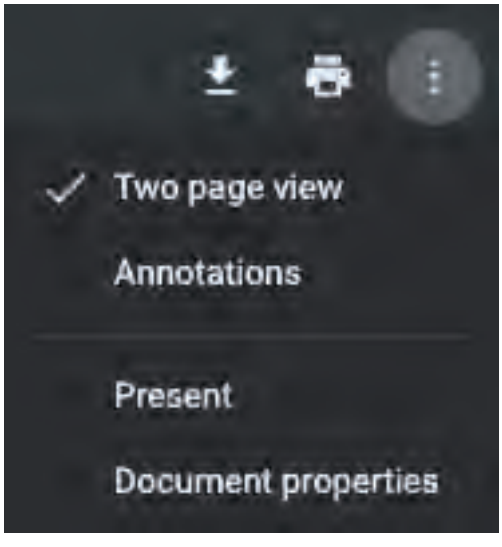
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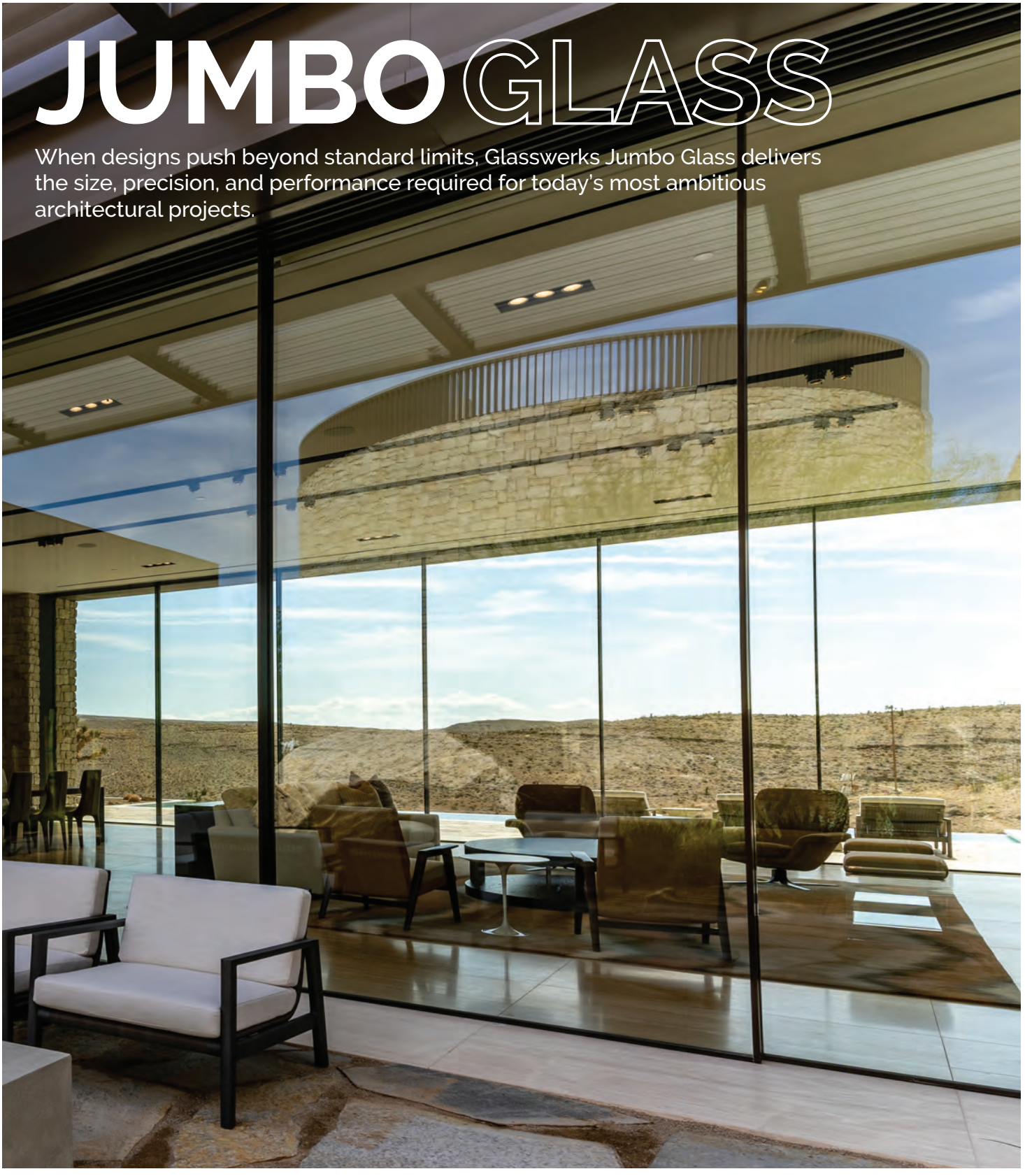
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ON THE COVER: Anodized aluminum helps to ensure the performance and aesthetic success of the new Muskegon Museum of Art's façade. Lorin Industries provided its anodizing capabilities to the project, and President Park Kersman shares more about the importance of anodize on page 28 of this issue.

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GLASS CAST

GFAB Rewind: NGA President and CEO Lakisha A. Woods sits down with IIDA CEO Cheryl Durst for a conversation on the untapped potential of glass in the commercial interior. Durst makes the case that glass is "the material of our lives."

WORKFORCE

In October, the National Glass Association took part in the Big Build event at the National Building Museum in Washington, D.C. The Big Build is a free, hands-on festival focused on construction and design. This year's event brought about 3,500 children.

GLASSBLOG



SECURITY GLAZING

Rethinking Ballistic Framing for a Tighter Energy Code

By Eric M. Hatty



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The Transparent Solution for Safer School Design

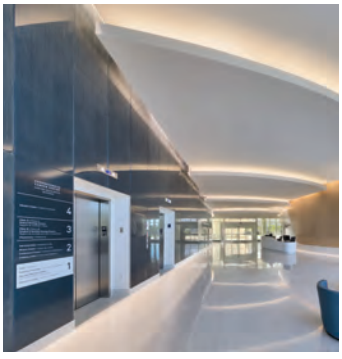
By Devin Bowman



INDUSTRY

Hot Products and Cool People

By Max Perilstein



PROJECT SHOWCASE

Skyline Glass partnered with CannonDesign to fabricate a floor-to-ceiling donor recognition feature wall for the Irma and Norman Braman Comprehensive Cancer Center, a new cancer care facility overlooking Biscayne Bay in Miami Beach, Florida. Inspired by the colors and atmosphere of the waterfront setting, the installation transforms a functional donor recognition element into a signature architectural feature within the lobby.

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At GlassBuild, Creating a Legacy

Industry leaders urge family-owned businesses to plan leadership transitions



NORAH DICK
EDITOR

GlassBuild America 2026 showed what's new in the industry: new technologies, new opportunities, and new collaborations. The skilled labor shortage remains a major driver of many innovations, especially automation and robotics,. Speaking with glass company owners at the Family Business Breakfast on the final day of the show, the lack of labor can also lead to a loss of legacy if the next generation is not interested in the business. "We have a 50-year company, and no one to leave it to," one owner shared with me. Following the breakfast, a panel discussion—"Who's Next: Building the Leadership Pipeline That Keeps Your Company Strong and Protects Long-Term Value" — aimed to offer insights into creating succession plans for the unique and valuable types of companies family-owned businesses are.

Start planning early. Every panelist empasized that planning should start early. Babak Golriz, head of expanding markets at aluplast, a second-generation, family-owned German manufacturer of uPVC window and door extrusions, advised audience members to start the handoff while the older generation is still in the building, so culture and knowledge carry over. "Doing it early is very good because you have the time to have the continuity and an overlap between previous leadership and future leadership. ... It's better to come from a position of wanting change rather than needing change," he says.

Trusted outsiders can bridge family transitions. Panelist Lori Benish was a longtime vendor contact at Oldcastle BuildingEnvelope before joining Enclosures Unlimited, a family-owned shower company. She moved it from handwritten tickets to software technologies and social media, and has hired about 75% of the current staff. Benish described her role as advocating for both the owners and the employees, which can be especially important when managing conflict. "I'm a bridge between the owners and [the employees], and I can be an advocate for them ...to show each side what things can be done," she says.

Private equity partnerships need honesty upfront. Panelist Jeff Goodman, senior operating partner at private equity firm the Riverside Co., advised owners to decide what they want before taking outside capital and selling their business. He underlined that PE is a "transitional owner" that buys in order to sell. "Once you cash the check, the world does change. So we really encourage folks to be honest: What do you want out of this?"

Control the narrative, or competitors will. Rick Dominguez of Jordon Glass Machinery, a third-generation family business, said that after his father's passing, rumors spread that Jordon Glass would be acquired or might fold, and he didn't hear about them until employees raised them. "If I could do it over again, I think what I would have had a greater formality in saying, 'We're fine," he shared with audience members.

Disagree in private, and let the next generation fail safely. During the Q&A, intergenerational conflict came to the fore. After a question about difficulties in handing off the business to the next generation, a third-generation audience member advised current family leadership to let younger family members try new things, such as emerging technologies and processes, in a "controlled environment" while older family members are still there to offer guidance. "I'm exposing the business to new technology, new methods, new this and new that. I want to try. I need to fail to learn. And if it is a controlled environment, you're still in control. ... Do it now, before you're not there anymore or you retire."

And while resolving disagreements is crucial, Golriz advised attendees to make sure those conflicts are kept private. "It's very important that this is happening behind closed doors and the organization is not exposed to these disagreements in public. There's nothing worse than demotivating your organization and creating a culture of fear and uncertainty." ■



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YOUR ASSOCIATION AT WORK

■ NEED-TO-KNOW INFORMATION FROM THE NGA



NGA VOLUNTEERS INTRODUCE NEXT GENERATION OF WOMEN TO GLAZING AT FUTURE CONSTRUCTION LEADERS SUMMER CAMP

This summer, NGA joined Future Construction Leaders at their annual summer camp in San Diego, where girls in grades 9–12 get hands-on experience across the construction trades. On glazing day, campers learned to cut glass and designed their own custom mirrors, guided by a group of industry volunteers led by Kristie Rehberger of A Glasco Inc. Supplies for the activity were donated by Frameless Hardware Co. Asked what advice she'd give girls considering a career in the industry, Rehberger didn't hesitate: "Don't be afraid. You got this. Go for it, do it." NGA board member Syndi Sim, Q-Railing, also took part in the day. Asked to describe the future of women in glass and glazing in a single word, she chose "inspiration." Her advice for young women considering the industry: "The one piece of advice I would give for young women considering the glass and glazing industry is to ask questions."

