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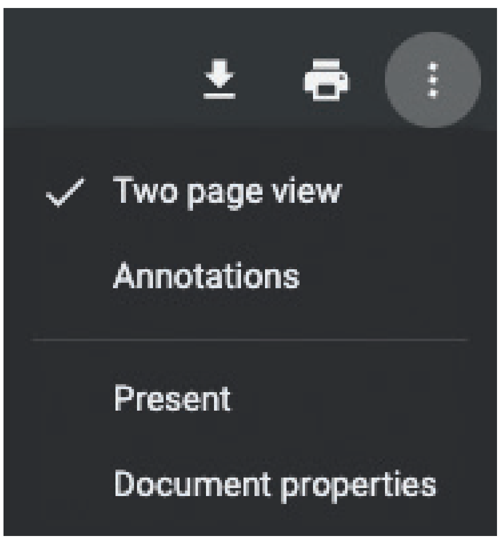

RESIDENTIAL FENESTRATION COVERAGE, FROM SOURCE TO SALE // WINDOWANDDOOR.COM // JANUARY/FEBRUARY 2024

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The Industry Forecast Issue

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Tenured Celebrations

Our employees are our greatest spokespeople for the industry

BY LAURIE COWIN

January marks my five-year anniversary with Window + Door magazine and the National Glass Association. For a Xennial like myself (a microgeneration between Gen Xers and millennials), five years is above-average tenure. For one in the fenestration industry, I'm still a newbie.

I had the opportunity to attend two anniversary celebrations last year for Pittsburgh-area companies. Veka Inc. celebrated its 40th anniversary in North America with celebrations across its North American plants. The final one was a pig roast at its Fombell, Pennsylvania, headquarters in August, which I attended. It was terrific to talk with employees—many of whom have been with the company for 30 years and beyond—and experience the employee-first culture.

Llewellyn Williams, who celebrated 30 years with Veka in December, shared about the camaraderie, constant learning, unity, family-like atmosphere and constant evolution. "Life is about changes and updates," he told me. "The modernization has been awesome. They take ingenuity and put it back in the company to make it better."

In October, I attended Winchester Industries' 40th anniversary celebration in Saltsburg, Pennsylvania. President Michael Sugrue shared the following statistics: 50% of companies go out of business after five years and only 5% of businesses survive more than 30 years.

Winchester beat the odds and, as with Veka, showed me first-hand the leadership, camaraderie and dedication of a team environment in fenestration. Sugrue said that although producing an efficient, secure, quality window was important to founders Robert Weis and George Yuhasz, it was equally important to provide jobs with great benefits. The employee tenure is notable: there are 13 active and three retired employees with 37 to 40 years of service, and a combined 713 years of service among all Winchester employees.

This issue contains the robust annual Industry Pulse report. Many respondents and interviewees discussed the labor challenge, both recruitment and retention. High employee turnover during the early days of employment made the average employee tenure only 6 ½ years. But one of the things I noticed through my local visits, conversations with industry leaders and comments on the survey is once employees engage with the company and all it encompasses, they're often in it for the long haul. It's not unusual to see many employees with decades of history in one company.

The labor challenge likely will continue for years to come, but I've come to realize that once we get people truly invested in this industry and what we do, they're our greatest spokespeople. ■

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IN THE KNOW

News

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Miter Brands to Acquire PGT Innovations

Miter Brands will acquire PGT Innovations. The transaction will be financed in part by an equity investment from KochEquity Development LLC, the principal investment and acquisition arm of Koch Industries Inc., and a current investor in Miter.

PGTI also announced that it has terminated its merger agreement with Masonite International Corp., originally announced in December 2023. This termination follows the Masonite board of directors' decision not to submit a revised offer to acquire PGT Innovations, after being notified that the PGTI Board had determined that a revised proposal from Miter Brands submitted on Jan. 12 was a "superior proposal."

Miter's transaction with PGTI is expected to close by mid-year 2024, subject to PGTI shareholder approval, regulatory approval and customary closing conditions. The definitive merger agreement for Miter to acquire all outstanding shares of PGTI is at a price of $42.00 per share in cash, or an enterprise value of approximately $3.1 billion.

The purchase price represents a premium of 60% over PGTI's unaffected closing share price on Oct. 9, 2023, the last trading day prior to the public disclosure of a proposal for the acquisition of PGTI. The merger agreement has been unanimously approved by the boards of directors of both companies.

Masonite Acquires Fleetwood

Masonite International Corp.'s U.S. subsidiary acquired Fleetwood Aluminum Products LLC for $285 million in cash. Fleetwood is a designer and manufacturer of aluminum-framed glass door and window solutions for luxury homes.

Fleetwood is expected to contribute approximately $150 million of incremental full-year revenue to Masonite in 2024. Masonite plans to operate Fleetwood as an independent business unit within its North American residential business segment.

Masonite also opened a fulfillment center in Mesquite, Texas. The 630,000-square-foot facility combines production and distribution under one roof. This facility is Masonite's second Mesquite location.

Windows, Doors & More Acquires Island Sash & Door

Windows, Doors & More acquired Island Sash & Door, a distributor of luxury fenestration products. Both businesses are based in Washington and will now provide distribution and installation services of windows, doors and related products, catering to the luxury residential construction markets with a focus on new construction and remodeling.

Windows, Doors & More owner Rick Locke is also the majority owner of Montana Sash & Door, with operations in Bozeman, Montana; Kalispell, Montana; Coeur d'Alene, Idaho; and Jackson, Wyoming.

