0.1 mm
5th grinding wheel	2.5 mm	0.1 mm

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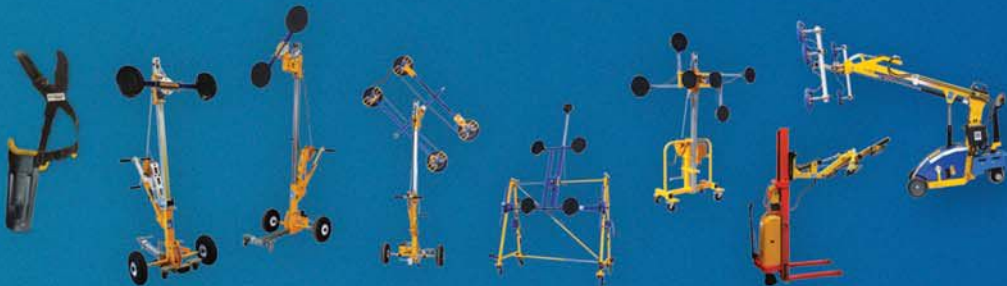
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EXIT PLANNING AND SUCCESSION

NO. 2

Eight Disciplines OF A SUCCESSFUL EXIT

BY KEVIN KENNEDY

Editor's Note:

This article and the feature of Giroux Glass beginning on page 24 mark part two of Glass Magazine's multi-part Exit Planning and Succession series. The first in the series, "A Successful Exit: Capture Business Wealth and Pass the Baton to the Next Generation," appeared on pages 38-44 of the January/February issue; the next article in the series will run in the May issue. If you have an exit or succession planning story to share, contact Editor Katy Devlin, kdevlin@glass.org.

1

CONTINGENCY *planning*

Contingency planning addresses what will happen to an owner's business stock and to their family if they die unexpectedly. Contingency planning is often framed in terms of a buy-sell agreement.



2

BUSINESS *planning*

Business planning in anticipation of selling the business involves discussion of the timing of a business's sale, strength of the cash flows and business value drivers.



To read about Kevin Kennedy's first-hand experience in exit planning, and to learn more about how an exit planner can ease the exit process, visit GlassMagazine.com/April2016.

an owner's exit from a business will probably be the largest financial event of their life. Further, harvesting the illiquid wealth trapped in a business can also be one of the most complex transactions an owner will face.

Key to navigating this process is gathering the best information to minimize risk, to make correct decisions, and to understand the financial and strategic control issues required to replace an owner's income. This process protects an owner's hard-earned wealth and legacy.

To successfully exit a business, an owner will need to develop a comprehensive, multifaceted exit plan. The exit plan neces-

itates that owners combine eight business disciplines, from valuation analysis to succession to tax planning. Throughout this process, owners will need to seek the input of a range of advisors, including attorneys, accountants, estate planners, insurance advisers, financial planners and business consultants.

Owners might also seek services of an exit planner to act as a process consultant and

3

VALUATION

analysis

A valuation analysis provides information about the worth of a company within a range of values. The valuation analysis should only be completed by an accredited business appraiser. The valuation analysis is central to meeting the value gap and replacing income.

4

SUCCESSION

planning

Succession planning requires that an owner consider how to replace themselves with strong managers and management team and move them into leadership for the next business generation.

5

FINANCIAL

planning

Financial planning is required for an owner to discuss income replacement and harvesting their business in retirement. During this process, an owner addresses how their primary asset, the illiquid business, will serve as a critical component for meeting their financial needs.



6

ESTATE

planning

Estate planning addresses how a business owner will transfer privately held stock to children and future generations in a tax-efficient manner by protecting wealth in trusts. This is an important conversation that can assist an owner in protecting wealth against estate taxes. Owners should seek input from their attorney in estate planning.

7

TAX

planning

Tax planning addresses the various tax implications to an owner, to the business and to the estate; and tax reduction strategies. This is a critical aspect of business transfers, as there is the possible exposure to over 55 percent taxation in such transactions.

8

EMOTIONAL

attachment

While a less traditional “discipline,” owners must also address and consider issues of emotional and financial attachment to their business during the exit planning process. If an owner is having difficulty trying to figure out the when, who and how particulars of their exit, they are still stuck in the business. An owner may have difficulty delegating, training, letting go and seeing themselves outside the business in another useful endeavor. Most advisers are not trained to measure and understand this level of emotional and financial attachment to the business. An exit planner can assist an owner in this area.



help guide owners through the various disciplines working with the numerous collaborators. The exit planner moves an owner down the exit path to reach goals, reduce risk and achieve the best result by coordinating the various disciplines.

Before beginning the exit process and seeking input from advisors, owners should fully understand the eight disciplines that make up the exit planning process.

An owner may feel a little disjointed with the different discussions among advisers. Many times the conversations are focused in their transactional space and key area of practice providing one fragmented aspect of an exit plan, not a holistic solution coordinating and encompassing all disciplines. An exit planner can ease this process and help owners address these challenges. **■**



Kevin Kennedy is the founder of Beacon Exit Planning LLC (America's Exit Planner), beaconexitplanning.com, and Beacon Merger & Acquisitions Advisors LLC, and is a nationally recognized speaker, author and thought leader for business owners for exit planning and succession. Kennedy walked the exit path and understands firsthand the challenges an owner faces from buying and selling a 200-employee company and implementing succession planning to the fourth-generation owners. Beacon brings owner-centric advice to business owners, once only available to the very affluent. He can be reached at KJKennedy@BeaconExitPlanning.com.



An Employee Partnership

GIROUX GLASS
LEADERSHIP LOOKS TO
STAFF TO SAFEGUARD
COMPANY'S FUTURE
BY BETHANY STOUGH

a nne-Merelie Murrell has long had a vision for her company, Giroux Glass, girouxglass.com. Under her leadership, Giroux has grown to become one of the nation's top glazing contractors, with four locations and 204 employees, and a project portfolio that includes some of the highest profile buildings in the Western United States.

However, Murrell's vision for the company goes well beyond the company's growth and project success, and to how the company would continue to succeed after she retired.

Murrell, who served as CEO of Giroux Glass for 24 years after purchasing the company from its founder Louis Giroux in 1991, worked for nearly a decade to craft an exit and succession plan—one that kept her employees top priority. This plan included the creation of an Employee Stock Ownership Plan (ESOP) that allowed Murrell to gift her stock to



For more resources on ESOP and for additional information about Anne-Merelie Murrell's legacy at Giroux Glass, visit GlassMagazine.com/ April 2016



Nataline Lomedico (left) and Anne-Merelie Murrell at Giroux's Los Angeles office. In 1991, Murrell purchased a group of six buildings in downtown Los Angeles, with the intention of improving the area. Owner Louis Giroux agreed to sell them to her as long as she took his glass business as well. At the time, Giroux Glass was a small glass service shop.

WHAT IS AN Employee Stock Ownership Plan?

Not to be confused with an Employee Stock Option Plan, an Employee Stock Ownership Plan, or ESOP, is the main form of broad-based employee ownership in the United States, according to the National Center for Employee Ownership. The NCEO explains employee ownership as “the ownership of a company, directly or indirectly, in part or in whole by some or all of its employees.” Ownership transfers from the sole owner to a broad cross-section of employees, from all levels of the company, generally through a formal plan offered by the employer.

Ultimately a retirement plan, an ESOP makes it possible for a company to contribute stock, or the money to buy its stock, to the plan for the benefit of the employees. The ESOP invests primarily in company stock and holds its assets in a trust, in accounts earmarked for employees, according to NCEO. Shares of stock vest over time before an employee is entitled to them, which is generally when the employee leaves the company. The U.S. Department of Labor's Employee Benefits Security Administration oversees ESOPs.

employees over time, and a two-year search for a successor.

The exit plan

Murrell owned 100 percent of stock in Giroux Glass from the time of purchase until 2007, when Murrell enacted the ESOP exit plan. Through this process, Giroux employees became partners,

and Murrell determined how her exit would ultimately benefit all of them, according to company officials.

Currently, Giroux is 14.5 percent employee owned, and set to be 100 percent employee owned by 2022, when Murrell will completely exit from the company as a shareholder. This trajectory allows time for the

ESOP to be unleveraged—without debt. The more profitable Giroux Glass is, the more stock can be purchased. While working toward maintaining an unleveraged ESOP, Giroux Glass will be able to grow bonding capacity by continuing to strengthen its balance sheet, according to company officials. (See sidebar)



“WHAT IS BEST FOR A COMPANY AND FOR ALL PERSONNEL MUST *always be considered* IN ANY BUSINESS DECISION. ... IN THE END, INVOLVEMENT WITH YOUR PARTNERS IS KEY. YOU MUST BE WORKING TOGETHER TO BE SUCCESSFUL.”

Consideration of transitioning Giroux to an ESOP company began for Murrell over 15 years ago, at which time she considered other transfer options, and reached out to dozens of experts and peers in the field.

“There are always options [when selling a business],” says Murrell. “You can either sell your company to an unknown individual, or to those who shared in your successes. I contemplated many years ago just selling, but I couldn’t. Those who have been important to your life, growth and reputation, they should share in what they have created.”

Ultimately, Murrell’s decision to transfer Giroux to an ESOP and exit the company as a shareholder over time was due to her love of the company she, and those around her, had created. “I love Giroux,” says Murrell. “I love the projects we do. I want to see it grow.”

After establishing the ESOP as a way for Murrell to gift stock to Giroux’s employee-partners and help them diversify their qualified retirement accounts, she began looking into how ESOPs are based in a culture of ownership. In 2009, Murrell began educating her employee-partners to learn how to “think like an owner.”

The success of Giroux employees goes hand-in-hand with the success of the company. Murrell believes that

within an ESOP, if Giroux’s employee-partners understand that they have the ability to grow their investment, they will be more committed to contributing to the success of Giroux.

“When we saw the positive impact of ESOP companies with a culture of ownership on the profits and value of their companies, we knew we had a strong foundation of culture and the potential for the same or greater success for Giroux,” says Nataline Lomedico, current CEO and president of Giroux, explaining Murrell’s ultimate decision to adopt an ESOP for Giroux.

“It’s sensible to have an ESOP if planning a succession, if you’ve already entrusted your company to others” Murrell advises other industry CEOs. “I had confidence that people here knew how to grow what we started. Nothing makes me happier than passing along what is good and know it’s going to be made better. These are the reasons I went to the ESOP.”

During the 15 years of considering and planning her exit and succession, Murrell was also busy with the day-to-day, closely involved with her employee-partners. While spending much of her life with Giroux, her thoughts on how to pass it on always dovetailed with thoughts of those who made Giroux a success.

“What is best for a company and for all personnel must always be considered in any business decision,” she says. “For instance, just because you’re a son or daughter doesn’t mean it’s in the best interest of the company for you to lead. Or, in some business cases, it might be better to sell. These are decisions companies must make. In the end, involvement with your partners is key. You must be working together to be successful.”

The succession plan

After Murrell developed a plan for transferring ownership of the business, she moved her attention to transferring leadership.

Murrell notified the employee-partners of Giroux on Dec. 31, 2012, that she would be stepping down as CEO as of Dec. 31, 2014.

“I knew the exit would come because I thought it was the best thing,” she says. “Two years [to find a replacement] was pretty fast, and maybe it was too fast. But after too much time you’re just holding on. You must give them a chance to grow and expand.”

To help her manage the quick transfer, Murrell relied on outside consultants who came in quarterly to interview employees, offer feedback on necessary steps, and help develop Giroux’s management. In her search for a successor, Murrell also solicited feedback from clients, vendors, Giroux employees, peers, experts in construction, and successful CEOs of Fortune 500 companies, notes Barbara Kotsos, director of marketing and public relations, Giroux.

During the two-year transfer process, many people inside and outside of Giroux came to the floor as potential CEO candidates. Murrell held conferences and formed committees to choose her successor. “It’s important that everyone is on board. They all have to know how to handle it as a company,” she says.

As part of the interview process, Natalie Lomedico came to the floor. "She had great dedication, she's intelligent, she knew the skills, and had energy and drive," recalls Murrell.

With a 26-year career in the construction industry, Lomedico was hired as a controller for Giroux in 2001. After 15 years working under Murrell, Lomedico became president and CEO of Giroux Glass in January 2015.

Choosing a successor was only half of the succession process, however. Murrell worked for many months with Lomedico to integrate her into the leadership process before stepping down. From July 2014 to January 2015, she saw all of the typical work Murrell handled on a daily basis, and she and Murrell made decisions together. As of Jan. 1, 2015, however, Murrell put all decision making solely into Lomedico's hands.

"Not seeing Anne-Merelie around the office after 15 years was a big transition," says Lomedico. "A tremendous amount of work crossed my desk. I knew how to handle it, though, because Anne-Merelie has been coaching me since the day I met her."