"We're trying to empower girls to seek opportunities in different pathways," said Azahalia Valdez Rosas, executive director of Future Construction Leaders. Programs like this are how NGA and its member companies help build the next generation of the glass and glazing workforce. ■

ENERGY CODES & STANDARDS UPDATE

DOE and ICC Dispute; Potential New Residential Energy Code

Over the last month, there has been a public dispute between the U.S. Department of Energy (DOE) and the International Code Council (ICC) over the development of building energy codes, particularly residential energy codes. DOE released a press release asserting that the residential 2024 IECC is not cost effective with excessive incremental first costs and lengthy paybacks. ICC responded with a press release pointing out how this new analysis contradicts DOE's own prior analysis showing the residential 2024 IECC does save consumers money and is cost effective.

The DOE senior policy advisor over this area, Michael Sangaline, also addressed the ASHRAE 90.1 committee and board of directors at ASHRAE's recent annual conference, where he stressed that DOE's goal is "transparency, affordability, and consumer choice." NGA and the Glazing Industry Code Committee actively participate and have leadership positions in both the IECC and ASHRAE 90.1 processes, and NGA's consultant Tom Culp, founder of Birch Point Consulting, also met with Mr. Sangaline separately. The primary focus of this dispute is currently on the IECC residential energy code, and DOE indicated they are currently satisfied with the ASHRAE process and commercial energy code references to ASHRAE 90.1.

In response, ASHRAE has indicated they will develop a new energy standard for low-rise residential buildings in competition with the IECC. This is a developing situation which NGA's Advocacy Team is closely monitoring, as it could have significant impact on future energy code development and adoption around the country.

DOE Request for Information on Cost-Effectiveness of Building Energy Codes

In a related matter, DOE has also issued a Request for Information (RFI) soliciting input on the methodology for assessing affordability and cost effectiveness of building energy codes. They are asking for comments on gathering first cost information for consumers, accounting for regional variations, and methodology and assumptions on assessing cost effectiveness. More than just gathering cost information, they also had questions about how DOE and energy standards should assess cost effectiveness of energy codes. It is believed their primary focus is on residential energy codes, but the information could be used for both residential and commercial energy codes. ■



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GLASS ADVOCATE

NGA LEADS INDUSTRY PUSH TO MODERNIZE ENVIRONMENTAL REPORTING FOR GLASS PRODUCTS

Environmental Product Declarations are a standardized and transparent way to understand the environmental impact of products, according to the National Glass Association's Technical and Advocacy Team. The most common metric is global warming potential, also called embodied carbon or product carbon footprint.

Where are EPDs required?

Architects and general contractors add EPD requirements to specifications or request EPDs for specific projects. The International Green Construction Code, or IGCC/ASHRAE 189.1, voted to increase requirements for product-specific EPDs. LEED v5 awards points for providing product-specific EPDs, and more points for showing a 20% reduction in embodied carbon. "Buy Clean" policies at state and local levels require EPDs.

- New Mexico passed the U.S.'s first rebate program for purchasing low-carbon construction materials, including glass and aluminum.
- Boston's "Net Zero Carbon Zoning" policy applies to new buildings larger than 20,000 square feet and renovations larger than 50,000 square feet.
- Buy Clean California and CALGreen requirements apply to state-funded projects, large offices and schools.
- Buy Clean Colorado applies to state-funded projects, with tax credits for private projects.
- New York state is considering new requirements.

These programs mainly focus on concrete, steel, flat glass and asphalt EPDs, but whole-building life cycle analysis will require product-specific carbon footprint information on all materials, including fabricated glass and aluminum. NGA maintains a Sustainability Legislation Database at glass.org to track these policies as they develop.

How are EPDs generated?

NGA partnered with TrueNorth Collective in June to create an EPD generator tool to help fabricators supply EPDs and product carbon footprint data on processed glass products quickly and efficiently. When updating the now-expired Product Category Rules that inform EPDs, the existing flat glass and processed glass rules will combine into one rule covering both categories. This new approach is intended to better reflect how glass moves through the value chain while also addressing the environmental data needs tied to the most common fabricated glass applications, end uses and how they affect the built environment.

What is the timeline to develop the PCR?

NGA intends to develop the new combined Product Category Rule in two phases. The first phase will focus on a "minimum viable," or limited-scope, rule that enables industry-average environmental impact calculations for the most common flat and processed glass product options in the near term. Building on that, the second phase will expand the framework to support product- and manufacturer-specific impact calculations. In parallel, TrueNorth Collective will develop a calculation tool designed to serve as a rule-aligned sustainability data engine, simplifying product transparency for glass industry manufacturers in a practical and consistent way.

The project is directed by a steering committee that includes North American primary and flat glass manufacturers and several glass fabricators and suppliers. Attendees of NGA's Glass Fabricator Conference in June 2026 participated in a workshop with TrueNorth Collective and program operator SmartEPD, including hands-on activities to help define the process steps and boundaries for processed glass fabrication. The rule development process is open to all stakeholders. To participate, contact Georgia Oehler, NGA sustainability manager, at goehler@glass.org ■

Find more information on glass.org

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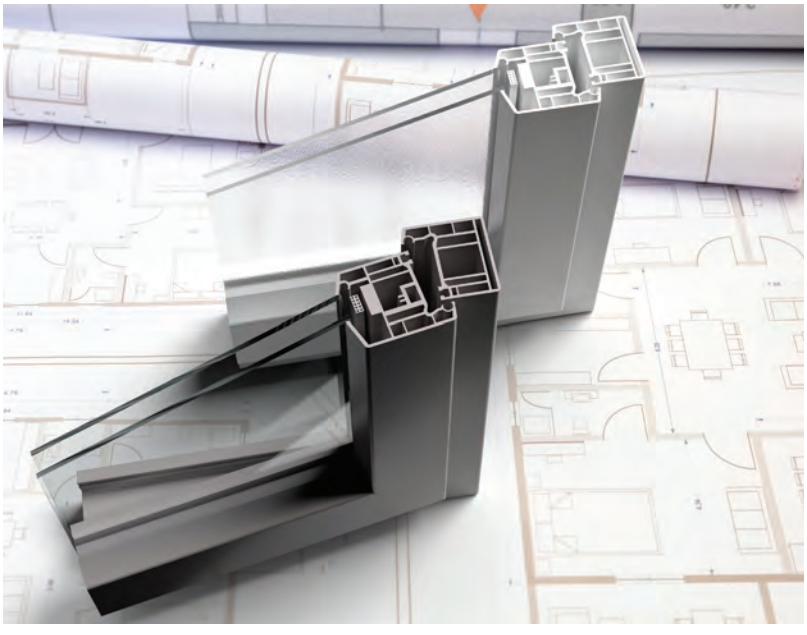
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GLASS INFORMATIONAL BULLETIN



This bulletin is an excerpt of NGA Glass Technical Paper IN03-12 (2023) Key Elements of Fenestration System Shop Drawings, developed by members of the NGA Installing Committee. Download the complete technical paper to read details that are often overlooked in shop drawings, a general checklist of items that are included in shop drawings in an "order of assembly" format, and abbreviations and symbols commonly used in shop drawings. A free download is available at glass.org/store.

KEY ELEMENTS OF FENESTRATION SHOP DRAWINGS

Shop drawings for window and wall systems document and detail all requirements of design parameters, material ordering, fabrication and erection of the glazing subcontractor's scope of work. Failure to properly document and identify these requirements can result in numerous errors and project delays.

What are shop drawings?

Shop drawings are interpretations made by the glazing contractor or material suppliers of the architectural contract documents, including drawings and specifications. Shop drawings clearly and accurately represent the product being installed and allow the glazing contractor to properly order materials to fabricate and eventually install the glazing system. Shop drawings are reviewed and approved by architects for compliance with the contract documents.

Shop drawings are developed by the glazing subcontractor primarily to show how, in conformance with the contract documents, it plans to fabricate and install the work. In addition to that, shop drawings play a bigger role throughout a project's life. It is important to convey the information to the architect, but there are several roles the shop drawings fill.

How shop drawings may be used

1. Internal to the glazing subcontractor, the shop drawings may be used to prepare quantity surveys or material takeoffs prior to issuing purchase orders for various portions of the work, such as glass, glazing accessories, gaskets, framing system components, finishing, sealants, fasteners, etc.
2. The glazing subcontractor (or the framing supplier) also may use them as the basis for preparing fabrication documents or part drawings of the individual components that have to be cut to length and machined prior to shipping the produced parts to the site for assembly, or prior to any factory-assembled work as may be necessary, such as in unitized walls, or for any post-fabrication finishing that may be required (formed panels, formed copings, etc.)
3. The general contractor may use them

to coordinate not only the work of the glazing subcontractor with the construction of the building structure, but also with any of the other trades associated with the installation of the glazing system. This is critical when it comes to coordination of adjacent trades associated with air and water barriers. Coordination with other trades such as insulation and fire-safing installer (when not included in the glazing subcontractor's scope), a precast panel fabricator/erector into which windows may be set, or a masonry contractor creating rough openings for a strip window system, etc., may also be part of the general contractor's required coordination.

4. Project consultants may also review them for compliance with project specifications.
5. Code officials may review them to assess compliance with life-safety issues, such as safety or fire-rated glazing installations, or proper detailing of perimeter floor fire-safing installation.
6. At project conclusion, the owner and building maintenance personnel may archive a copy for glazing system-related issues, such as ordering replacement parts, determining how to make any required repairs.