Andersen Introduces Ashley Norton and Baldwin Designer Door Hardware, Begins Construction on New Renewal by Andersen Facility

Andersen is working with two designers to offer a variety of new designer hardware options for doors. Now, 14 new Ashley Norton and Baldwin hardware styles in a variety of finishes will be available, adding to Andersen's existing portfolio of hardware styles.

The new handle sets from Ashley Norton and Baldwin are compatible on all Andersen hinged, entry and folding doors.

Andersen also began construction on the new Renewal by Andersen manufacturing and distribution facility in Locust Grove, Georgia. Renewal by Andersen plans to invest more than $420 million in this facility, which will employ approximately 900 team members when running at full capacity. Construction of the 638,000-square-foot space is expected to be completed in late 2024, with operations expected to begin in 2025.

The new facility will be its first manufacturing facility in Georgia, joining an Andersen Logistics distribution center located in Douglasville and an Andersen Windows office in Marietta. The facility will initially support Renewal by Andersen, with capacity to expand in future years to support additional Andersen enterprise product lines.

Cyncly Opens AI Innovation Center

Cyncly opened its AI Innovation Center, an AI strategy and engineering

resource that will develop and integrate AI solutions across a range of Cyncly products. The Innovation Center aims to add technical expertise and development resources to Cyncly's global team, helping accelerate ongoing programs to make its products smarter and enhance the customer experience through the application of AI techniques. The center, which will apply technologies such as generative AI and machine learning, will work in collaboration with Cyncly's industry experts to leverage insights from the company's global team.

PGT Innovations Establishes Glass Company, Unveils Western Window Systems' Design Studio

PGT Innovations has established Triple Diamond Glass, a PGT Innovations company. Triple Diamond Glass will offer solutions to window and door manufacturers in the areas of energy efficiency, security and sound-abatement applications. The initial products to be produced include Tri-Ultra thin-triple insulating glass units and Diamond Glass laminated glass units. The operations for Triple Diamond Glass will be housed in a facility in Prince George, Virginia.

Western Window Systems, part of the PGT Innovations family of brands, unveiled its architectural design studio in Santa Monica, California. The 2,800-square-foot architectural design studio doubles as a showroom and will serve as an innovation hub and immersive experience for architects, builders, developers, dealers and interior designers. Western Window Systems' industry partners will also be able to use the space as an extension of their own showrooms, and introduce homeowners to more than 18 of the brand's products.

Pella Updates and Expands Showroom and Warehouse

Pella Products of Arkansas and Missouri completed its showroom renovation and warehouse expansion in North Little Rock, Arkansas, which aims to make window and door shopping an easier, more personalized experience.

Pella also completed an expansion of the warehouse space due to what it describes as "unprecedented growth." Over 13,000 square feet have been added onto the original warehouse space built in 1983.

Business Pilot Teams Up with Paradigm for U.S. Market

Business Pilot has integrated with Paradigm Vendo, a home improvement contractor sales app in the U.S. The two digital business and sales management platforms are now integrated via an application programming interface to remove double-entry input and help improve business efficiency.

Customer details, lead information and sales appointments entered into the Business Pilot system are pulled through to the Paradigm Vendo platform ready for quoting and selling jobs virtually or in the home. Quote and sales information from Paradigm Vendo is fed back to Business Pilot where contracts, finance, installation dates, purchase orders and stock can be managed. It also collates live data into personalized dashboards.

LiSEC Opens Engineering Center

LiSEC opened a new engineering center at its Seitenstetten, Austria, site. Around 140 additional workplaces were added to the 21,500-square-foot, four-floor space. Construction work began in April 2022, with more than $7.5 million invested in the construction project.

People

Klein

ODL Inc. promoted *Dave Klein* to president and CEO. Klein has been part of the ODL team for the past eight years, initially joining as chief operating officer. He was promoted to the role of president and COO in 2020. Throughout his tenure, Klein has exhibited an ability to build and lead high-performing teams, driving strategic initiatives that have contributed to the company's growth, say officials.

Daulerio

RiteScreen Company appointed *George Daulerio* as chief financial officer. A member of the executive leadership team reporting directly to CEO Chris Yankowich, Daulerio will oversee finance, accounting and information technology to support the company's growth strategy.

Henderson

PGT Innovations appointed *Craig Henderson* as senior vice president and chief financial officer. As CFO, Henderson will lead the company's finance strategy, budgeting and planning, accounting, financial reporting, and investor relations functions. Henderson joined PGTI in 2021 as vice president of finance and has served as interim CFO since February 2023.

Faure

Cyncly appointed *Julien Faure* as its chief product officer. In his capacity as CPO, Faure will support Cyncly's product management, strategy and design efforts as the company continues to grow its customer base and solution portfolio. Faure will lead Cyncly's product team

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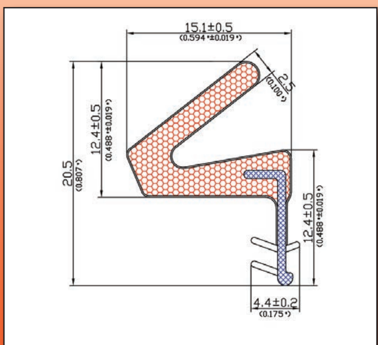

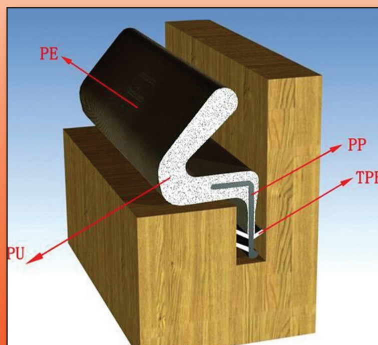

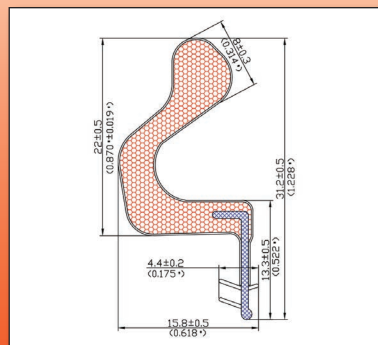

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to design and execute a robust product strategy that brings to market the products customers in the spaces-for-living industry need, say officials.