Although Murrell, who now serves as Chairman of the Board, is still very hands-on and meets with Lomedico on a weekly basis for updates, she believes an exited CEO should step away from the day-to-day as quickly as possible.

"For anyone considering going from CEO to Chairman, understand that the new CEO is going to manage and have leadership. They don't need the old CEO around; they need room to expand on their own," she says.

Murrell, who is now in her 80s, says she will fully exit the business and step down as chairman in 2022, when the company will be 100 percent employee owned. While Murrell continues to own a stake in the company, she will continue to be involved, she says. "I still own stock. And as long as I do, I get a thrill to see what my partners are doing. I am so proud," she says. **■**



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THE 2016 TOP GLASS FAB

New opportunities, challenges keep Top Glass Fabricators innovating to meet demand

**By Bethany Stough
and Wendy Vardaman**

With 86 percent of Top Glass Fabricators reporting an increase in overall sales volumes year-over-year, 2015 was a year of success for the North American fabrication industry. Many companies increased capacity by adding new locations, expanding to larger facilities, investing in machinery and equipment, and hiring new personnel to keep pace with growing demand. Capitalizing on the economic momentum, Top Glass Fabricators see 2016 as another growth year, with over half planning to invest in new machinery and equipment, and 76 percent planning to add products or product lines.

Increased demand coupled with capacity constraints, pinched glass supply, transportation logistics and an unskilled workforce, created a chal-

lenging atmosphere for fabricators. But, this year's Top Glass Fabricators are using these challenges as opportunities to invest and innovate.

"Our biggest challenge in 2015 was to keep up with demand without sacrificing quality and service," says Chris Mammen, president, M3 Glass Technologies, m3glass.com. "We continue to invest and expand capacity so that we never compromise on the quality and service that the customer expects."

"There's an increasing demand for oversized glass, and more laminated glass is being specified," says Michael Zizek, marketing director, Vitrum Glass Group, vitrum.ca. "In 2016 we will be introducing bent glass to meet this demand and allow us to complete these orders in-house."

To increase capacity, some fabricators expanded or added facilities in

FABRICATORS

2015. Viracon, viracon.com, broke ground on a 360,000-square-foot expansion of its Owatonna, Minnesota, headquarters in December. After acquiring the assets of Glasswall in January 2015, Tecnoglass Inc., tecnoglass.com, added a distribution and engineering facility in Miami, its first U.S.-based location. Tristar Glass Inc., tristarglass.com, added a third fabrication facility in Houston, and expanded its Grand Prairie, Texas, and Catoosa, Oklahoma, facilities. Woonsocket Glass Fabricators, woonglass.com, spent 2015 moving from a maxed-out 12,000-square-foot facility to a 34,000-square-foot facility, complete with new machinery.

2015 was also a big year for Dlubak Specialty Glass, dlubakglass.com, which established itself as a viable company again after declaring

Opportunities

In 2015, many companies increased capacity by adding new locations, expanding to larger facilities, investing in machinery and equipment, and hiring new personnel to keep pace with growing demand.

Challenges

Increased demand coupled with capacity constraints, pinched glass supply, transportation logistics and an unskilled workforce, created a challenging atmosphere for fabricators.

bankruptcy in 2013. “Our company emerged from bankruptcy, yet many customers thought we were out of business,” says Chris Cotton, general manager, Dlubak. “So we worked very hard to get back in people’s minds so they could see what we do. We are alive and well.”

Along with increasing capacity to meet demand, glass fabricators report that product innovation remains a top priority. Decorative glass will offer the most potential for growth in 2016, companies report, but many see growing demand for energy-efficient glass and protective glazing products. Respondents to this year’s Top Glass Fabricators survey note product trends—and their subsequent product development—in the laminated and decorative glass markets, with new options for interior and exterior applications.

“There’s increased demand for laminated glass for safety, security, solar control and sound control. SIGCO is installing a state-of-the-art Lisec laminating line in response to these requests,” says Troy Johnson, vice president of sales, SIGCO Inc., sigcoinc.com.

“We have seen a growth in decorative glass products within exterior applications,” says Antonio Aftimos, director of sales, Cristacurva, cristacurva.com. “Going larger in size is something we are working toward catering to. Another trend is mimicking the look of other materials encapsulated in glass, such as wood, marble, and similar product substrates. That is where our digital printing is headed.”

Many challenges facing glass fabricators in 2015 will continue into 2016—including capacity constraint, and continuing transportation and employment issues, fabricators report.

Forty percent of this year’s Top Glass Fabricators report continued challenges with finding qualified employ-

ees. Attracting, training and retaining employees—at every level—all seem to be top concerns for many reporting companies.

Glass supply issues also challenged Top Glass Fabricators in 2015—both sourcing materials and managing timely deliveries.

“We have shifted sourcing from other sources occasionally where transportation was more readily available,” says Arthur Berkowitz, president, J.E. Berkowitz, jeberkowitz.com. “Materials are readily available; the challenge has been finding available transportation to transport the materials.”

“We’ve experienced inconsistent due dates from our glass suppliers,” says Robert Nolan, executive manager, Midwest Glass Fabricators, mwgf.com.

To cope with the schedule delays, many fabricators have adjusted business practices to meet project deadlines. Syracuse Glass, syracuseglass.com, has “committed to weekly orders with some of our suppliers so they can secure the truck,” according to John Dwyer, Syracuse president.

As the glass industry continues working in a busy and challenging construction climate, fabricators are working to maintain high-quality standards in the midst of a competitive and growing market. Adapting to the changing climate, they are applying innovation to product development and business practices in order to meet customer expectations and keep up with the pace of growth.

About the list

The Top Glass Fabricators list—based on annual sales volume—is accompanied by market statistics and notable projects from a selection of Top Glass Fabricators. Glass fabricators include those companies that have stand-alone fabrication plants in the United States

Newcomers

Multiver Ltd.

multiver.ca/en

TBM Inc.

tbmglass.com

or Canada that service our industry. An exception to this rule is Tecnoglass. Although the fabricator’s manufacturing facility is located in Barranquilla, Colombia, its significant U.S. presence earned it a spot on the list. The list does not include float glass manufacturers that also have fabrication capabilities at their locations.

The majority of the information included in the Top Glass Fabricators report comes directly from the fabricators themselves. In cases where a company did not provide information, we gathered sales estimates and other data from industry insiders, business credit resources and the respective companies’ websites. Sales figures for these companies are shown as estimates. Although we provide specific sales data when it’s available, many privately held companies do not release sales figures. As a result, fabricators are listed alphabetically within six sales range categories.

We at Glass Magazine believe the Top Glass Fabricators report reflects leading companies within this industry segment. If your company belongs on the list, or you would like to update the information published here, please contact us. It is only with the cooperation of individual companies that Glass Magazine’s Top Glass Fabricators can reflect the industry as it is today. Questions or comments about this year’s list and requests to be included next year can be sent to Bethany Stough at bstough@glass.org.



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THE LIST

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BASED ON ANNUAL SALES VOLUME

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to \$500 million

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Certifications: Insulating Glass
Certification Council, Safety
Glazing Certification Council

Locations: Four: Nazaré
Paulista, Brazil (GlassecViracon);
Owatonna, Minn.; Statesboro,
Ga.; St. George, Utah

Products offered: Insulating,
tempered, laminated and
decorative glass

Products offered: Insulating,
tempered, laminated and
decorative glass; all-glass
entrances; shower enclosures;
RavenWindow thermochromic
dynamic glazing, switchable
privacy glass, fire-resistant
glass, and Berman Glass
editions

*Hartung is the parent company
of Agalite Shower & Bath
Enclosures, agalite.com; Holcam
Bath & Shower Enclosures,
holcam.com; and Lami Glass
Products, lamiglass.ca.*

\$50 million
to \$100 million

Cristacurva

Houston
cristacurva.com

Employees: 500

Certifications: PPG Certified
Fabricator, Guardian Select
Fabricator

Locations: Two: Guadalajara,
Mexico; Houston

Products offered: Tempered,
insulating, laminated and
decorative glass; all-glass
entrances; shower enclosures;
curved, oversized and privacy
glass; digital printed glass;
Creanza Interiors decorative
glass for interiors

GGI

Secaucus, N.J.
generalglass.com

Employees: 200

Certifications: Guardian Select
Fabricator

Locations: One: Secaucus, N.J.

Products offered: Tempered
and decorative glass; all-
glass entrances; shower
enclosures; digitally printed
glass, decorative patterns and
back-painted glass; oversized
glass lites, anti-reflective and
fire-rated glass

Glasswerks LA Inc.*

South Gate, Calif.
glasswerks.com

Employees: 500

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: Eight: Carson, Calif.;
Easton, Pa.; Irving, Texas; Los
Angeles; Mount Airy, N.C.;
Oceanside, Calif.; South Gate,
Calif.; Utica, Ohio

Products offered: Tempered,
insulating, laminated and
decorative glass; all-glass
entrances; shower enclosures

Multiver Ltd.

Québec, Canada
multiver.ca

Employees: 400

Certifications: SGCC, IGCC

Locations: Four: Montréal,
Canada; Québec, Canada (3)

Products offered: Tempered,
insulating, laminated and deco-
rative glass; all-glass entrances;
shower enclosures; silk screened
glass, heat soaked tested glass,
ceramic and OPACICOAT span-
drel glass, manual or motorized
integrated blinds

Prelco Inc.

Rivière-du-Loup, Québec,
Canada
prelco.ca

Employees: 650

Certifications: NSG Select
Fabricator, Guardian Select
Fabricator, Saint-Gobain
Certified Fabricator

Locations: Three: Edmundston,
New Brunswick; Montreal;
Rivière-du-Loup, Québec

Products offered: Tempered,
insulating, laminated and deco-
rative glass; all-glass entrances;
shower enclosures; ballistic,
privacy and thermochromic/
heated glass products; bent an-
nealed glass; heat soaked glass,
oversized silk-screen glass and
digital printed glass

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

THE TOP GLASS AND METAL FABRICATORS

Saand Inc.*

Toronto, Ontario
saand.ca

Employees: 400-500

Certifications: NSG Select
Fabricator, PPG Certified
Fabricator, Guardian Select
Fabricator

Locations: Five: London,
Ontario; Ottawa, Ontario;
Rexdale, Ontario; Toronto,
Ontario (2)

Products offered: Tempered,
insulating and decorative glass;
all-glass entrances; shower
enclosures

Tristar Glass Inc.

Catoosa, Okla.
tristarglass.com

Employees: 215

Certifications: PPG Certified
Fabricator, Guardian Select
Fabricator, NSG Select
Fabricator, IGCC, SGCC

Locations: Three: Catoosa,
Okla.; Grand Prairie, Texas;
Houston, Texas

Products offered: Tempered,
insulating, laminated and
decorative glass; shower
enclosures

Among the leading glass fabricators in the United States and Canada are several companies that also manufacture architectural aluminum products for storefront and curtain wall applications, using their own proprietary lines and dies. Due to their unique product offerings, they are ranked separately from the Top Glass Fabricators, here. For information on these companies' metal fabrication capabilities, please see Glass Magazine's Top Metal Companies rankings in the November 2015 issue.

More than \$500 million

Oldcastle BuildingEnvelope*†

New York, N.Y.
obe.com

Certifications: PPG Certified Fabricator, Guardian Select Fabricator, Insulating Glass Certification Council

Locations: 88, including: Albertville, Minn.; Atlanta; Burnips, Mich.; Calgary, Alberta, Canada; Charlotte, N.C.; Chicago (2); Cincinnati; Cleveland; Dallas; Denver; East Rutherford, N.J.; Fremont, Calif.; Grand Prairie, Texas; Hauppauge, N.Y.; Houston (2); Indianapolis; Jessup, Md.; Langley, British Columbia, Canada; Los Angeles; Miami; Midway, Tenn.; Mississauga, Ontario, Canada; Montreal (2); Moorestown, N.J.; Newnan, Ga.; Perrysburg, Ohio; Phoenix; Rock Hill, S.C.; Seattle;

Shawnee, Okla.; St. Louis; Tampa (2); Terrell, Texas; Toronto (2); Vancouver, British Columbia, Canada (2); Warrenton, Mo.; Warwick, R.I.; Wausau, Wis. (2); Wright City, Mo.

Products offered: Custom-engineered curtain wall and window wall; architectural windows; storefront and entrance systems; skylights; blast- and hurricane-resistant systems; architectural glass including: tempered, insulating, laminated, structural, decorative; custom hardware products and supplies

†In August 2015, Oldcastle BuildingEnvelope acquired C.R. Laurence Co. (CRL). For information on CRL, see the Top Metal Companies list. Oldcastle BuildingEnvelope is a subsidiary of CRH plc, one of the top three international building product companies.

