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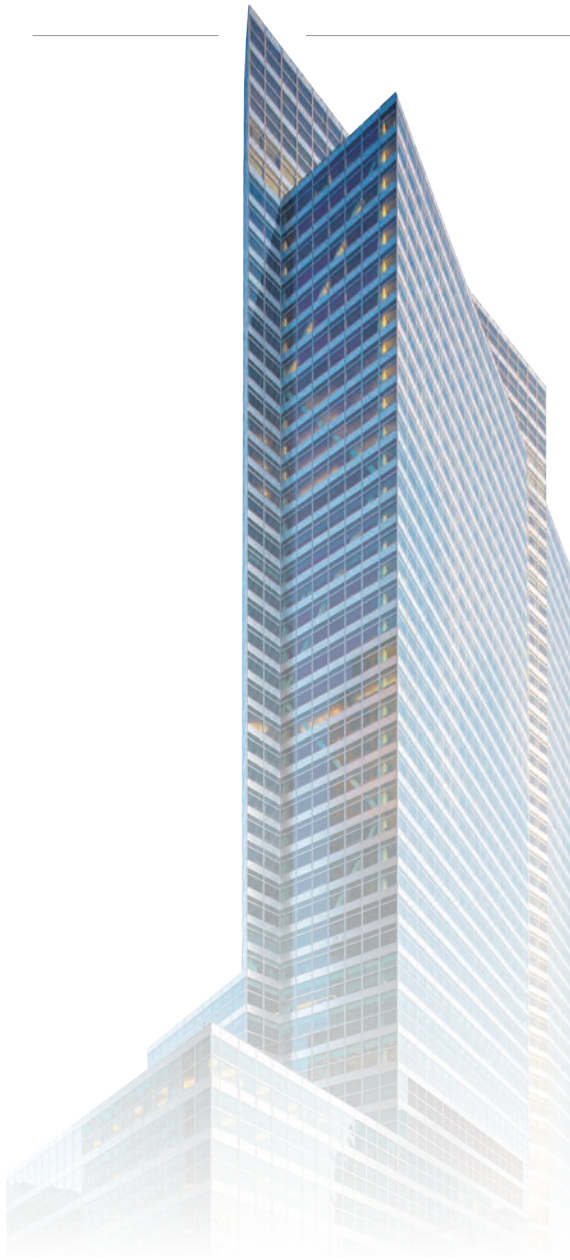
INVESTING IN

TOP GLASS FABRICATORS LOOK AHEAD WITH NEW EQUIPMENT,
PLANT EXPANSIONS AND MORE

+

ONE-ON-ONE WITH TRULITE'S NEW CEO
GUIDE TO HEAVY GLASS DOORS

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2020 Top Glass Fabricators

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LEADING FABRICATORS CONTINUED EXPANDING AND INNOVATING IN 2019. A MAJORITY ... ADDED PRODUCTION CAPACITY; 14 PERCENT ... ADDED OR EXPANDED NEW LOCATIONS, WHILE 77 PERCENT INVESTED IN NEW EQUIPMENT.

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On the Cover: A look inside Trulite Glass & Aluminum Solutions' Dallas/Fort Worth fabrication location. Glass Magazine interviewed Trulite CEO Kevin Yates about the company's dig into data, equipment investments, recent changes in management and more. Read on page 22.

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DATA

Future Enhanced Remote Service Based on IoT Data

By Robert Kraus, Glaston



FORECAST

2020 and Beyond

By Pete deGorter, DeGorter Inc.



TRENDS

Get Ready for the Year of Glass

By Max Perilstein, Sole Source Consultants

PROJECT NEWS



Featured in Glass Magazine Weekly. To submit projects, write Wendy Vardaman at wvardaman@glass.org. **Pictured:** Ellison Bronze provided eight pairs of extruded aluminum balanced doors for the new science center at Amherst College. Ellison's PowerNow Stanley Magic-Force power operators were incorporated and connected to the building's smoke evacuation system.

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YOUR ASSOCIATION AT WORK

NEED-TO-KNOW INFORMATION
FROM THE NGA



Notes from the Chair: A golden time for glass

By Chris Bole

This time in our industry is a golden time. Construction is great, the economy is doing well, and the NGA is growing and thriving. As I begin my term as NGA Chairman of the Board for the 2019-2020 term, I find myself considering the growth and development of the industry and this association, and the ambitious goals on the horizon for the coming year.

But first, a bit about my background. I joined the glass business 19 years ago by purchasing Pikes Peak Glass, a commercial glazing subcontractor in Colorado Springs, Colorado. In 2011, I went on to purchase City Glass Co., a service glass company serving the area since 1950. Between the two companies, we do everything from table work to multimillion-dollar curtain wall contracts. Though there have been some major ups and downs, glass has always managed to provide for my family, my employees and their families.

I originally joined the NGA to build relationships with my peers in the industry. I was in a Vistage group—a peer coaching group for executives—for a number of years. It was immensely valuable, but I wanted similar relationships with those in my industry. I reached out to some of the people I saw mentioned in Glass Magazine, and I was quickly introduced to the NGA, eventually landing on the board. It has been a great experience, and I am honored to be your chair.

My goals for this year are to:

- Engage and encourage member-

ship in the NGA.

- Connect with our Affiliated Chapters and encourage state and regional glass associations that are not already engaged with us to consider becoming Affiliated Chapters of NGA. (Recently, my own state association, The Colorado Glazing Contractors Association, became an NGA Affiliated Chapter.)
- Continue to enhance and promote NGA's MyGlassClass.com training program.
- Work with my fellow Board members, NGA staff and NGA President and CEO Nicole Harris to pursue our goals of representing our industry well and providing amazing tools to our members.

Additionally, I want to talk with those in the industry. If you would like to reach out to me, connect with me through LinkedIn or email me at NGABoardChair@glass.org.

If you are an NGA member, make sure to visit the website to find out all the benefits afforded you by your membership. If you are not an NGA Member, I greatly encourage you to consider it. It will truly benefit you, your business and your clients. Let's not just work in our businesses this year; let's work on our businesses. ■

Chris Bole is 2019-2020 Chair of the NGA and the owner of two glass companies in Colorado Springs, Colorado: Pikes Peak Glass and City Glass Co.

NGA AND ASA ANNOUNCE ALLIANCE PARTNERSHIP

The National Glass Association and the American Subcontractors Association announced they have entered into a mutual agreement for NGA to be an ASA Alliance Partner. The agreement will help support ASA initiatives and provide NGA member companies with access to select ASA benefits and resources.

NGA members have gained access to ASA resources such as popular ASA publications Contract Negotiating Tips and Bid Proposal Addendum. Moreover, the combination of association resources, content and knowledge will strengthen the collective voice of the installer and subcontractor industries.

"As immediate past president of ASA, I've lived and breathed our 'better construction through fair construction' mantra," says Courtney Little, Ace Glass Construction. "As a lawyer and NGA glazing contractor member, I know how important it is to protect the rights and interests of all subcontractors."

"As a long-time NGA and ASA member, I agree that this is a mission-critical alliance for both organizations," says ASA board member, Gloria Hale, CEO and president of Hale Glass.

WE'RE NOT STOPPING AT NUMBER ONE.

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CONTENT FROM THE NGA

Bird-Friendly Glass, Recycling and More at NGA Annual Conference

Industry technical leaders met in La Jolla, California, in January for the Annual Conference of the National Glass Association. Key topics on the agenda included bird-friendly glazing, glass recycling, glass rack tracking, and looking ahead to the next decade and beyond. The three-day conference also included meetings of the NGA's Forming, Advocacy and Fabricating Committees.

Forming

The Forming Committee officially published its industry-wide flat glass EPD. In addition, a presentation on Glass Recycling by Infinite Recycled Technologies set the stage for attendees to review the results of NGA's Recyclability and Re-Use of Glass survey, issued to manufacturers and fabricators at the end of last year. The survey aimed to inform the committee of the most current industry trends and practices, which will aid in updating NGA's existing glass technical paper, Recyclability of Architectural Glass.



Advocacy

The Advocacy Committee highlighted specific goals to promote codes, standards and regulations that positively affect glass in the built environment; educate the industry, stakeholders and consumers about the benefits of glass; and increase communication and education about the importance of NGA advocacy initiatives. Committee members are discussing how to address daylighting in interior space to support healthcare, education and office environments and occupant wellbeing by developing language to propose to the International Building Code.

In addition, the committee expanded on the goal of its new "strike team." Members volunteering for this team may be engaged to review potential legislation relevant to the glass industry and are otherwise ready and willing to address issues that arise quickly and require urgent action.

Finally, Installing Committee Chair Matt Kamper and Vice Chair Steve Dean

attended the update and have expressed intent to bridge the work efforts between the Forming and Advocacy Committees to ensure the entire supply chain is reflected in the association advocacy pursuits.

Fabricating

Within the Fabricating Committee, the Decorative segment continues to develop the important and complimentary resources on Defining an Acceptable Color Variance, Measuring Color Variance in the Field, Best Practices for Installed Decorative Paints and How to View Decorative Products in Interior and Exterior Applications. Notably, a task group was established to begin the work towards publication of a new Decorative Glazing Manual. In addition, new work will begin on issues surrounding considerations for testing color samples.

The Mirror segment updated its Green Aspects of Mirror glass technical paper to incorporate copper-free mirror solutions. It will be available for download by the end of second quarter.



GLASS INFORMATIONAL BULLETIN

Proper Procedures for Cleaning Architectural Glass

This bulletin was developed by the NGA Fabricating Committee Tempering task group in cooperation with the IWCA Glass Committee.

Architectural glass products should be properly cleaned and protected throughout the construction process and during the life of the building using a program of regularly scheduled maintenance designed to maintain visual clarity and prevent glass surface damage.

Routine cleaning and maintenance

For routine maintenance, interior and exterior glass surfaces should be thoroughly cleaned as dirt and residue appear. Generally, twice per year cleaning is sufficient; however, specific regions may require more frequent cleaning due to environmental factors and atmospheric pollutants. Contact a professional window cleaner, such as a member of the International Window Cleaning Association (IWCA), to discuss recommended frequencies for your particular building.

Prior to beginning a cleaning project, test clean a small area of one window, then stop and examine the surface carefully for any damage to the glass and/or any exposed coating. Daylight conditions are needed to properly evaluate a glass surface for damage.

Architectural Glass Cleaning Do's and Don'ts

DO

- Clean glass when dirt and residue appear
- Determine if coated glass surfaces are exposed
- Start cleaning at the top of the building and continue to lower levels
- Soak the glass surface with a clean water and soap solution to loosen dirt and debris
- Use a mild, non-abrasive commercial window cleaning solution
- Use a window-cleaning squeegee to remove all the cleaning solution
- Clean one representative window and check to see if procedures have caused any damage
- Be aware of and follow the glass supplier's specific cleaning recommendations
- Watch for and prevent conditions that can damage the glass
- Protect glass during all stages of construction

DON'T

- Allow dirt and residue to remain on glass for an extended period of time
- Begin cleaning glass without knowing if a coated surface is exposed
- Clean tinted or coated glass in direct sunlight
- Allow water or cleaning residue to remain on the glass or adjacent materials
- Begin cleaning without rinsing excessive dirt and debris
- Use abrasive cleaning solutions or materials for maintenance cleaning
- Use razor blades on coated glass surfaces
- Allow metal parts of cleaning equipment to contact the glass
- Trap abrasive particles between the cleaning materials and the glass surface
- Allow other trades to lean tools or materials against the glass surface
- Allow splashed materials to dry on the glass surface

Scratches that are not easily seen with a dark or gray sky may be very noticeable when the sun is at a certain angle in the sky or when the sun is low in the sky. In addition, because different backgrounds may yield different observations, cleaning methods should be tested on all glass constructions on the building, including both vision and spandrel units.

Surface damage is more noticeable on reflective glass compared to other glass products. A simple test to

determine the location of the reflective coating is to touch the point of a pencil to the glass surface. If the reflection of the pencil point meets the real pencil, the coating is exposed on that side. If there is a gap between the pencil point and the reflections, the coating is not exposed on that side of the glass. Cleaning procedures should also include checking that the wind is not blowing the cleaning solution and residue onto already cleaned glass.

GLASS INFORMATIONAL BULLETIN—PROPER PROCEDURES FOR CLEANING ARCHITECTURAL GLASS

Glass Types Requiring Special Cleaning Procedures

Heat-Treated Surfaces

Avoid scrapers

Scrapers, abrasives, and harsh chemical cleaning agents can cause irreparable damage, such as scratching and chipping, if any microscopic particles that are adhered to the surface become dislodged and are transported across the glass surface during the scraping process.

High Performance Coatings

Consult the manufacturer

- Consult the glass manufacturer's guidelines for specific cleaning procedures
- Low-E Coatings: Typically neutral in color and difficult to see
- Reflective Coatings: Increase reflectivity of glass and are easier to see

Laminated

Avoid chemicals

Fluids and vapors such as corrosives, solvents, acids, bases or other chemicals must be kept away from the interlayer, which may be exposed around the periphery

Insulating Glazing Units (IGUs)

Avoid chemicals

Exposure to chemicals may affect the sealants of IGUs and the IGU longevity

Routine cleaning procedure

- Soak the glass surfaces with clean water and a mild, non-abrasive glass cleaning solution.
- Apply generous amounts of solution to the glass surfaces with a brush, strip washer or other non-abrasive applicator.
- Lightly agitate to loosen the soil and debris.
- Use a window-cleaning squeegee to remove all the cleaning solution from the glass surface.

During routine cleaning care should be taken to avoid metal contact with the glass surface; razor blades and metal scrapers should not be part of routine cleaning. The use of sufficient water will help prevent abrasive particles from

being trapped between the glass and the cleaning tools being used. However, the window cleaner needs to be diligent in keeping all abrasive particles from scratching the glass.

The IWCA recognizes an additional glass cleaning technique being utilized by some professional window cleaning contractors:

- Deliver pure water (tap water is not acceptable) to the glass surface using a specialized extension pole
- Agitate gently with a non-scratching (non-abrasive) brush
- Rinse with pure water
- Allow rinse water to evaporate from freshly cleaned surfaces.
- Pure water used in both the wash and

rinse must have a total dissolved solids content (TDS) of 20 parts per million (PPM) or less to prevent spotting and streaking of cleansed surfaces.

- Use effective water treatment, via ion exchange and/or reverse osmosis equipment
- Water quality can be monitored with a handheld TDS or conductivity meter.
- 40 microsiemens represents a TDS level of 20 PPM.

Non-routine post-construction cleaning and restoration

Extended construction schedules may create the need for multiple cleanings to avoid the accumulation of significant amounts of soil and debris, and to avoid potential damage. Temporary protective window films may be applied to glass. Follow specific manufacturer instructions regarding film application and removal.

Glass surface conditions that may require more aggressive cleaning techniques would include the accumulation of paint, stain or varnish overspray; mortar, concrete or cement splashing on glass; silicone sealants and/or lubricants being smeared or sprayed onto glass and frames; and sealer overspray or runoff from adjacent masonry or stone waterproofing operations.

It is recognized that window cleaners may choose more aggressive techniques, including the use of razor blades, in non-routine cleaning. In such cases, use of razor blades should be limited to the affected areas of the glass. Scraping should be done in one direction only with a new blade. Never scrape in a back and forth motion as this could trap particles under the blade that may cause scratches. ■

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Let's Write a New Story About Bird-Glass Collisions



KATY DEVLIN
Editor-in-Chief
kdevlin@glass.org

The glass industry has faced growing scrutiny in recent years over bird deaths caused by collisions with glass façades. Between 365 million and 988 million birds are killed annually due to collisions with glass, and news of bird-deaths at several high-profile projects has brought the issue to the fore.