Schmidt

Marvin announced the election of new member *Norb Schmidt* to its board of directors. Schmidt is regional president and senior vice president of global operations for Kohler Co.

Kolbe Windows & Doors promoted Bryan Kujawa to vice president of sales. Kujawa fills the role of Bob Kasten, who recently retired from Kolbe after 25 years with the company and 22 years as vice president of sales. Kujawa's responsibilities include leading the sales and customer support teams, driving revenue growth, and aligning strategies with Kolbe's overall mission.

YKK AP America Inc. promoted *Jennifer Smith* to architectural sales representative serving the Atlanta, Georgia, region. Smith will be responsible for building long-term customer relationships with commercial architects, glazing contractors and building project teams. Smith first joined YKK AP America in 2005. During her tenure, she has been successful in both estimating and customer service positions. Most recently, Smith served as senior customer service administrator for the Atlanta branch.


Pocock

GED Integrated Solutions appointed *Derrick Pocock* as marketing and communications coordinator, where he will create various materials and implement solutions for GED within the design and marketing field.

Pocock's previous experience includes helping build branding strategies and aiding in the creation of business and design work.

In Memoriam


Howes

Steve Howes, one of the founders of **Glasslam**, passed away. Howes started in the fenestration industry with a window company, followed by a decorative glass company. He brought the sales division to the U.S. in 1984.

"Steve's dedication, passion and innovative spirit were second to none," say company leaders. "He constantly aimed to revolutionize the glass industry. Steve's legacy is an indelible mark on the glass industry, with our company standing as a testament to his efforts and visionary leadership." ■

The Current State of Energy Star

The overall energy trend for the architectural glass industry is increased stringency moving toward net-zero

BY GEORGIA SCALFANO

The U.S. Environmental Protection Agency officially finalized the Energy Star Version 7.0 Specification for Residential Windows, Doors and Skylights on Oct. 20, 2022. The updated criteria became effective on Oct. 23, 2023, following a collaborative effort between the EPA, the U.S. Department of Energy and the Lawrence Berkeley National Laboratory over the past four years. This joint initiative focused on modeling the energy characteristics of a diverse range of high-performing windows under various operational conditions.

In the residential glass industry, the Energy Star program has traditionally played a significant role in promoting energy-efficient windows and doors, both critical components of building envelopes, influencing energy consumption and occupant comfort. Energy Star-rated products typically feature advanced technologies, such as low-emissivity coatings and improved framing materials, to enhance thermal performance and reduce heat transfer. Version 7.0 incorporates more stringent requirements and updated technologies to reflect advancements in energy efficiency. These requirements continue to focus on U-factor and solar heat gain coefficient, or SHGC, but update the climate zones to better reflect the International Energy Conservation Code and our changing climate. The four distinct climate zones are as follows:

Northern

The Northern zone is a heating-dominated climate driven by U-factor performance and, if possible, higher SHGC, which allows the sun to help offset winter heating costs. Products are guided by best thermal performance, or a U-factor of 0.22 or lower, and with an SHGC greater than or equal to 0.17. Low-e coatings may be specified for the third surface to increase the SHGC; in the coldest regions, a surface four coating or triple glazing may be specified to further improve thermal performance.

Quick Look

ENERGY EFFICIENCY REQUIREMENTS FOR

Windows

Climate Zone	U-Factor	SHGC
Northern	≤ 0.22	≥ 0.17
North-Central	≤ 0.25	≤ 0.40
South-Central	≤ 0.28	≤ 0.23
Southern	≤ 0.32	≤ 0.23

Doors

<table>
<tr><th>Glazing Level</th><th>U-Factor</th><th>SHGC</th></tr>
<tr><td>Opaque</td><td>≤ 0.17</td><td>No Rating</td></tr>
<tr><td>≤ ½-Lite</td><td>≤ 0.23</td><td>≤ 0.23</td></tr>
<tr><td rowspan="2">> ½-Lite</td><td>≤ 0.25</td><td>Northern and North-Central ≤ 0.40</td></tr>
<tr><td>≤ 0.28</td><td>South-Central and Southern ≤ 0.23</td></tr>
</table>

Skylights

<table>
<tr><th>Climate Zone</th><th>U-Factor</th><th>SHGC</th></tr>
<tr><td>Northern</td><td>≤ 0.45</td><td>Any</td></tr>
<tr><td>North-Central</td><td rowspan="3">≤ 0.50</td><td rowspan="3">≤ 0.25</td></tr>
<tr><td>South-Central</td></tr>
<tr><td>Southern</td></tr>
</table>


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To increase design options for manufacturers to comply, Energy Star Version 7.0 also provides equivalent energy performance alternatives for windows that allow the U-factor to be increased from 0.22 up to 0.23-0.24 when combined with a higher SHGC of 0.35 or greater, or a U-factor of up to 0.25-0.26 when combined with an SHGC over 4.0.