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

THE TOP GLASS AND METAL FABRICATORS

(continued from page 33)

\$250 million
to \$500 million

Tecnoglass SA[†]

Barranquilla, Colombia
tecnoglass.com

Employees: 6,000

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: Two: Barranquilla,
Colombia; Miami

Products offered: Tempered, insu-
lating, laminated and decorative
glass; all-glass entrances; shower
enclosures; coated glass

*†Although it does not have fabri-
cation facilities in North America,
Tecnoglass has a major presence
in the United States, and is there-
fore included in this list.*

Trulite Glass & Aluminum Solutions^{*†}

Peachtree City, Ga.
trulite.com

Employees: 2,200+

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: 34: Alvarado,
Texas; Atlanta; Bradenton, Fl.;
Carbondale, Pa.; Columbus,
Ohio; Denver; Fall River, Mass.;
Fort Worth, Texas; Fremont,

Calif.; Fresno, Calif.; Grenada,
Miss.; Houston (3); Indianapolis;
Knoxville, Tenn.; Las Vegas;
Lithia Springs, Ga.; Los Angeles;
Nashville, Tenn.; New Berlin,
Wis; New Orleans; Orlando;
Pittsburgh; Phoenix; Rich-
mond, Va.; Sacramento, Calif.;
Salt Lake City (2); San Anto-
nio, Texas; San Diego, Calif.;
Toronto, Ontario; Tulsa, Okla.;
Youngsville, N.C.

Products offered: Tempered, insu-
lating, laminated and decorative
glass; all-glass entrances; shower
enclosures

*†In January 2016, Trulite acquired
R.F. Supply. The sales listed here
for Trulite do not include the
recently acquired operations.*

\$50 million
to \$100 million

Coral Industries Inc.

Tuscaloosa, Ala.
coralind.com

Employees: 415

Certifications: SentryGlas Certi-
fied Fabricator, SGCC

Locations: Two: Tuscaloosa,
Ala. (2)

Products offered: Tempered,
insulating, laminated and decora-
tive glass; all-glass entrances;
shower enclosures; cast glass;
back-painted glass; glass floor-
ing; decorative interlayers for
laminated applications; carved
glass; ballistic, impact, bomb-
blast, fire-rated and smart glass

PRL Glass and Aluminum

City of Industry, Calif.
prlglass.com

Employees: 450

Certifications: Guardian Select
Fabricator

Locations: Three: Industry,
Calif. (3)

Products offered: Tempered,
insulating, laminated and
decorative glass; all-glass
entrances; shower enclosures;
full-frame clad doors; sliding
doors; handrails; curtain wall
and storefronts; hardware and
architectural metals

SIGCO Inc.

Westbrook, Maine
sigcoinc.com

Employees: 200

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: Two: Portland, Maine;
Westbrook, Maine

Products offered: Tempered,
insulating and laminated glass;
all-glass entrances; shower
enclosures; Opaci-Coat 300 and
ceramic frit spandrel; architec-
tural metal

\$25 million
to \$50 million

Aldora Aluminum and Glass Products[†]

Miramar, Fla.
aldora-architectural.com

Employees: 300

Certifications: SentryGlas
Certified Fabricator

Locations: Three: Charleston,
S.C.; Miramar, Fla.; Orlando, Fla.

Products offered: Tempered, insu-
lating, laminated and decorative
glass; all-glass entrances; shower
enclosures; back-painted glass

*† In July 2013, Aldora Aluminum
and Glass Products and Coastal
Glass Distributors merged. Each
company operates independently,
while sharing common ownership.
For information on Coastal, see
page 38.*

^{*}Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

Vitrum Glass Group

Langley, British Columbia,
Canada
vitrum.ca

Employees: 340

Certifications: Guardian Select
Fabricator, IGCC, PPG Certified
Fabricator, Saint-Gobain
Certified Fabricator

Locations: One: Langley, British
Columbia

Products offered: Tempered, insu-
lating, laminated and decorative
glass; all-glass entrances; shower
enclosures; glass-clad polycar-
bonate impact/bullet resistant
products and heat-soaked glass

**\$35 million
to \$50 million**

J.E. Berkowitz LP

Pedricktown, N.J.
jeberkowitz.com

Employees: 250

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: One: Pedricktown,
N.J.

Products offered: Tempered,
insulating, laminated and
decorative glass; all-glass
entrances; silk screened and
spandrel glass; heat soak
tested, point-supported canopy
and wall systems; glass railings
and interior glass partition walls

Northwestern Industries*

Seattle
nwiglass.com

Employees: About 400

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator, PPG Certified
Laminator

Locations: Two: Seattle; Yuma,
Ariz.

Products offered: Tempered,
insulating and laminated glass

Solar Seal†

South Easton, Mass.
solarseal.com

Employees: 125

Certifications: Guardian Select
Fabricator, PPG Certified
Fabricator

Locations: Three: Hamden,
Conn.; South Easton, Mass.;
Stafford, Va.

Products offered: Tempered
and insulating glass; all-glass
entrances; shower enclosures;
obscure, painted and spandrel
glass; fire-rated glass

*†Solar Seal is an affiliate of
Consolidated Glass Holdings,
Grey Mountain Partners.*

Virginia Glass Products Corp. / Virginia Mirror Co.

Martinsville, Va.
va-glass.com

Employees: 155

Certifications: Guardian Select
Fabricator

Locations: Two: Martinsville, Va.
(Virginia Mirror Co.); Ridgeway,
Va. (Virginia Glass Products)

Products offered: Tempered
and laminated glass; all-glass
entrances; shower enclosures

**\$20 million
to \$35 million**

AGNORA - Architectural Glass North America

Collingwood, Ontario, Canada
agnora.com

Employees: 75

Certifications: IGCC, NSG
Certified Fabricator, Saint-
Gobain Certified Fabricator,
SGCC

Locations: One: Collingwood,
Ontario

Products offered: Tempered,
insulating, laminated and
decorative glass; all-glass
entrances; shower enclosures;
digitally printed in-glass ceramic
ink decorative glass

Custom Glass Products

Weston, Wis.
customglassproductswi.com

Employees: 210

Certifications: AGC Certified
Fabricator, Guardian Select
Fabricator

Locations: Two: Salisbury, N.C.;
Weston, Wis.

Products offered: Tempered,
insulating and laminated glass;
all-glass entrances; shower
enclosures; spandrel glass

Gardner Glass Products Inc.*

North Wilkesboro, N.C.
gardnerglass.com

Locations: Three: North
Wilkesboro, N.C. (3)

Products offered: Tempered and
decorative glass

Garibaldi Glass Industries Inc.

Burnaby, British Columbia,
Canada
garibaldiglass.com

Employees: 210

Certifications: Guardian Select
Fabricator, IGCC

Locations: One: Burnaby, British
Columbia

Products offered: Tempered,
insulating, laminated and deco-
rative glass; all-glass entrances;
shower enclosures; structural
glass with fritting; silk screen

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

ceramic frit glass; heat soaked glass; Marin and Opaci-Coat 300 glass coatings

Glass and Mirror Craft*

Wixom, Mich.
glassandmirrorcraft.com

Certifications: Guardian
SunGuard Select Fabricator

Locations: One: Wixom, Mich.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures

Glassfab Tempering Services Inc.*

Tracy, Calif.
glassfabtempering.com

Employees: 102

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: Three: Reno, Nev.; Tracy, Calif. (2)

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; oversized tempered and custom laminated glass; silk screen; spandrel back-painted and fire-rated glass

Glaz-Tech Industries Inc.*

Tucson, Ariz.
glaztech.com

Employees: 200

Certifications: Guardian Select Fabricator

Locations: Eight: Albuquerque, N.M.; Baton Rouge, La.; Boise, Idaho; Denver; Phoenix; Salt Lake City; Santa Teresa, N.M.; Tucson, Ariz.

Products offered: Tempered, insulating and laminated glass; all-glass entrances; shower enclosures

Goldray Industries Ltd.*

Calgary, Alberta, Canada
goldrayindustries.com

Locations: One: Calgary, Alberta

Products offered: Tempered, laminated and decorative glass; all-glass entrances; shower enclosures

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.



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CAN DO
GGI

Insulite Glass Co.*

Olathe, Kan.
insuliteglass.com

Employees: 160

Certifications: PPG Certified Fabricator, Guardian Select Fabricator

Locations: Two: Olathe, Kan.; St. Louis

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; ceramic frit spandrel and digital ceramic

Liberty Glass Fabricators*

Corona, Calif.
libertyglassfabricators.com

Employees: 195

Locations: Two: Corona, Calif. (2)

Products offered: Tempered, insulating and decorative glass; all-glass entrances; shower enclosures

Paragon Tempered Glass LLC

Niles, Mich.
paragontemperedglass.com

Employees: 200

Locations: Two: Antwerp, Ohio; Niles, Mich.

Products offered: Tempered, insulating and decorative glass; bent, tempered glass

Skyline Design

Chicago
skydesign.com

Employees: 100

Locations: One: Chicago

Products offered: Decorative glass; shower enclosures; patterned Eco etched glass; Vitracolor back-painted glass; AST digitally printed glass; Fotoglas; writable magnetic and nonmagnetic marker glass

Standard Bent Glass

Butler, Pa.
standardbent.com

Employees: 120

Certifications: Guardian Select Fabricator

Locations: One: Butler, Pa.

Products offered: Tempered, insulating, laminated and decorative glass

Syracuse Glass Co.

Syracuse, N.Y.
syracuseglass.com

Employees: 100

Certifications: Guardian Select Fabricator

Locations: One: Syracuse, N.Y.

Products offered: Tempered, insulating and laminated glass; all-glass entrances; shower enclosures; Opaci-Coat 300 glass coatings; fire-rated glass

Walker Glass Co.*

Montreal, Québec, Canada
walkerglass.com

Employees: 85

Locations: One: Montreal

Products offered: Decorative glass; acid-etched and anti-slip products

\$20 million and under

All Counties Glass Distribution*

Stockton, Calif.
allcountiesglass.com

Employees: 36

Locations: One: Stockton, Calif.

Products offered: Tempered, insulating and decorative glass; all-glass entrances; shower enclosures; Opaci-Coat spandrel glass

All Weather Tempering*

Phoenix
allweathersweb.com

Employees: 40

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: Two: Phoenix; Vacaville, Calif.

Products offered: Tempered glass; shower enclosures

Bendheim*

New York, N.Y.
bendheim.com

Locations: One: Passaic, N.J.

Products offered: Tempered, laminated and decorative glass; shower enclosures; walls and partitions; stair railings and balustrades; wall cladding; doors and transoms; counter tops and mirrors

Can-Am Glass Products*

Edmonton, Alberta, Canada
crystalglass.ca

Employees: 60

Certifications: PPG Certified Fabricator, IGCC

Locations: One: Edmonton, Alberta

Products offered: Tempered, insulating and decorative glass; all-glass entrances; shower enclosures; mirrored closet doors; Opaci-Coat glass coatings; sandblasted glass

Coastal Glass Distributors*†

Miramar, Fla.
coastalglassdist.com

Employees: 90

Locations: One: Charleston, S.C.

Products offered: Tempered, insulating, laminated and decorative glass; all glass entrances; shower enclosures

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

†In July 2013, Coastal Glass Distributors and Aldora Aluminum and Glass Products merged. Each company operates independently, while sharing common ownership. For information on Aldora, see the Top Glass and Metal Fabricators sidebar on page 34.

Consolidated Glass Corp.

New Castle, Pa.
cgcglass.com

Employees: 80

Locations: One: New Castle, Pa.

Products offered: Tempered and decorative glass; all-glass entrances; shower enclosures; heat soaked glass; UV bonding, shapes, notches and holes

Dependable Glass Works

Covington, La.
dependableglass.com

Employees: 35

Locations: One: Covington, La.

Products offered: Insulating, laminated and decorative glass; all-glass entrances; shower enclosures

Dlubak Corp.

Blairsville, Pa.
dlubakglass.com

Employees: 90

Certifications: Guardian Select Fabricator

Locations: One: Blairsville, Pa.

Products offered: Tempered, insulating, laminated and decorative glass

Echols Glass and Mirror*

Buford, Ga.
echolsglass.com

Employees: 45

Locations: One: Buford, Ga.

Products offered: Tempered glass; all-glass entrances; shower enclosures

Flat Glass Distributors*

Jacksonville, Fla.
flatglassdistributors.com

Employees: 40

Certifications: Guardian Select Fabricator

Locations: One: Jacksonville, Fla.

Products offered: Tempered and insulating glass; all-glass entrances; shower enclosures

Galaxy Glass & Stone

Fairfield, N.J.
galaxycustom.com

Employees: 40

Certifications: SGCC

Locations: One: Fairfield, N.J.