Technical information typically included in shop drawings

- Framing material type and finish type
- Glass make-up
- Types and sizes of framing members, including elevations with locating dimensions, plan and sections cuts
- Connections to the building structure, or adjacent trades necessary to support the glazing system (precast panels, stud/sheathing/masonry construction, etc.)
- Methods showing how the glass is glazed into the system and the glazing accessories required to do that (gaskets, setting blocks, edge blocks, etc.)
- Transitions from the glazing systems' perimeter conditions to the adjacent construction
- How the glazing systems will meet specified performance requirements of air, water, structural and building movement (for example, slab live-load deflection or seismic drift)
- How the glazing system(s) interface with surrounding construction substrates
- Fastener information including type, size, material, finish and spacing
- Door size, rough opening, swing and hardware

The level of detail in the shop drawing will vary based on the complexity of the project. For example, some of the information proposed would only be essential if the shop drawings are to include engineering details, which may not be required for more simple building projects. ■



The most-clicked news stories on GlassMagazine.com, brought to you by GLASS MAGAZINE WEEKLY*

NSG Group Successfully Demonstrates Manufacturing Float Glass Using Waste Glass

NSG Group successfully manufactured float glass using waste glass recovered from renovation projects. The project was conducted in collaboration with the Flat Glass Manufacturers Association of Japan. As part of this initiative, waste glass removed from a building owned by The University of Tokyo was collected jointly with the Association. The recovered glass consisted of 12-millimeter-thick ceramic-printed tempered glass with safety film. The project aimed to achieve horizontal recycling, whereby end-of-life glass is recycled back into new float glass products.

Salem Fabrication Technologies Group Acquires Matodi

Salem Fabrication Technologies Group, Inc. acquired Greensboro, North Carolina-based Matodi. Matodi will retain its name and become the fifth operating division under the SFTG umbrella, joining Salem Fabrication Supplies, HHH Equipment Resources, Glass Machinery Locator and K&W Grinding. SFTG is a 100% employee-owned company, and Matodi employees will become part of the SFTG employee-owner family. Matodi will continue operating from its Greensboro, North Carolina location.

Gardner Glass Products and Walker Glass Officially Become Gardner Walker

As a final step in the integration of the two companies, Gardner Glass Products and Walker Glass are merging the two brands under the name Gardner Walker. The companies announced the corporate merger over two years ago and have operated the brands separately until now. Together, Gardner Walker (GW) operates four facilities positioned to efficiently serve its customer base throughout the North American architectural glass market. Gardner and Walker have been producing mirror for a combined 150 years.

GW will continue manufacturing acid etched glass from its Montreal facility and beginning in 2027, from its Huntsville, Texas, plant as well. The Huntsville operation will have the capability to produce jumbo size full surface etched glass as well as bird-friendly glass in sizes up to 130 inches by 240 inches. The Walker Textures acid etched glass and AviProtek bird friendly glass brands will continue to be used under the Gardner Walker banner.

LuxWall Receives DOE Support for Expansion of VIG Manufacturing, Launches AIA Continuing Education Course

LuxWall is constructing a 276,000-square-foot manufacturing facility in Detroit to produce Transparent Insulation, its vacuum insulating glass product. Serial production will begin in third quarter of 2027 and the factory will create up to 277 new jobs at full capacity. This represents a milestone in the company's continued investment in the state's manufacturing landscape, following its R&D Center in Ypsilanti, Michigan, and its Factory One in Litchfield, Michigan.

The U.S. Department of Energy will provide financial assistance through a cooperative agreement from the Office of Critical Minerals and Energy Innovation's Manufacturing Deployment Office to LuxWall. The company's proprietary technology is designed to significantly reduce energy costs for property owners and as well as homeowners, and the DOE's continued support will help accelerate LuxWall's ongoing growth and manufacturing expansion. LuxWall also announced the launch of its American Institute of Architects continuing education course dedicated to Transparent Insulation. The course provides architecture professionals with a technical introduction to Transparent Insulation, including heat transfer fundamentals, energy saving performance, occupant health, safety, and welfare considerations, and performance comparisons with traditional glazing solutions.

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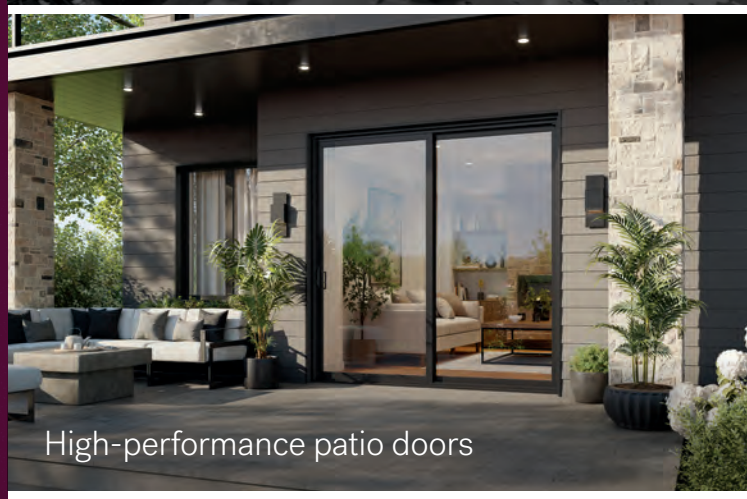
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dormakaba Acquires Alliants
dormakaba has signed a binding agreement to acquire Alliants, the guest experience technology partner behind more than 100,000 hotel rooms. The acquisition expands the company's hospitality offering beyond physical access control, connecting room entry with digital guest engagement.

Founded in 2009 in Southampton, United Kingdom, Alliants provides proprietary guest experience software and managed services that help hotels serve guests from pre-arrival through their stay and beyond. Its capabilities include concierge, contactless check-in, mobile key, payments, messaging, and agentic AI. The company operates globally and employs more than 100 people. By pairing Alliants' experience platform with dormakaba's global portfolio and scale, hotels will have the option for an end-to-end solution across digital guest engagement, access, and hotel operations.

Jamison Door and BMP Group Break Ground on New Manufacturing Facility
Jamison Door Company and BMP Group broke ground on a new 355,000-square-foot advanced manufacturing facility in Hagerstown, Maryland, marking the first phase of the planned 58-acre North American manufacturing campus. The $35 million to $50 million production center will expand Jamison and BMP's U.S. manufacturing capabilities and increase capacity to serve customers across North America. Designed and constructed by ARCO Design/Build, the facility will integrate advanced manufacturing technologies, automation, research and development, and product testing to support continued growth across the group's portfolio of brands.

The Glass Guru Expands in Oregon
The Glass Guru is opening The Glass Guru of West Portland, Oregon, locally owned and operated by father-and-son team Joe and Tom Ruble. The Glass Guru of West Portland provides professional glass repair, replacement and installation solutions for homes and businesses. Its services include window glass replacement, foggy window restoration, shower enclosures, mirrors, screens and a variety of custom glass solutions.

Updated ANSI Standard for Industrial Head Protection Now Available
The International Safety Equipment Association announced the release of ANSI/ISEA Z89.1-2026, the updat-



ed American National Standard for Industrial Head Protection, approved by the American National Standards Institute. ANSI/ISEA Z89.1 is referenced in OSHA regulations and remains the primary benchmark for industrial head protection.

The 2026 revision does not replace existing requirements or make current compliant head protection obsolete. ANSI/ISEA Z89.1-2026 maintains the familiar Type and Class classifications used throughout the industry. Type I and II designations address impact and penetration protection, while Class designations address electrical protection performance. The 2026 revision establishes optional testing criteria for features that are increasingly being considered by safety professionals and employers across a wide range of industries.


Haber

People

Jerry Haber, one of the founders of **W&W Glass**, died on Sept. 6, 2026, at the age of 85. Haber's career in the glass industry began in 1963, at 21 years old. He was thrust into the business following the untimely death of his father, William Haber, founder of Haber and Henry Glass and Metal Inc. Jerry stepped in to lead both his family and the company, guiding it to a successful and stable livelihood.

Beyond his own company's success, Jerry was a steadfast champion of union labor throughout his career. He was a strong supporter of union glazing, serving as a trustee for the Glaziers Pension Fund and sitting on the board of the Finishing Contractors Association, among other union-related roles. Even after retirement, he remained actively involved with District Council 9, the National Pension, and Glaziers Local 1087.

Hartung Glass Industries announced that longtime glass industry executive *Bob Cummings* has retired, concluding a career of more than four decades in the glass and glazing industry. Cummings first joined Hartung in 2014, serving as vice president of sales for the southwest region through 2018. He later served as vice president of architectural sales and marketing and ultimately president and CEO of Consolidated Glass Holdings. In 2021, he joined United Architectural Metals as chief operating officer before returning to Hartung in 2024 as vice president of sales. ■


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GLASSBUILD AMERICA 2026 DELIVERS ON INNOVATION AND INSIGHT

This year's premier glass industry trade show offered high-level lessons from thought leaders and hands-on education for students exploring the industry

GlassBuild America 2026, held Sept. 23-25, welcomed attendees and exhibitors to the Las Vegas Convention Center for another year of innovation, business, networking and education.

Debuting the Keynote Theater

New to GlassBuild this year was the Keynote Theater, a dedicated space for the three keynotes that started each day of the show.

Day one of GlassBuild welcomed Daymond John, star of ABC's "Shark Tank." In his presentation, John stressed the importance of setting goals and doing your business "homework" to lay the groundwork for success. "Change will always be at our forefront," John said. He urged business owners to understand their value proposition and encouraged attendees to learn from their own mistakes as well as those of others who have tried to succeed in business before them.

Senior economist Connor Lokar of ITR Economics opened the second day of the show with a comprehensive forecast for the commercial and residential segments of the industry. Lokar's outlook for the U.S. GDP is mixed: the economy is growing and he expects the growth to continue, but it will slow in 2027, beginning to stall as we move into next year. "It's not a recession, but we do have some headwinds coming [in the broader economy]," he said.

The final keynote ended the week on a strong note with the fifth annual Women in Glass and Fenestration breakfast and keynote address. Syndi Sim, director of sales and business development, Q-Railing, kicked the session off by highlighting the representation of women within NGA's leadership, noting that 80% of the staff and

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100% of the senior leadership team are women. She also discussed the success of the California Glass Association Women in Glass chapter, as well as a similar chapter established in Texas.

Barbara Bouza, executive director at Live, Work, Play at CannonDesign, and previously with Disney Imagineering, led the keynote address, which centered on the importance of lifelong curiosity, learning and overcoming perfectionism. Bouza highlighted the importance of visibility for women and people of color in architecture, using as examples the stories of Julia Morgan, the first female architect licensed in California; and Norma Sklarek, the first black woman to become a member of the American Institute of Architects to illustrate.

From the show floor

Exhibitors at GlassBuild showcased new and legacy products and innovations. They spoke with Glass Magazine editors about the challenges and triumphs of the past year, and what's ahead for many going into 2027.