North-Central
The North-Central zone is a region that includes both heating and cooling loads, so it is not wholly dependent on the U-factor or SGHC. Generally, a U-factor of 0.25 or less and an SHGC of 0.40 or less is required.

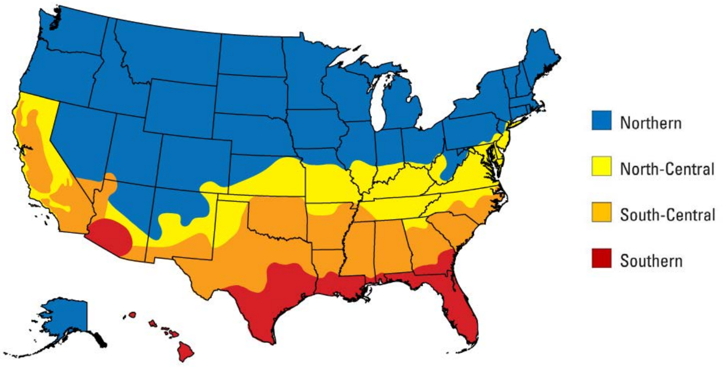
South-Central
The South-Central zone is another region that includes both heating and cooling loads (mainly cooling), so both U-factor and SGHC are important, but a low SHGC plays a more critical role. Generally, a U-factor of 0.28 or less and an SHGC of 0.23 or less is required.

Southern
The Southern zone is a cooling-dominated climate driven by SHGC requirements. A low SHGC is required at 0.23 or less, and the U-factor is not dominant, with a requirement of 0.32 or lower. Low SHGC may mean sacrificing visible light transmission, but solar-selective, low-e coated glass can be selected to maximize light transmission. In some cases, lower levels of light transmission may also be desirable to reduce glare in a building.

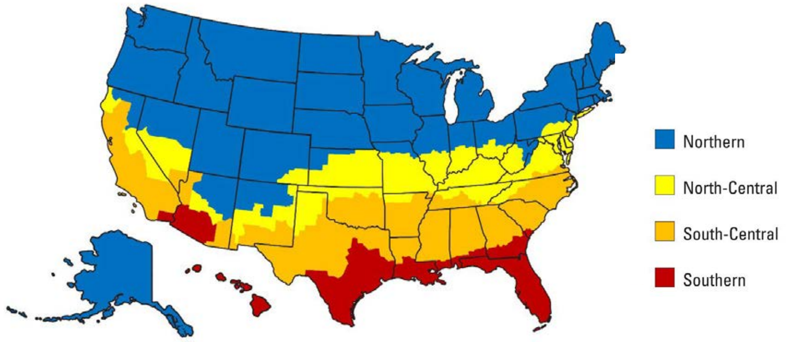
Overall Energy Trends
With these requirements, low-e coatings are now required across all climate zones, either to help meet the low SGHC requirements in the Southern zones or to help meet the low U-factor requirements in the Northern zones.

The overall energy trend for the architectural glass industry is increased stringency moving toward net-zero. Energy Star Version 7.0 is not the only standard requiring a reduction in U-factors and SHGC; both the IECC and ASHRAE 90.1 standard now have goals to achieve net-zero energy consumption by 2031, which means increased energy-efficiency requirements and renewable energy requirements. ■

Current climate zones



New climate zones



Energy Star Version 7.0 will change zones to match the IECC and reflect changing climate patterns. McDowell says the EPA made this change to align itself more closely and create continuity with the IECC.

Low-e coatings are now required across all climate zones.

Georgia Scalfano is technical services sustainability manager for the National Glass Association. She oversees NGA's efforts in sustainability for the glass and glazing industry, and serves as the association's liaison to related government and industry standards development organizations for sustainability issues.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New technology that meets the stringent Energy Star Version 7 guidelines will make glass a hot commodity, keeping home temperatures more regulated and earning homeowners substantial rebates and incentives.

Windows of Opportunity for 2024

From innovation and market demand to labor and materials, the new year looks promising for the fenestration market

BY JEFF JACKSON

With interest rates on the rise, the uncertainty of an election year looming and a rocky lending environment, it may seem like 2024 is not off to a great start; however, in the fenestration market, there is a window of opportunity for growth. From innovation and market demand to labor and materials, the new year looks promising for the window and door industry.

Innovation and trends

Let's start with innovation. The window and door industry is on the cusp of several new technological updates with the potential to revolutionize customer experiences. For example, integrating new glass technology for all the openings in a home will make windows and doors an essential, more viable part of residences nationwide in terms of energy efficiency, safety and even energy generation.

New technology that meets the stringent Energy Star Version 7 guidelines will make glass a hot commodity, keeping home temperatures more regulated and earning homeowners substantial rebates and incentives. Larger sizes and more glass in modern homes will continue to dominate window and door trends, with some residential customers considering commercial products in their homes for aesthetic purposes.

Market demand

For those with the infrastructure and ability to serve a larger audience, market demand will continue to increase modestly in the fenestration industry. Overall, new construction is down about 22%, with the renovation and remodel market down 8% to 9%. From a growth standpoint, expect a flat market; however, those companies with multiple product lines and a solid infrastructure will remain stable.

In the Florida condominium market, 2022 legislation requiring associations to fund repairs to ensure the structural integrity of older buildings will have ramifications in 2024 and beyond. Lighter glass technologies will be a good fit for these renovations as they relieve building joint stress. Products that offer additional benefits, such as impact resistance or energy efficiency, coupled with lighter weight, will be a great alternative for these renovations. This will dramatically increase the


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demand for innovative glass options over the next few years.