Products offered: Laminated and decorative glass; shower enclosures; back-painted glass; custom-color silkscreen; textured glass and various interlayer options for laminated glass applications

GlasPro Inc.*

Santa Fe Springs, Calif.
glas-pro.com

Employees: 90

Locations: One: Santa Fe Springs, Calif.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures

Glass Dynamics*

Stoneville, N.C.
glassdynamics.com

Employees: 100+

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: One: Stoneville, N.C.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; ceramic frit and silkscreen

Glenny Glass Co.

Milford, Ohio
glennyglass.com

Employees: 85

Certifications: Guardian SunGuard Select Fabricator

Locations: Two: Cincinnati, Ohio (2)

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; resin pour laminated and kiln laminated glass; custom-colored laminates; laminated films; back-painted glass; custom sandblasted patterns on glass; spandrel glass

InKan Ltd.*

Brampton, Ontario, Canada
inkan.ca

Employees: 75

Certifications: SentryGlas Certified Fabricator, SGCC

Locations: Two: Brampton, Ontario (2)

Products offered: Tempered, laminated and decorative glass; all-glass entrances; shower enclosures; digital ceramic printing; spandrel glass; Opaci-Coat products

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

ITI Glass

Bel Aire, Kan.
itiglass.com

Employees: 100

Certifications: PPG Certified Fabricator

Locations: One: Bel Aire, Kan.

Products offered: Tempered, insulating and laminated glass; all-glass entrances; shower enclosures; oversized tempered glass panels; ceramic spandrel glass; sandblasted glass; handrails

M3 Glass Technologies

Irving, Texas
m3glass.com

Employees: 115

Certifications: PPG Certified Fabricator

Locations: One: Irving, Texas

Products offered: Tempered, laminated and decorative glass; shower enclosures; DecoTherm digital ceramic frit glass printing; MPrint digitally printed interlayer; Colorbak back-painted glass; glass flooring and treads; bent tempered glass

Mercer Glass Fab LLC*

Trenton, N.J.
mercerglassfab.com

Employees: 10

Certifications: SGCC

Locations: One: Trenton, N.J.

Products offered: Tempered glass; all-glass entrances; shower enclosures

Midwest Glass Fabricators

Highland, Mich.
mwgf.com

Employees: 112

Locations: Two: Highland, Mich. (2)

Products offered: Tempered glass; all-glass entrances; shower enclosures; mirror glass

Precision Glass Bending

Greenwood, Ark.
e-bentglass.com

Employees: 50 to 99

Certifications: Guardian Select Fabricator

Locations: One: Greenwood, Ark.

Products offered: Tempered, insulating, laminated and decorative glass; shower enclosures

Rochester Insulated Glass*

Manchester, N.Y.
rochesterinsulatedglass.com

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: One: Manchester, N.Y.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures

TBM Inc.

Santa Ana, Calif.
tbmglass.com

Employees: 45

Locations: One: Santa Ana, Calif.

Products offered: Tempered, laminated and decorative glass; all-glass entrances; shower enclosures; bullet-resistant glass

Tempco Glass Fabrication

Flushing, N.Y.
tempcoglass.com

Employees: 31

Certifications: IGCC, SGCC

Locations: One: Flushing, N.Y.

Products offered: Tempered and insulating glass; shower enclosures

Thermalsun Glass Products*

Santa Rosa, Calif.
thermalsun.com

Employees: 50

Certifications: PPG Certified Fabricator

Locations: One: Santa Rosa, Calif.

Products offered: Tempered and insulating glass; shower enclosures

Thompson I.G.*

Fenton, Mich.
thompsonig.com

Employees: 130

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: One: Fenton, Mich.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; lamination and IG fabrication of Pleotint Suntuitive thermochromic interlayers

Triview Glass Industries

City of Industry, Calif.
triviewglass.com

Employees: 115

Certifications: Guardian Select Fabricator, IGCC, SGCC

Locations: One: City of Industry, Calif.

*Annual sales volume is an estimate, not confirmed by the company.

Note: Certification listings are not necessarily comprehensive. They reflect only those certifications publicly promoted by the respective certifying organizations.

Products offered: Tempered, insulating, laminated and decorative glass; all-glass entrances; shower enclosures; PrimelImage graphic glass; 3D etched glass; switchable glass; wall cladding; silk-screened frit graphics; custom colored and organic laminates; sand-blasted and custom glue-chipped glass; patterned and obscure glass

United Plate Glass Co.*

Butler, Pa.
unitedplateglass.com

Employees: 120

Certifications: Guardian Select Fabricator, PPG Certified Fabricator, IGCC, SGCC

Locations: Three: Butler, Pa. (2); Lincolnton, N.C.

Products offered: Tempered and insulating glass; all-glass entrances; shower enclosures

W.A. Wilson Inc.

Wheeling, W.V.
wawilsonglass.com

Employees: 95

Certifications: Guardian Select Fabricator, PPG Qualified Fabricator

Locations: One: Wheeling, W.V.

Products offered: Tempered and insulating glass; all-glass entrances; shower enclosures; ceramic frit spandrel glass

Wholesale Glass Distributors*

Memphis, Tenn.
wgdmemphis.com

Employees: 57

Certifications: Guardian Select Fabricator, PPG Certified Fabricator

Locations: One: Memphis, Tenn.

Products offered: Tempered and insulating glass; all-glass entrances; shower enclosures

Woonsocket Glass Fabricators LLC

Woonsocket, R.I.
woonglass.com

Employees: 40 to 50

Locations: One: Whitinsville, Mass.

Products offered: Tempered and decorative glass; all-glass entrances; shower enclosures; railings and stairs

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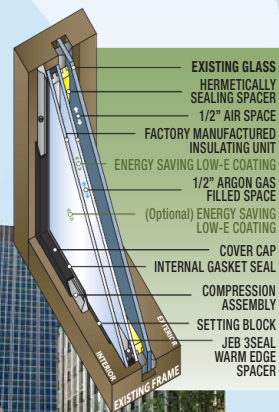
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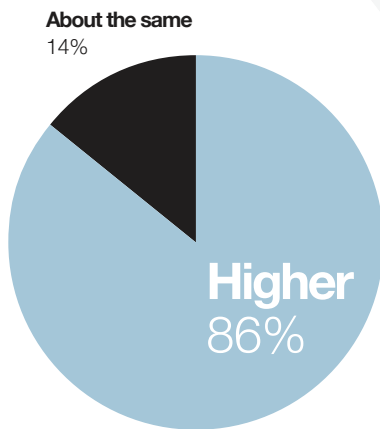
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THE MARKET

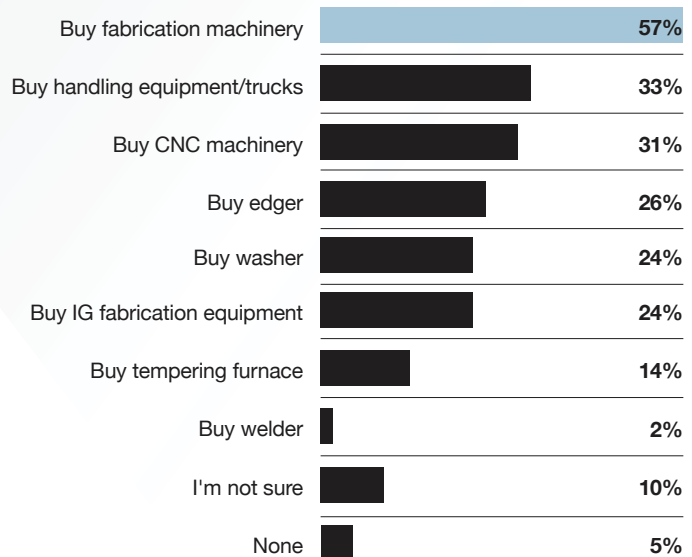
2015 MARKED SALES SUCCESS AND NEW CHALLENGES FOR TOP GLASS FABRICATORS

1. How did sales levels in 2015 compare to the previous year?



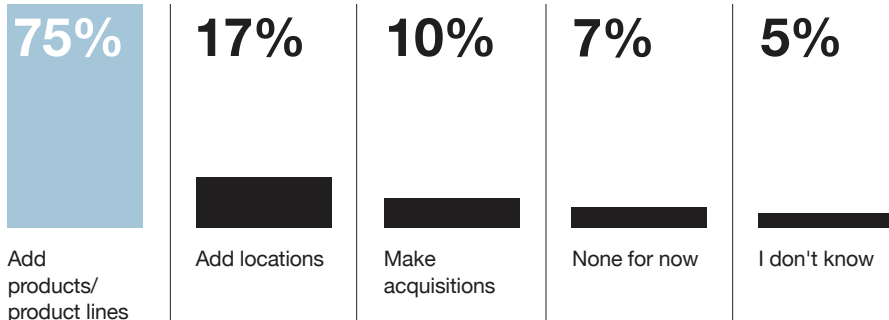
Respondents to the Top Glass Fabricators survey compared their 2014 and 2015 sales. The vast majority reported higher year-over-year sales.

2. What are your future capital acquisition plans?*



Fabrication machinery, equipment and handling equipment/trucks continue to top fabricators' lists of capital acquisition plans, as they did the last two years. Fabricators are looking to increase production, with 57 percent of respondents planning to acquire new machinery and equipment.

3. What are your company's future expansion plans?*



The majority of respondents to the Top Glass Fabricators survey plan to add new products and product lines in the coming year. An additional 17 percent expect to add locations. Just 10 percent plan to make acquisitions, compared to 20 percent last year.

TOP GLASS FABRICATORS TALK PRODUCT TRENDS

“Larger, thicker low-emissivity insulating glass.”

Rob Carlson, engineer/designer, Tristar Glass Inc., tristarglass.com.

“The demand and expanded need for fire and safety rated glass has propelled our involvement in this genre.”

Chip Rogers, president, Woonsocket Glass Fabricators, woonglass.com.

“Privacy glass has increased tenfold. Laminated glass has gone through the roof.”

Corey Myer, TBM Inc., tbmglass.com.

“The demand for laminated glass and decorative glass continues to rise... and the combination of multiple processes, such as laminated back-painted glass, or glass with both digital print and back paint.”

Chris Mammen, president, M3 Glass Technologies, m3glass.com.

TOP GLASS FABRICATORS TALK TRANSPORTATION WOES

“There is a shortage of trucking equipment and drivers. We are reserving dedicated trucks from our vendors in advance.”

Troy Johnson, vice president, sales, SIGCO Inc.

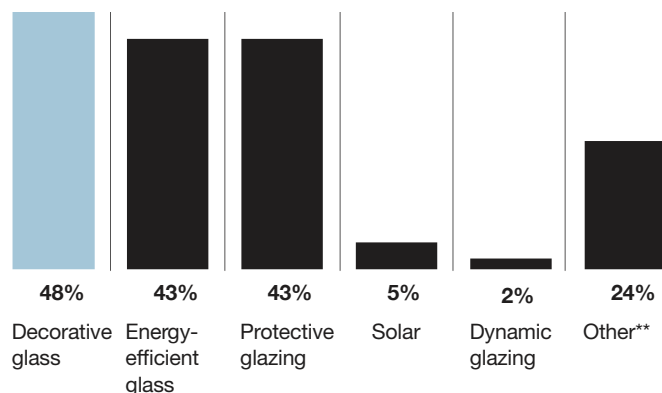
“Our suppliers’ shortage in trucks means we have to supply and pickup glass from their locations to ensure on-time, consistent delivery.”

Michael Zizek, marketing director, Vitrum Glass Group

“We have experienced late shipments and extended product lead times that, at times, have forced us to juggle factory workloads and production schedules.”

Rob Taliani, vice president, sales, W.A. Wilson Inc.

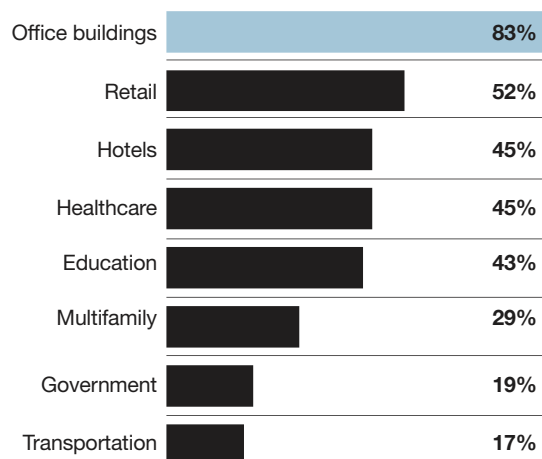
4. What product areas offer the most potential for growth in 2016?*



Energy-efficient glass and protective glazing continue to compete with decorative glass products in terms of growth potential for Top Glass Fabricators. While decorative glass has long been the frontrunner product area for fabricators, the growth opportunities are increasing in other areas in 2016.