Consider the viral video and news story from October 2019 of 310 birds colliding into the NASCAR Hall of Fame in North Carolina during a single one-hour period. Following the incident, ornithological experts pointed the finger at the light shining through the building's glass façade, hypothesizing that the migrating birds became confused by the lights, causing them to fly directly into the windows.

“

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Another recent article from the Boston Globe reports on the dozens of bird deaths at a brand-new LEED-certified, seven-story glass building in Providence, Rhode Island. The article describes the high-performance windows of the project, but includes the cutting line: “Who would have thought ‘going green’ could be so deadly?” Ouch.

Most in our industry know that those collisions could have been prevented through bird-friendly design and product solutions. We know that glass companies have worked for years to develop bird-friendly products—that manufacturers have launched a range of glasses that feature markings applied through a variety of methods, making the glass visible to birds.

However, word of such solutions has yet to reach the mainstream. Whether due to lack of education or understanding, bird-friendly glass remains a niche product. As a result, collisions continue to occur, and glass continues to be painted as the problem.

Attention to bird-glass collisions will continue to rise. An increasing number of jurisdictions throughout North America are adopting bird-friendly requirements for buildings. Our industry must ensure that glass is understood as part of the solution, rather than part of the problem.

We as an industry need to work to write a new story about bird-glass collisions. We need to be proactive in educating the design community about the range of already-available solutions.

“We need to communicate with one voice to the market a simple message: we have a solution,” says Charles Alexander, vice president of sales and marketing at Walker Glass Ltd. “The industry has economic, viable glass solutions that are working.” ■

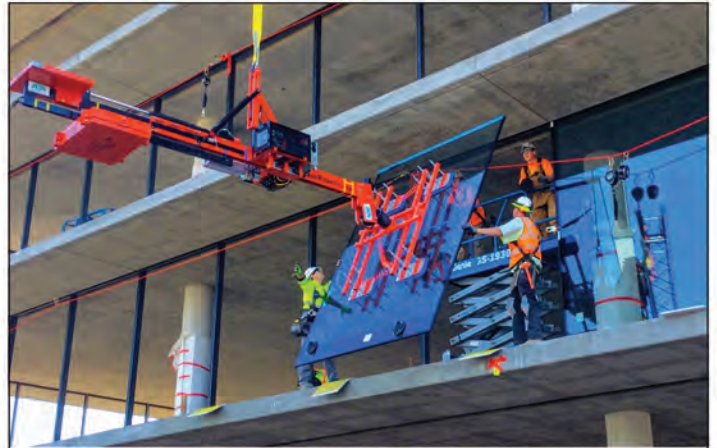


Visit glassmagazine.com to learn more about bird glass and National Glass Association activities addressing bird-friendly design.

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Fuyao Invests \$46 Million in Moraine Plant

Fuyao Glass America will invest \$46 million in a new expansion at its Moraine, Ohio, production plant, according to reporting in the Dayton Daily News. The company will purchase new production equipment, and will create 100 jobs, according to the report.

Guardian Glass Opens New Asia-Pacific Headquarters in Bangkok, Thailand

Guardian Glass opened a new regional headquarters and Customer Service Hub for the Asia-Pacific region, located in Bangkok, Thailand.

The new facility is a collaborative space that forms the base for the global manufacturer's Asia-Pacific business. Around 50 Guardian employees will work at the new hub, including general management and administration, marketing, supply chain, sales, finance and HR roles.

American Insulated Glass Acquires Two Companies

American Insulated Glass acquired two companies in recent months. In late December 2019, AIG acquired Great Lakes Glass Distributors, located in Michigan. The company also acquired A.L. Smith Glass Co. based in Ijamsville, Maryland, which represents AIG's fourth acquisition in two years.

"We couldn't be more pleased with this acquisition because AIG brings a wealth of glass industry experience and resources that together will position us to accomplish so much more for our customers," says Dan Dirmeyer, president and general manager of Great Lakes Glass Distributors. Dirmeyer will continue to manage the daily operations of this facility.



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Great Lakes Glass Distributors is a glass fabricator and wholesale distributor that services customers throughout Michigan, northern Ohio and northwest Indiana, providing a complete line of flat glass and insulating glass capabilities, including a range of fire-rated glazing solutions. GLGD is also a stocking distributor for Southeastern Shower Doors.

"The business model and company culture of A.L. Smith Glass, combined with the experienced team of employees made the company an ideal candidate to bring into the AIG family of businesses," says Billy Blair, president and CEO of AIG. "We look forward to positioning this fabrication facility to effectively meet the needs of the commercial building segment." Mike Torre and Russell Hardy will stay on as part of the AIG management team.

Cristacurva Sells Assets of Houston Plant to Oldcastle BuildingEnvelope

Cristacurva sold the assets of its Houston plant to Oldcastle BuildingEnvelope, part of CRH. The facility, known as Glass Wholesalers, provides a full range of architectural glass and related products in the Southwest market.

"This is one of the best plants in the [United States], and as a leader in the building products sector, OBE is the right successor to continue Glass Wholesalers' legacy and tradition of providing best-in-class products and services throughout Houston and the broader Texas market," says Francisco Sanchez-Gil, Cristacurva CEO. "Cristacurva will continue to offer customers throughout North America quality and complex value-added glass products. With this transaction, both companies advance in the achievement of their respective missions."

YKK AP Acquires Erie Architectural Products Group

YKK AP America Inc. acquired high-performance façades solutions provider Erie Architectural Products Group, according to a company announcement released in December 2019.

Headquartered in Lakeshore, Ontario, Canada, Erie AP engineers, manufactures and distributes its Enviro|Facades curtain wall systems across the United States. It provides design assist collaboration services, in-house engineering services, performance validation, state-of-the-art manufacturing and technical support to glazing contractors.

"Through YKK AP's decade-long relationship as a supplier to Erie AP, we have learned that the companies share tremendous synergy when it comes to our core values and customer and employee centric philosophies,"

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says Oliver Stepe, president of YKK AP America Inc. “As we looked to the future of our business, it was clear that we needed to grow our offering for prefabricated, pre-assembled products. By bringing Erie AP under the YKK AP umbrella, we are making a progressive move to meet what we see as a growing market demand for unitized products. At the same time, YKK AP’s broad product line will help enhance Erie AP’s position in the market and allow them to further serve their customers. I am excited for this opportunity, and I feel confident that these two great brands will come together as one great company.”

Saint-Gobain Completes Divestment of its Construction Glass Business in South Korea

Saint-Gobain completed the sale of Hankuk Glass Industries, the company’s construction glass activity in South

Korea, to Glenwood Private Equity on Dec. 19, 2019.

The business generated revenues of around \$221 million and operating income of \$11 million in 2018. The divestment was based on an enterprise value of around \$266 million.

New Glazing Subcontractor Element13 Facades Opens in Denver

Element13 Facades, a new glass and glazing subcontractor located in Denver, officially launched as of Sept. 6, 2019. Element13 Facades will service clients not only in the Denver metro area but all along the front range, from Colorado Springs to Fort Collins.

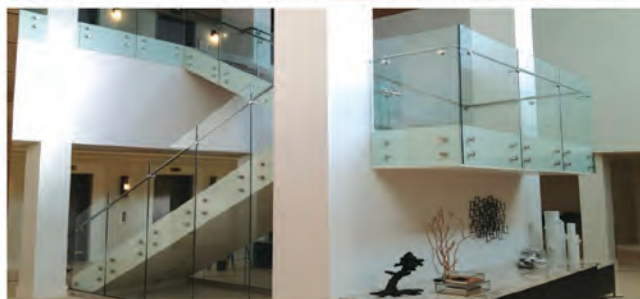
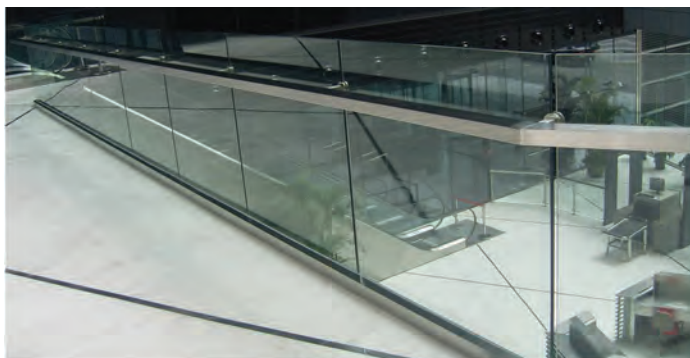
The company specializes in the furnish and installation of storefronts, curtain walls, window walls, aluminum storefront and all glass doors, louvers, glass handrail and sunshades, among other products. The company plans to

enter the metal wall panel market in Denver as well and will become Minority Business Enterprise certified through the City and County of Denver in first quarter 2020.

Mainstreet Computers Acquires Utah-based Software Provider

Mainstreet Computers, a subsidiary of Convenient Payments Holding, acquired Dialmark LLC, a Sandy, Utah-based provider of business software to the auto and flat glass industries. Through its Chameleonware point-of-sale application, Dialmark—which does business under the name DB Controls—provides software that supports a full range of business functions, including ticketing, invoicing, and accounting and inventory functions. DB Controls uses a SaaS business model.

“The DB Controls team and their focus on value-add solutions are a perfect complement to Mainstreet. We believe



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that both companies will be better positioned to deliver outstanding customer tools along with service and support, and we continue to look for similar acquisition opportunities," says Brad Rhoades, CEO of Mainstreet.

HHH Tempering Wins Trulite Machinery Contract

HHH Tempering Resources, a wholly-owned subsidiary of Salem Distributing Co., signed an agreement with Trulite Glass & Aluminum Solutions to upgrade and refurbish the fabricator's tempering equipment.

"We look forward to working with the Trulite team on this significant upgrade to their overall tempering capacity. The new NorthGlass technology will increase output and production speed," says Mike Synon, HHH president/CEO.

Crystal Expands Engineering Assistance Services for Window Projects

Crystal Window & Door Systems expanded its offerings of project engineering assistance services for architects and fenestration trade customers. The Crystal R&D/engineering department qualified to use the National Fenestration Rating Council Component Modeling Approach Program and its online directory. This tool will give Crystal the ability during the project's design and specification phase to estimate and optimize selections of window types, configurations, glazing options, and frame and spacer components to maximize overall window energy performance and energy efficiency ratings, according to company officials.

While Crystal currently uses thermal performance modeling for glazing options, the CMA Program adds in

spacers, window frames, and other components to the assessment.

FeneTech and Siemens Announce Partnership

Officials from Siemens Vertical Glass and FeneTech announced a collaboration for fully automated and digitalized glass processing. According to the announcement, the FeneVision ERP system from FeneTech rounds out the Siemens automation and digitalization portfolio for the glass processing industry.

"At the heart of digital solutions from Siemens is the digital twin, a virtual image of plants based on an end-to-end data model. The consistent use of these solutions along the entire value chain in glass manufacturing and processing and throughout the entire life cycle pays off. In glass processing, which tends to be performed by medium-sized businesses, we still require an integrated

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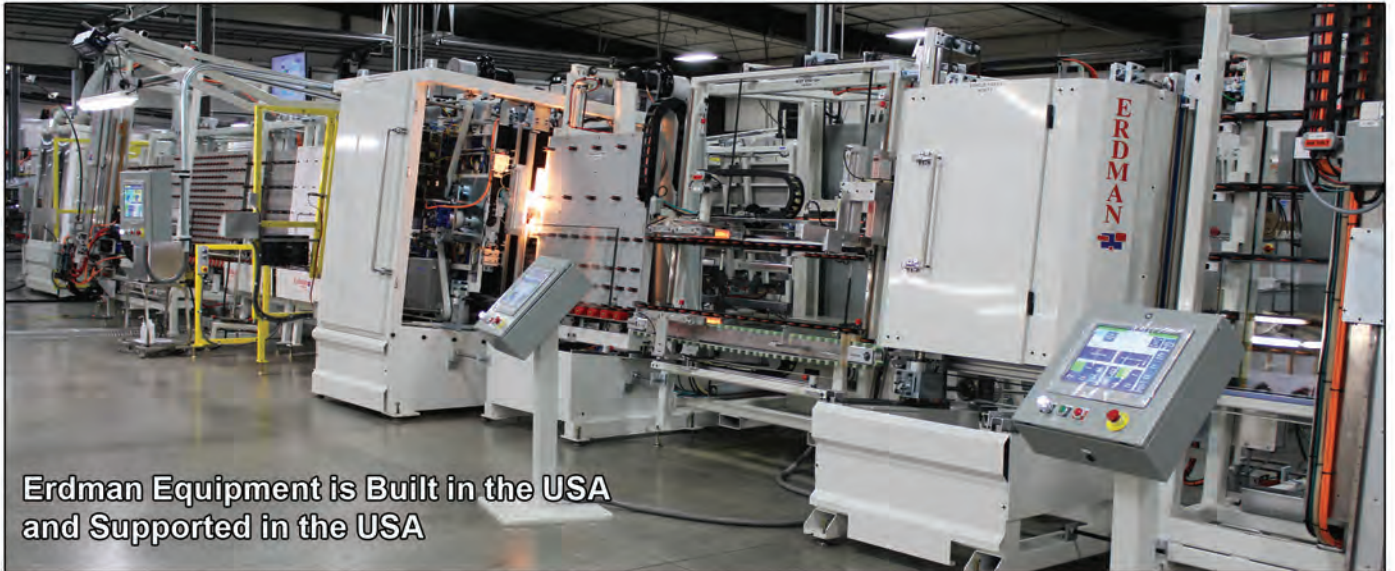
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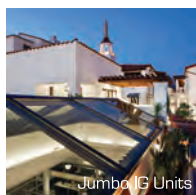


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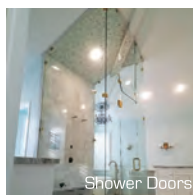
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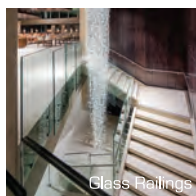
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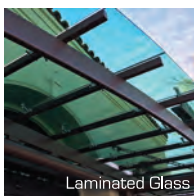
Doors and Hardware



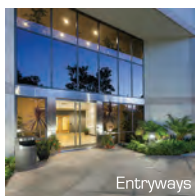
Shower Doors



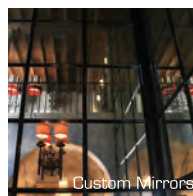
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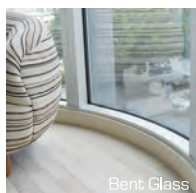
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and customized ERP solution,” says Heinz-Josef Lennartz from Siemens Vertical Glass in Karlsruhe. “In numerous discussions with customers, both we and FeneTech, independent of one another, keep hearing that there is a demand for completely integrated solutions in glass processing.”

Madico Celebrates Grand Opening of Manufacturing Facility in Florida

Madico, a manufacturer of materials-based solutions, opened a new 25,000-square-foot manufacturing facility, located in Tampa Bay, Florida.

Madico employs more than 200 people, with 75 new employees hired in 2019 as part of its growth initiatives. In 2017, Madico purchased the manufacturing facility in Pinellas Park, Florida, which is significantly larger than the combined former locations in St. Petersburg, Florida, and Woburn, Massachusetts, say company officials. Including the acquisition of the building, Madico has invested more than \$40 million into the Florida site, say company officials.