For example, many are saying the automation conversation has shifted from whether to how fast. At Salem Fabrication Technologies Group Inc., Doug Mangus says that automation is an inevitability: "In the future everyone will have to automate." The company brought its AMR (autonomous mobile robot) to GlassBuild again, which can now move full racks of glass across the factory floor, scanning a code that ties into the plant's ERP system to determine where the glass goes. Forel SpA, marking its 50th anniversary this year, is working on two fully automated manufacturing plants for customers. Troy Larson, U.S. area manager for Forel, pointed to the labor shortage and fabricators' desire for speed and quality as the drivers.

New digital technologies are also helping machinery companies make equipment purchases. Joseph Gates, vice president, Lattuada North America, says they're running simulations that show a customer exactly what automation would do to the customer's throughput and model for them when the investment pays back. It usually pays back sooner than the customer expects, he said, and seeing the math tends to move people off the fence.

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Students at GlassBuild

This year's GlassBuild welcomed 250 local Clark County students to the show floor. This offered an opportunity for the students to "see themselves in glass." Students completed challenges in the Skills Challenge Area, including caulking their names or other designs at the Dow booth, or completing math challenges at the FHC Frameless Hardware Co. booth, among others. Students also walked the show floor following the Career Discovery Trail, which brought them to companies spanning multiple segments of the glass industry, including A+W Software, CRL and Q-Railing.

Angela Santos, marketing specialist with Q-Railing, said that she was excited for the students to come by their booth because of the importance of education. "Not a lot of people know about this industry until they get the chance to learn about it. And once you learn about it, it really is so interesting. There's so many different opportunities out there."

Izabella C. is a sophomore at a Clark County school who participated in the event at GlassBuild. She said she was looking forward to learning more about glass because, "you see glass everywhere, but you don't really know too much about it." She also said that as a girl, she was looking forward to hearing more from women in the field about their experience and the opportunities out there for her. "Being here is just about finding more things to do. This field is huge and I'm very open-minded about what I want to do in the future," she said. ■



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PROTECTION BEYOND GLASS

Understanding tornado and hurricane rated glazing systems

BY WADE ARNOLD, CSI, CDT

When a tornado is bearing down, a window is more than a piece of glass in the wall. Windows, doors and fenestration systems are crucial components of the building envelope. This is why terms such as impact glass, tornado-rated, hurricane-rated and storm-shelter glazing should not be treated as interchangeable. They refer to separate performance requirements.

People should also be wary of the phrase "FEMA-rated" when referring to glazing systems. FEMA does not rate or certify glazing products; products may instead be tested or listed for compliance with applicable FEMA P-361 criteria.

For architects, glaziers, and building owners, the starting point is simple: glass alone does not make an opening storm rated. The building community should fully understand how to specify the correct products, and how standards shape the test methods required for storm ratings.

Navigating the Testing Standards

Tornado and hurricane fenestration systems are intended to help building envelopes remain unbreached after windborne-debris impacts and fluctuating wind pressures. ASTM E1996 sets qualification requirements for exterior windows, glazed curtain walls, doors and impact-protective systems designed for use in areas subject to severe windstorms that generate windborne debris. ASTM E1886 is the companion test method for missile impact followed by cyclic positive and negative pressure differentials. The required missile and test conditions used depend heavily on the application type and classification.

A nominal nine-pound 2-by-4 wooden post is used in common hurricane impact test large-missile protocols, even though the required impact velocity varies with applicable criteria.

Storm shelters are a different category, though. ICC 500 establishes minimum design and construction requirements for tornado and hurricane storm shelters. FEMA P-361 builds on this framework with additional guidance for residential and community safe rooms and includes funding criteria for projects receiving FEMA grant assistance. For tornado shelters designed for a 250-mph design tornado speed, ICC 500 uses a 15-pound 2-by-4 lumber missile traveling at 100 mph against vertical surfaces and 67 mph against horizontal surfaces. This is a much more demanding impact than the familiar hurricane large-missile test and shows why simply specifying "impact glass" is not enough, given how different the testing conditions are. The same principle applies to ballistic, blast and forced-entry glazing. A laminate tested for one hazard does not automatically satisfy another. Multithreat systems are available, but every required per-

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formance needs to be supported by the appropriate testing or listing.

The Glass Is Only One Part of the Test

A common misconception is that a tested laminated glass makeup can be installed in any sufficiently robust frame and still provide the same rated performance. For hurricane and tornado impact, the fenestration assembly and its installation must be qualified under the applicable standard, listing, or product approval. The glazing, retention components, frame, mullions, sealants, fasteners and anchors work together to create impact resistance. Impact and pressure loads are resisted by those components and transferred through the frame and anchorage into the supporting structure. If the frame, glass retention, or anchorage fails, the glass makeup itself will not preserve the opening.

This is also why substitutions deserve complete scrutiny. The NGA Technical Paper FB24-24, "Hurricane Product Substitution," summarizes the ASTM E1996 approach to component changes. Depending on what is being changed, a substitution may be automatically permitted, require engineering analysis or additional testing, or require complete retesting. Changes involving interlayers, insulating glass unit components, glazing sealants or framing details should never be assumed to be equivalent simply because they look similar on paper.

For glaziers, "or equal" deserves special attention on an impact-rated project. Any proposed substitute must maintain compliance with the applicable testing standard and the qualified assembly. A component with similar published properties is not automatically equivalent if the change takes the system outside the tested configuration.

Understanding Design Pressure

Debris impact gets most of the attention, but wind pressure is equally important. Hurricane-impact systems qualified under ASTM E1996/E1886 must withstand cyclic positive and negative pressure loading after impact.

Required design pressures are project-location specific. Site wind speed, building height, exposure, building geometry, risk category and the opening's location on the envelope can all affect the loads. The tested or approved positive and negative design pressures of the selected assembly need to meet the project requirements. "Impact-rated" tells only part of the story; the pressure rating and approved size range matter too.

Anchorage Is Part of the System

The load path continues beyond the glass and frame into the anchors and supporting construction. Anchorage must follow the tested or listed configuration, manufacturer requirements and project-specific engineering. The supporting structure also must be capable of accepting the loads delivered by the fenestration. This requires coordination among the architect, structural engineer, manufacturer and glazing subcontractor. Changing an anchor, spacing, substrate or perimeter condition in the field may affect the system's qualified performance.

Specify Early, Then Build What Was Approved

Address the hazard and performance requirements during design, not when the glass is ready to release. Waiting until late in the process can trigger revised engineering and submittals, additional testing, refabrication and schedule delays. Identify whether the project needs hurricane impact resistance, tornado-shelter protection, another security performance or a combination. Confirm the applicable code, product approval or listing, design pressures, impact classification, approved sizes and installation requirements.

Specify the complete system to match the tested configuration, including glazing, framing, anchors, sealants, approved sizes and installation details. This helps ensure the installed assembly performs to the qualified test standards. For FEMA-funded safe-room projects, the system must also meet the applicable ICC 500 and FEMA P-361 requirements to support grant eligibility.

Appearance is a separate consideration from storm-impact qualification. Laminated glass makeups with multiple plies and interlayers can exhibit more tint or optical distortion than conventional glazing. On projects where appearance is especially important, the National Glass Association recommends full-size mockups to evaluate the glazing under actual project, lighting and surrounding conditions. Most importantly, install what is approved. Verify the glazing makeup, framing, sealants, fasteners, anchors, and installation details before work begins. Storm-rated performance belongs to the complete assembly. If one link in the load path changes, the tested performance may change with it. ■



Wade Arnold, CSI, CDT, is the vice president of sales at Specialty Fenestration Group. Reach him at warnold@usbp.com



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Left: Lorin Industries contributed its anodized aluminum capabilities to systems featured in the Muskegon Museum of Art in Muskegon, Michigan. Anodized metal systems are present in the structural and decorative elements, complementing the museum's contemporary architectural design.

UNDERSTANDING ANODIZED ALUMINUM

Demystifying the finish and its qualities **BY PARK KERSMAN**

Over the years, I've had countless conversations about anodized aluminum with architects, fabricators, contractors, and building owners. What I've learned is that the biggest hurdle isn't the material itself. The challenge is helping people understand what it actually is. When a surface is painted, powder-coated, or otherwise covered, you're applying something to the material. Anodizing works differently. Through an electrochemical process, the aluminum itself becomes the finish. The oxide layer grows from the aluminum substrate rather than being applied on top of it.

Anodized aluminum resists weathering

Understanding this process is important because anodizing changes how the material behaves over decades of service. In the glass and glazing industry, we're constantly balancing aesthetics with durability. Architects want finishes that look exceptional on day one. Owners want those same finishes to look exceptional 20 or 30 later. Contractors want materials that install predictably and require minimal maintenance. Those expectations are becoming harder to satisfy as projects face harsher environmental conditions, longer design lives, and increasing sustainability requirements.

This is where anodized aluminum deserves a closer look. The oxide layer formed during anodizing is extremely hard and highly resistant to weathering. Because it is integral to the aluminum itself, concerns such as chipping, flaking, or peeling simply don't exist in the same way they do with applied finishes. Even in demanding environments, including coastal applications where salt exposure is a constant concern, anodized aluminum has established a long history of performance.

Preserving the look of metal

Yet durability is only part of the story. One of the characteristics that continues to attract architects and designers is the ability to preserve the appearance of real metal. Unlike opaque coatings, anodizing is translucent. The finish allows the natural character of the aluminum to remain visible, creating depth and a metallic appearance that is difficult to replicate. The industry has also made significant advances in color consistency, finish options, and fabrication capabilities. Roll forming, perforating, embossing, and other complex architectural applications have become commonplace.

Looking ahead, I believe the future growth of anodized aluminum will depend less on technological breakthroughs and more on awareness. The material already offers durability, corrosion resistance, recyclability, and design flexibility. What remains is helping more architects, glazing contractors, fabricators, and building owners understand where it fits within their toolbox of material options. ■



Park Kersman is president of Lorin Industries, a third-generation family-owned company headquartered in Muskegon, Michigan.

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Students visit A+W Software's booth on the Career Discovery Trail at GlassBuild America 2026.