** including office partitions, custom laminated glass, all-glass heavy shower enclosures, jumbo/oversized glass

5. Which of the following commercial construction segments provided the most growth for your company in 2015?*



*Respondents were asked to check all that apply.

2016 Top Glass
Fabricators

THE PROJECTS





Viracon

**Benjamin P. Grogan
and Jerry L. Dove Federal Building**
Photo © Nick Merrick / Hedrich Blessing

The Benjamin P. Grogan and Jerry L. Dove Federal Building in Miami, Florida, is a U.S. General Services Administration leased facility housing the southeast region of the FBI. Completed in December 2014, the 380,000-square-foot building accommodates nearly 1,000 FBI employees.

Due to its practical use, the building's design needed to resist severe impacts, natural and manmade, as well as provide anti-eavesdropping protection. Viracon, viracon.com, supplied laminated insulating glass units to control solar heat gain, protect against blast and hurricane, and mitigate cyber security issues. Restoring the surrounding natural wetlands was also part of the construction project. Architects Krueck + Sexton, ksarch.com, wanted to connect inhabitants to the restored, natural environment by maximizing the building's daylighting and views using glass. The building's unique purpose and setting contributed to its fabrication challenges.

"Viracon's project design team worked with the architect Krueck + Sexton to develop glass make-ups that meet both the blast and hurricane requirement, which is difficult, because blast protection requires a flexible glass make-up to assist in absorbing the blast shock wave, while hurricane protection requires a stiff glass make-up that will remain intact in the opening during negative and positive wind pressures present during a hurricane," says Ron McCann, director of sales, Viracon.

The unitized curtain wall incorporates an insulating glass unit on its outer lite, and a solar control coating and silk-screen pattern into the No. 2 surface of the inner lite. PPG Industries, ppgideascape.com, supplied Starphire 3/8-inch low-iron glass for the exterior lite, and Viracon provided VRE-59 for the interior laminate as well as CyberShield protective glazing. Project glazier Enclos Corp., enclos.com, fabricated the project's metal system and the distinctive diamond-shaped solar shades, which are integrated into the unitized panel.

Other notable sustainability features of the project include a 95 percent reduction in water consumption, achieved through rainwater, well-water, and municipal reclaimed water capture, and rooftop solar panels that generate nearly 20 percent of the building's energy usage, according to a GSA press release. The project site has achieved key sustainability designations for reduced environmental impact, including two stars from Sustainable SITES Initiative and LEED Gold for Commercial Interiors. The LEED Platinum for Core & Shell Certificate application is pending.

According to the GSA, the project generated nearly 1 million work hours during its construction, with about 75 percent of construction contract dollars awarded to Florida businesses. The project also exceeded small business goals in all categories.

J.E. Berkowitz

The Tower at PNC Plaza
Photo courtesy of PPG Industries

The Tower at PNC Plaza, PNC Financial Corp.'s new headquarters, completes a five-year process with the vision of creating "the world's greenest skyscraper."

Opened in October 2015, the 33-story skyscraper features an innovative double-skin façade to help the building naturally ventilate for more than 40 percent of the year. This unique façade is equipped with a motorized outer layer and a manually operable inner layer of louvers that draw fresh air across building floors, where it warms, rises through two shafts in the building's core, and exhausts through the roof. Narrow floor plates, angled street orientation, and highly transparent glass enable light to penetrate 92 percent of work spaces throughout the building, reducing the need for artificial lighting. The outer façade features diagonally staggered glass panels, designed to resemble boat sails, as they capture the breeze for the building's occupants.

Working within a tight construction schedule, J. E. Berkowitz, jeberkowitz.

com, fabricated more than 125 truckloads of custom glass products, including high-performance insulating glass units and monolithic laminated glass with individual panels that were 14 feet tall.

"J.E. Berkowitz's capacity in the areas of cutting, heat-treating, laminating and insulating glass assembly enabled the company to meet the project's schedule, which required sequential deliveries to six different assembly locations," says Arthur Berkowitz, president, J.E. Berkowitz.

J.E. Berkowitz fabricated nearly one million square feet of glass for the project. The outer glass wall features two lites of 5/16-inch Starphire Ultra-Clear glass by PPG Industries, ppgideascape.com, laminated with a SentryGlas interlayer by Kuraray, kuraray.com. The inner wall incorporates IGUs featuring 3/8-inch Starphire glass and 1/4-inch Sungate 400 passive low-emissivity glass by PPG Industries. Sungate glass is engineered to maximize the environmental performance of buildings in northern climates by harvesting solar heat in the winter to

diminish furnace loads and by emitting high levels of daylight year-round to reduce lighting costs. The inner and outer curtain walls incorporate metal panels finished with Corafon fluoropolymer powder coating in Gray Mica.

Initial shipments began in March 2013 and were completed in January 2015.

The Tower represents PNC's investment in downtown Pittsburgh. PNC required glazing contractor Permasteelisa North America Corp., permasteelisausa.com, to open a local manufacturing facility in order to bring jobs to the area. About half of the Tower's facade was assembled at the site. It is expected to earn LEED Platinum certification from the U.S. Green Building Council.

Metal systems supplier, Sapa Extrusions America, sapagroup.com, applied the coatings. The sustainability consultant for the project was Paladino & Co., paladinoandco.com, the general contractor PJ Dick, pj dick.com, and the curtain wall consultant, Heintges & Associates, heintges.com.



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Triview

**Kaiser Permanente, Kraemer
Radiation Oncology Therapy Center**
Photo by Bruce Damonte

The Kraemer Radiation Oncology Therapy Center in Anaheim, California, is a gateway building for Kaiser Permanente, serving cancer patients during their frequent treatment visits. The circular 16,000-square-foot, single-story building houses three linear accelerators, CT imaging, exam rooms, doctors' offices and support space for patients and staff.

Triview Glass Industries, triview-glass.squarespace.com, supplied insulating glass units for the building's curved, segmented curtain wall. The units were constructed using low-emissivity SunGuard SNX 62/27 from Guardian Industries Corp., guardian.com, along with custom screen fritted glass. Triview was brought into the project at an early stage to assist in the development of the glass specification.

Architect Yazdani Studio of Cannon Design, cannondesign.com, focused on the special needs of cancer patients in the design, which emphasizes calm, natural light and outdoor views. To fulfill this design need, the exterior curtain wall's custom frit pattern is denser in areas that require privacy and more open for views. The project required 34 unique panels for the precise layout of the graphic, which also incorporates a pattern of trees that mirrors the surrounding landscape. The design of the glazing system allows the building to glow at night, symbolizing hope, according to Triview.

"The decorative element of this project had to be reconciled with the required solar performance," said Joe Carlos, director, sales and marketing,

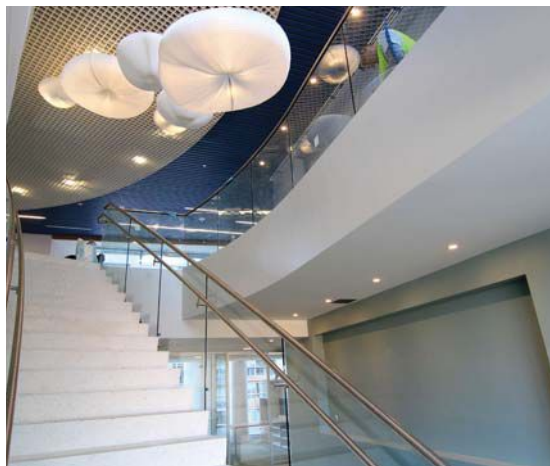
Triview. "To achieve this, there was a rigorous sampling process. After the glass configuration was decided, Triview had to execute the layout of the graphic onto the curtain wall. The dimensions of the curtain wall, glass and sealant all had to be accounted for exactly to ensure the uniformity of the design. This was a collaborative effort with open communication between the fabricator, glazier and the architect."

Turner Construction, turner-construction.com, was the general contractor for the project. The curtain wall was designed by glazing contractor Bagatelos Architectural Glass, bagatelos.com. The project is designed to be LEED Gold certified.

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Standard Bent Glass

Faces of Regent Park

Photo by Dan Bergeron / Fauxreel Studios

Faces of Regent Park designed by artist Dan Bergeron, fauxreel.ca, and fabricated by Standard Bent Glass, standardbent.com, is a permanent public artwork commissioned by the City of Toronto. The 12 photo-based, mixed-media portraits depict residents from the newly revitalized neighborhood, which has transformed from subsidized housing only, to a mixed-use development with an even split of subsidized and market-rate units. Standard Bent Glass fabricated six double-sided laminated glass panels for the finished installation, each 9 feet high by 6 feet wide and 2,000 pounds.


“It was a challenging project. As an exterior glass art display, the work

combined form and function with safety laminated glass products,” says Jeff Nichols, vice president sales and marketing, Standard Bent Glass Corp.

The 70 by 130 by 2 1/2-inch thick laminated decorative glass panels use SentryGlas Expressions decorative interlayers by Kuraray, kuraray.com. Bergeron had originally proposed porcelain tile for the finished medium, both for durability and easy installation, but says that he and the City of Toronto decided after some research “to go with a laminated glass product. We felt that laminated glass would be a better aesthetic fit with the site where the artwork would be installed, that it would be easier to achieve a more vibrant and color corrected image using glass as opposed to tile, and that laminated glass would give the artwork a more contemporary and airy feel allowing the work to be read in a clean, simple and elegant framework.”

The 12 subjects, residents of the neighborhood, celebrate its diversity.

Bergeron created each portrait in studio as a mixed-media artwork on a birch panel. The original portraits were digitized, then color corrected and sharpened. Standard Bent and Bergeron worked closely together throughout this process, creating samples of each portrait that the fabricator laminated into the final glass works. The process, according to Bergeron, “was very collaborative, and it was very reassuring to work with a fabricator that understood the complexities of the colors in the portraits and my desire to get the colors just right.”

According to Bergeron, the work combines “the human face with the distressed surfaces of aged architecture and infrastructure found in the urban environment. The graffiti tags have been meticulously rendered from actual markings found in the neighborhood.” 

GLASS & LIGHT

DECORATIVE INTERIOR INSTALLATIONS DEMAND
LIGHTING KNOW-HOW

BY KATY DEVLIN

The specification of interior decorative glass often prompts the question: How will it be illuminated? Decorative interior glass is frequently paired with lighting fixtures for two purposes: to highlight the decorative features of the glass and to create interesting lighting effects in the space.

This trend requires that glass companies become proficient in lighting design to ensure a decorative installation appears as envisioned. When the desired look is not achieved, it may be the glass suppliers, not the lighting companies, that are blamed, sources say.

“The way that light complements glass is effective, but only when it is done well. Designers, including those experts referred to as lighting consultants, generally make the same typical mistakes when introducing light to glass,” says Bernard Lax, CEO of Pulp Studio, pulpstudio.com.

“Lighting can have an amazing impact on how the glass is presented. It can make it or break it,” adds Mark Toth, vice president of architectural glass sales at Skyline Design, sky-design.com.

Glass companies, including the decorative glass fabricators and the glass installers, should become familiar with the motivations behind lighting glass, the available lighting fixtures, the potential application of the fixtures, and the common challenges of lighting glass.

Illumination goals

Before making any lighting recommendations for a project, the glass supplier should work with the designer or owner early on to understand the vision for the glass installation. This conversation may help determine the type of glass and how that glass is illuminated, sources say.

“We collaborate actively with the architectural teams and consultants on most projects, in order to realize their unique design vision,” says Donald Jayson, senior vice president, Bendheim, bendheim.com. “From that standpoint, integrating lighting into the glass installation is not an additional challenge, but there are more team members involved.”

In addition to working with the architect and owner, glass companies may also be working with interior designers and lighting consultants. A de-

signer may be looking for lighting that illuminates a standout decorative glass installation, or a way to actually light a space through innovative combination of glass and light. Understanding these goals will be critical to a successful installation, sources say.

“The primary goal when integrating lighting with our channel glass wall systems is typically dramatic aesthetic impact or visual interest,” describes Mike Tryon, general manager for Bendheim Wall Systems Inc., bendheimwall.com.

The type of glass affects the style of illumination. For example, etched, sandblasted or textured glass can diffuse the light, dispersing it more evenly throughout the space. While “specialty laminated glass featuring a colored, graphic, or textile interlayer ... allows greater customization of the color effect and more subtlety,” Jayson says.



Jockimo Inc., jockimo.com, supplied its Crystal Clear Glass Flooring for the lobby of the Renaissance Hotel in Palm Springs, California. The glass is back-lit with LEDs in a green color. Mattoni Design Studio, mattonidesignstudio.com, was the designer, and Allied Glass & Door, alliedglassanddoor.com, was the glazier.