Workforce development

The job market is still solid, and the labor market is good; however, companies must continue various efforts to attract and retain talented, skilled workers. While unemployment is still low, some dealers and distributors continue to experience challenges in hiring skilled labor. Installers, machine operators, technicians and truck drivers are still in high demand. Many manufacturing companies in the industry are now turning to robust apprenticeship programs and student outreach to build career pipelines.

Materials and costs

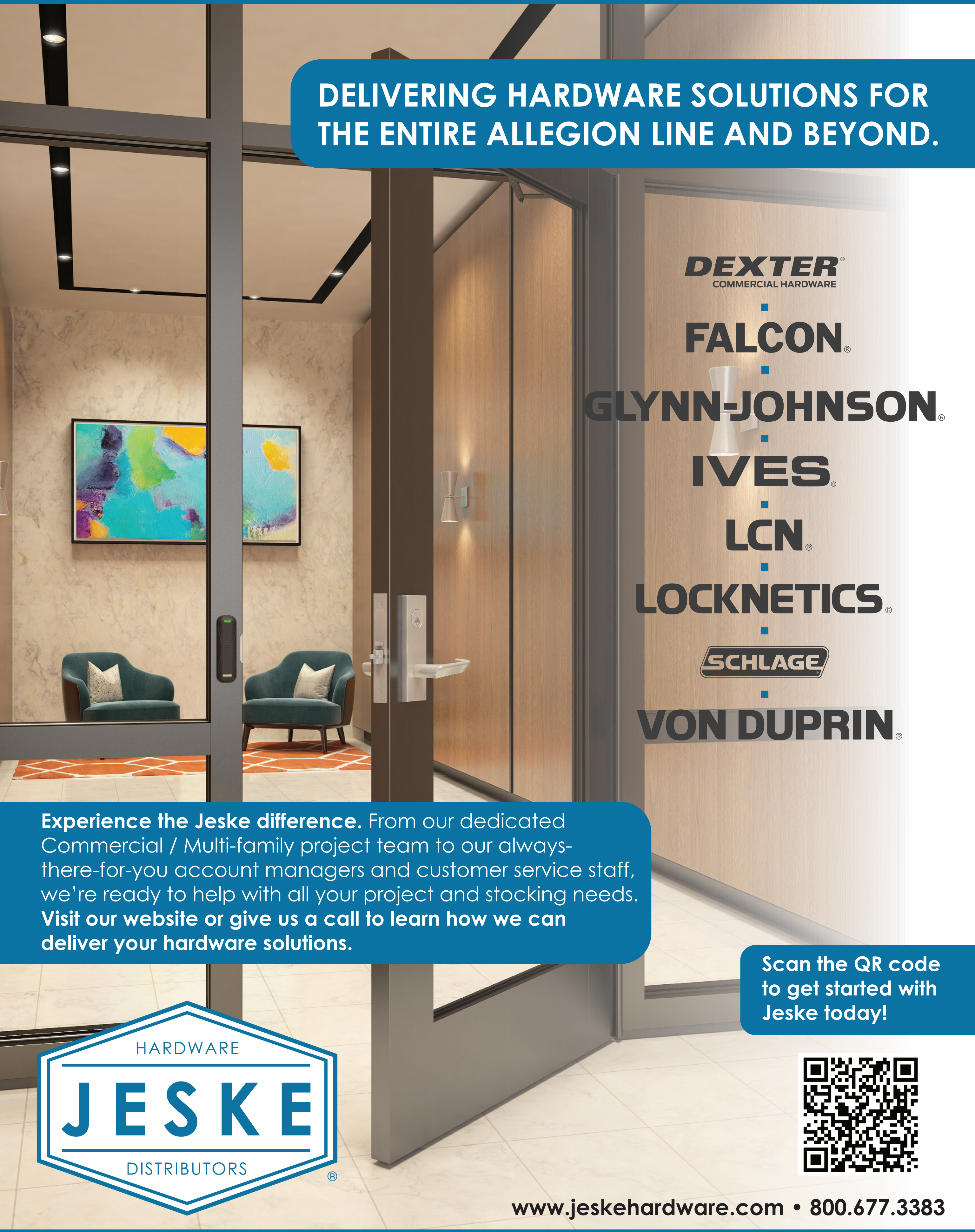
Regarding materials in the new year, the biggest change involves aluminum. In 2023, the U.S. Department of Commerce and the U.S. Trade Commission enacted anti-dumping duties on imports of aluminum extrusions. This will drive aluminum costs higher as companies move sources inshore and increase domestic demand tremendously.

Mergers and acquisitions

Finally, the fenestration industry is ripe for consolidation. With many smaller firms in the marketplace, keeping up with the innovation and technology investments ahead may be challenging. Integrating state-of-the-art technology is expensive, and without big purchasing power, it will be difficult for smaller players to compete on price, especially in a challenging environment.