STUDENTS SEE THEMSELVES IN GLASS AT GLASSBUILD AMERICA

The National Glass Association welcomes the next generation of glass professionals **BY RACHEL VITELLO**

GlassBuild America, held Sept. 23-25 in Las Vegas, Nevada, welcomed 250 local Clark County, Nevada, students to the show floor on the final day of the show. The students had the opportunity to walk the show floor, meet with participating companies, talk with representatives about what their companies do and partake in hands-on demonstrations.

"College costs are skyrocketing. Parents and students alike increasingly question the value of a four-year degree, and students worry about starting their adult lives deep in debt. The glass and glazing industry offers an alternative path to a rewarding, fulfilling career that begins immediately after high school, and events like this give students a firsthand look at opportunities," says Lakisha Woods, president and CEO of the National Glass Association.

Student expectations going in

Izabella C. is a sophomore at a Clark County school who participated in the event at GlassBuild. She said she was looking forward to learning more about glass because, "you see glass everywhere, but you don't really know too much about it." She also said that as a female student, she was looking forward to hearing more from women in the field about their experience and the opportunities out there for her.

"Being here is just about finding more things to do. This field is huge and I'm very open minded about what I want to do in the future," says Izabella. "I know I'm interested in construction, and that construction is sort of an umbrella. I think glass is under that umbrella and I can make some new connections today."

Jackson C., another sophomore from the same school, said that he knows he wants to go into the trades, but hasn't decided specifically what he wants to specialize in. He hoped the day would inspire him and open some new ideas about what his career could look like.

Following the Career Discovery Trail

Fourteen exhibitors participated in the Career Discovery Trail, which was a path of companies on the trade show floor that the students followed. This "trail" offered the students a glimpse into the broad range of capabilities and product offerings that make up the glass industry and the jobs associate with them. They had the chance to speak with company officials spanning from expertise in robotics, machinery, software, hardware, glass transportation and glass fabrication.

One company that participated in the Career Discovery Trail was Q-Railing. Angela Santos, marketing specialist with Q-Railing, said that she was excited for the students to come by their booth because of the importance of education. "Not a lot of people know about this industry until they get the chance to learn

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about it. And once you learn about it, it really is so interesting. There's so many different opportunities out there."

Santos added that she was looking forward to speaking with young girls as a woman in a male-dominated field, to offer inspiration to them that they can join this industry too and there are allies out there paving the way. Similarly, Letty Angel, senior marketing manager at CRL, says "[CRL is] very invested in education. Kids often aren't aware of the types of opportunities in this field, so we would love to have more engagement like this tour for students." Gardner Walker is another company that was on the trail. "We want to support the industry and the future," says President and CEO Randy Brooks. "The more bright and young folks we can attract the better. We also want to be good industry citizens by getting involved with initiatives like this."

Charles Alexander, vice president of sales and marketing at Gardner Walker, added that he hasn't spent his whole career in the glass industry like many others. He says that the industry is overall a "healthy, well-run industry and fun to be a part of," and that's something he wanted to convey to the students.

Skills Challenge Area offers hands-on component

Also on the Career Discovery Trail was the Skills Challenge Area. This part of the day offered hands-on activities for the students. Dow was one of six companies with a booth in this area. Students had the opportunity to caulk names or designs between two small panes of glass. This challenge tested their precision and fine motor skills, and students were able to take their creations home with them. At this booth, students also learned about the importance of safety and personal protective equipment, like goggles and gloves.

A representative for Dow says they wanted to participate in the day to "support up and coming kids." She adds that the industry needs to work "to get [students] excited about the different opportunities out there." Also in this area, AGMT taught students to step up to a storefront entrance mock-up, find what's wrong, and dial in the closer before their competition did. Hardware & Glass showed students how to level glass in a railing system. The Shower Door Professionals Co-Op challenged students to identify what's wrong with their shower door installation, and FHC tested them on their measuring skills.

"It was clear students left with a better understanding of what a career in glass can offer," says NGA Vice President of Workforce Development Jenni Chase. "We're grateful to everyone who took the time to share their expertise and make this experience a success." ■



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SEVEN LESSONS FOR BUILDING A RESILIENT BUSINESS

Fundamental lessons after two decades in business

BY MARCO TERRY

Some business lessons have no expiration date. Markets change, technology changes, and industries evolve, but the fundamentals remain consistent. I've learned the following seven important lessons through more than 20 years of business ownership. They may seem like common sense. The challenge is that common sense is often much easier to recognize in hindsight.

01

GET COMFORTABLE WITH PUBLIC SPEAKING

I must confess that I was a terrible public speaker early in my career. This common problem is one that everyone should fix. Good executives, especially those who get promoted into leadership roles, are good communicators. Public speaking is a trainable skill like any other. Start by enrolling in your local Toastmasters chapter. Toastmasters is a wonderful organization with a time-tested process to help anyone become a more confident public speaker. It is affordable and has chapters all over the country. Going beyond Toastmasters requires an investment, since the most useful courses can be expensive. These courses provide personalized coaching and record your presentations, enabling you to fine-tune your public speaking skills.

02

HANDLE TOXIC "HIGH PERFORMERS" EARLY

Having a high-performing but toxic employee is a tough challenge, especially if they are in a revenue-generating role. The employee is valuable to your bottom line but also sows discontent among the team. Over time, their behavior can outweigh their contributions, and the employee becomes a net loss for the company. Experience has taught me to address this issue early, before it becomes a serious problem. Speak to the employee and give them the opportunity to improve. Document everything, just in case the situation does not improve. If there is no improvement, work with human resources to transition the employee out of the company.

03

KNOW WHEN TO PART WAYS WITH DIFFICULT CLIENTS

We've all had clients who are "difficult" to deal with. It's a fact of business life. However, some clients go far beyond normal business friction. They have incessant demands, complain all the time, and are never satisfied. Usually, your company is better off serving clients who are a better fit. Parting with clients, even when they are "difficult," is challenging. The immediate revenue loss can be painful and difficult to justify to upper management. However, the long-term benefits often outweigh the short-term pain. Remember to check your contract termination provisions and handle the issue gently and professionally.

We had to take on some difficult clients when I started my company 23 years ago. These were the clients that no competitor would take. We knew they were hard to manage, but I wanted to grow the business. This approach became a costly mistake. I learned a valuable lesson: some clients are not worth it. Spend your resources looking for good clients.

04

ALWAYS KEEP A GENEROUS CASH RESERVE

As a general rule, advisors recommend that companies should keep at least three to six months' worth of anticipated expenses as a cash reserve. That rule may be a useful baseline. However, experience has made me more conservative. The last two major financial downturns were the global financial crisis of 2008-2009 and the COVID-19 pandemic. These two events share a few things in common. They were unexpected, lasted more than six months, and rippled through the economy quickly.

Both downturns severely impacted the construction industry. I saw dozens of companies go out of business. I've taken an important lesson from these events. Always have a large and comfortable safety net. Consider optimizing your company for long-term resilience, rather than fast growth.

05

CULTIVATE A GOOD REPUTATION

Professional relationships rarely end when the job does. Former colleagues can become future clients, bosses, or employees as they move through different roles and companies. Few career mistakes can be more costly than having a bad reputation. People may forget individual projects, but they rarely forget whether you were reliable and professional. A bad reputation follows you as you change jobs and can affect your career in ways that aren't obvious.

The best approach is to cultivate a reputation for professional behavior and reliability. These are the two cornerstones of a good reputation that can support a leadership career. Lastly, remember the adage: it takes a lifetime to build a good reputation but a minute to destroy it.

06

EVALUATE DECISIONS, NOT OUTCOMES

One of the biggest mistakes you can make as an executive is to evaluate decisions purely by their outcomes. Unfortunately, many executives do just that by focusing primarily on results. This behavior has unintended consequences. Bad decisions that succeed by luck are rewarded, while sound decisions that fail due to external factors are treated as mistakes. The right approach is to evaluate the decision process, the execution, and the results separately. This perspective helps you determine whether the results came from judgment, execution, timing, or just luck.

07

BEWARE OF THE SUNK COST FALLACY

Have you ever stayed with a failing project because walking away felt like wasting prior effort? This tendency, called the "sunk cost fallacy," is a common cognitive bias that affects people and organizations. It is insidious because it disguises bad decisions as perseverance. The resources you have invested in a project are a sunk cost. They are in the past and cannot be recovered. The best way to evaluate a project is to determine whether investing additional resources is worth it, regardless of prior investments. If it's not, terminate the project and invest resources elsewhere.

Thank you and goodbye!

This is my final article. My schedule has become tighter in recent years, and it is increasingly difficult to find the time needed to write regularly. I would like to thank the readers and the NGA for giving me the wonderful opportunity to write for them over the years. During my 11 years writing for the NGA, I have had the pleasure of working with Jenni Chase, Katy Devlin, and Tara Lukasik. They are great editors and valuable resources for the glass industry. ■



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



Left: Clean water recovered after the filtration process, ready to be reused in glass processing. Photo courtesy of Filtraglass.

OPTIMIZING WATER MANAGEMENT

How closed-loop water recycling supports plant efficiency and sustainability **BY ALBERTO MEDINA**

Water plays a fundamental role throughout the glass processing industry. It is essential for cooling, grinding and polishing operations, while also directly influencing production quality, machine reliability, and operational efficiency. As manufacturing facilities continue to increase production capacity and integrate multiple processing lines, efficient water management has become an increasingly important challenge.

Beyond reducing water consumption, modern production plants seek solutions capable of maintaining stable process conditions, minimizing equipment maintenance and supporting more sustainable manufacturing practices. The recent installation of a centralized water recycling system at the new production facility of L&L Glass in Denver, Colorado, provides an example of how these objectives can be addressed simultaneously.

Case Study: A growing glass fabricator investing in efficiency

L&L Glass specializes in shower enclosures, mirrors and other architectural glass applications. The opening of a new production facility represents another step in the company's continued expansion and commitment to increasing manufacturing capacity. Like many modern glass fabricators, the company required a water treatment solution capable of supplying several processing machines simultaneously while ensuring consistent water quality throughout the production cycle. To meet these operational requirements, a centralized water recycling system was integrated into the new production line.

The installation serves four edging machines operating simultaneously from a common water treatment circuit. During production, process water is continuously collected, filtered to remove suspended glass particles, and recirculated back into the system. This closed-loop approach maintains stable operating conditions while significantly reducing the accumulation of abrasive glass particles within the machinery. For facilities operating multiple interconnected machines, centralized water treatment offers important operational advantages by simplifying water management and ensuring consistent process performance across the production line.