Lamberts channel glass from Bendheim Wall Systems, bendheimwall.com, is a prominent design element in the new Montclair State University Student Recreation Center in Montclair, New Jersey. Energy-efficient, programmable LED lights illuminate the curved interior channel glass wall and breathe energy into the state-of-the-art facility. The 20-foot tall parallel, single-glazed channel glass walls provide a backdrop to the curved center staircase, while a computer-controlled LED system displays an array of light shows, giving the entire space a sense of movement.



A 160-foot wide, 10-foot high glass art installation wraps around four walls at the CalSTRS Headquarters in West Sacramento, California. The piece consists of mouth-blown glass that is slightly milky, painted with vitreous enamels that are fired onto the glass, then laminated to mirror. The mirror reflects the ambient light in the space through the mouth-blown glass. Paul Housberg of Glass Project, glassproject.com, created the glass; HOK, hok.com, was the architect.

Mirrored glasses may also be used to add light and dimension to a space.

Illumination techniques

Designers are looking for illumination solutions for any number of interior decorative glass applications, including countertops, wall partitions and backsplashes. Glass can be illuminated through a variety of methods—natural daylight, artificial light, or a combination—that affects the end appearance of the installation, says Toth.

The most common artificial illumination techniques include: edge lighting, bottom lighting, top lighting and backlighting. For applications such as glass flooring or ceilings, diffuse under- or over- lighting might be used.

Backlighting is common for wall applications and requires the project team take numerous factors into consideration. Backlighting can create

LIGHTING CONSIDERATIONS

Heat buildup.

Lighting is frequently used to illuminate a glass installation along a wall, and is often applied in a cavity behind the glass. These cavities can face issues of heat buildup. The project team should ensure the cavity gets adequate air circulation for the chosen lighting. “You have to get enough air movement. If it’s a cavity enclosed, you’re going to get heat buildup,” says Paul Housberg, owner of Glass Project Inc., glassproject.com.

Access.

Will a project require maintenance access? LEDs require minimal maintenance. However, if a project specifies halogen, incandescent or fluorescent lights, access must be considered. “If access is difficult, then LEDs have an advantage. If access is possible, then you can use [other lighting types],” Housberg says.

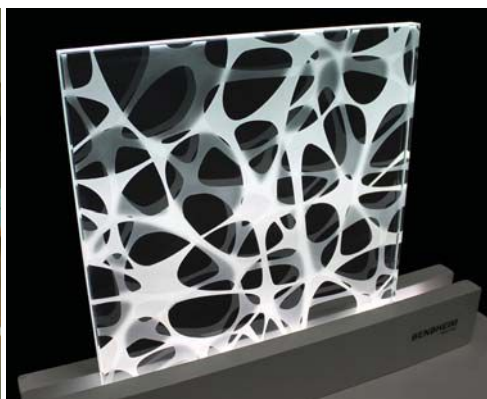
Concealed fixtures.

A challenge to lighting glass is hiding the fixtures. This will be easier for some types of glass than for others, depending on the level of transparency. “The question is, how do you make a glass installation appear lit without showing how it is lit,” says Tim Casey, owner of Jockimo Inc., jockimo.com.

Hot spots.

Hot spots occur when the lighting fixture is too bright or too close to the glass, creating a concentration of light, or yellowed appearance. “You want to be able to position the lights so you don’t get hot spots, but at a distance that provides [even illumination] across the reflective surface,” Housberg says.

The use of diffusers—film on the glass, suspended film or sheet between the glass and lighting—can also help eliminate hot spots.



Oberon Etched Glass from Bendheim, bendheim.com, with edge lighting. Edge lighting can serve as an effective way to illuminate and highlight decorative elements of glass. Pictured, the Oberon Etched Glass is a half-inch thick, ultra-clear (low-iron) glass with a double-sided acid-etched pattern that adds depth to interior partitions and building facades.



Hartshorne Plunkard Architecture, hparchitecture.com, designed an illuminated 10-foot by 10-foot interior glass cube to house the resident shared tech hub at the AMLI Lofts at the edge of Chicago’s historic Printing House Row District. The glass is digitally printed by Skyline Design, skydesign.com, on ½-inch low iron glass and back lit with an LED panel that is programmed to shift colors. The glass is printed to offer a diffused effect, and the pattern is Alphabet by Alexander Girard, selected in homage to the Amli’s Printers Row location. Photo by Patsy McEnroe Photography.



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an in-demand diffuse light. However, it requires an open cavity behind the glass to house the lighting fixtures.

“We often supply digital printing on glass for feature wall or wall cladding applications,” Toth says. “If the glass is translucent, it is in most cases backlit. Once that is determined, we get into how it should be backlit.”

“Most backlit glass requires no more than about 15 percent light transmission to make glass illuminate,” adds Lax. “The next requirement is to find solutions to balance the back lite. Without determining these two elements the result will generally be substandard.”

Paul Housberg, owner of Glass Project Inc., glassproject.com, recommends the use of dimmers to provide optimal lighting control throughout the day. “Get as much light behind as you can and put it on dimmers. If I’ve had an issue, it’s that the light is too bright, [You] can control it with dimmers,” Housberg says.

Additionally, a bright colored wall behind the glass will assist in backlighting. “I recommend just a wall painted white with the brightest white paint that you can find. Just try to minimize any kind of shadows,” Housberg says.

In situations where a back cavity is impossible, edge lighting, bottom lighting and top lighting can meet design goals. However, these solutions also might be preferred to highlight decorative aspects of the glass itself. “Edge lighting is a technique that is particularly effective with etched pattern glass,” Jayson says. “The etched design picks up the light and gets highlighted in a powerful way.”

The lighting options

The lighting industry has undergone notable developments in recent years that have changed the needs and expectations from the project team. Previously, halogen lights, which cause notable heat buildup in spaces, were popular in applications. Now, LEDs are leading lighting trends, with some architects and designers continuing to specify high-output florescent lights or even incandescent.

“The technology has changed over

the last five years. The market has mostly shifted to LED,” Toth says. “LEDs are being used in feature wall and backlit applications.”

In choosing fixture type, a design team should consider factors such as maintenance requirements, access potential and ventilation. For example, LEDs offer a long lifespan (30,000 hours according to some estimates) and do not create significant heat buildup. Halogen, on the other hand, “has to be replaced a couple of times a year and creates heat gain,” Toth says. “You have to worry about ventilation, and you have to worry about how far behind the glass the fixtures are installed.”

Mockup

The best way to ensure that a glass and light installation achieves the desired appearance and performance is to test it with a mockup or sample piece. “In situations where I can’t mock up at full scale, sometimes the lighting company will send me sample fixtures, and I will mock up in my studio. Or, sometimes I’ll make a sample panel to send to the lighting designer, and they will do a mockup in their shop,” says Housberg.

Glass suppliers can also use their showroom to demonstrate various lighting types and how they work with different glass applications. Tim Casey, owner of Jockimo, jockimo.com, says he encourages designers and owners to visit the company showroom to view lighting options. “Homeowners can come in with their designer and look at kitchen countertops and how to edge-light them,” he says. “We also have glass floor panels with lighting underneath.”

These mockups are key to determining not only the type of lighting but also the placement. Consider the placement of backlighting for a feature wall panel. Or, for top or bottom lighting, the mockup shows how far the light will shine up or down the glass, and will help determine whether the glass is illuminated evenly. “All of this needs to be tested,” Toth says. “You can design as much as you like ahead of time, but you don’t know how it is going to turn out until mockup.” ■

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Product Spotlight

INT45 Interior Flush Glaze Framing from Tubelite Inc.

Tubelite Inc. extended its 4500 Series Storefront framing with the addition of INT45 Interior Flush Glaze Framing for commercial interiors. Specialized adapters allow Tubelite INT45's frames to be installed before or after the drywall, completely covering the end of the stud wall and helping meet fast-track construction schedules.

Tubelite's first interior framing product line, the INT45 resulted from the company's New Product Introduction process, where clients in various regions share their feedback on market opportunity and design concepts.

"In the concept stage of our NPI process, we asked several of our clients to participate in sharing the Voice of the Customer," says Tim Fookes, Tubelite's director of engineering. "We discussed likes and dislikes of existing interior framing products, and decided as a team to enhance our existing E4500 system, using perimeter adaptors."

Tubelite INT45 easily incorporates standard aluminum storefront with metal stud and drywall systems. Perimeter trim members are pre-applied on one side of the 4 1/2-inch frame opening for simple, fast installation. Additionally, as clients requested, a fixed leg adaptor allows the framing to be easily positioned in an opening.

Also as a result of its findings from the New Product Introduction process, Tubelite opened up the existing system's glass capability by allowing 1/4-inch to 1/2-inch glass thicknesses.

"Clients also asked for glazing gaskets in gray, so we developed a suite of gaskets allowing for 1/4-inch through 1/2-inch glass in both black and gray," says Fookes.

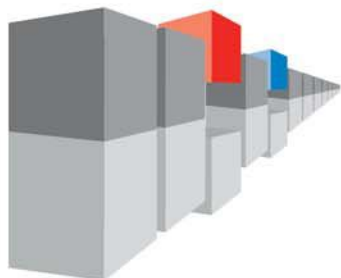
Recycled aluminum content may be specified for the storefront framing members. Aluminum extrusions are stocked in Dark Bronze and Clear anodize, and can be requested in five other anodize colors, including Cham-



pagne, Light Bronze, Medium Bronze, Extra Dark Bronze, Copper and Black; and 20 standard paint choices or a custom paint color. Matching finishes are offered for standard swing doors and frames to complete the system.

"The simplicity of our INT45 system saves time in installation, where other interior systems require many complex pieces to assemble into openings," says Fookes. "INT45 uses an existing storefront system to accomplish the look and functionality of other interior systems that utilize more parts. Our clients can fabricate this in their shops, which lessens their costs as it further reduces installation time and labor. This is especially helpful to our clients who are experiencing tight labor markets."

To expand the interior framing line further, Tubelite is currently looking at another adaptor configuration that may offer even greater flexibility of installation, according to Fookes. 800/866-2227 | tubeliteinc.com



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Fluted Glass by Nathan Allan is now available using kiln-formed production methods. Nathan Allan's methods allow the fabricator to produce Fluted Glass in any thickness required, and in panel sizes up to 6 feet by 10 feet, com-



pany officials report. The extra glass thickness allows for larger sizes, up to 6 feet by 10 feet, and far more application options, including door panels, partitions, windows, balustrades, cladding and walls, according to company officials. Available as clear or low-iron glass, Fluted Glass is available in colored or frosted finishes and in Lucent, Gemstone or Metallic colors. It is also available in tempered or laminated. 604/535-8849 | nathanallan.com

Finishes

Process finishing

Cefla North America partnered with Henkel Corp., developer of Technomelt CHS UV Fusion Coating technology, to speed the process of giving melamine panels and other products high-gloss as well as lower gloss finishes. According to a company release, pairing Henkel's technology with Cefla's Inert Coater by Sorbini shortens production lines, saving equipment and labor costs, while reducing space and waste. Technomelt CHS UV bonds to all melamines and of-



fers the advantage of an immediate cure with ultraviolet light, so it can be incorporated into a wet-on-wet process with Cefla's Inert Technology to achieve the right coating weight and avoid repetitive sanding, say company officials. Traditional finishing lines can be more than 300 feet long, designed for adding up to seven layers of coating. Each layer requires a UV cure lamp, followed by a sanding station to prepare for the next application. A streamlined processing saves the costs associated with extra labor, additional machines, and replacement parts such as sanding belts. 704/598-0020 | ceflaamerica.com

Metal products and finishes

2 1/2-inch Rail System

Dorma Inc. added to its DRS Rails line of products with the new DRS 2 1/2-inch Rail System, which offers users more natural light. With a larger clear opening and minimal amount of visible metal, the system provides structural support while expanding interior



views. The DRS 2 1/2-inch Rail System comes in both square and tapered profiles and supports monolithic and tempered laminated glass from 3/8- to 3/4-inch thick. With five standard architectural finishes, four special order finishes, 200 plus RAL finishes and

custom finishes available, it can satisfy virtually any specification, according to the company. Like all Dorma DRS products, it is a clamp-on rail system that enables quick and easy assembly and has two security options: key cylinders and thumbturns within the rails themselves or DORMA locksets fitted to glass doors. 800/523-8483 | dorma.com

Resources

Extended warranties for louvers between glass

Unicel Architectural offers increased warranty lengths for its Vision Control integrated louvers solution, which now has a 20-year warranty for interior applications and a 10-year warranty for exterior applications. According to the company, Vision Control is a patented, hermetically sealed insulating glass unit



combining louvers within glass for both interior and exterior glazing applications. The extended warranties commence from the date of manufacture. Vision Control insulating glass units are warranted not to develop, under normal conditions, material obstruction of vision as a result of dust or film formation on the internal glass surface caused by failure of the hermetic seal other than through glass breakage. Additionally, the warranties cover any internal parts for malfunction, mechanism failure or premature wear.