Tubelite Celebrates 75 Years of Business

Tubelite Inc. celebrated its diamond anniversary. “We’re proud to be known as one of the industry’s premier architectural aluminum manufacturers specializing in pre-engineered aluminum framing systems,” says Steve Green, Tubelite’s president.

Tubelite was founded in 1945 by James T. Miller. The name “Tubelite” was coined to represent the tubes of aluminum and lites of glass. After five successful years working from a 50-by-60-foot alley-front building, Miller moved the company’s operations to a new, small building in Reed City, Michigan. The building has been added to more than 20 times since 1949 and continues to serve as Tubelite’s aluminum extrusion operation.

Dec. 9, 2019, to press time, Feb. 5, 2020. Read these stories, and others, in their entirety at GlassMagazine.com.

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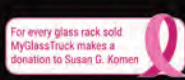


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TAKE FIVE WITH TRULITE CEO KEVIN YATES

Navigating a new industry armed with an eye toward growth, investment and data

In October 2018, officials from Trulite Glass & Aluminum Solutions appointed Kevin Yates as CEO. Trulite became part of Sun Capital Partners in 2010. Since then, the fabricator has experienced tremendous growth through an aggressive acquisition strategy, most notably acquiring the U.S. fabrication assets of AGC Glass in 2014. Trulite is now one of the largest glass and metal companies in North America, with about 30 facilities in the U.S. and Canada.

Yates came to Trulite as a newcomer to the glass industry. He previously worked for 15 years at Siemens, serving most recently as president of the Energy Management Division for the U.S. and Canada, where he led operational and commercial activities for Siemens' complete power distribution portfolio, from utility transmission through to end-user distributions.

Yates earned his bachelor's degree from Clemson University in industrial engineering in 1994. He went on to achieve a Master of Science in engineering and industrial management 4.0 in 1999 from The University of Tennessee at Chattanooga.

Glass Magazine Editor-in-Chief Katy Devlin spoke with Yates following his first year with Trulite, discussing his transition into the glass industry, growth and change at Trulite, the company's new focus on data analysis and more.

Glass Magazine: How has your background at Siemens prepared you for your work in the glass industry?

Kevin Yates: Prior to Trulite, I spent 15 years at Siemens, and prior to that about a decade in the carpet industry. I began my career with Siemens as a manufacturing manager and ... I became an executive with the company in 2007. Throughout that time, the commercial construction space was a large part of the Siemens portfolio and much of my career has been in the commercial construction space.

There are many parallels between Siemens and Trulite: the entire value

chain; the architectural building specs requirement; translating information to the general contractor who manages the subcontracts; then to the OEMs and product manufacturers. I have a broad understanding of the product chain.

I also understand that construction is also a local business, a fact large national companies can't lose sight of. Local relationships are vital in the construction industry. I think of general commercial construction as a type of 'hand-to-hand' combat: you have to invest in tools and support of local resources; you have to be the best equipped to locally fight each day for market share; you have to invest in training people, especially sales resources, to be the best in the industry, but also have to provide them with support of on-time delivery, quality and back office processes. We have to make it extremely easy for glazing contractors to do business with us—to offer a good product, on time.

GM: What's different about the glass industry?

KY: The uniqueness in the glass industry is the market—it's still a very fragmented market. While there has been a lot of consolidation in the recent past, there are still a lot of local competitors in market. Additionally, the intensity of the current labor market; it requires a very solid human resource strategy and a high level of training. It's an industry that has risks to employees, and it can be a dangerous environment if you don't take appropriate precautions. We must try to take hazards out of the process and protect our people.

GM: When you took on your role at Trulite a year ago, you stated an intention to continue the company's growth trajectory through both organic growth and aggressive acquisition. How has this been realized, and is this still your plan for the company?

KY: We are very active in making sure we see organic growth. We're very focused on top-line growth and we are still very



active in looking for where we might find a strategic opportunity. But our core focus at the moment is on growing our own portfolio through better servicing our customers.

If you look at some things we've done, you'll see we've divested one facility and consolidated another two. We are also looking at our portfolio, both product and geography. We've invested in more transparency and data analytics. By doing this, we have changed some organizational paradigms, [such as] which markets and products are profitable. We are investing in our factories and expanding our capabilities. In recent months we have purchased several new pieces of equipment, including tempering, glass fabrication and aluminum fabrication, to make us more effective and reliable.

GM: I understand data analysis was essential in your work at Siemens. Can you discuss how the emphasis on data has been brought over to Trulite?

KY: Data is a powerful tool. It should be the thing that guides most of your decisions. Data isn't the end all be all of decision making; we must consider the humanistic nuances when making decisions. But, information is power. This was one thing I saw as an opportunity at Trulite, and we spent several months in 2019 unpacking the numbers and gaining true clarity on cost structure, performance structure, different branches and different customer groupings. It has provided a tremendous increase of transparency for us. The transparency has started to shape how we approach many facets of our business. I envision a future where data drives the right conversations.

Looking at cost, for example; in the past, we had been very cognizant of raw material costs, we hadn't had as much clarity on other costs, such as labor costs, or the cost to serve customers—distance, lead time, material yields, price levels or types of products. This has become a lot more transparent [through data analysis] in determining the true absolute costs that it takes to serve customers.

GM: The glass industry has seen a growth in private equity ownership in recent years. This includes Trulite, which has been owned by Sun Capital for 10 years. This trend has prompted questions over the ability of outside companies to be successful in a specialized industry, such as glass. How do you respond to such concerns?

KY: My first response is to say, just like in any industry, not all companies are created the same. Sun Capital has made and continues to make an investment in this industry, and they believe in this industry. They believe there is value in this industry. Their role is to create capital value for shareholders, and the U.S. construction market has been and continues to be a great place to do that. Sun Capital continues to be supportive of me and my Trulite staff. They are open-minded and willing to make investments. ■

LEGAL

DAMAGES WAIVERS

Boilerplate terms raise questions of coverage and put companies at risk

BY MATT JOHNSON



Contractual damages waivers are everywhere. They are found in hundred-page capital expense contracts that waive consequential damages. They are found in simple parking stubs that waive direct damages to any vehicle in the garage. We all regularly agree to waive a right to recover direct, indirect, consequential and incidental damages, even if we don't realize it. But what are these things?

Start by recognizing that in a legal sense "damages" are something that can be awarded by a court to someone who has suffered loss. It is a way to describe things given to an injured party as a way to do justice, rebalance the scales and return what was wrongfully taken. Within those lofty concepts rest real fights about what can be rightly awarded.

Categories and terms

Most legal systems have created categories of damages as tools to help define recovery. Broad groups of "general,"



THE BOTTOM LINE: When faced with negotiating damages waivers, it is critical to recognize the language used and what it tries to capture. That way, if a breach occurs, the parties are not forced to rely on what a judge believes falls within the broad legal definitions of damages.

"special" and "exemplary" damages each break down into detailed categories depending on the kind of injury, parties involved and their conduct.

Contract negotiations and lawsuits tend to focus on the special damages category because this group usually captures hard-cost items. This type of damages includes some likely familiar terms such as "direct," "consequential," "incidental" and "indirect." And while the terms are often used together, each is very unique.

Direct damages are usually the immediate result of a breach. For example, if a contract requires payment of a certain expense, the cost incurred

by the nonbreaching party to pay that expense is an item of direct damages. Or, if a contract that requires goods be sold for \$100 is breached, and it costs \$125 to obtain similar goods, the \$25 difference is also direct damages.

Consequential damages are those that are the result of a breached contract but may not be within the terms of the breached contract. This broad category typically includes items seemingly remote to the underlying contract or conduct of the parties. Examples include lost profits, damages to third parties, loss of use, interest, or in some cases legal fees.

Incidental damages are costs and expenses incurred by a nonbreaching

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party to avoid incurring direct damages. Examples of these items include costs to store or return nonconforming goods or restaging expenses relating to a failure to permit work to go forward.

Indirect damages often serve as a kind of catch-all for various items that do not fit neatly into any of the other categories. Usually related more toward incidental damages than direct damages, indirect claims for recovery often relate to the breach but lack an easy tie to the breach itself. That is not to say these items cannot be recovered as damages, but often require more creativity from the lawyer pursuing their recovery.

Risks in coverage language

Most states address these damage categories legislatively and define when and what can be recovered. The Uniform Commercial Code is an effort to harmonize those definitions across the states. It recognizes most of these damages categories and defines the

bounds by which commercial entities can waive damages via contract, regardless of the category into which they fall.

This legal-vocabulary lesson is important because damages waivers are an everyday reality of most business contracts and warranties. Usually within the “limitations or damages/remedies” or “warranty” section there is language designed by the drafter to try and exclude various types of damages that may arise from the transaction at issue. Failing to realize the legal nuances, this language often proves an afterthought, where many rely on boilerplate terms without consideration for the scope of the agreement itself. This is a dangerous prospect.

The failure to properly understand and define damages that are waived or recoverable in the event of breach of contract can lead to uncertainties and ambiguities in the agreement that must be answered by a court. Most courts ultimately do a good job of allocating damages, but they are an expensive

option when compared to a small bit of up-front contractual negotiation.

When faced with negotiating damages waivers, it is critical to recognize the language used and what it tries to capture. Obviously, if faced with having to waive damages, it is crucial to understand what is being given up and weighing whether a deal still provides a reasonable return in the event of a breach. On the other hand, if relying on a waiver for protection, use the broad terms above, but also consider specifically defining the damages included or waived. That way, if a breach occurs, the parties are not forced to rely on what a judge believes falls within the broad legal definitions of damages. ■

Matt Johnson is a member of The Gary Law Group, prgarylaw.com, a Portland, Oregon-based firm specializing in legal and risk issues facing manufacturers of glazing products. He can be reached at matt@prgarylaw.com.

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HEAVY GLASS DOORS

Guide to glass types, code requirements, size limitations and more
SOURCE: NGA HEAVY GLASS DOOR DESIGN GUIDE

In the last two decades, the heavy glass door trend has continued its upward trajectory. To address this market demand, the National Glass Association published an update to its Heavy Glass Door Design Guide, replacing the previous 1999 edition.

The guide offers critical technical information and application suggestions for fully tempered and tempered laminated, heavy glass storefront and entrance system design. “Frameless structural glass systems can enhance the efficiency of sustainable projects as well as create dramatic aesthetics, and this new edition reflects design trends and materials that will help ensure the continued growth and desirability of this industry segment,” says Ron Biberdorf, Trulite Glass and Aluminum Solutions.

Structural guidance is provided on: types of glass doors, hardware and entrance components; swinging, sliding door systems; top- and floor-mounted systems; and application recommendations for fully tempered and tempered laminated glass entrance systems.

This article answers essential FAQs, based on information from the updated guide. To access the complete guide, visit glass.org.

What is a heavy glass door?

Heavy glass doors are the all-glass entrances seen in commercial buildings including offices, storefronts and public buildings. They are designed to accommodate the flow of pedestrian traffic into and out of the building.

What considerations are important for heavy glass door design?

When designing a heavy glass door, it's important to consider not only the glass, but also the hardware, rails, closers, patch fittings and structural silicone in the entrance system. Exterior heavy glass doors are exposed to weather and wind loads, as well as serving as the building's security and access point. Interior doors are protected from weather, wind and extreme temperatures and can be



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designed with laminated glass supported by patch fittings.

What types of glass can be used in heavy glass doors?

According to the International Building Code, all glass in doors must comply with safety glazing requirements. This excludes annealed glass, chemically strengthened glass and heat-strengthened glass in favor of fully tempered and fully tempered laminated glass types.

What types of hardware can be used in heavy glass doors?

Heavy glass in doors and sidelites can be supported by full or partial rails, including patch types for corner applications in a variety of profiles. Door hardware can be aluminum, stainless steel, brass, bronze or any of a variety of anodized metal finishes. Guidelines for securing glass into various hardware constructions are in Sections V, X and XVI.

How can I be sure the heavy glass entrance system complies with egress requirements?

Balance between security of the building and safe egress of building occupants during emergency situations is a critical design consideration for heavy glass entrance doors. A variety of locking mechanisms are available, including mechanical or electrical latching with fail-safe or fail-secure features in case of power outage. Panic hardware is included to ensure occupants can escape freely regardless of locking mechanism. For door installations requiring compliance with ADA regulations, heavy glass doors are designed to accommodate persons in wheelchairs using door closers sized and positioned to handle the weight of the doors, and automatic and power-assisted door operators can be included in the door design.

What are the size limitations for heavy glass doors?

Limitations exist for glass thickness as well as door height and width. Very wide doors may be difficult to control in windy environments. Glass door height is limited primarily by the ability of the hardware to accommodate the unsupported length of the door, given the flexibility of the glass thickness chosen.

What's the best way to clean heavy glass doors?

It's important for building owners to establish a routine maintenance program for heavy glass doors, not only to keep the glass looking clean and protected from scratches, but also to ensure the hardware is functioning properly and protected from debris and oxidation. Refer to Section XVII for special considerations depending on the metal hardware in the door assembly. ■

HEAVY GLASS DOOR

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DIFFERENT EXPECTATIONS.
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ALL IN THE FAMILY: PART 1

5 key considerations for
family business owners
ready to sell to the next
generation

BY MARCO TERRY



During a recent family dinner, my teenage daughter casually mentioned that she could not wait until she grew up and I gave her my company. I looked at her quizzically and asked, “Honey, what do you mean by ‘when I give you my company?’” She replied, “Well, eventually the company will be mine, right? Aren’t you going to give it to me?” Well, about that.

Have you had “the talk” with your children?

When it comes to succession planning, parents and children often have different expectations. These differences are often more marked when it comes to family businesses. Family businesses have their own set of challenges.

These topics of conversation may be uncomfortable, but they need resolution before the succession plan materializes. If they are not resolved beforehand, they are guaranteed to surface at the worst possible time.

These differences can be resolved with a simple strategy. Have open and frank discussions with the incoming generation of owners. Have everyone lay their cards on the table and come to an agreement.

The subjects that need to be discussed with the family fall into five categories:

1. Company direction

The company’s future direction is often a source of disagreement between the outgoing and the incoming generation. For example, the family elders may be interested in keeping the business stable. This approach makes sense for them, especially if they plan to get retirement income from the business. It’s a logical and low-risk strategy.

On the other hand, the incoming generation may be interested in pursuing growth. This goal is not surprising, as the younger generation may be looking to make their mark. Growth comes



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with potential rewards, but also with increased risk. From the new generation's point of view, this strategy makes sense. The incoming team has plenty of time to recover from any mishaps.

Company direction disagreements are common during transitions. It's best to resolve them before the transfer.

2. Management structure

Discuss the future management structure

with the incoming generation early. Set expectations properly. This subject could be an issue if family members are vying for the same management position.

3. Ownership structure

Ownership structure is one of the more sensitive subjects you need to discuss with the incoming generation. How will business ownership and control be divided among the incoming generation?

Will everyone have an equal share? Will everyone have the same voting rights? The answers to these questions depend on specific family dynamics.

4. Price

Some owners sell the business to their successors at full market price. This strategy is perfectly valid. They have invested a lot into running and growing the company. Also, most entrepreneurs have their nest eggs tied to their companies.

Other owners may choose to sell the business to their children at a discount. That strategy also makes sense under the right circumstances, especially if the owner wants to (or can) help their children. This approach also improves their children's chances of getting external financing.