Despite the hurdles many organizations will face in 2024, I'm confident that the window and door industry is poised for a strong year. Overall, the outlook for the fenestration market is positive, and companies in this industry are well-positioned to capitalize on the opportunities ahead. ■

Jeff Jackson is the president and CEO of PGT Innovations. He has been with the company since 2005.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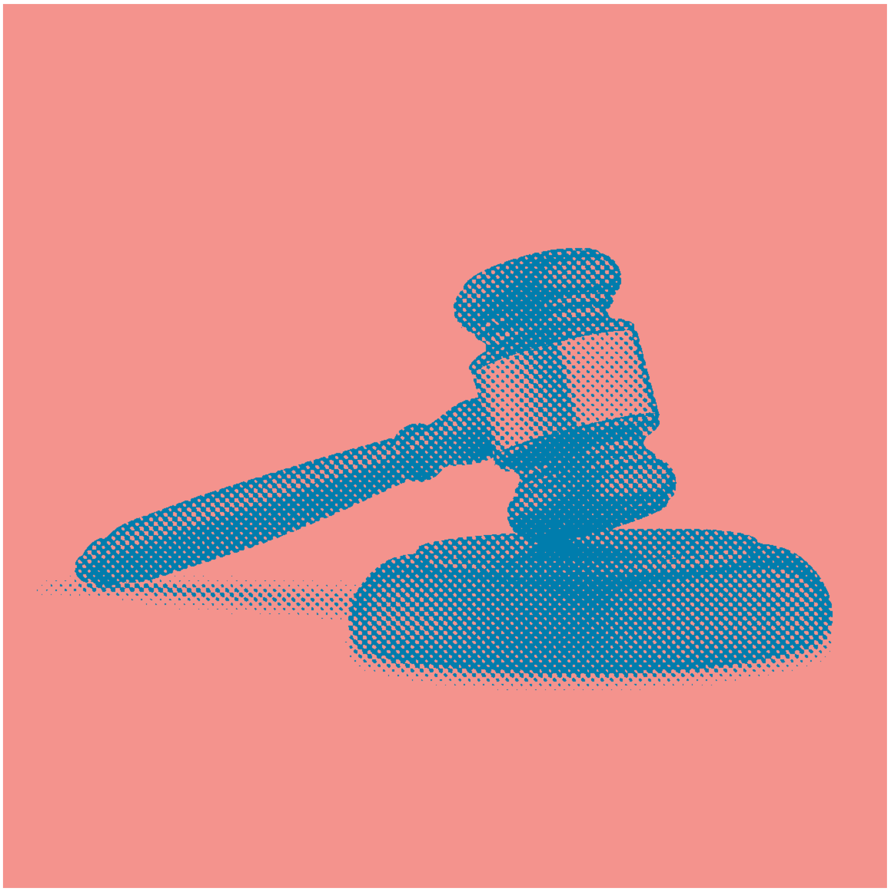

Responding to Administrative Agency Subpoenas

Establishing a process enables a well-prepared response, the basis for an effective defense

BY JOHN NOLAN

A legal demand to compel production of information, documents or testimony, subpoenas are commonly used to obtain information and evidence from a non-party in an ongoing court matter. Beyond the courts, however, administrative agencies in federal and state systems often have the authorization to issue administrative agency subpoenas outside traditional civil or criminal proceedings as part of an investigation into an event or practice of a business. These subpoenas are increasing and warrant attention.

Court review of agency subpoena authority

Administrative subpoenas are generally enforced and challenged in court. Current court precedent views agencies as having very broad authority to subpoena. Judges and courts can differ, however, in their review of a subpoena's scope.

> **Having an action plan, protocol and procedure in place to address, in a timely and efficient manner, the demands being made from a subpoena helps conserve immediate resources.**

In considering the enforcement of a subpoena, a judge may rely on well-established federal case law, which holds that when asked to enforce an administrative subpoena a court should look to:

1. Whether Congress granted authority to investigate;
2. Whether procedural requirements have been followed;
3. Whether the evidence is relevant and material to the investigation; and
4. Whether the request is not unreasonably broad or unduly burdensome.

Like the federal courts, most state courts follow the same analysis in evaluating state agency subpoena enforcement. And these more local decisions also demonstrate differing views of how broadly the allowable scope of agency subpoenas for an investigation can go. When pushed, subpoenaing agencies seek court "confirmation" of their authority to seek the information requested, as opposed to permission. Therefore, given the wide scope of what an agency is permitted to seek, the question becomes what to do when faced with an investigative subpoena from a governmental agency.

Considerations

Establish a plan. Having an action plan, protocol and procedure in place to address, in a timely and efficient manner, the demands being made from a subpoena helps conserve immediate resources. Complying with a subpoena

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requires significant time and effort. The costs increase without an organized and efficient process in place—worked through with counsel—to anticipate and respond to any subpoena.

Timing is everything. Subpoenas have a "return date" or compliance date, chosen by the agency and perhaps dictated by the agency's procedural rules. The time to respond can be capped at 30 days, the deadline should be identified and calendared, and assume that the response deadline will be enforceable. If an extension is necessary, consider reaching out to the agency in writing sooner rather than later.