800/668-1580 | unicelarchitectural.com

Direct freight shipping program

YKK AP America Inc. announced an expansion of its direct freight service program, offering a more efficient and secure method of shipping customer orders in Northeast and Midwest U.S. markets, according to a company release. The most recent expansion is in addition to programs previously



launched in the Texas, Gulf Coast, Florida, Southwest and Central U.S. regions and decreases the use of less-than-truckload transportation. The program employs a dedicated logistics system with company trucks to handle transportation and deliveries. Each shipment is moved by hand, limiting the possibility of damage. Additionally, through the direct freight program, shipments will be scheduled for delivery on a regular date. The direct freight program will be rolled out to additional sales regions over the next year. 678/838-6000 | ykkap.com

Sealants and adhesives

Glazing sealant

The ExactaBlend AGP from Graco cuts costs while improving accuracy in glass bonding and sealing applications. While competing technology relies upon mechanically linked pumps



or gear pumps without real-time ratio monitoring to mix materials, the ExactaBlend AGP monitors material ratios constantly, according to a company release. According to Graco officials, the system allows operators to set up and make ratio changes with a touch of a button. If off-ratio conditions exist, the system automatically shuts down to prevent compromised material from being dispensed onto the curtain wall or insulating glass. The applicators deliver variable ratios between 6 to 1 and 14 to 1, and can perform at flow rates up to 4,000 grams per minute. The ExactaBlend has fewer moving parts than the old system, requiring the stocking of only one set of parts. The ExactaBlend also has a smaller overall footprint, making it easy to incorporate into the hand-filling line. 844/241-9497 | graco.com

Software, apps and tools

Continuing education mobile app

AGC Glass Co. North America, a registered American Institute of Architects continuing education provider, now sponsors the recently launched CE|Strong mobile app, which gives architects the flexibility to learn and earn credits on the go, according to AGC. The CE|Strong mobile app offers AIA/CES approved courses in video and text formats, allowing architects to manage their work and track their progress from their devices. The app, available at cestrong.com, submits completed courses to AIA for credit, and the user receives certificates via email. AGC's newest AIA/CES program, Understanding Energy Code Compliance and Glass Selection, covers the reasoning behind energy codes and the code adoption process, as well as code differences in the various climate regions of North America. It explores code compliance tools and methodology, and the process of designing with glass to meet the requirements for energy efficient buildings. 404/446-4207 | us.agc.com

Workplace hearing safety app

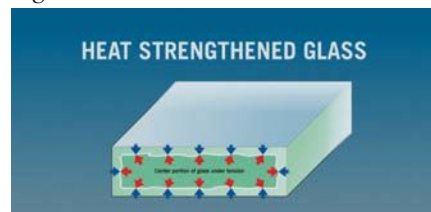
Developed in close cooperation with audiologists and safety professionals, Honeywell's new Howard Leight Hearing Conservation Toolbox mobile



application for iPad, hwll.co/HearingApp, is an accessible resource of interactive tools and educational materials for safety managers to use in support of workplace hearing safety programs, according to company officials. The app features information on the risks of occupational noise, hearing conservation program best practices, and practical instruction on the testing, selection, fitting and use of hearing protection. 877/841-2840 | honeywellnow.com

Website learning center

Pulp Studio announced an addition to its website called the "Learning Center," which features a selection of streaming videos useful for architects and



those in the glazing industry. These videos educate viewers on topics such as where glass comes from and how low-emissivity glass works. Pulp Studio will continue to post videos as they find them and welcomes contributions from any source interested in having videos posted on the Learning Center, pulpstudio.com/learning-center. 310/815-4999 | pulpstudio.com

Industry Products

Railings in BIM format

Q-railing's Easy Glass Slim, Pro and Max glass railing systems are now available as building information modeling objects at the Q-railing website. Other systems will follow. The BIM objects hold 3D modeling information, drawings and product data. They are compatible with the most common modeling software, Revit and ArchiCAD.

714/259 1372 | q-railing.com

Curtain wall Revit model

Wausau Window and Wall Systems significantly expanded its 3D building information modeling tools with the addition of a new unitized curtain wall Revit project file, according to company officials. This single file is preloaded with Wausau's INvision family of unitized curtain wall profiles allowing architects, designers, engineers and contractors to choose different widths, depths and sightlines. This all-in-one



approach automatically updates to the selected parameters without repeating steps or requiring multiple files, according to officials at Wausau, who add that Wausau's Revit files can be used with other BIM tools for clash detection. Revit files for Wausau's INvision unitized curtain wall, conventional stick SuperWall, and the INvent family of projected and fixed windows are available. For more information about Revit building design software or to download a free trial, visit autodesk.com.

877/678-2983 | wausauwindow.com

approach automatically updates to the selected parameters without repeating steps or requiring multiple files, according to officials

Tools and supplies

Mini RFID handheld reader

Northern Apex introduces a mini, handheld radio-frequency identification (RFID) reader that connects to a backend system via Bluetooth. According to the company, the mini RFID is



easier and cheaper to use in the field for sales, item identification and dynamic pricing. The device is powered by an Impinj Indy RS500 Reader System in Package, has a USB-chargeable battery and weighs four ounces.

260/637-2739 | northernapex.com

Portable emissions analyzer

The new E8500 Plus emissions analyzer from E Instruments International is a complete portable tool for EPA compliance level emissions monitoring and testing, company officials report.



Ideal for regulatory and maintenance use in boiler, burner, engine, turbine, furnace and other combustion applications, the analyzer includes many new features. Some of these features are upgraded software, a volatile organic compounds sensor option, upgraded display and keypad design, easier filter replacement, expanded memory and

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215/750-1212 | e-inst.com

Transportation and handling

Glass transportation

Bromer Inc. offers a new solution for glass transportation—the aluminum folding side door option instead of curtain or roll-up tarp. Equipped with



rust-free heavy-duty stainless fasteners and hardware to suit industrial expectations, the folding side doors maintain an effective weather seal and help to speed up the delivery process, according to the company.
450/477-6682 | bromerinc.com

Windows

Hurricane certified windows

Winco Windows' 1450 Aluminum Fixed Window and 1450S Aluminum Casement/ Picture Combination Window have been certified for impact resistance by the Texas Department of Insurance, according to the company. This certification will allow use of both window units in areas where windborne debris protection is required. Both products have been evaluated for compliance with the wind loads specified in the International Building Code and the International Residential Code. Both products have a design pressure rating of +80 PSF and an AW performance rating of 12 PSF water resistance.
800/525-8089 | wincowindow.com

Commercial casement

European engineering meets North American window design with Äspekt, the new commercial casement from Rehau. According to company officials, the Äspekt commercial casement



design is engineered to provide key benefits to any commercial project as compared to alternative aluminum casement windows, including: up to 35 percent less energy without limiting project design, up to 55 percent less time for

design is engineered to provide key benefits to any commercial project as compared to alternative aluminum casement

installation, up to ten times less leakage potential, and increased comfort due to better noise insulation, air tightness, energy savings and longevity. The system accommodates direct-set glazing and allows for multi-lite configurations within one continuous frame. With this design, Rehau expands its commercial product portfolio, which also includes a European tilt-turn window design.
800/297-6371 | rehau.com/us-en

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The SELECT few don't believe in putting a bandage on door problems. They know those problems won't go away with quick fixes. So SELECT men and women find long-term solutions. They continually improve hinge performance. Simplify installation, minimize maintenance and ship orders sooner. That's what you want. That's what you get.



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People

Air Louvers

I & H Associates, owned by *Jim Cavness* and *Chris Bianco*, now represents the Air Louvers, activarcpg.com, line of products in Texas, Mississippi, Oklahoma, Louisiana and Arkansas.

Beneq

The Board of Directors of Beneq Oy, beneq.com, announced two executive announcements, including the appointment of *Jukka Nieminen* as president of Beneq Oy. Nieminen previously served as vice president for sales, marketing and business development for Beneq. *Sampo Ahonen*, who has served as CEO since 2005, will become Chairman of the Board.

BV Glas and glasstec

The Federal Association of the Glass Industry, bvglas.de/en, elected *Dr. Frank Heinrich*, chairman of the Board at Schott AG, us.schott.com, as its new president. As a result he will also act as president of glasstec 2016, International Trade Fair for Glass Production, Processing and Products.

Canadian Glass Association

Bill Yanek has been named executive director of the Canadian Glass Association. Yanek is currently executive vice president of the Glass Association of North America and president of its subsidiary association management company, Centric Management. He will remain in those roles as he adds the CGA post.



Zoellner

Dwyer Group

Dwyer Group Inc., dwyergroup.com, announced the addition of *Lisa Zoellner* to the newly created position of chief strategy and marketing officer. Zoellner most recently served as executive vice president and chief marketing officer of Golfsmith International, the world's largest specialty golf retailer.



Bornhurst

Enclos

Enclos, enclos.com, promoted *Bruce Bornhurst* to president, replacing *Gregg Sage*, president of Enclos' parent company, CH Holdings USA Inc., who had been acting president of Enclos since 2004. Sage is stepping down to focus on other CH Holdings business. Bornhurst has been responsible for Enclos' west coast sales and operations since 1985. *Steve Danke* was named executive vice president of sales with national responsibility for the firm's sales and pre-construction activities. Reporting to Danke will be *John Wolf*, promoted to vice president of sales. Like Danke, Wolf's background combines operations with business development. Wolf joined Enclos in 2014.



Weld

Empirehouse

Empirehouse Inc., empirehouse.com, promoted *Jason Weld* to the position of senior project manager. Weld joined Empirehouse in 2006. In his new position, Weld will manage the project manager department and the drafting department, and oversee large projects.



Biason

GIMAV

GIMAV, gimav.it/en, announced that *Laura Biason* has been named director. Biason is an expert in corporate organization and communications. Named deputy director of GIMAV in May of 2014, she immediately began working side-by-side with former director *Renata Gaffo* in all the areas required to manage these two key Italian glass industry organizations, according to a company statement.

Graham Architectural Products

Graham Architectural Products, grahamwindows.com, named *Steve Weisser* as safety manager, *Steven Skaggs* as field service manager and *Danielle Daugherty* as assistant project manager. Previously, Weisser worked as safety and health manager at Goodhart Sons Inc. With over 30 years in the industry, Skaggs has an extensive window background, most recently at Accent Windows. Before joining the Graham team, Daugherty worked as a customer service representative at Rite Aid Corp. and Lowe's Home Improvement.



Kujawa

Kolbe

Kolbe Windows & Doors, kolbe-kolbe.com, has named *Bryan Kujawa* as the company's national sales manager. He will oversee and work closely with Kolbe's regional sales managers. Kujawa began his career at Kolbe in 1991. Most recently, Kujawa returned to the Midwest to work in sales at the Kolbe Gallery Twin Cities in Minnesota.



Rowe

Pella

Davis Rowe has been named the vice president of national accounts for Pella Corp., pella.com. Rowe succeeds *Bob Kubacki*, who will retire after 17 years with the national accounts team, which oversees Pella's partnerships with national home improvement retailers and building material suppliers to contractors. Rowe has gained extensive experience in marketing, sales and management during his 13-year career with Pella. Most recently, Rowe held the position of director of national accounts.



Lentz

social media efforts for the company's Suntuitive Glass products. Lentz has 16 years of experience in marketing and e-business development.

Pleotint

Pleotint LLC, suntuitive.com, named *Patrick Lentz* as its new marketing manager. In this position, Lentz will head marketing and



Tiberghien

PPG

PPG Industries, ppgideascales.com, announced two executive appointments. *Hervé Tiberghien*, senior director, global human resources, will become vice president, human resources, and report to PPG President and CEO Michael McGarry. *Chris Caruso*, director, information technology, global architectural

coatings, will become vice president, information technology. He will report to Ram Vadlamannati, PPG vice president, architectural coatings, for the Europe, Middle East and Africa and Asia Pacific regions.

Quality Enclosures

Steve Kady has been promoted to vice president of Quality Enclosures, qualityenclosures.com. Kady has more than two decades of experience in the industry. He joined Quality Enclosures in 2012. *Shane Torsell* also has been promoted to vice president. Torsell joined Quality Enclosures in 2000 after working as an installer and a merchandise manager.

Sika

Sika Target Market Industry, usa.sika.com, appointed *Mike Rea* to the position of senior product engineer for TM Industry, *Edwin Eshesimua* as market field engineer, *façades/insulating glass*, and *Butch Paula* as territory sales manager, aftermarket.

Solaria

Solaria Corp., solaria.com, expanded its leadership team and Advisory Council. *Scott Hoover* was appointed vice president of sales, Building Solutions, North America. Hoover will work with prominent building and construction partners to bring to market powered-by-Solaria building integrated photovoltaic solutions. In addition, *Scott Thomsen*, co-founder of Innoscovy, and *Emanuel Salmons*, head of Global Business Development in the Building Technologies Division at Siemens, have joined Solaria's Advisory Council.