Regardless of which path is chosen, the business should be valued by an expert appraiser. There are a few very different valuation methods. Selecting the right one is key. In this field, experience matters. Look for an appraiser who is certified by a national association.

5. How involved will the owner be in the company?

Lastly, the owner will need to discuss their level of involvement after the glass business has been transferred to the incoming generation. Will they remain hands-on? In an advisory role? Or will they completely step away from the business? Owners should discuss this issue with the new generation and make sure that everyone agrees. ■

Editor's Note: Read Part 2 of Marco Terry's "All in the Family" series about financing the sale of a family business to the next generation online now at glassmagazine.com and in the April issue of Glass Magazine.

Marco Terry is managing director of Commercial Capital LLC, comcapfactoring.com, a factoring company and provider of invoice financing to companies in the glass industry. He can be reached at 877/300-3258.

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DO'S AND DON'TS FOR NEW MACHINERY IN 2020

BY JOE ERB



The factory of the future is a hot topic of discussion and is an aspirational goal for many industrial operators.

The future factory features high-speed, efficient, automated machines whirring away, connected by the Internet of Things. Shop floor workers, rather than piecing together products with their hands and tools, are busy working with software to ensure that all processes are flowing as they should. Logistics and shipping are optimized at every level.

Many of today's commercial glass manufacturers aren't quite at this level of sophistication, but companies are getting closer every day. Glass shops around the world have made the investment in high-speed insulating glass lines and other forms of automated equipment. Many

others are likely considering doing so very soon. Some may have made the purchase over the winter and are awaiting installation from the OEM in the coming months—just in time for busy season.

For manufacturers making investments in their factories, there are a few do's and don'ts to think about when it comes to getting the most from today's top commercial glass machinery.

DO: Ensure IT compatibility with existing equipment and systems.

If a company is awaiting installation of new equipment, owners and managers must make sure they are doing their homework on the IT side of the operation. The new equipment needs to be compatible with existing systems,

and decision makers should ensure any necessary software updates have been completed so they are ready to start production right away.

DON'T: Neglect older equipment.

Not many commercial glass producers are completely overhauling all equipment at once. While it can be easy to become preoccupied with ensuring new equipment is up and running as intended, priority must still be placed on numerous older and still-reliable machines and equipment that help make quality commercial glass. Keep up those maintenance schedules.

DO: Optimize plant flow.

The installation of new equipment provides a great opportunity for manufacturers to rethink plant flows and processes. One consideration is a straight-line approach, such as that provided by vertical high-speed IG lines. Because supervisors can see

straight down the line, they know what is happening with in-production units at all times, allowing them to easily spot any deficiencies. The straight-line approach can and should be applied across the plant, where possible, minimizing the number of touch points and the distance units need to travel from point to point across the plant.

DON'T: Assume "business as usual."

New equipment probably means manufacturers will need to adjust some of their typical processes. Shop floor workers will need some training on how to best work with new machinery. If the manufacturer is adding capacity to a line, that means raw materials ordering and fulfillment will need to be adjusted, too. Owners and managers should work with vendors to make sure they have what they need to maximize new capabilities. Above all, keep an open mind. Advanced new equipment may open doors to new opportunities

for glass manufacturers—be open to where those doors might lead once the equipment is up and running.

DO: Prepare the sales teams.

The benefits of new equipment extend beyond just the shop floor. Oftentimes, high-tech machinery can help a company make a higher-performing product—which means the sales teams must have the knowledge to convey those benefits to customers. The sales teams must be armed with the right information and knowledge to clearly communicate the benefit of the improved product to discerning customers.

New machinery brings new opportunities. Manufacturers should work with vendors to make sure they are fully capable of seizing them. ■

Joe Erb is the commercial sales specialist for Quanex Building Products, quanex.com. He can be reached at joe.erb@quanex.com.

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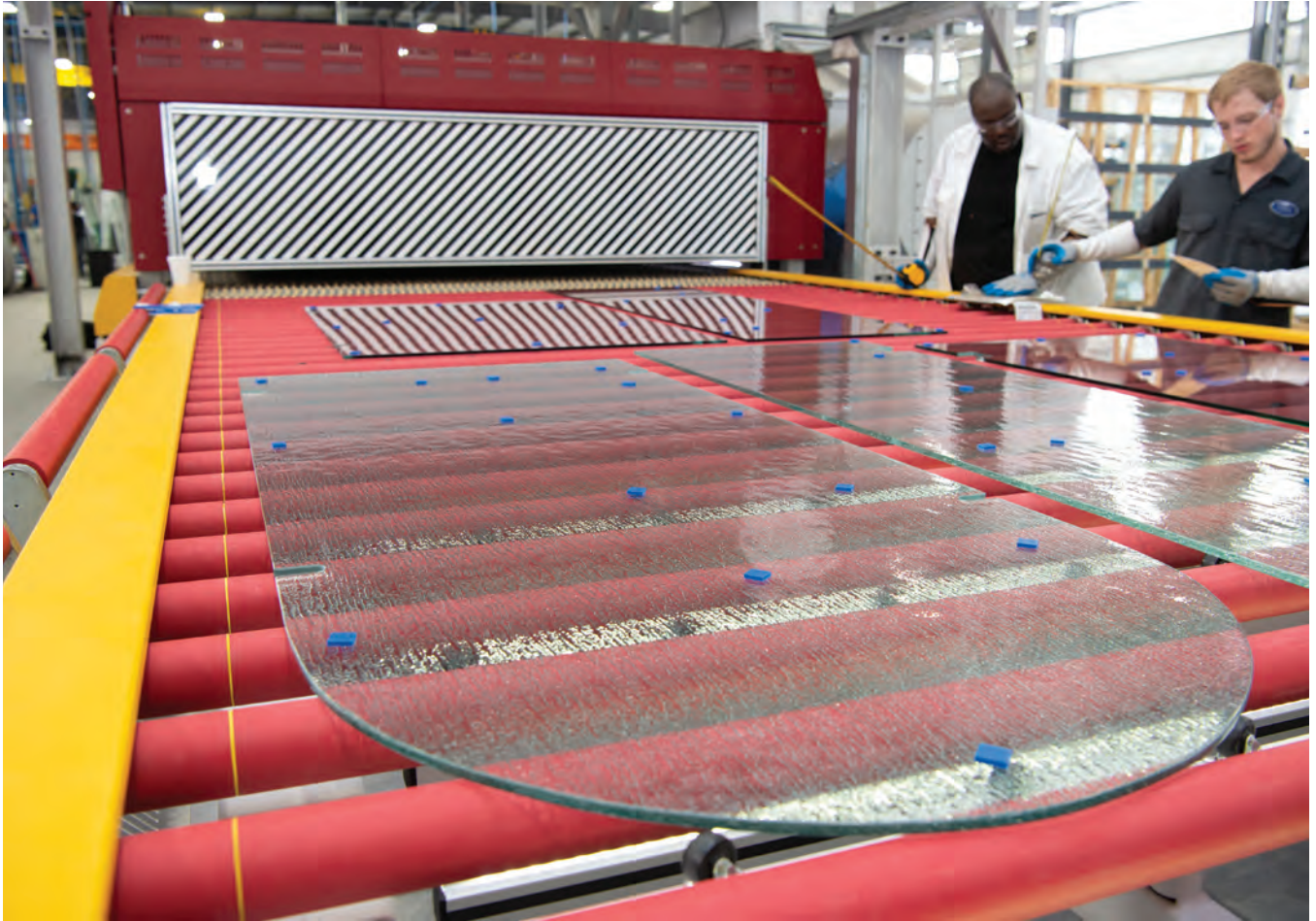
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TEMPERING TRANSFORMATION

How 25 years of advancement has changed the tempering industry

BY TERRY HESSOM AND JOHN HAWS

Twenty-five years ago, the internet was in its infancy, and business was still conducted via landline and fax. Fast forward to 2020: business has been fully reinvented. Although the old-school glass industry is often pulled forward with a bit of kicking and screaming, it too has totally transformed since 1995.

One industry segment that has witnessed impressive evolution is glass tempering. This article presents some of the major changes in glass tempering along with some expectations for the future.

1. Transcendent technology

In the mid-'90s, changing building codes started specifying tempered glass. Safety standards increased demand for tempering and drove technical advancements. The industry saw tempering technology advance from horizontal-roller hearth radiation furnaces to today's litany of heating options, including controlled convection technology, which is the most significant tempering advancement in the last 25 years. Thin, coated and oversized glass are all made possible with enhanced convection technology.

2. Advanced products

The technology evolution opened the door for advanced tempered products. Today's convection heating and aspiration bring architects' high-performance, oversized glass designs to life. No lines. No beams. Just the outside light illuminating the room. Design appetite, technical capabilities and high-value oversized projects may continue to push glass larger and larger, but watch for increased usage of bent glass on the horizon.

Looking ahead, ultra-sonic and microwave tempering technologies could be possible. Both tempering techniques hold the promise of reducing surface defects. Once these technologies are refined, surface temperatures will no longer be heated higher than the glass's core temperature, ushering in the era of super-flat, defect-free glass. Both

technologies are still a long way out, but the glass industry requires continuous innovation and reinvention to keep up with the ever-growing number of flat glass types and coatings.

3. Increased accessibility

Back to the 1990s: about 100 tempering furnaces were operating in the U.S. By the early 2000s, fabricators and glass equipment manufacturers alike started to feel the heat as competition drove quality and service standards. Today, there are over 600 furnaces across the U.S., and it's not uncommon for a single fabrication plant to have two or even three tempering furnaces running around the clock. Moving forward, expect tighter delivery times as automation increases across the board.

4. Training for tomorrow

Personal computing revolutionized tempering equipment. Gone are the

“
TODAY, THERE ARE OVER 600
FURNACES ACROSS THE U.S., AND
IT'S NOT UNCOMMON
FOR A SINGLE FABRICATION PLANT
TO HAVE TWO OR EVEN THREE
TEMPERING FURNACES
RUNNING AROUND THE CLOCK.
”

days where operators resembled mad scientists manually turning knobs to maintain consistent heat inside the furnace. Furnace control changed completely when computers started to read the furnace's temperature. Tempering furnaces are becoming more autonomous. In the future, the system will make decisions for the operator based on glass quality.

Machine learning will lessen the need to “read the glass,” but will require operators to understand foundational tempering processes and have technical savvy in control systems. The operation may be less hands-on, but it will require tempering and technology training. ■

Terry Hessom is vice president of operations and John Haws is director of engineering for HHH Tempering, a subsidiary of Salem Distributing. They can be reached at thessom@hhhtempering.com or jhaws@hhhtempering.com.

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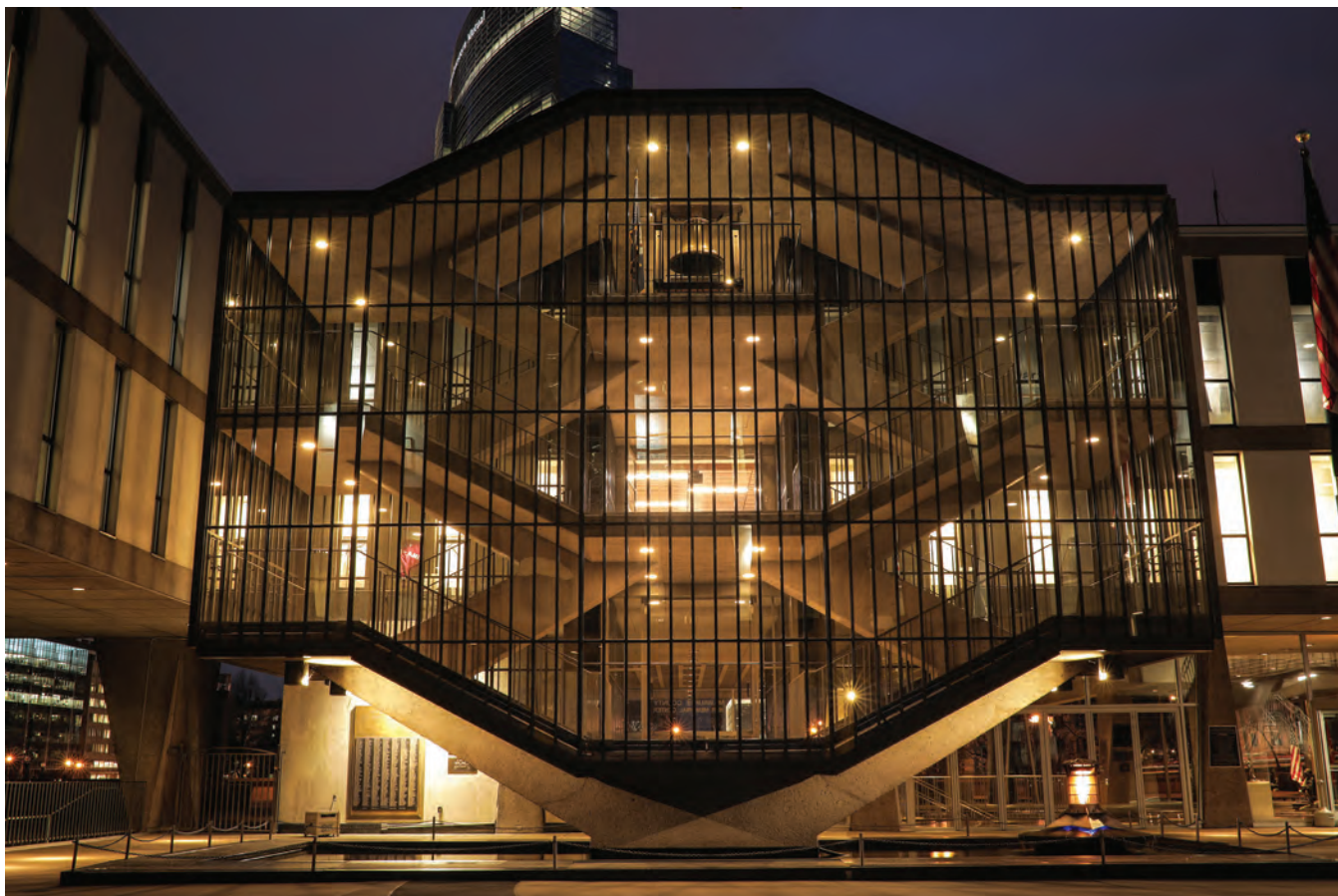
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GREAT GLAZING: THE BIRD CAGE RESTORATION

The basics:

Pilkington Spacia™ Vacuum Insulating Glazing was critical to the restoration of the 1955 Eero Saarinen-designed “Bird Cage” at the Milwaukee County War Memorial. The Bird Cage is a double cantilever staircase enclosed with a glass and steel curtain wall. The project team undertook the task of restoring the iconic curtain wall, while improving the thermal efficiency.

“Energy performance is critical in looking at any aspect of a restoration,” says Donna Weiss, architectural conservator, Preserve LLC. “When you have a glass curtain wall stair, it becomes

even more critical. You’re looking at glass performance to be your primary means of buffering your interior climate from conditions.”

The players:

Vacuum insulated glass supplier, NSG Group; restoration project architect, HGA Architects and Engineers; preservation consultants, Preserve LLC; glazing consultant and contractor, Restoric LLC.