Technology adapted to industrial requirements

One of the key aspects of modern water treatment systems is their ability to adapt to different production layouts and machine configurations. The installation at L&L Glass illustrates how centralized water recycling can be integrated into facilities operating multiple processing machines while maintaining continuous production and stable operating conditions.

The L&L Glass project illustrates how advanced water recycling technologies can contribute to improving operational efficiency in modern glass processing plants. By combining lower water consumption, improved equipment reliability and more efficient waste management, centralized water treatment systems support production environments that are both economically and environmentally sustainable. As water becomes an increasingly valuable industrial resource, integrated water management solutions are expected to play an even greater role in the future development of the global glass processing industry. ■

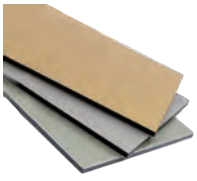


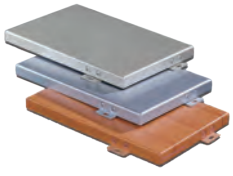
Alberto Medina is commercial director at Filtraglass, a company specializing in water treatment and recycling solutions for the glass processing industry.

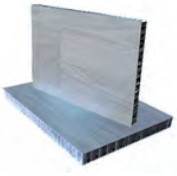


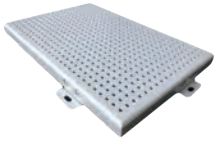


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PLAYING THE





MERGE

Market uncertainty and higher performance criteria lead major metal companies to think long term about product development and business strategy

By Norah Dick

While "unprecedented" was the catchword of the pandemic, "uncertainty" may be the most repeated way to describe the current economy: uncertainty about material supply, inflation, costs, project timelines, and more. Architectural metal companies have been dealing with the entrenched nature of business uncertainty this past year, while also navigating the tariffs and supply issues unique to metal fabrication and manufacturing. The long-term effects of trade tensions, combined with increasing demand for higher-performing systems, is changing the way some companies plan for the future.

01 —

Supply Disruptions

Two fires that broke out at Novelis's Oswego, New York-based hot mill disrupted supply to some architectural metal suppliers and fabricators this past year. The first fire broke out in September 2025, with another starting in November during repair work. Hot mill operations resumed in May 2026, according to Manufacturing Dive. The shutdown affected major commercial customers like Ford, as well as some metal suppliers to the building industry.

Tom O'Malley, managing partner at Clover Architectural Products, says that the fires disrupted access to ⅜-inch plate specifically, which is only produced by a few mills. While hot mill operations have resumed, companies from other industries were given preferential treatment, leading to delays for lower-priority companies, he says, companies that are now also dealing with higher costs from the mill.

The last couple of years have also seen some movement toward reshoring primary aluminum production to the U.S. In 2025, the Department of Energy's Office of Clean Energy Demonstrations awarded Century Aluminum $500 million to construct the first U.S. primary aluminum smelter since 1980. Currently, the U.S. operates four aluminum smelters, two owned by Century Aluminum and two by Alcoa Corp. The new smelter will be developed jointly with Emirates Global Aluminum, and will be located in Inola, Oklahoma.

While Century Aluminum President and CEO Jesse Gary says the new smelter is slated to break ground in 2026 and begin smelting aluminum by the end of 2029, the company is also growing supply in the near term. In April 2026, the company announced that it had completed expansion of its Mount Holly, South Carolina, plant, which will by itself increase U.S. primary aluminum production by 10%, according to the company.

Opened in March 2026, the Pine Rest Pediatric Center of Behavioral Health offers children and families in Michigan life-changing care and a path to recovery. Upholding the architectural intention and specification, Vos Glass installed Wausau 4000i-DT Behavioral Care Windows and Tubelite 400T Series Curtain Wall to meet the project's requirements for occupant safety, energy efficiency and long-term durability. Linetec, also part of Apogee Architectural Metals, provided thermal barriers and architectural finishing for both systems. Photo by Pine Rest Christian Mental Health Services.



02 —

Tarrifs and volatility

The tariff environment remains complicated, especially for metal goods and products. In June 2025, Section 232 tariffs on steel and metal were increased to 50% on steel and aluminum articles. The past year has seen two updates to the 232 tariffs: one in April that seemed designed to encourage other countries to use U.S. metals, with another shift in June to provide some relief to construction equipment vendors, according to reporting by ConstructConnect. Beyond Section 232 tariffs, trade tensions escalated again between the U.S. and Canada in late August. As of this writing, Canada has announced retaliatory tariffs, levying a 50% tax on U.S.-made steel and aluminum.

While the tariff environment remains unpredictable, many company representatives interviewed say they have learned to deal with the





volatility. "The new tariff environment has been extended enough that I think we've learned a lot from managing challenges with tariffs and material supply," says Kimberly Ferro, commercial vice president, Arconic Building and Construction Systems. Some companies continue to focus on price transparency and communication with vendors as markets fluctuate. "We feel we have a very good way to break it down for our clients so they can clearly see the difference [in price] and be able to pass that along to their clients in return," says O'Malley. Frameless Hardware Co.'s Vice President of Manufacturing Armando Rodriguez says that in response to the combination of import tariffs, constrained supply from mills, and competing industrial supply, the company has adapted by "doubling down on U.S. extrusion partnerships, nearshoring supply chains, and maintaining deeper strategic inventories."

While companies have adapted to these new uncertainties, price volatility has changed the nature of quoting metal material and systems. "For so many years metal would maybe shift 10 cents in either direction. Now it can shift over $1 a pound in the wrong direction. No one can eat that especially on larger jobs," says O'Malley. Mike Turner, president, commercial business group, YKK AP America Inc., says that quoting has become more "dynamic" recently due to an increase in quote volume. "Raw material volatility, coupled with broader cost pressures across the commercial construction sector, has driven a sharp rise in overall quote department volume," he says. "As total project budgets exceed original estimates, general contractors and project managers are scrutinizing every trade to find savings. This has dramatically increased demand for quote revisions, alternate system options, and value engineering."

Pricing fluctuations can be particularly difficult for subcontractor clients that want to hold pricing for the purpose of their own bids, says John McClatchey, vice president of marketing, Southern Aluminum Finishing (SAF). Metal that the company supplies can have an eight-week lead time and is paid for on arrival at their facility; that means the cost of the material has almost certainly changed in the meantime. The company's solution is conversion pricing for subcontractor customers—setting a base price for clients to purchase and house product at the company's facilities, with a secondary cost, available to their clients, that shifts depending on contemporary market price fluctuations.

While expanded transparency appears to be the best method for metal manufacturers and fabricators to communicate unpredictable pricing with customers, companies are attempting to internally cut operating costs as much as possible. Turner says the company increased the percentage of secondary aluminum used in its billet production to 50% as a "buffer against tariff volatility" and as a way to create "a more resilient, sustainable and cost-stabilized material stream." Representatives for Fairfield Metal, a New Jersey-based metal fabricator, says the company "has taken a hard look at our internal costs to try and rework them and to remain as competitive as we can be in the current market."

The Princeton Plasma Innovation Center, part of Princeton University's Plasma Physics Laboratory, will include new laboratory and office space "as the Laboratory is expanding its research mission and increasing its staff," according to a University news piece. Clover Architectural Products contributed custom two-piece extrusions and the striking orange and yellow sunshades that run both horizontal and perpendicular from the building. Photo by Sven Shockey.



03 —

Future-proofing performance

While the marketplace remains unpredictable, architects and code-making bodies continue to set the bar higher for metal systems performance, and companies are increasingly seeing the convergence of performance aspects in design expectations. "Today's R&D is really about solving several requirements simultaneously. Architects and owners expect better thermal performance, larger openings, greater design flexibility, durability, sustainability and a competitive installed cost," says Tammy Schroeder, director of marketing, Apogee Architectural Metals. Similarly, representatives for Sightline Commercial Systems say that architects still want the transparency and daylighting of glass and metal systems, as well as customization options. "A lot of what we're seeing comes down to balancing performance with design intent. Architects want cleaner sightlines, more transparency, and greater flexibility in how systems are integrated into the building."

As a result of these factors, Apogee's product development timeline has become more holistic, says Schroeder, focusing now "on optimizing the complete building-envelope solution rather than improving a single performance characteristic." Arconic's Ferro also reports that architects are interested in greater multifunctionality of metal systems; while the company used to see demand for systems that had either impact or seismic performance, recently they've had requests for systems that combine those performance factors, she says. Codes are continuing to push performance, she adds, especially in major urban centers such as Boston, Seattle, and New York, which have implemented stretch targets for whole building performance.