Southern Stretch Forming

Southern Stretch Forming, southernstretch.com, named *Rob Seils* its new national sales manager.



Seils

Seils comes to SSF with 17 years of experience in the architectural glass, metal and finishing markets, according to a company release. Seils succeeds *Charles Michie* ("Mickey"), who will retire this summer after 13 years with the company and many more in the industry.



Dietrich

Tubelite

Doug Dietrich and *Kevin Haynes* join Tubelite Inc., tubeliteinc.com, as architectural accounts representatives. Based in Iowa, Dietrich most recently worked at Merchants Metals Inc./Oldcastle Architectural Inc. as the manager of technical sales and specifications. Based in Florida and a member of the Construction Specifications Institute, Haynes, CSI, comes to Tubelite from Coral Industries Inc.



Haynes



Evans

United Architectural Metals

United Architectural Metals, unitedarchitectural.com, named *Stephen Evans* as its new design manager. Evans

joins UAM with extensive knowledge of curtain wall and window systems from design to installation, according to a company release. His career in the glass and aluminum world dates back more than 36 years with experience at respected companies in the industry.

Upstate Glass Tempering

Officials from Upstate Glass Tempering Inc., upstateglasstempering.com, announced *Steven Pangel* as its new plant manager. Pangel comes to the company with over 30 years of experience in glass production and management. Since joining, Pangel has already made "many production and quality enhancements," Upstate Glass officials said in a company release. "Steve's encyclopedic knowledge and skills makes him a tremendous asset to our company," officials said.



Traynor

Vetrotech

Joe Traynor was named senior designer/special engineering projects manager for Vetrotech North America, vetrotechusa.com. Traynor brings with him ten

years of experience in the fire-rated and non-fire rated fenestration industries in design, engineering and project management.



Graham

Wheaton Sprague

Wheaton Sprague Building Envelope, wheatonsprague.com, promoted *Jason Graham*, P.E., to the position

of branch manager for the firm's Minnesota office. Graham is a civil engineer who has devoted

his career to the curtain wall and glazing industry. He has been with WS since 2011. Graham is a licensed professional engineer in Illinois, Iowa, Minnesota, North Dakota, South Dakota, Utah and Wisconsin.



Herber



Gibson



Rios

such as Los Angeles and San Diego. Gibson has assumed the role of branch manager of the Houston branch and Rios is now operations manager of the Dallas branch.

In Memoriam



Berkowitz

Edwin "Ed" Berkowitz

Edwin "Ed" Berkowitz, chairman of J.E. Berkowitz LP, jeberkowitz.com, passed away on Jan. 8. Berkowitz was a

fixture in the glass industry for many decades. He entered the industry in 1950, when he joined J.E. Berkowitz, the glass business his father started in 1920. He went on to become president of the company, a position he held until the mid-1980s when he became company chairman and his son took over the role of president.

During his impressive tenure in the industry, Berkowitz actively took on leadership roles in glass associations, including as chairman of the Flat Glass Marketing Association, a precursor to the Glass Association of North America, according to a GANA release.

Hilton Berger

Hilton Berger, co-founder and former vice president of Saand Inc., saand.ca, has passed away. He was 63. As a result of ongoing health issues, Berger announced his decision to retire from Saand in July, bringing to a close a remarkable career spanning over 25 years, according to Saand officials. The announcement came about a year after Peter Garvey was appointed CEO of the company. Berger co-founded Saand, originally called Independent Mirror, in 1990. At that time there were 10 employees.

"Through his unique vision, dedication, hard work and his ability to connect with everyone who met him, this small business today has over 450 employees in six locations in Canada. Without his guidance and business sense, Saand as it is today would not exist," said Mark Franklin, Saand co-founder.

ONLINE

Visit GlassMagazine.com for retirement and additional personnel news.



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Business and building for sale. Retiring after 49 years, located in So. Jersey, turn key operation, well equipped glass & metal shop, can do any size job. Huge walk-in, 800k to 1 mil. in sales. Too much to list. Serious Inquires only. Asking 600K. 6500 Sq. ft. 609-513-9846.

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Project Manager

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We are a roll-up-your-shirt-sleeves, high energy company. We are looking for a professional project manager to run our aluminum storefront/curtain wall/glass division projects.

Successful candidate should have a minimum of five years' experience in the glass industry as a project manager for new construction projects.

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ESTIMATOR/PROJECT MANAGER
38 year old Louisville, KY commercial glazing firm looking for ideal candidate with a minimum of 3 years' industry experience in storefronts, entrances, curtainwall, windows and glass. Excellent salary and benefit package. Call Bill Cole at 502-267-4499 or send resume to wrc@birch.net.

GLASS PLANT SUPERVISOR
Immediate needs for Glass Plant Supervisors and Managers at a growing glass fabricator in suburban Detroit area. Prefer degreed candidates with entrepreneur spirit. Innovator with the ability to solve problems. Please send resumes to hkindt@glassandmirrorcraft.com.

PROJECT MANAGER
Commercial glass company seeking project manager. Top pay: \$90,000-\$100,000 based on experience with excellent full Benefits package. 3 years' experience with glazing, curtain wall, storefront & entrances from take-offs, procurement, budgets. Fredericksburg Glass, Fredericksburg, VA. Ph: 540/379-4210. Schedule a FaceTime Interview & Walk-Thru tour with the Owner to see our Admin/Fabrication Shop/Warehouse. Great Location for Family, Excellent Schools, Seasonal Weather, & close drive to Mountains & Beaches.

HELP WANTED



Assistant Project Manager **Continental Glass Systems, LLC** **Hialeah, Florida**

Continental Glass Systems, LLC, a partnership with Graham Architectural Products, companies of The Graham Group, headquartered in York, Pennsylvania, is seeking an Assistant Project Manager to join our Continental Glass Systems team located in Hialeah, Florida. The Assistant Project Manager will be responsible for reviewing project proposals or plans with the Project Manager to assist in determining time frame, funding limitations, procedures for accomplishing project, staffing requirements, and allotment of available resources to various phases of the project. Position requires a 4 year degree in construction management, construction technology, construction engineering, civil engineering, business or related degree from a college or university; and/or a minimum of 6 months of related work experience; or equivalent combination of education and experience. If you are interested in becoming an integral part of our team, please send your resume along with a cover letter stating your salary requirements to: pmjob@cgsfl.com. EOE M/F/D/V



Estimator **Continental Glass Systems, LLC** **Hialeah, Florida**

Continental Glass Systems, LLC, a partnership with Graham Architectural Products, companies of The Graham Group, headquartered in York, Pennsylvania, is seeking an Estimator to join our Continental Glass Systems team located in Hialeah, Florida. The Estimator will provide competitive project pricing by developing accurate costed Bills of Material from information supplied by the Continental Glass Systems Sales team. The Estimator will read and interpret architectural and structural drawings, project specifications, wind tunnel studies and project drawings/details and will effectively communicate with material vendors and suppliers to maintain a balanced cost and estimating structure. This position requires a 2 or 4 year technical degree or equivalent experience, 3–5 years' experience in the architectural window wall, curtain wall or window (fenestration) industry, preferably in Estimating/Preconstruction or Project Management. If you are interested in becoming an integral part of our team, please send your resume along with a cover letter stating your salary requirements to: estjob@cgsfl.com. EOE M/F/D/V



Human Resources Administrator **Continental Glass Systems, LLC** **Hialeah, Florida**

Continental Glass Systems, LLC, a partnership with Graham Architectural Products, companies of The Graham Group, headquartered in York, Pennsylvania, is seeking a Human Resources Administrator to join our Continental Glass Systems team located in Hialeah, Florida. The Human Resources Administrator will provide HR administrative and HR logistics support for the company working closely with employees and management to administer and keep records for employee safety, maintain employee benefit plan records and updates to all benefit plan providers, maintain the HRIS system and act as primary backup for the Payroll Administrator. Position requires a High School diploma or equivalent; Associates or Bachelor's Degree in HR Management, Business Administration or equivalent and 4–7 years' prior HR administrative experience in similar or related HR role, preferably in a manufacturing environment. If you are interested in becoming an integral part of our team, please send your resume along with a cover letter stating your salary requirements to: hrjob@cgsfl.com. EOE M/F/D/V



Project Engineer / CAD Drafter Detailer **Continental Glass Systems, LLC** **Hialeah, Florida**

Continental Glass Systems, LLC, a partnership with Graham Architectural Products, companies of The Graham Group, headquartered in York, Pennsylvania, is seeking a Project Engineer / CAD Drafter Detailer to join our Continental Glass Systems team located in Hialeah, Florida. Position is responsible for the drafting of any and all computer aided drawing to support production engineering, design engineering, and manufacturing. This position will assist in the development of creating glazing systems shop drawings, fabrication sheets, material cut sheets and material purchase orders. Position requires a technical school graduate or equivalent experience with AutoCAD and 3– years' experience as a CAD Drafter/Detailer and reading architectural drawings for commercial construction projects. Must have glazing systems fabrication knowledge. Position requires excellent CAD skills with current industry experience a plus. If you are interested in becoming an integral part of our team, please send your resume along with a cover letter stating your salary requirements to: pejob@cgsfl.com. EOE M/F/D/V

HELP WANTED

Project Manager / Estimator

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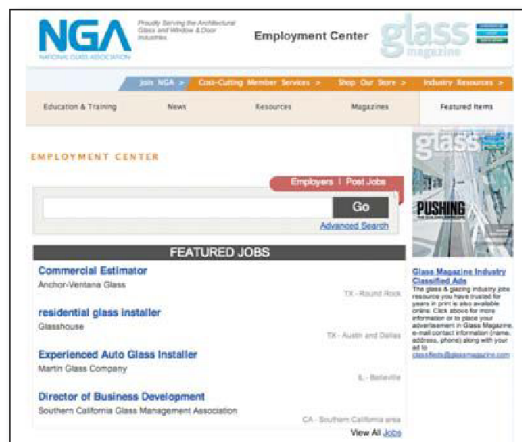
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Here's an Idea...

Companies from all parts of the glass and glazing industry have implemented innovative, out-of-the-box ideas to improve business from the ground up. Here's an Idea... showcases these sometimes small behind-the-scenes ideas that can make a big impact on a company's bottom line. If you have an idea that you would like to share, contact Bethany Stough, bstough@glass.org.

The Shower Doors & More One-Stop-Shop



Shower Doors & More employees in front of the company's new tempering furnace. Photo by Brooke Ashlyn.

Faced with rising demand and lengthening lead times, Larry and Page Giacin, owners of Shower Doors & More Inc., showerdoors.com, in Fort Lauderdale, Florida, decided to turn their shower door manufacturing facility into an all-in-one fabrication service shop—a rarity in the Florida market. “We want our customers to come to us for everything,” says Page Giacin. But, shower door companies in South Florida typically either fabricate or temper; if they offer both services, it’s done at two separate locations.

Since 2008, the construction market in Florida has been strong. But, as customer demand increased, Shower Doors & More waited up to 10 days for tempered glass to fill jobs. While it isn’t typical in Florida to be a one-stop shower door company, the Giacins had the volume to be able to invest in themselves, and differentiated their

services to meet customer needs.

Shower Doors & More has been adding polishers, cutting tables, drills and beveling machinery since 2014, to further enhance its product line and increase convenience. Most recently, the Giacins installed a 96-inch by 144-inch Glaston tempering oven. The company tempers its own glass—alleviating wait times and quality concerns—and also offers tempering services to other glass shops.


The Giacins spent two years researching fabricating machinery and the details of their facility before purchasing. Initially, they asked their customers what was important in a fabrication and tempering facility, and the majority of respondents said accuracy. Taking this feedback, Larry and Page asked friends and colleagues what machinery was reliable, affordable, and turned out a great product.

“We visited several glass trade shows and interviewed a variety of sales reps.

We traveled to Canada and toured facilities similar to our own. We listened to stories of both success and failure,” says Giacin.

Once the Giacins and their employees worked through all the kinks of installing new machinery, they began to explore tempering furnaces. “Each step must be researched with the understanding you can do it right or do it twice,” says Giacin.

The Giacins advise that the three main benefits of having all necessary, top-quality equipment under one roof are ease of operation, customer convenience and little lost time when something goes wrong. In the one-stop-shop setting, SDM has complete control over the quality of its products from start to finish, protecting their reputation and that of their customers.

“Now customers do not have to wait if something goes wrong. SDM fixes the problem and the customer can leave happy,” says Giacin. “Because shower doors are typically the last thing to go into new construction, when we can turn high-quality glass around in three days, our customers look good, and it rolls downhill.” 

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