The glass and systems:

Pilkington Spacia™ Vacuum Insulating Glazing provided two essential benefits to the project: thermal performance and

a thin profile. The thermal performance compares to that of traditional insulating glass units, helping architects meet efficiency goals while reducing condensation and ice formation. Meanwhile, Pilkington Spacia™ has a thin profile that allowed the high-performance glass to be incorporated into the original, restored curtain wall system.

“One of the big factors was replacing glass with something that was insulated. However, it couldn’t weigh more than the ¼-inch glass that was in place,” says Russ Drewry, associate vice president, HGA Architects and Engineers. ■

SAFTI FIRST EMBARKS ON \$8M EXPANSION AS A WORLD-CLASS, FULLY VERTICALLY INTEGRATED, SINGLE SOURCE, FIRE RATED GLASS & FRAMING MANUFACTURER



Upgrades include a dedicated door manufacturing division and the construction of an additional building to house new, state-of-the-art automated glass manufacturing equipment.

In 2019, SAFTI **FIRST** began Phase 1 of an ambitious \$8M expansion of its manufacturing facilities in Merced, California. It started with upgrades and improvements to the **Titan Metal Products** facility, a division of SAFTI **FIRST** and the manufacturer of its popular GPX Builders Series Doors. This included adding a 17,000 sq. ft. building to the existing 50,000 sq. ft. door fabrication facility, new automated seam welders, new automated door sanders, new paint booths and additional door hanging bucks to ensure that each door functions as it should when it is shipped out to the job site.

The investment in **Titan Metal Products** was done as a direct response to the increased demand for full-vision, code-compliant, 60 and 90 minute, temperature rise doors in exit stairwells and other code required applications. Investing in a dedicated door manufacturing facility also continues SAFTI **FIRST's** desire to be the leading full vertically integrated, single source, fire rated glass and framing manufacturer in the USA.

With Phase 1 now complete, SAFTI **FIRST** is pleased to announce and share that Phase 2, upgrading the fire rated glass manufacturing facilities, is now underway. This will include the erection of an additional 45,000 sq. ft. building having 30 ft. high ceilings. This will help keep up with the increased demand for the award-winning SuperClear 45-HS-LI and SuperClear 45-HS products. It will also provide safe handling of the recently tested and approved increased glass sizes of fire resistive SuperLite II-XL and SuperLite II-XLB 60-120 products, as well as future planned size increases in these ratings.

The new building will have state-of-the-art, automated manufacturing equipment increasing SAFTI **FIRST's** production on-time capacity and maintaining the high product quality and service while providing safe working conditions. Some of the new manufacturing equipment moving into the newly constructed building include:

- *Bromer automated glass handling and loading systems*
- *Lisec automated fall line and fall table*
- *Bromer glass cutting and break-out table*
- *Billco vertical glass washer*
- *Bovone vertical glass polisher*
- *Perfect Tech double belt seamer*
- *Glaston tempering line*
- *Newly designed oversized glass pouring racks to accommodate the larger sizes recently tested and passed – stay tuned for further announcements!*

SAFTI **FIRST** is still very busy in the research and development department, and is looking to upgrade that facility as well. The success of SuperClear 45-HS-LI and SuperClear 45-HS product launch last year has focused the company on bringing new, USA-made products to the market. Before SuperClear, the design and building communities were settling for foreign-made, expensive, brittle and tinted ceramics because there was no monolithic, 45 minute product that met the hose stream test. SuperClear changed all that, and now they have a USA-made, clear, safe and affordable 45-minute product that meets the stringent hose stream test. *SuperClear is a true game-changer*, as indicated by the several product awards it won in the architectural and glass industry last year.

Thank you for your continued support. SAFTI **FIRST** will persist in working diligently to bring several new and exciting products to the glass industry in this new year – and the new decade!



▲ Phase II: New state-of-the-art glass manufacturing equipment will be moving into the newly constructed 45,000 sq. ft. glass fabrication building with 30 ft. high ceilings.



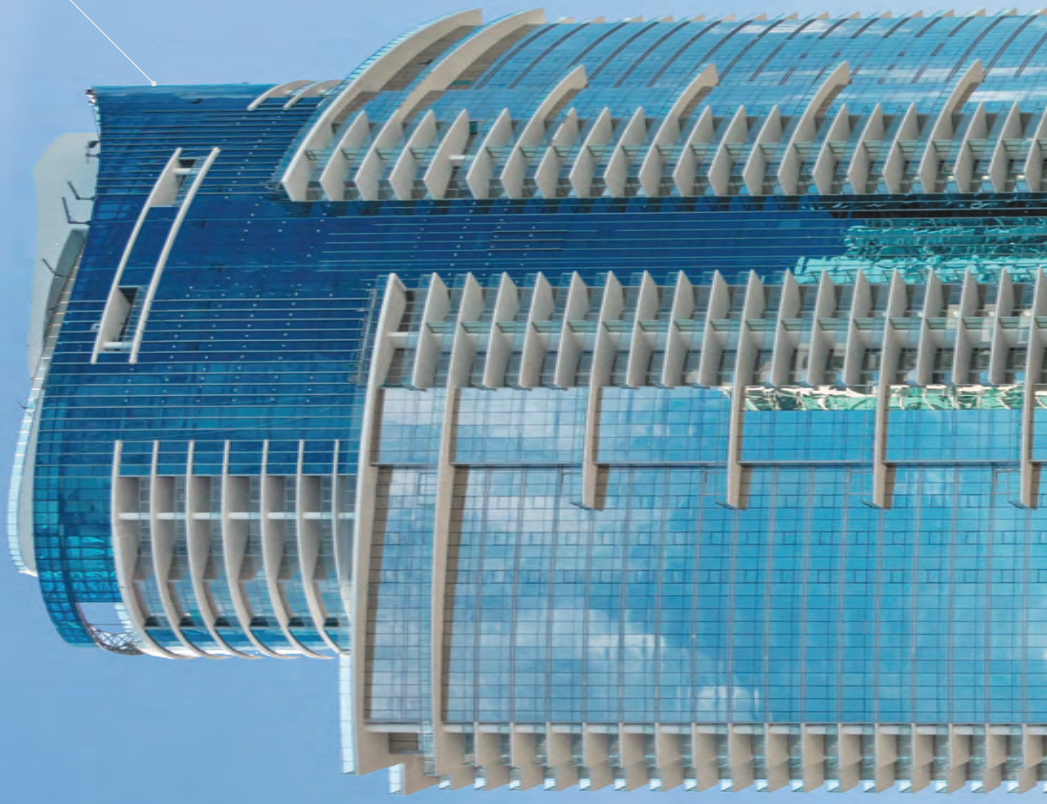
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Amid signs of growth slowdown, leading/fabricators expand to meet the needs of an advancing market **By Norah Dick**

Leading fabricators in North America continued to invest and expand in 2020, opening new facilities and buying equipment to keep up with market demand and trends. While demand for glass remains high, fabricators face a continued labor shortage alongside signs of slowing sales growth.

Now in its tenth year, the Top Glass Fabricators presents a market survey of leading glass fabricators in the industry. Companies included in this report

fabricate and supply tempered, insulating, laminated and/or decorative glass products, and may supply a variety of specialty fabrication, including fire-rated and security glasses. The following report includes a comprehensive industry ranking, organized by 2019 gross sales information, as well as market information, compiled from companies' survey responses regarding production capacity, market trends and existing challenges.

44. The List 2020: *Top Glass Fabricators ranked by annual sales*

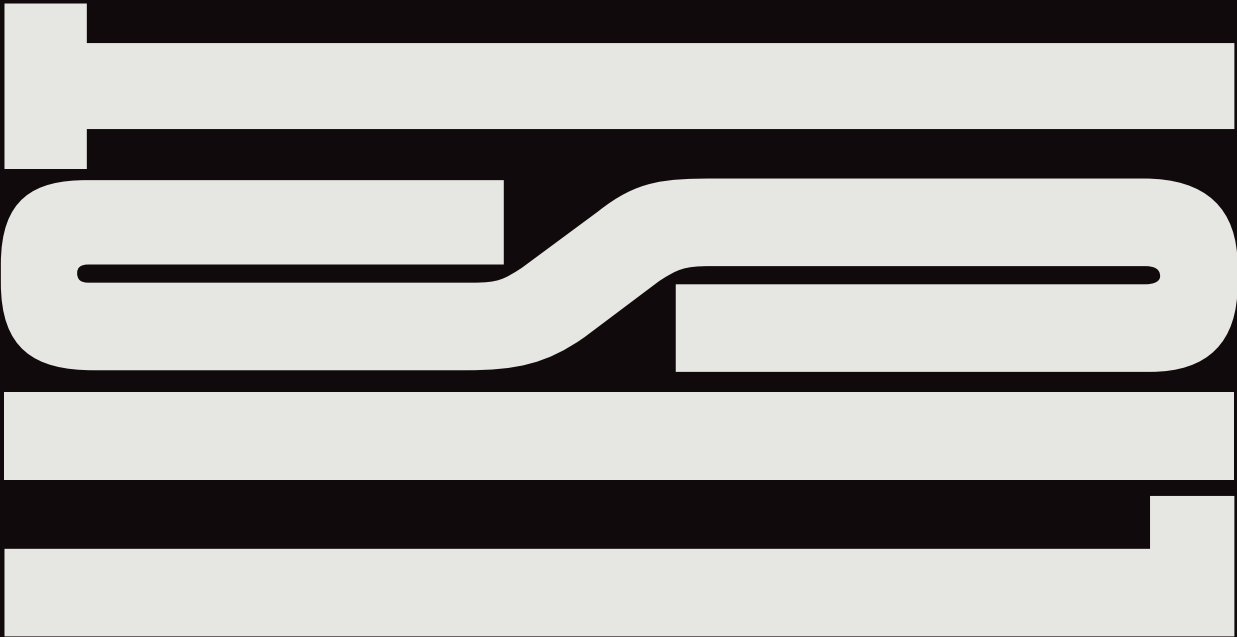
52. Sales & Capacity: *Continued growth allows companies to invest and expand*

54. Trends: *Jumbo and laminated glass lead design trends*

56. Challenges: *Ongoing labor concerns continue to strain a changing industry*

CHALLENGE



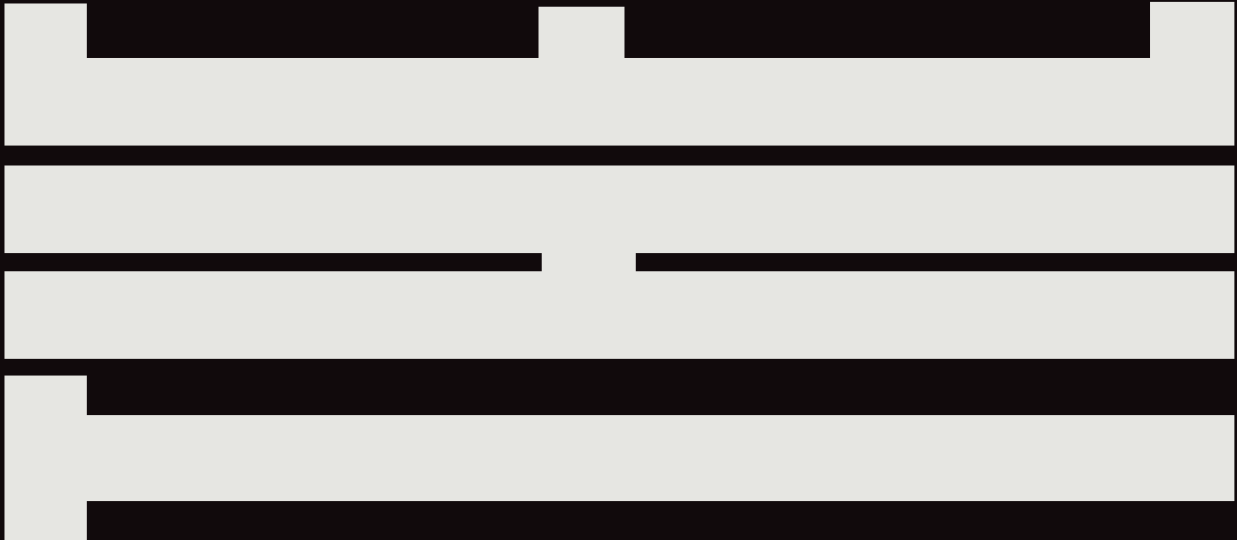


2020 Companies Ranked by Annual Sales

The Top Glass Fabricators industry ranking is compiled from survey responses, and companies are ranked based on reported annual sales. In the instance that companies decline to provide sales information, the editorial staff uses independent sources

to rank the company accurately. Companies are listed alphabetically within sales range categories. If your company belongs on the list, or you would like to update information, please contact Norah Dick, Associate Editor of Glass

Magazine, at ndick@glass.org. It is only with the cooperation of individual companies that Glass Magazine's Top Glass Fabricators report can be as accurate as possible. Requests to be included next year, can be sent to Norah Dick.



		<div><div>T</div> Tempered</div> <div><div>I</div> Insulating</div> <div><div>L</div> Laminating</div> <div><div>D</div> Decorating</div> <div><div>J</div> Jumbo</div> <div><div>M</div> Metal</div>			
Company	Mfg. plants	Employees	Product types	Other products	
Over \$1 Billion					
Oldcastle BuildingEnvelope obe.com, Dallas	90	7,000+	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>M</div></div>	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	
\$200-500 Million					
Tecnoglass tecnoglass.com, Barranquilla, Colombia	1	5,500+	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div><div>M</div></div>	CURVED GLASS, CERAMIC FRIT, SILKSCREEN, SPANDREL GLASS, DIGITAL PRINTING, LOW-EMISSIVITY GLASS, INSULATING LAMINATED GLASS	
Trulite Glass & Aluminum Solutions trulite.com, Peachtree City, Ga.	29	2,500	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div><div>M</div></div>	DECORATIVE INTERLAYERS, CABINET GLASS, FIRE-RATED GLASS	
Viracon viracon.com, Owatonna, Minn.	3	2,500	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	DIGITAL PRINTING, SCREEN-PRINTING, BIRD-FRIENDLY GLASS, FE/BR, RF SHIELDING, ACOUSTIC GLASS	
\$100-250 Million					
American Insulated Glass aiglass.com, Atlanta	7	600	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	BACK-PAINTED, PATTERNED, SATIN-ETCHED GLASS, LOW IRON GLASS, FIRE-PROTECTIVE CERAMICS, KERALITE SELECT FILMED AND KERALITE SELECT LAMINATED	
Glasswerks LA glasswerks.com, South Gate, Calif.	4	500+	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	BACK-PAINTED, ACID-ETCHED GLASS, CERAMIC FRIT, DIGITAL PRINTING, SCREEN-PRINTING, BENT GLASS, BIRD-FRIENDLY GLASS	
Hartung Glass Industries hartung-glass.com, Tukwila, Wa.	9	800+	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	SHOWER ENCLOSURES, TEXTURED GLASS, SCREEN-PRINTED FRIT, DIGITAL FRIT, GLASS MARKER BOARDS	
HMI Cardinal hmicardinal.com, Louisville, Ky.	2	700	<div><div>T</div><div>L</div><div>D</div></div>	KILN-FORMED CAST, PATTERNED GLASS, SANDBLAST, CHIPPED EDGE, DIGITAL CERAMIC IN-GLASS PRINTING, BACK-PAINTED GLASS, CUSTOM MIRRORS	
Prelco* prelco.ca, Rivière-du-Loup, Québec, Canada	3	600	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	DIGITAL IN-GLASS PRINTING, KILN-FORMED CAST AND PATTERNED GLASS, CHIPPED EDGE, SANDBLAST, BACK-PAINTED GLASS	
PRL Glass prlglass.com, City of Industry, Calif.	5	450	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div><div>M</div></div>	BULLET-RESISTANT GLASS, SANDBLAST	
Saand saand.ca, Toronto, Ontario	4	475	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	SILKSCREEN, SPANDREL GLASS, OPACI-COAT, CERAMIC FRIT, AQUA PAINT AND MIRROR, BIRD-FRIENDLY GLASS	
Tvitec System Glass tvitec.com, Madrid, Spain	5	500	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	CURVED GLASS, DIGITAL PRINTING, SCREEN-PRINTING, BIRD-FRIENDLY GLASS	
\$50-100 Million					
Aldora Aluminum and Glass Products Inc. aldoraglass.com, Coral Springs, Fla.	6	425	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div><div>M</div></div>	BACK-PAINTED GLASS, PATTERNED GLASS	
Basco basco showerdoor.com, Mason, Ohio	3	300	<div><div>T</div><div>L</div><div>D</div></div>		
Coral Industries* coralind.com, Tuscaloosa, Ala.	3	450	<div><div>T</div><div>M</div></div>		
Cristacurva* cristacurva.com, Houston	3	600	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	DIGITAL PRINTING, LAMINATED SPECIAL INTERLAYERS, SILKSCREEN, BACK-PAINTED, ETCHED, SPANDREL	
Gardner Glass Products* gardnerglass.com, North Wilkesboro, N.C.	2	230	<div><div>L</div><div>D</div></div>	BACK-PAINTED GLASS, MIRROR, ANTIQUE MIRROR	
GGI generalglass.com, Secaucus, N.J.	3	250	<div><div>T</div><div>I</div><div>D</div><div>J</div></div>	DIGITAL PRINTING, BACK-PAINTED GLASS	