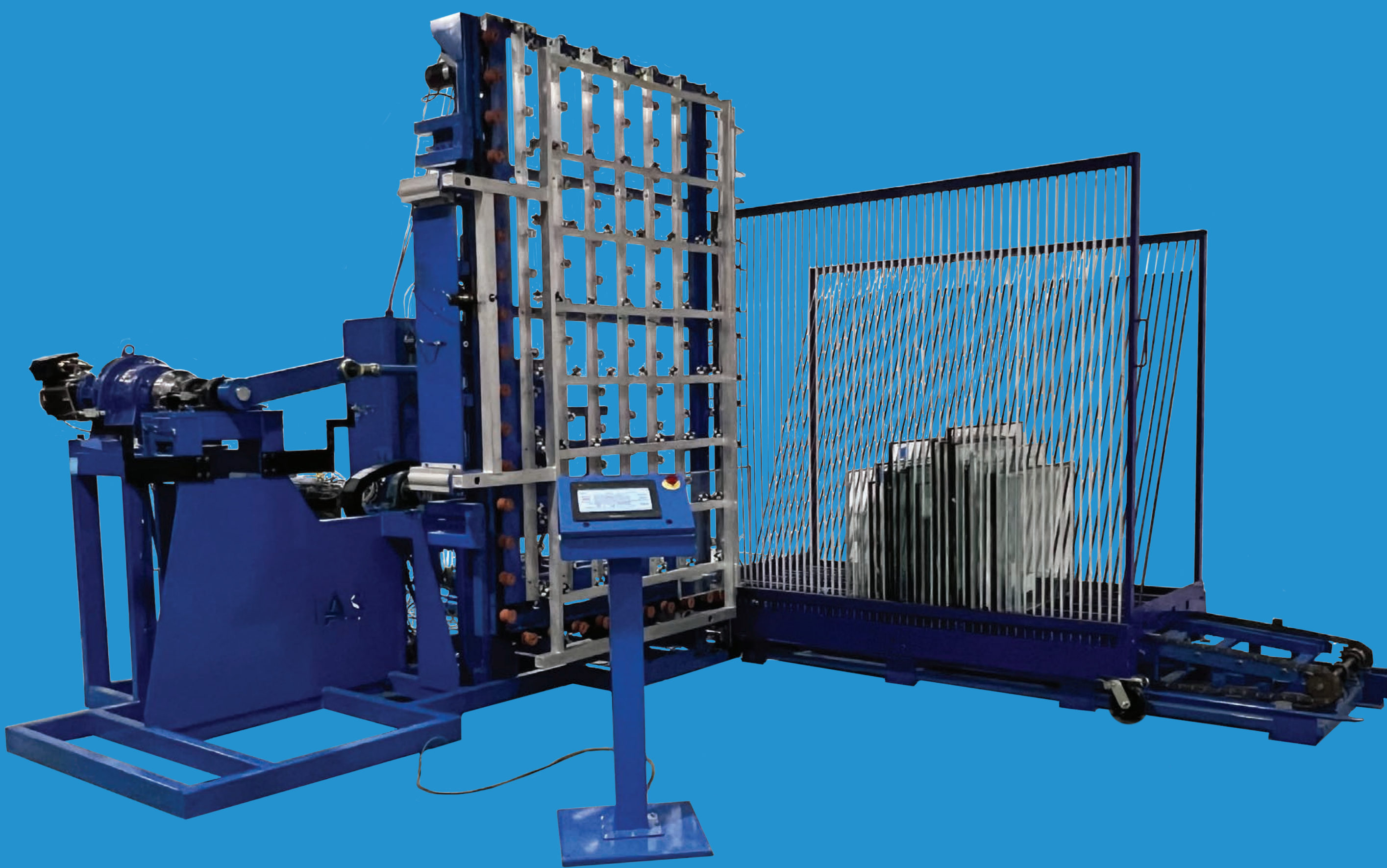
Notice to team members, notice to preserve. Immediate thought should be given to which organization members need to know about the subpoena, and begin working toward compliance. Quickly identify who oversees the information within each of the requests, and who supervises the team members, to establish specific lines of communication. Also consider whether proprietary information or trade secrets are within the scope of the request; their identification can assist a later objection to the request or help develop disclosure parameters to maintain their confidentiality.

Contact legal counsel. Counsel should be contacted early so they can direct and control the subpoena response. The initial work of identification and location of documents will assist counsel in its efforts to challenge or comply with the request. Without the direction of counsel, the initial work may fall outside the protections available from an attorney-client communications privilege. Information and communications created during the initial subpoena response effort may become "discoverable" if the investigation proceeds further.

Reasonableness. If court enforcement is sought, courts are generally less likely to punish a party that has conducted itself reasonably and in good faith. The efforts made early in the process of responding to an agency subpoena can help establish a defense to claims by an agency that its authority was ignored.

An agency subpoena may be the first notification to a business of an agency investigation. Establishing a process to effectively address such requests will enable a well-prepared response, which may also provide the basis for an effective defense of the alleged conduct being investigated. An effective response process helps all team members, including counsel, to establish a solid basis to respond. ■

John Nolan is an attorney with The Gary Law Group, a law firm based in Portland, Oregon, that focuses on legal issues facing manufacturers of windows and doors.



Resources for Glass and Glazing, and Fenestration Professionals

The National Glass Association offers Glass Technical Papers (GTPs) free for the industry on a wide range of topics pertaining to the commercial/residential glass and residential window and door industries. GTPs are developed by NGA's dedicated member volunteers and subject matter experts. Below is a list of all GTP titles available.

All GTPs are free to download in NGA's online store

FB01-00 (2020) Proper Procedures for Cleaning Architectural Glass Products*

FB02-02 (2018) Heat-Treated Glass Surfaces Are Different*

FB03-03 (2023) Construction Site Protection and Maintenance of Architectural Glass*