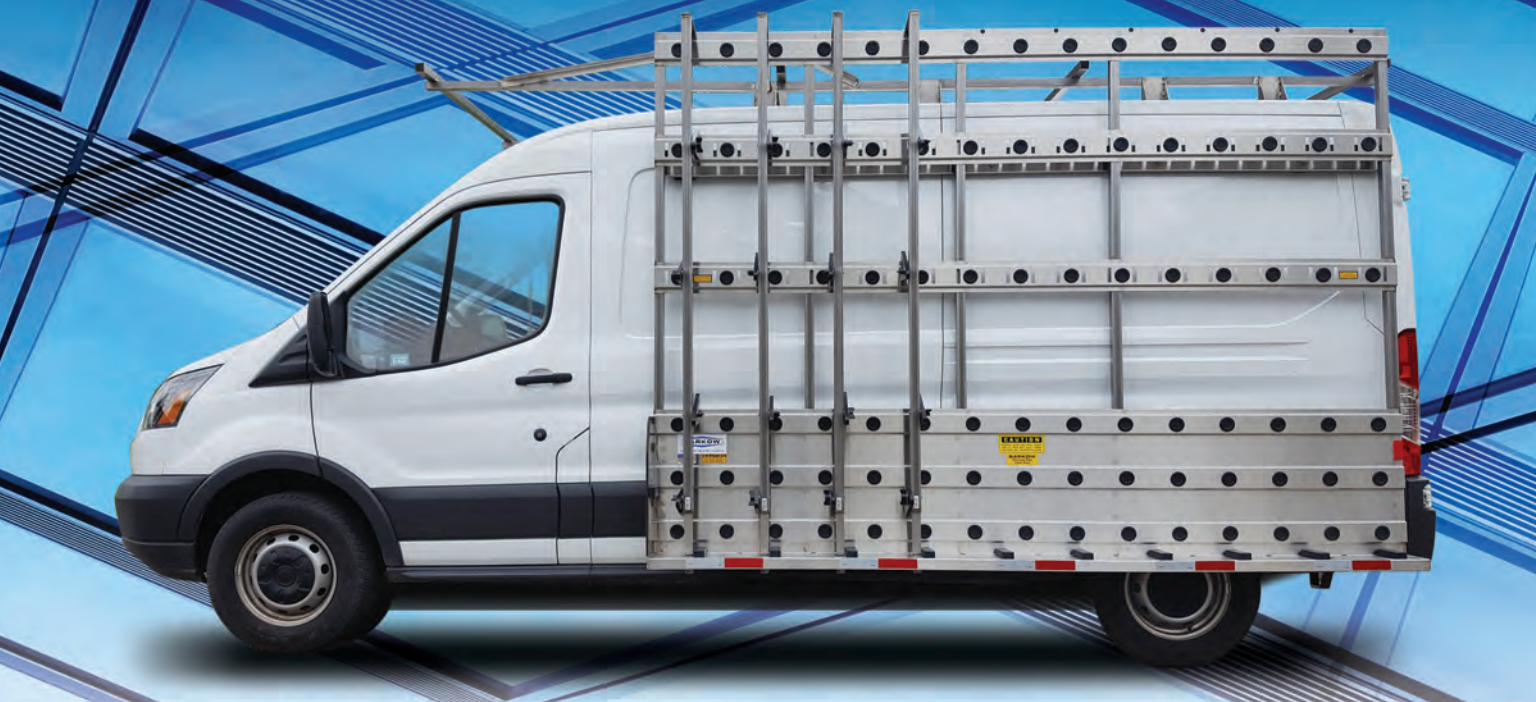
Design interest and updated codes seem to also be converging on a desire for future-proof performance. Oldcastle BuildingEnvelope Director of Product Management Matthew Davis says that IECC and ASHRAE energy code updates are "pushing manufacturers to develop systems that don't just meet today's requirements, but anticipate and meet future changes as well."

Architectural metal technical resources

Find these and further resources online at glass.org and store.fgia-online.org.

- NGA Commercial Fenestration Systems Manual
- NGA Heavy Glass Door Design Manual
- AAMA SFM-1, Aluminum Storefront and Entrance Manual
- AAMA 611, Specification for Anodized Architectural Aluminum

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Sustainability reporting accelerates

Medical University of South Carolina (MUSC) Health recently opened Black River Medical Center as a newly established 63,500-square-foot hospital, expanding essential access to healthcare across this rural region. Greeting patients, staff and visitors as they enter the hospital, the architects specified EFCO curtain wall, storefront and doors to achieve the required high performance, sustainable goals and MUSC's established aesthetic. The curtain wall was engineered as a sweeping, segmented system, giving the appearance of a continuous curving line. Photo by Terry Wieckert, Abstract Photography Inc.



Architects remain interested in reducing the environmental impact of the built environment, according to company leaders, especially through use of environmental product declarations, which document the amount of carbon emissions created to produce a certain product. Frameless Hardware Co.'s Rodriguez says the company sees "accelerated" demand for product-specific EPDs and global warming potential data. "Driven by updated green building standards (such as LEED v5) and municipal decarbonization mandates, architects and owners now routinely require verified carbon metrics during early submittal phases," he says.

Aluminum manufacturing is understood to be one of the largest contributors to carbon emissions from the building sector, says Aluminum Extruders Council Market Development Consultant Lynn Brown. He has worked closely with the Aluminum Extruders Council to create their first industry average EPDs. While these developments allow companies to meet reporting requirements, the process has also helped quantify where in the supply chain carbon emissions happen, Brown says. For aluminum, most emissions happen upstream, during primary manufacturing, before metal fabricators and extruders receive material.

While the federal reporting requirements that began under the Biden administration mostly ended in 2025, the escalation toward greater environmental impact documentation is unlikely to ebb, Brown says. Even after federal agencies ended requirements for low-carbon building products, states and regions have continued to show interest in low-carbon building, as has the design community. "It's not going to be a clean evolution. It's going to be fits and starts, but the pressure is coming up from a variety of different places," he says. Part of the recent evolution of these requirements includes a greater desire for specificity; while in the past, companies could submit industry average data for product types, architects increasingly require individual EPDs to reflect the specific product, and the specific facility where it was produced, he says.

Part of that information can help companies to internally pinpoint where potential changes can be made to reduce emissions, Brown says, including things like changing power sources or implementing more energy-efficient equipment. "Anything you do about increasing your efficiency or your productivity is going to help," he says.

Given the continued interest in capturing carbon footprint data, the Aluminum Extruders Council worked with its members over the last year and a half to create an EPD generator tool, designed to prompt manufacturers for the information needed for an EPD. Beyond helping companies meet sustainability requirements for projects, the tool can also create a way to for manufacturers and fabricators to model scenarios for design teams. For example, manufacturers can show architects data demonstrating differences in environmental impact if low-carbon billet or more recycled material is used, Brown says.

And EPDs are just part of the picture. Clay Wilhoite, project center operations manager at YKK AP America Inc. says that while in the past he's been asked for EPDs for their products, now they're being asked to share health product declarations, LEED information, recycled content and more depending on the project. "There's so much more information and data that we can track and manage now," he says. ■

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HOW PRECONSTRUCTION MAKES PROFIT CLEAR

WHY PRECONSTRUCTION IS BECOMING THE GLAZING INDUSTRY'S MOST IMPORTANT MARGIN PROTECTION TOOL

BY DIANA SAN DIEGO



Kawneer contributed several of its systems to the Wawanesa Mutual Insurance Company headquarters in Winnipeg, Manitoba, Canada. From the project's inception, Kawneer Collaborative worked closely with the glazing contractor, architects and general contractors to provide design assistance and specialized product knowledge. Photo by Tom Arban Photography.

The June AIA/Deltek Architecture Billings Index (ABI) indicated that market conditions remain soft and are still declining, but at a slower pace despite a difficult and uncertain market. On a positive note, project inquiries have remained relatively strong and generally improved over the past two years, indicating that demand is still in the market. In addition, the AIA Consensus Construction Forecast Panel adjusted its 2027 nonresidential spending forecast from 2.2% to 3%, reflecting growing optimism about longer-term market conditions.

What this signals is the challenge in the construction market is not a lack of opportunities, but increased uncertainty and longer timelines with projects moving more slowly as owners weigh budget, financing, and timing concerns. The work is out there, but it's less predictable and taking longer to convert. That uncertainty is driving a broader shift in how architecture firms and building teams are thinking about their business. The focus is no longer just on winning more work, but on making money on the work already secured.

For glazing contractors and glass manufacturers, this is not a new concept. In many ways, the glazing industry has been operating in a reality where early decisions often determine whether a project preserves margin or erodes it. Many in the industry feel that clearer preconstruction collaboration can help protect profit and lead to better project outcomes.

For Troy Hein, program manager at OBE 360 Design Services Group, preconstruction is fundamentally about proactive collaboration and risk mitigation. It requires teams to think beyond drawings and consider how a system will actually be fabricated and installed. "Just because you draw it doesn't mean we can build it," he says, highlighting the persistent gap between design intent and real-world constraints. Whether the issue is constructability, performance, or cost, the root cause is often the same: scope, schedule, and budget were not fully vetted early enough.



Working alongside Bruner/Cott Architects and glazing contractor A&A Window Products, Oldcastle BuildingEnvelope's design-assist team helped deliver innovative glazing solutions — including dual and triple-glazed IGUs and hybrid vacuum insulating glass — engineered to meet rigorous U-factor requirements without compromising the building's iconic mid-century zipper wall aesthetic. Narrow sightlines and strict thermal targets made this a technically demanding project from the start, but the collaborative process allowed the team to adapt solutions in real time and preserve the visual integrity of the original design. The result is a high-performance building envelope that honors what made Gund Hall architecturally significant in the first place.



How the Facade Impacts Profitability

For Matt Kamper, director of preconstruction at Woodbridge Glass, the facade is far more than a cost component: it's also a key driver of project-wide profitability. The facade is one of the few systems that directly influences both the economics and the perception of a building. It shapes marketability for owners, drives design trade-offs for architects, and introduces cost and execution risk for contractors and glazing teams. In Kamper's words, "[Facade decisions] impact costs at every level," reinforcing that early decisions carry outsized financial consequences.

"A specified item might be a fantastic product, but wrong for a project's needs, leading to budget excess and/or unnecessary risk," says Justin Russell, vice president of preconstruction at Enclos. System selection, material choices, tolerances, and sequencing strategies all influence whether a project runs smoothly or becomes a source of friction and cost overruns.

Where Margin Is Lost

Margin loss is rarely the result of a single issue. More often, it begins with early assumptions that fail to fully account for performance requirements or constructability, and compounds later through field conditions and coordination challenges. For Russell, "margin loss catches up in the field." Early input helps refine and support the goals of any project, but "reacting downstream is what erodes margin." In other words, both early decisions and execution determine the outcome. By the time construction begins, many risks are already embedded in the project, with limited ability to recover them. Without proper preconstruction planning, these risks can show up several ways during project execution:

- Facade systems that are over-engineered or misaligned with fabrication capabilities;
- Custom geometries that introduce unnecessary complexity;
- Late-stage material changes that disrupt procurement;
- Poor trade coordination, resulting in cascading Requests for Information and redesign.

By the time these challenges appear on site, they become cost problems, not design problems. Unfortunately, someone in the project chain has to absorb them.

Preconstruction as a Margin Protection Tool

This is where preconstruction shifts from a nice-to-have service to a strategic lever. At its best, preconstruction is not just estimating or budgeting. It functions as a margin protection system for the entire project team:

- Owners and developers gain clearer cost certainty, experience fewer surprises, and enjoy better alignment between design intent and budget;
- Architects benefit from more buildable designs, reduced downstream liability, and stronger fee justification;
- Contractors see fewer change orders, tighter schedules, and improved coordination
- Manufacturers and fabricators achieve more predictable production, less variability, and improved margins.