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

Glass and Metal Craft

150 Ottawa Avenue
Grand Rapids, Michigan
Photo by Peter Michael Photography



		T Tempered I Insulating L Laminating D Decorating J Jumbo M Metal		
Company	Mfg. plants	Employees	Product types	Other products
Glassfab Tempering Services glassfabusa.com, Tracy, Calif.	4	252	T I L D J	CERAMIC FRIT, SILKSCREEN, DIGITAL PRINTING, BIRD-FRIENDLY GLASS
Safty First safty.com, Brisbane, Calif.	4	280	T I	FIRE-RATED GLASS, FIRE-RATED AND HURRICANE GLASS; BALLISTIC, BLAST AND SECURITY GLASS; LOW IRON GLASS, ENERGY EFFICIENT GLASS
Sigco* sigcoinc.com, Westbrook, Maine	2	235	T I L D M	CERAMIC FRIT SPANDREL GLASS
Tecnovidrio grupotecnovidrio.com, Mexico City, Mexico	4	950	T I L D J	COLOR GLASS, SPANDREL GLASS, CURVED GLASS
Tristar Glass Inc. tristarglass.com, Catoosa, Okla.	4	250	T I L D J	SENTRY GUARD FORCED ENTRY LAMINATED GLASS, FIRE-RATED GLASS, HEAVY GLASS, SPANDREL GLASS, SILKSCREEN, SANDBLAST, PATTERNED GLASS
Vitrum Glass Group vitrum.ca, Langley, British Columbia, Canada	2	700	T I L D J	TEXTURED GLASS, DIGITAL PRINTING, CURVED GLASS, BIRD-FRIENDLY GLASS
\$35-50 Million				
Custom Glass Products customglassproductswi.com, Schofield, Wis.	2	200	T I L	
Garibaldi Glass Industries Inc. garibaldiglass.com, Burnaby, British Columbia, Canada	1	240	T I L D J	CERAMIC FRIT, FRAMELESS STRUCTURAL DOORS AND GLAZING
Glass and Metal Craft glassandmetalcraft.com, Wixom, Mich.	1	140	T I L D J	SCREEN-PRINTING, PAINTED GLASS, ETCHED GLASS, PATTERNED GLASS, SLUMPED GLASS
Glaz-Tech* glaztech.com, Tucson, Ariz.	8	300+	T I L M	
J.E. Berkowitz jeberkowitz.com, Pedricktown, N.J.	1	200	T I L D	DECORATIVE INTERLAYERS AND SILKSCREEN, BIRD-FRIENDLY GLASS, CHILDGARD PROTECTIVE GLAZING
Nashville Tempered Glass ntglass.com, Nashville, Tennessee	2	200	T I L D J	CURVED TEMPERED GLASS, BIRD-FRIENDLY GLASS, TURTLE-FRIENDLY GLASS, IMPACT AND BULLET-RESISTANT GLASS, BLAST RESISTANT GLASS, DIGITALLY-PAINTED JUMBO GLASS
Rochester Insulated Glass* rochesterinsulatedglass.com, Manchester, N.Y.	1	130	T I L D J	DIGITAL PRINTING, SILKSCREEN
Solar Seal solarseal.com, S. Easton, Mass.	1	150	T I	SPANDREL GLASS, SHOWER ENCLOSURES
United Plate Glass* unitedplateglass.com, Butler, Pa.	2	100	T I L	
Virginia Glass Products va-glass.com, Martinsville, Va.	2	170	T L J	
\$20-35 Million				
Agnora agnora.com, Collingwood, Ontario, Canada	1	70	T I L D J	DIGITAL CERAMIC, FRIT AND OPACI-COAT, BIRD-FRIENDLY GLASS
Bendheim bendheim.com, Wayne, N.J.	1	100+	T L D J	BACK-PAINTED GLASS, DECORATIVE LAMINATED GLASS, ETCHED GLASS, TEXTURED GLASS, DIGITAL PRINTING, BIRD-FRIENDLY GLASS, ART, HISTORIC REPRODUCTION, DRY-ERASE
CamGlass* camglass.com, Tulsa, Okla.	1	100	T L	
Dillmeier Glass dillmeierglass.com, Van Buren, Ark.	1	143	T L D	PAINTED GLASS, SILKSCREEN, DECORATIVE LAMINATED GLASS, SANDBLAST

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

<div><div>T</div> Tempered</div> <div><div>I</div> Insulating</div> <div><div>L</div> Laminating</div> <div><div>D</div> Decorating</div> <div><div>J</div> Jumbo</div> <div><div>M</div> Metal</div>				
Company	Mfg. plants	Employees	Product types	Other products
Glassopolis glassopolis.com, Toronto, Ontario	1	50	<div><div>I</div><div>L</div><div>D</div><div>J</div></div>	DIGITAL CERAMIC FRIT, OPACI-COAT, BIRD-FRIENDLY GLASS
Glassource glassource.net, Grand Haven, Mich.	1	105	<div><div>T</div><div>D</div></div>	DIGITAL PRINTING, ROLLED PATTERN GLASS, MIRROR
Global Security Glazing security-glazing.com, Selma, Ala.	1	88	<div><div>T</div><div>I</div><div>L</div></div>	CHILDGARD SECURITY GLASS; BOMB, BLAST AND ATTACK GLASS; BULLET-RESISTANT GLASS
Insulite Glass Co. insuliteglass.com, Olathe, Kan.	2	175	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	DIGITAL PRINTING
Midwest Glass Fabricators Inc. mwgf.com, Highland Charter Township, Mich.	1	130	<div><div>T</div><div>L</div><div>J</div></div>	COATED SOFT/HARD LOW-EMISSIVITY GLASS, SPANDREL GLASS, BULLET-RESISTANT GLASS
Multiver* multiver.ca, Québec City, Québec, Canada	5	400	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	ACID-ETCHED GLASS, CERAMIC FRIT SPANDREL GLASS, SILKSCREEN, FIRE-RATED GLASS
Paragon Tempered Glass paragontemperedglass.com, Antwerp, Ohio	2	185	<div><div>T</div><div>I</div><div>D</div><div>J</div></div>	SILKSCREEN, DIGITAL PRINTING, BENT TEMPERED GLASS
Skyline Design skydesign.com, Chicago	1	100	<div><div>T</div><div>L</div><div>D</div></div>	ECO-ETCHED GLASS, AST DIRECT DIGITAL PRINTING, CERAMIC FRIT, DIGITAL PRINTING, PRINTED INTERLAYER, TEXTURED GLASS, BIRD-FRIENDLY GLASS
Standard Bent Glass* standardbent.com, East Butler, Pa.	1	120	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	DIRECT-TO-GLASS PRINTING, SENTRYGLAS EXPRESSIONS, BENT GLASS, BULLET-RESISTANT GLASS
Syracuse Glass Co. syracuseglass.com, Syracuse, N.Y.	1	106	<div><div>T</div><div>I</div><div>L</div></div>	
Thompson IG thompsonig.com, Fenton, Mich.	1	160	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	DIGITAL PRINTING, LAMINATED INTERLAYERS, BULLET-RESISTANT GLASS, SCHOOL SECURITY GLASS
W.A. Wilson Glass Plus wawilsonglass.com, Wheeling, W.V.	2	100	<div><div>T</div><div>I</div></div>	SPANDREL GLASS
\$10-20 Million				
Clarity Glass Wholesalers clarityhouston.com, Houston	1	60	<div><div>T</div><div>L</div><div>D</div><div>J</div></div>	BACK-PAINTED GLASS, CUSTOM LAMINATED GLASS
Columbia Commercial Building Products ccbpwin.com, Rockwall, Texas	1	55	<div><div>T</div><div>I</div></div>	
Consolidated Glass Corp. cgcglass.com, New Castle, Pa.	1	70	<div><div>T</div><div>D</div></div>	PATTERNED GLASS, LOW IRON GLASS, SANDBLAST, HEAT-SOAKED GLASS
Dlubak Specialty Glass dlubakglass.com, Blairsville, Pa.	1	80	<div><div>T</div><div>I</div><div>L</div><div>D</div></div>	LAMINATED INTERLAYERS, CURVED AND BENT GLASS, BOMB AND BULLET-RESISTANT GLASS, CHILDGARD SECURITY GLASS
FGD Glass Solutions fgdglass.com, Suwanee, Ga.	1	35	<div><div>L</div><div>D</div></div>	BACK-PAINTED GLASS, PRINTED GLASS, ETCHED GLASS, ANTIQUE MIRRORS, EDGE LIT, LAMINATED INTERLAYERS, BIRD-FRIENDLY GLASS, BIOPHILIC GLASS
Glenny Glass Co. glennyglass.com, Milford, Ohio	2	96	<div><div>T</div><div>I</div><div>L</div><div>D</div><div>J</div></div>	BACK-PAINTED GLASS, SANDBLAST, CUSTOM FILMED LAMINATED INTERLAYERS, BENT LAMINATED GLASS, SPANDREL GLASS
Goldray Glass goldrayglass.com, Calgary, Alberta, Canada	1	100	<div><div>T</div><div>L</div><div>D</div></div>	SILKSCREEN, DIGITAL PRINTING, BACK-PAINTED GLASS, DICHROIC, BIRD-FRIENDLY GLASS, SWITCHABLE PRIVACY GLASS, SPANDREL GLASS, WALL CLADDING SYSTEMS
M3 Glass Technologies m3glass.com, Irving, Texas	1	120	<div><div>T</div><div>L</div><div>D</div></div>	MPRINT DIGITAL PRINT, SCREEN-PRINTING, COLORBAK BACK-PAINTED GLASS, DECORATIVE LAMINATED GLASS, SWITCHABLE PRIVACY GLASS, BIRD-FRIENDLY GLASS
Maryland Glass & Mirror Co. mdglass.net, Baltimore	1	45	<div><div>T</div><div>I</div><div>L</div></div>	FIRE-RATED GLASS, MIRROR

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

GGI

Community DNA, public
art project
St. Petersburg, Florida
Photo by Catherine Woods



Company	Mfg. plants	Employees	Product types	Other products
Precision Glass Bending e-bentglass.com, Greenwood, Ark.	1	75	T I L	BENT GLASS
Splendor Glass Products splendorshowerdoor.com, Holland, Ohio	1	70	T	
Suntuitive Dynamic Glass suntuitiveglass.com, Jenison, Mich.	1	40	I L	THERMOCHROMIC DYNAMIC GLASS, SECURITY GLASS
Under \$10 Million				
ArtVue Glass ArtVueGlass.com, Sarasota, Fla.	1	7	L D	BACK-PAINTED GLASS, DECORATIVE LAMINATED GLASS, MIRROR
Clearlight Glass & Mirror clearlightglass.com, Kernersville, N.C.	1	20	T I D	V-GROOVING DESIGNS, ETCHED GLASS, PATTERNED GLASS, LOW IRON GLASS

Trulite Glass & Aluminum Solutions

Manufacturing facility floor,
Dallas/Fort Worth, Texas



T Tempered
 I Insulating
 L Laminating
 D Decorating
 J Jumbo
 M Metal

Company	Mfg. plants	Employees	Product types	Other products
Dundy Glass & Mirror Corp. dundyglass.com, Springfield Gardens, N.Y.	2	25	T I L J	FIRE-RATED GLASS
High Performance Glazing Inc. hpglazing.com, Concord, Ontario, Canada	1	40	T I L D	
Moag Glass moagglass.com, Georgetown, Ind.	1	30	T L D	CAST AND PAINTED GLASS
Moon Shadow Etchers moonshadowglass.com, Sandy, Oregon	1	10	L D	ETCHED GLASS, BACK-PAINTED GLASS
Tempco Glass Fabrication tempcoglass.com, Flushing, N.Y.	1	61	T I	
Woon-Tech (an HMI Cardinal Company) woon-tech.com, Whitinsville, Maine	2	102	T L D	DIGITAL IN-GLASS PRINTING, BACK-PAINTED GLASS, CAST GLASS



SALES

Continued growth allows companies to invest and expand

Leading fabricators continued expanding and innovating in 2019. A majority of reporting companies added production capacity; 14 percent of these companies added or expanded new locations, while 77 percent invested in new equipment.

"In November 2019 we were proud to announce the opening of our newest 175,000-square-foot plant," says Thomas Martini, president, Vitrum Glass Group. "With the expansion into our newest facility, we are excited to see our production, staff, equipment and capabilities continue to grow."

A plurality of companies say they bought equipment for decorative and specialty glass, including bent glass, security glass and specialty edging. Many companies also report they increased capacity across several types of fabrication. "We added capacity to all in-house fabrication

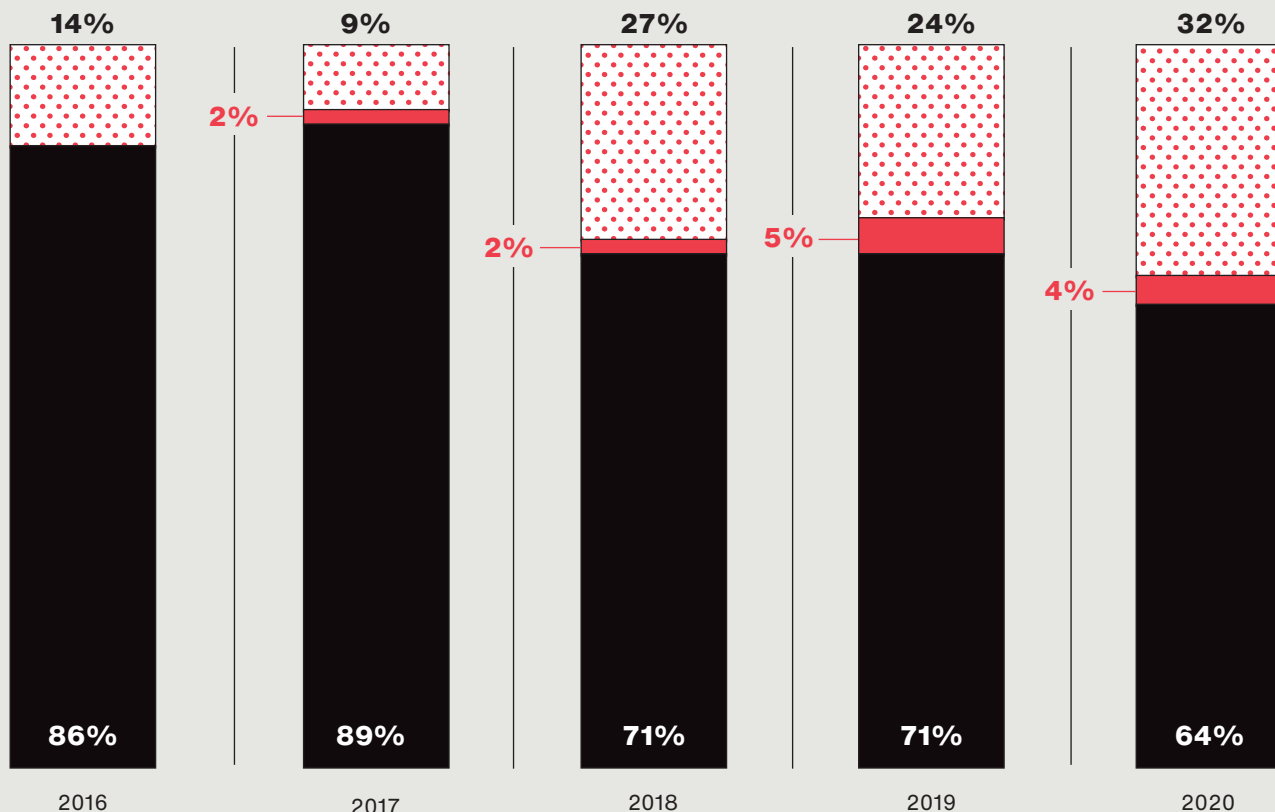
processes, including tempering, lamination and back-painting, among others, to position ourselves for growth in the coming year," says Donald Jayson, co-owner and executive vice president, Bendheim.

While fabricators expanded in many directions, actual sales growth was muted in 2019. Reported sales increases slowed, with 64 percent of surveyed companies reporting growth in 2019, down from 71 percent the previous year. The dip is part of a slowing growth trend. The measure of increased sales last peaked in 2017 with 89 percent of companies reporting increased year-over-year sales.

Production capacity increases also diminished slightly. Seventy-six percent of reporting fabricators registered added production capacity this year, down from last year's posting of 81 percent. ■

Year-over-year Change in Sales

■ Higher ■ Lower ■ Same

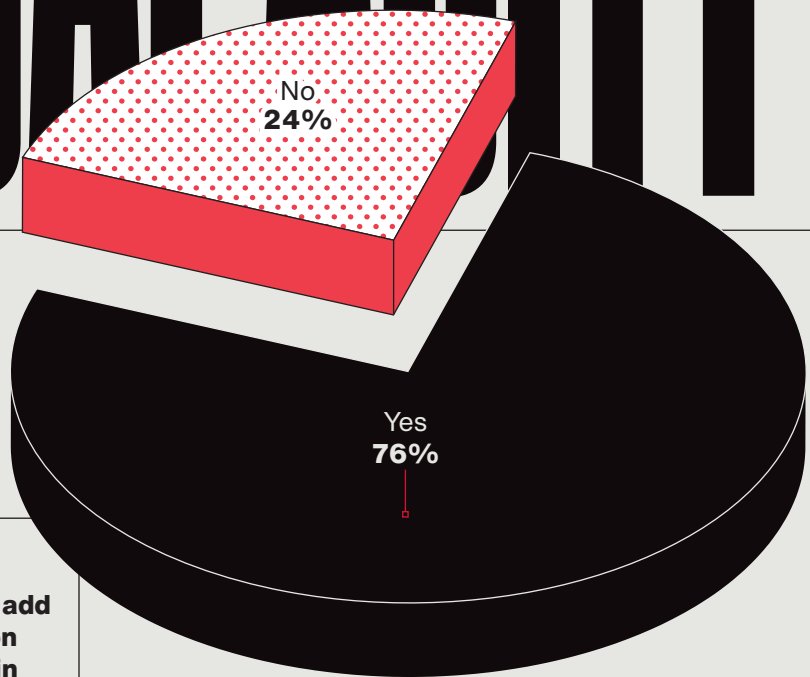


AND

CAPACITY



SEVENTY-SIX PERCENT OF REPORTING FABRICATORS REGISTERED ADDED PRODUCTION CAPACITY THIS YEAR, DOWN FROM LAST YEAR'S POSTING OF 81 PERCENT.



Did your company add production capacity in 2019?

How did your company expand capacity?

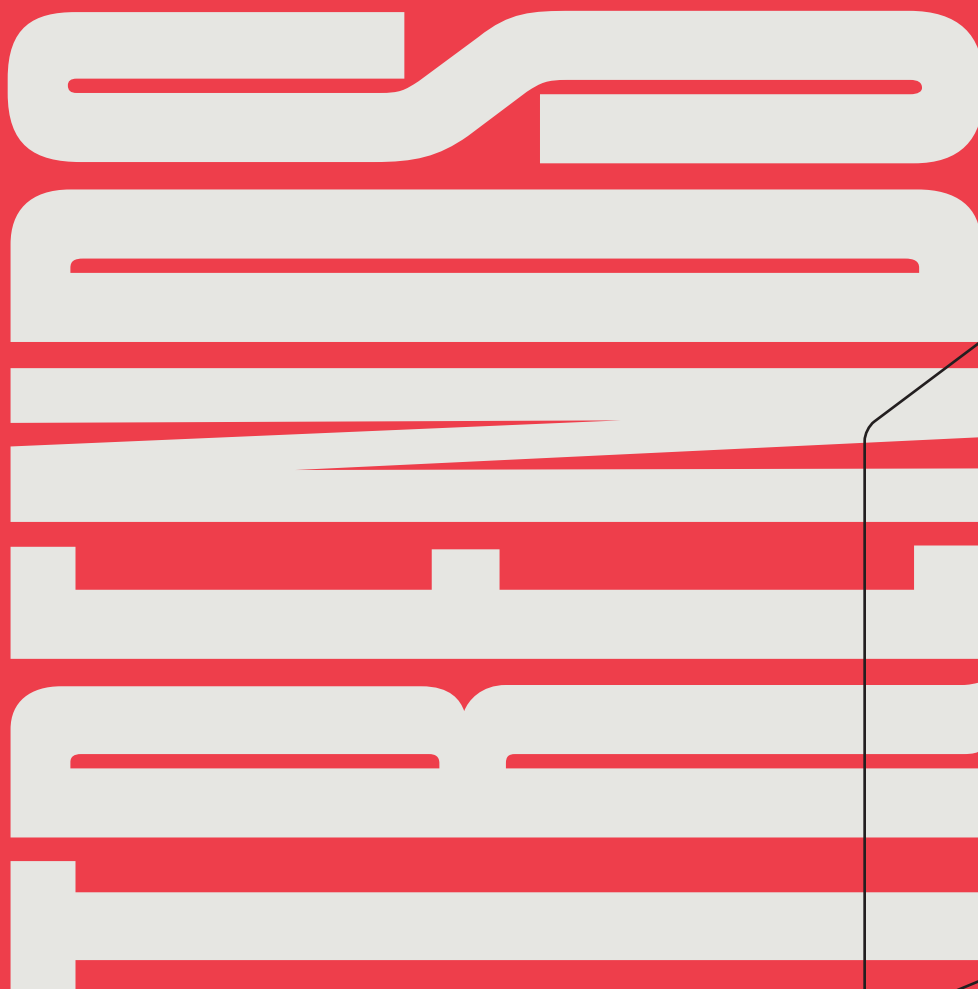
**New locations/
expansions**

14%

New equipment

77%



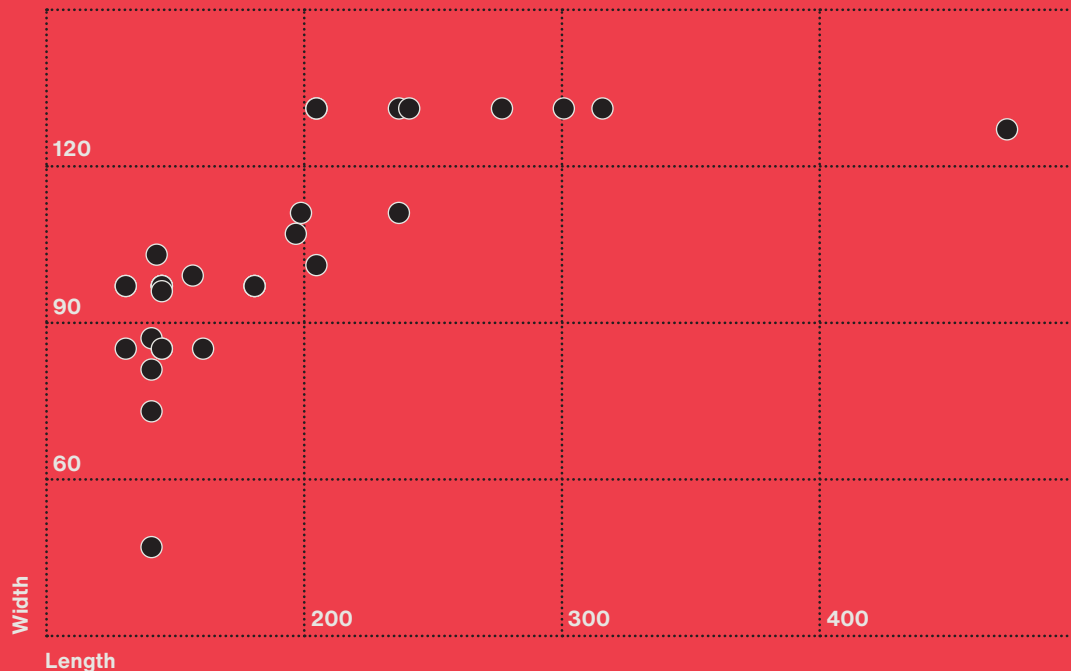


**2020
Design
Trends**

Larger glass **44%**
Laminated glass **22%**
Safety/impact glass **14%**
Other† **20%**



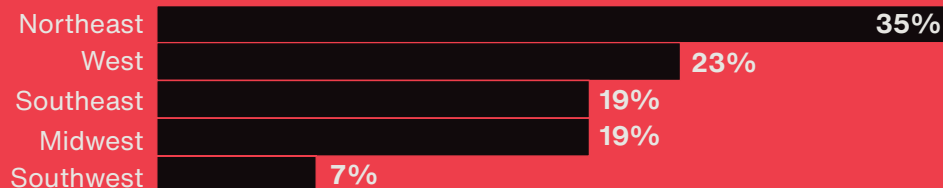
What is the maximum size glass you are able to fabricate? (in inches)



Does your company fabricate jumbo glass?



Which geographic market offers the most potential for growth in 2020?



Jumbo and laminated glass lead design trends

Larger glass sizes remain a major and growing design trend in the industry, say reporting fabricators. Nearly half of reporting companies say they fabricated jumbo glass in 2019, up from 42 percent the previous year. Forty-four percent of companies named jumbo glass as a notable design trend in 2019.

Fabricators also identified an increased trend toward laminated and safety glass, both driven by recent code

changes, according to respondents.

Jim Iaquinto, president and owner, Midwest Glass Fabricators Inc. "The largest market drivers for the additional equipment [are] the increased need for laminated glass per code and Midwest Glass' interest in supplying bullet resistant glass to the market."

"The IBC code requiring handrail glass to be laminated along with elevated concerns for security has

boosted demand [for these products]," says Braxton Smith, president, Glenn Glass Co.

Looking at regional demand trends, fabricators again predicted that the Northeast market would experience the most growth in 2020. This year, the West supplanted the Southeast as the second region most likely to see growth in the coming year, according to fabricators' responses. ■

THE

CHALLENGE

What were your company's biggest challenges in 2019?

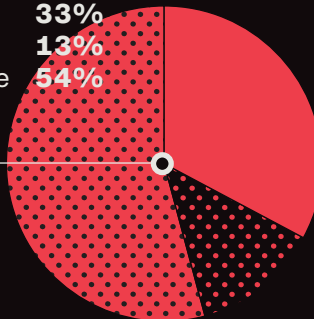
- Labor **55%**
- Capacity **21%**
- Expansion, new equipment **13%**
- Customer expectation **5%**
- Lead times **5%**
- Project timing **5%**

Did you have more difficulty finding workers this year compared to the previous year?

■ Yes ■ No ■ Same

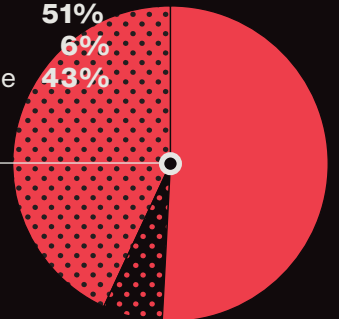
2019

Yes **33%**
No **13%**
Same **54%**



2018

Yes **51%**
No **6%**
Same **43%**



LENGUES

Ongoing labor concerns continue to strain a changing industry

Leading fabricators continued to report a lack of skilled labor, and the inability to maintain quality labor, as a major concern in 2019. More than half, 55 percent, of reporting companies listed the labor shortage as a primary concern. However, for the first time in the past four years, more than half of reporting companies said the difficulty finding workers was about the same as the previous year, and only 33 percent reported it was more difficult to find labor. Combined, these findings suggest that the shortage is the status quo.

Beyond labor, companies were also challenged by the need to expand without disrupting production. Many companies reported difficulties in trying to open new facilities, and purchase new equipment, without being able to diminish or pause production flow. "We doubled the size of our shop and added multiple new machines in 2019," says Kenny Hurley,

production manager, Clearlight Glass & Mirror. "We continued production throughout the construction project which was very challenging."

Even for those companies that didn't open new facilities, any kind of disruption affected lead times. "We experienced project timing delays," says Andy Russo, vice president, Glass and Metal Craft. "Several projects slipped and created peaks and valleys in our production capacity planning. Combined with the ever-present difficulty in finding labor resources, the challenge of managing to meet project deadlines is monumental." ■

PRODUCTS

SPONSORED CONTENT



Software for
Glass, Windows & Doors

SPOTLIGHT: A+W iQUOTE

Since its introduction, the Internet has changed how customers and businesses interact. In 2018, 69 percent of Americans purchased an item online, but by 2023, an estimated 91 percent of Americans (or 300 million people) will shop online. Compare that to only 26 percent of the small business market currently running an online ecommerce store and there's great potential for small businesses.

Customers nowadays demand flexibility, reliability and transparency while shopping. Industry-specific, scalable ecommerce software can sit on top of a glass fabricator's existing A+W ERP system, pull data and display feature-rich graphics that include self-service capabilities for dealers. All of this and more is possible with A+W's innovative software solution called A+W iQuote.