For glazing subcontractors, preconstruction is where design starts to meet reality. Enclos' Russell describes it as an effort that extends far beyond a single team. "Preconstruction supports all facets of our business ... engaging operations and field personnel helps bring ideas to execution." That integration is what allows early ideas to hold up under real-world conditions. Without it, decisions made during design often fail when they encounter fabrication constraints or field logistics. Firms like Woodbridge Glass and Enclos are brought in early to help translate design intent into systems that can actually be fabricated, coordinated, and installed. This is often through a mix of engineering input, budgeting, and trade coordination.

Glass manufacturers are also formal-

izing this early involvement through design-assist models. OBE 360 Design Services Group functions as a partner that works alongside the project team early to develop glazing solutions that are practical to fabricate and execute. Kawneer Collaborative takes a similar approach, staying engaged with the project team from concept through delivery to help shape facade systems that align with real-world budget and schedule constraints. Rob Huffman, director of sales and sales operations for Kawneer Collaborative/Cranberry, approaches that same equation from a slightly different angle.

"In the preconstruction world, we look in reverse order: budget, schedule, and scope," he explains. Thinking of it in this way ensures the project is properly funded before developing solutions. In many cases, the issue isn't that the project became too expensive, but that the design never matched the available budget in the first place, he says. "Preconstruction takes the project to an awardable condition," he adds, meaning the scope is fully defined, coordinated, and buildable before it goes out to bid. Without that alignment, "scope gap kills." Those gaps don't disappear, but resurface later as cost overruns, delays, and friction across the project team.

Timing Is Everything: The Value of Early Collaboration

If preconstruction is the tool, timing determines its effectiveness. While in many construction processes, stakeholders and trades may complete their work in order, and separately, preconstruction is most effective when stakeholders are engaged early on and work collaboratively throughout.

For glaziers and glass manufacturers, this means instead of waiting to be called to the table, they are collaborating with the architects, owners and general contractors all throughout the process. Armed with information early, the decision becomes informed instead of assumed. This shift allows teams to align on goals upfront, reduce rework, and shape the project instead of reacting to problems later. Timing is particularly critical for the facade. Mechanical and HVAC systems are typically introduced early, and their performance requirements often influence major building decisions before glazing is even part of the discussion. As Kamper notes, "Before the end of schematic design … definitely during design development. At construction documents, sometimes things are way too far down the line."

Yet while HVAC systems operate in the background, the facade is what people see and experience. It is a primary driver of perceived value, and one that is often introduced too late. Earlier involvement from glazing teams allows project partners to balance design and performance, improve budget certainty, and reduce the need for late-stage value engineering, where changes are more disruptive and costly. As Russell puts it, early alignment "limits rework and design decisions that excessively drive up budgets."

Where the Conversation Needs to Go Next

Despite its clear advantages, early engagement of glaziers and glass fabricators continues to face familiar barriers: resistance to upfront costs, concerns about limiting competitive bidding, and a lingering design-bid-build mindset. OBE's Hein reframes the issue as "we're just moving money to the left." In other words, preconstruction is not an added cost, but simply a shift in when that investment occurs, rather than an added-in cost due to failures during preconstruction. "We're going to have to collaborate … let's do it while everybody's in a good mood," he says.

He also highlights a structural gap in the process. Because general contractors typically do not purchase directly from manufacturers, their input is often missing early. The result is a fragmented workflow where information is withheld or siloed rather than shared. "You build trust through the exchange of information, helping them get to where they want to go" says Huffman. Preconstruction is not just about technical coordination. It's also about relationship-building that improves outcomes over time. To bring structure and clarity to preconstruction engagement, Huffman outlines a consistent process: initial consultation, conceptual detailing, preliminary engineering, product samples for visual alignment, and budget validation — followed by a discussion on whether the project warrants a contractual arrangement. "We certainly welcome a commitment," he says, "but understand circumstances may not enable that." The goal is not to force early decisions, but to create a clearer path forward — one where risks are identified early and outcomes are more predictable.

Profit Starts Before the Bid

In an increasingly unpredictable market where architects continue to push the boundaries of facade design and performance, protecting margins has become more complex and more critical than ever. In this environment, margins are no longer protected by reacting to problems in the field. It's protected by preventing them in the first place.

Preconstruction gives building teams and stakeholders the clarity to make better decisions earlier, when changes are still manageable and costs are still controllable. That doesn't mean every project requires a fully engaged preconstruction effort. Simpler, well-defined scopes can still follow a traditional path. But as complexity increases, whether driven by design ambition, performance requirements, or schedule pressure, the value of early engagement becomes harder to ignore. Because in today's environment, profit isn't won at bid day. It's decided long before it. ■



Diana San Diego is co-founder and managing partner of SmartSource AE, where she specializes in building and managing high-performing remote technical teams that help U.S. glass manufacturers, fabricators, and glazing contractors expand capacity, improve efficiency, and reduce costs while maintaining quality.

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01



03



02

01. Quattrolifts
Quattrolifts' Vector 1320 XR comes with a three-stage boom to reach over 196 inches to the center of the vacuum head and up to 239 inches to the top of the top cups. Vector 1320 XR comes standard with powered rotation making glazing at 16 to 20 feet in the air safer and easier. The Vector 1320 XR is fully hydraulic glazing robot. The Vector 1320 XR has a true side shift at the vacuum head and powered rotation allowing for precise movements for installation.
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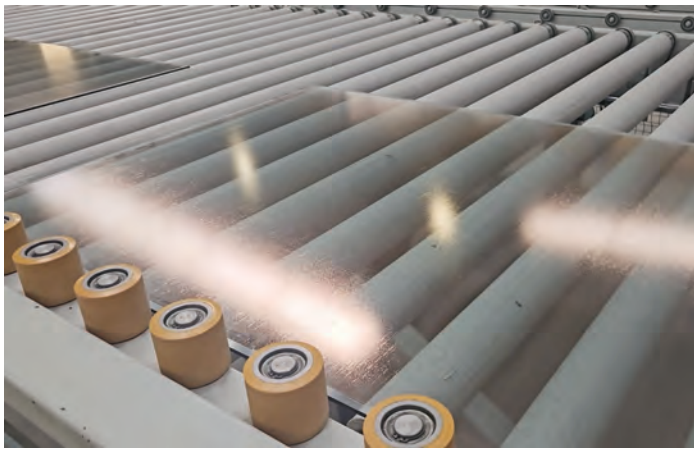
02. Deltarack
Deltarack's new GBR110 range of brush-protected transport racks for insulating glass and flat glass stores glass vertically in individual positions, helping fabricators keep insulating glass units, flat glass, and finished components organized and directly accessible throughout production. Side brushes help protect sensitive glass surfaces, while a grooved HMPE 1000 base provides durable support and positioning during repeated loading and unloading.
440/786-2444 | DELTARACKUSA.COM

03. Wood's Powr-Grip
The Powr-Lift 1600 from Wood's Powr-Grip helps glass installation teams lift heavier, position precisely, and reduce physical strain. This self-propelled vacuum lifting manipulator features a 1,600-pound capacity, 14-foot reach, and 360-degree rotation for handling large glass and windows. It brings controlled lifting and placement to jobsites, including storefronts beneath overhangs and indoor installations.
800/548-7341 | WPG.COM

04



05



06



04. Grabo
Grabo's new Ottovac Digital brings new levels of precision and large-scale lifting capability to trade professionals working with glass panels, stone slabs, tile, and other heavy materials. The digital display is the main upgrade from past product offerings. It shows current pressure readings in either pounds per square inch or bar and gives a real-time estimate of the cup's safe working load in pounds or kilograms. This takes the guesswork out of knowing how much the cup is holding at any moment.

844/430-0510 | GRABO.COM

05. Guardian Glass
Designed to burn off in the fabricator's tempering furnace, Guardian BPC eliminates the need for temporary protective film (TPF) on eligible products. Guardian BPC delivers TPF-like surface protection while reducing material handling and plastic waste. It also enables faster edge deletion, improves furnace cycle times by up to 12%, and helps reduce quality defects associated with handling and film application or removal.

866/482-7374 | GUARDIANGLASS.COM

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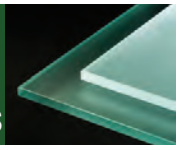
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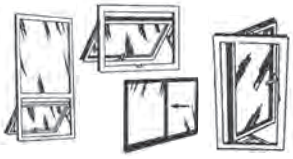
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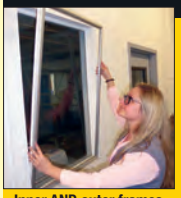
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Tackling perfectionism and paths to leadership



At GlassBuild America 2026, held Sept. 23-25 in Las Vegas, the final keynote ended the week on a strong note with the fifth Women in Glass™ breakfast and keynote address. Barbara Bouza, executive director at Live, Work, Play at CannonDesign, and former President of Walt Disney Imagineering and American Institute of Architects Los Angeles, gave this year's keynote. Syndi Sim, director of sales and business development, Q-Railing, kicked the session off by highlighting the representation of women within NGA's leadership, noting that 80% of the staff and 100% of the senior leadership team are women. She also discussed the success of the California Glass Association Women in Glass chapter, as well as a similar chapter established in Texas.

Bouza's keynote centered on the importance of lifelong curiosity, learning and overcoming perfectionism. Drawing from her experience working for Walt Disney Imagineering, she emphasized that design should tell a story and create human connections. She said that architects and designers alike should always remember that you're designing for the people who will inhabit that space.

"I always want to make sure I'm learning. It's so humbling to be a lifelong learner and to learn something different, especially if you're a leader," says Bouza, discussing how she found a love for playing the piano later in life. "It's a reminder to ourselves to ask, 'why not?' What are we waiting for?" Bouza highlighted historical figures in the architecture realm like Julia Morgan and Norma Sklarek to illustrate the importance of visibility for women and people of color, not only in architecture, but across all industries. She says that when women see other women in positions of leadership, it creates an "I can do that, too" mindset.

During the panel portion of the keynote, Bouza and Sim addressed common barriers to leadership for women, including the misconception that women must be perfect before accepting promotions, the tendency for women to delay leadership opportunities due to feeling "not ready," and the need for intentionality in recruitment and retainment to avoid male-only leadership structures. Bouza, Sim and NGA President and CEO Lakisha A. Woods emphasized the importance to all in the room, men and women, of creating a welcoming environment at work to help retain female talent. It's not simply enough to hire women; leaders need to be intentional about supporting and promoting women within the company and ensuring they have a seat at the table. ■

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