A+W iQuote gives customers direct

control when ordering with real-time visualization of their configured product. Through web-enabled access and a simple, custom, step-by-step user interface, A+W iQuote makes it easy and more convenient for customers and dealers to do business 24/7 on any device from anywhere.

Advantages of A+W iQuote:

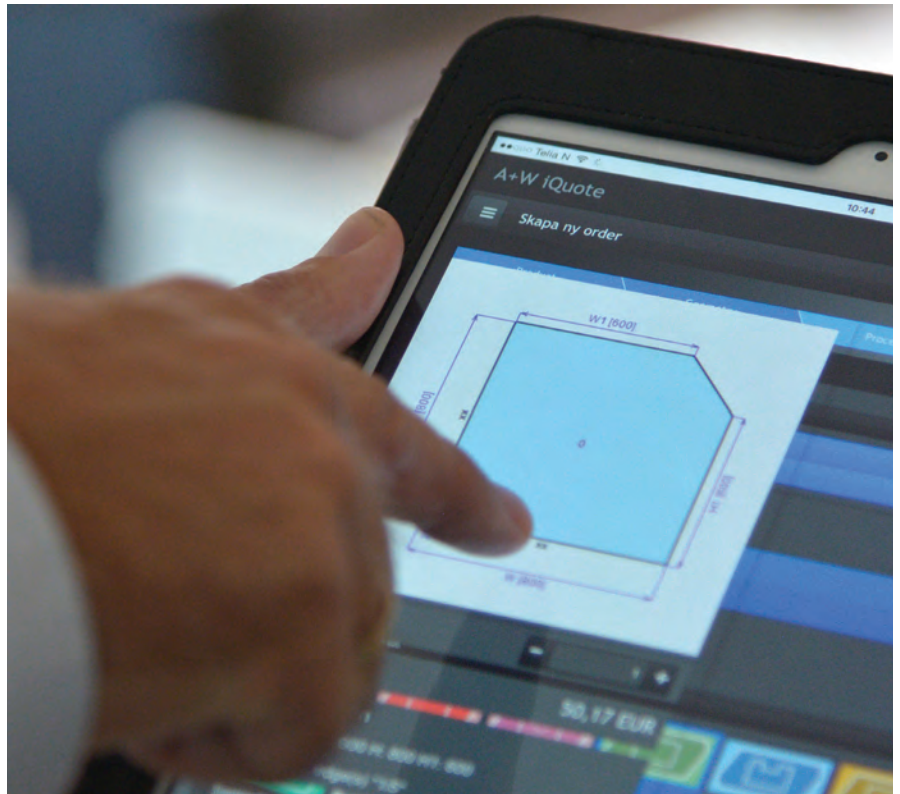
1. Visualize real-time, professional, true-to-scale product images while ordering
2. Order products (whether simple or complex, individualized or multiples) via an easy-to-use, intuitive and responsive web interface developed for desktop and mobile devices
3. Expand your business or service existing customers better through a 24/7 real time accessible system
4. Manage and execute all data (e.g.,

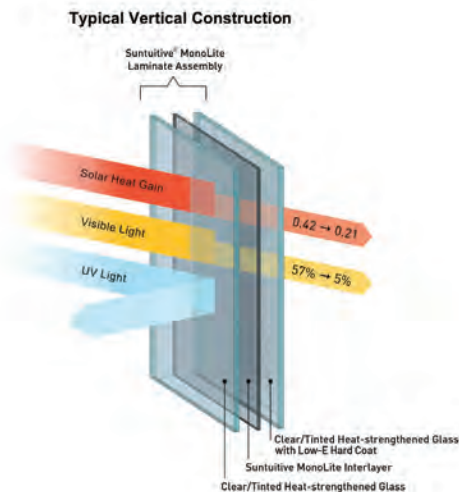
products, prices, and discounts) and calculations directly in your A+W Business ERP system, resulting in a synchronized, real-time web experience

5. Accepted orders are directly synchronized with stocks, allowing you to transfer them quickly and easily to production, eliminating double order entry
6. Host on your servers, third-party servers, or in the cloud.

According to Peter Dixen, A+W's CEO, "With these business-generating advantages, we are confident this tool can play an essential role in helping your business satisfy market demands."

Learn more about A+W iQuote for glass, window, and door fabricators at www.a-w.com/us. ■





Rehau System 4500 Tilt.



01. Dynamic laminate

Suntuitive Dynamic launched Suntuitive MonoLite. The high-performance dynamic glazing possesses the benefits of Suntuitive Dynamic Glass but in a single laminate. Powered by sunlight, Suntuitive MonoLite dynamically transitions from light to dark in response to solar heat without any wires or controls. It can be installed the same as traditional glass, while still fitting glazing pockets as small as a ¼ inch. 616/662-7216 | SUNTUITIVEGLASS.COM

02. Security glass

Consolidated Glass Holdings released Accessgard security glazing. Tested to nationally recognized detention standards, Accessgard is a laminated security glass featuring a proprietary interlayer that's designed to withstand extensive physical attack from various weapons for six to 17 minutes in a forced-entry scenario. Available for monolithic constructions and insulating glass units in new and retrofit applications, Accessgard can be used in ground floor areas, entryways, meeting and conference rooms, and other areas with security concerns. 800/257-7827 | CGHINC.COM

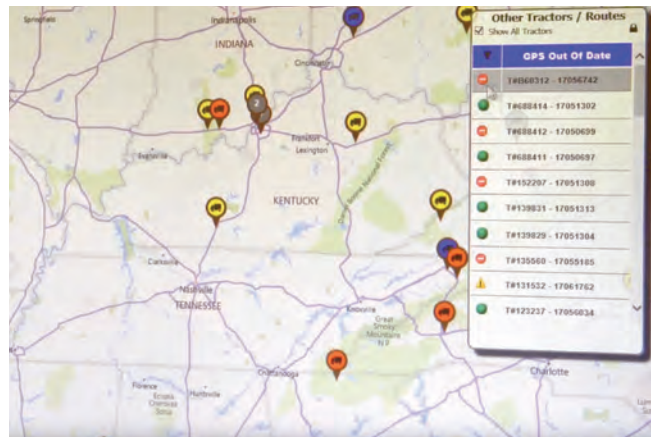
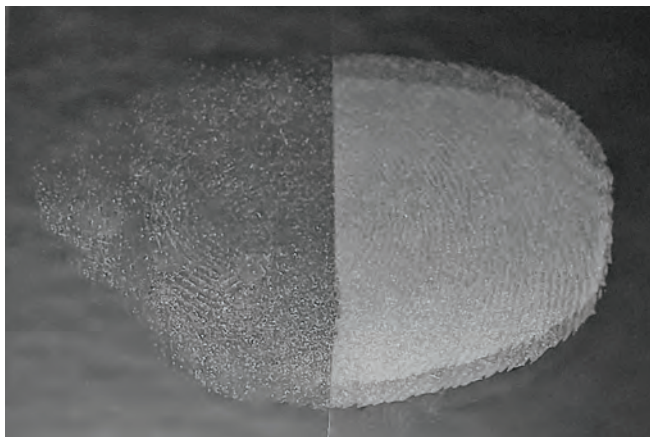
03. Windows and doors

Rehau System 4500 windows and doors are a high-performance solution for large openings in commercial applications, according to the company. Compression-seal technology, multi-point locking hardware and a glazing capacity of up to 1 ¾ inches create a durable barrier against the exterior environment. The system insulates occupants from outdoor drafts and noise with a simulated U-value down to 0.17 and an acoustical rating up to STC 43/OITC 34. 703/777-5255 | NA.REHAU.COM

04. Self-closing hinge

DHD International Inc. released a 1 15/16-inch by 6 ½-inch bottom hydraulic self-closing hinge. The hinge, manufactured in Italy, is the same size as standard patch fittings and meets the same U.S. pivot distance standard of 2 ¾ inches. It can be retrofit onto doors that already have a standard free-swinging bottom patch fitting in situations where an owner wants to change to a self-closing door. The self-closing hinge is available in all major finishes. 410/687-0069 | DHDINTERNATIONAL.COM

01



03

02



01. Coating

MetaShield, an advanced materials company, launched Nanoprint, an anti-fingerprint nanotechnology-enabled coating which reduces the appearance of fingerprints and smudges by as much as 70 percent, according to the company. Applications include a variety of consumer and commercial products, including glass windows, doors and storefronts for high-traffic commercial environments. Nanoprint improves products' day-to-day appearance and increases their cleanability, while decreasing maintenance time and cost, say officials. 212/938-3699 | METASHIELD.COM

02. CNC workstation

Neptun launched Quick 2 T8 160-30, an all-in-one automatic vertical CNC milling and drilling workstation designed to save space, while delivering high-speed accuracy and ease of use, say company officials. It can drill, countersink, mill quickly with high precision, and execute notches and port-holes on flat glass sheets with dimensions of up to 63 by 118 inches. The entire Quick series is customizable. 336/668-2300 | MATODI.BIZ

03. Management system

HMI Cardinal released the Cardinal360 Integrated Operations System, an integrated order entry and management system. The system fully accommodates the shower enclosure customization process, from order placement to delivery. The order entry system includes a detail-rich configurator, with visuals of the various shower enclosure, hardware and glass options available, to ensure that every detail of the customer's order is accurately processed. Full parts list and specifications are automatically generated by the Cardinal360 system to ensure unmatched order accuracy. 800/826-2577 | HMICARDINAL.COM

Subscription software

(not pictured) Hypertherm, a U.S.-based manufacturer of industrial cutting systems and software, began low-cost subscription pricing for its ProNest LT CAD/CAM nesting software for light industrial cutting applications. Rather than purchasing the software outright, smaller companies and individuals who have air or conventional plasma and oxyfuel cutting machines can now subscribe to ProNest on a monthly, annual or three-year basis. Subscribers have the freedom to start a subscription, then add or remove users or features when needed. 800/737-2978 | HYPERTHERM.COM

**Bendt****EFCO Corp.**

EFCO Corp. promoted *John Bendt* to president of the company, replacing *John Klein*, who will retire at the end of the 2020 fiscal year. Bendt will officially begin the transition process with Klein so that he can fully own the FY2021 Annual Operating Plan process and coordinate with Klein on an effective transition of responsibilities. Bendt will continue to be based in Minneapolis, but will ensure he has an effective plan to spend time in Monett, Missouri, with the EFCO team and with customers, say company officials.

**Wilson****Quanex Building Products**

Quanex will welcome a new executive team led by *George Wilson*, president and chief executive officer. Wilson was elected by the board of directors to succeed Bill Griffiths, who will remain with Quanex as executive chairman of the board.

In addition to Wilson taking over as president and CEO, there have recently been other moves within the executive leadership team.

Scott M. Zuehlke now serves as senior vice president, chief financial officer and treasurer. Zuehlke joined Quanex in 2016 as vice president, investor relations and treasurer, and has most recently been serving as interim chief financial officer.

Paul B. Cornett has been appointed as senior vice president, general counsel and secretary. Cornett joined Quanex as a staff attorney in 2005 and has held various positions of increasing responsibility, most recently serving as vice president, deputy general counsel.

Mark A. Livingston is now vice president, chief accounting officer and controller. Livingston joined Quanex in 2019 as vice president, controller.

**Hoffmann****Wausau Window and Wall Systems**

Wausau Window and Wall Systems promoted *Chad Hoffmann* to the role of president. He also will have responsibility for Toronto-based Sotawall Ltd. Both companies are a part of Apogee Enterprises Inc. Hoffmann draws from 23 years of industry expertise and a breadth of experience in leadership roles, including operations, sales, engineering and project management, as well as strong ties within the glazing industry. Prior to his promotion to president of Wausau, Hoffmann served as Apogee's vice president of operations and supply chain management. In this role, he led company-wide lean, procurement and shared services initiatives across Apogee's multiple business units.

**Avery****Tubelite Inc.**

Tubelite Inc. promoted *Mary Avery* to vice president of sales and marketing, and *Tom Mifflin* to director of marketing. Avery began her career at Tubelite more than a decade ago as the manager of client services before being promoted to manager of client services and marketing in 2009. To support the substantial growth and an increased focus on marketing, Tubelite concentrated her role as the marketing manager and then promoted her to director of marketing in 2013. Avery continued to be a driving force in Tubelite's success and was promoted to vice president of marketing in 2016. Mifflin moves into Avery's earlier role as director of marketing. He will oversee the architectural specification, promotion strategy, public relations, as well as the website and pricing.

**Mifflin****Trautman****Vitro Architectural Glass**

Vitro Architectural Glass welcomed *David Trautman* as national architectural manager for the Mid-Atlantic region covering Delaware, Maryland, eastern Pennsylvania, Virginia and Washington, D.C. As national architectural manager, Trautman will focus on delivering product, technology and service solutions to architectural designers and other customers in the commercial construction industry.

**Lewis****YKK AP America**

YKK AP America named *Craig Lewis* as architectural sales representative for the Tennessee market. Lewis will play an integral role in expanding the brand's efforts in Tennessee and surrounding areas, with a focus on customer development and architectural support. Lewis brings to YKK AP more than 25 years of business development experience in the building materials industry.

**Lizarazo****GGI**

GGI hired *Jonathan Lizarazo* as the new fabricated glass sales representative for the south Jersey territory. Lizarazo began his career in the glass and glazing industry in 2008 and brings knowledge in glazing, project management and sales to this role. Most recently, he held the position of manager at Shore Glass.

Classifieds

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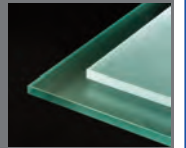
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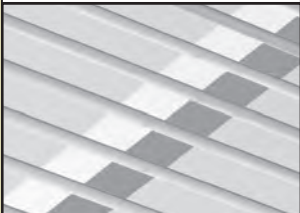
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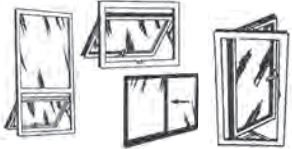


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Companies from all parts of the glass and glazing industry have implemented innovative, out-of-the-box ideas to improve business from the ground up. Here's an Idea showcases these sometimes small behind-the-scenes ideas that can make a big impact on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

CHRISTOPHER GLASS & ALUMINUM INC. TRAINS EMPLOYEES IN CPR

In 2019, Christopher Glass & Aluminum Inc., a contract glazing company based near Chicago, partnered with the City of Elmhurst Fire Department and Elmhurst Hospital to provide CPR training for 60 of the company's employees. The training staff offered a Hands-Only CPR and Stop the Bleed: Bleeding Control for the Injured training over the course of three sessions, held at the company's corporate headquarters in Elmhurst, Illinois.



Photos by Anita Forte-Scott.

The Occupational Safety and Health Administration provides standards regarding first aid and CPR for the construction industry. OSHA Standard Number 1926.50, Safety and Health Regulations for Construction, gives a range of guidance, including the following: "In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid."

"As a manufacturer and fabricator of glass and metal products for the construction industry it is imperative that our employees understand and practice preventative safety measures that meet or exceed OSHA standards," says Steven Schwartz, health and safety coordinator for Christopher Glass & Aluminum Inc. "In case there is an incident which would require immediate intervention to save someone's life we felt it necessary to train as many of our employees as possible in CPR and Stop the Bleed."

The comprehensive training provided to employees included step-by-step instruction in activating emergency medical services, or EMS; hands-only CPR; how to identify life-threatening bleeding; compression with the application of direct pressure on the wound; use of a tourniquet and wound packing. Each participant was able to practice these lifesaving techniques on mannequins and wound-care training appendage apparatus. ■



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