FB04-03 (2021) Design Considerations for Laminated Glazing Applications

FB05-04 (2017) Emergency Egress through Laminated Glazing Materials

FB06-05 (2019) Proper Procedures for Cleaning Flat Glass Mirrors

FB07-05 (2019) Point Supported Glazing

FB09-06 (2023) Suggested Procedures for Dealing with Broken Glass

FB10-06 (2023) Skylights and Sloped Glazing Are Not Walking Surfaces

FB11-06 (2022) Marking and Labeling of Architectural Glass

FB12-07 (2023) Blast-Resistant Glazing

FB13-07 (2018) The Importance of Fabrication Prior to Heat Treatment

FB14-07 (2020) Glass Floors and Stairs

FB15-07 (2022) Describing Architectural Glass Constructions

FB16-07 (2022) Bullet-Resistant Glazing

FB17-08 (2019) Glossary of Terms for Color and Appearance

FB18-08 (2023) Methods for Measuring Distortion

FB19-08 (2020) Guidelines for Handling and Cleaning Decorative Glass

FB20-08 (2022) Iridescence in Heat-Treated Architectural Glass

FB21-09 (2021) Installation Techniques Designed to Prolong the Life of Flat Glass Mirrors

FB22-09 (2019) Proper Procedures for Fabrication of Flat Glass Mirrors

FB23-09 (2019) Approximate Weight of Interlayer Used in Laminated Architectural Flat Glass

FB24-09 (2019) Hurricane Product Substitution

FB25-09 (2017) Performance Criteria for Glazing Subjected to Seismic Events

FB26-10 (2022) Detention Facility Glazing

FB27-11 (2015) Guidelines for the Appearance of Insulating Glass Unit Edges in Commercial Applications

FB28-11 (2022) Assessing the Compatibility of Glazing Materials and Components

FB29-11 Fire-Rated Glazing Changes in the 2012 International Building Code

FB30-11 (2019) Proper Procedures for Receiving, Storage and Transportation of Flat Glass Mirrors

FB31-11 (2019) LEED® White Paper—Mirror

FB32-11 (2018) Dynamic Glazing for High Performance Buildings

FB33-11 (2023) Glass Use in Guardrails

FB34-12 (2023) Screening Out UV Radiation with Laminated Glass

FB35-12 (2020) Bird-Friendly Glass Design Strategies

FB36-12 (2019) Coastal Glazing and the Turtle Codes

FB37-12 (2019) Laminated Glass Use in Furniture

FB38-14 (2021) The Recyclability and Reusability of Glass Products

FB39-14 (2019) Glass Properties Pertaining to Photovoltaic Applications

FB40-14 (2021) Recyclability of Architectural Glass Products

FB41-14 (2019) Design Considerations for Use of Sealants/Adhesives with Coated Glass

FB42-14 (2019) Decorative Glass Strength Properties

FB43-14 (2020) Security Glazing

FB44-14 (2019) Assessing the Durability of Decorative Glass

FB45-14 (2019) Recommended Applications for Heat-Treated Architectural Glass

FB46-15 (2022) Assessment of the Weatherability and Durability of Decorative Glass

FB47-15 (2021) Considerations When Installing Interior-Mounted Back-Painted Glass

FB48-15 (2020) Effects of Moisture, Solvents and Other Substances on Laminated Glazing Edges

FB49-17 (2022) Performance Improvements of IGUs

FB50-17 (2022) Building Energy Performance

FB51-17 (2022) Building Envelope Commissioning

FB52-17 (2022) Guidelines for the Production of Heat-Treated Architectural Flat Glass

FB53-17 Benefits of Decorative Glass in Daylighting Applications

FB54-17 (2022) Guidelines and Best Practices on How to Manage Color Variance of Decorative Glazing

FB55-17 LEED® White Paper—Decorative

FB56-18 Heat Soak Testing

FB57-18 One Optical Number Does Not Fit All

FB58-18 (2023) Understanding Reflective Distortion in Mirror Installations

FB59-18 Heat-Treated Laminated Glass Exposed Edges

FB60-18 (2023) Understanding Reflected Solar Energy of Glazing Systems in Buildings

FB61-19 Tornado-Resistant Glazing

FB62-19 Mitigating Thermal Stress Breakage in Heat-Treated Spandrel Glass

FB63-19 Products for Energy Applications

FB65-20 Glass for Personal Protective Barriers

FB66-20 Introduction to Vacuum Insulating Glazing

FB67-20 Guidelines on How to View Decorative Glazing Products in Interior and Exterior Applications

FB68-20 Guidelines for Measuring Color of Decorative Glazing Materials in the Field

FB70-20 Best Practices for Installed Painted Decorative Glass

FB71-21 School Security Glazing

FB72-21 Introduction to Hybrid VIG Fabrication

FB73-22 Types of Decorative Glass

FB74-22 Alignment in US Energy Conservation Codes ASHRAE 90.1 and IECC

FB75-23 Compatibility Testing of Insulating Glass PIB Primary Sealant with Respect to Glazing Materials

FB76-23 Fire-Rated Glazing 101

FM01-08 (2020) Approximate Weight of Architectural Flat Glass

FM02-07 (2017) Flat Glass Industry Standards

FM02-09 (2020) Protecting Glass Against Weld Splatter

FM03-10 (2023) LEED® Recycled Content for Glass

FM04-12 (2019) Daylighting

FM05-12 (2023) Physical and Mechanical Properties of Typical Soda Lime Float Glass

FM06-20 General EPD Education

FM07-21 Flat Glass Environmental Transparency Documents

IN01-06 (2020) The Top 10 Items Commonly Missing from Fenestration System Shop Drawings

IN02-09 (2022) Bid Considerations for Contract Glazing Proposals

IN03-12 (2023) Key Elements of Fenestration System Shop Drawings

IN04-14 (2020) Safety Guidelines for Deglazing Structural Silicone

IN05-17 (2022) Overview of Building Information Modeling (BIM) for Glass and Glazing Systems

TB-1601-95(14) Guidelines for Use of Capillary Tubes

TB-1250-19 PIB Primary Sealant

*Also available in Spanish.

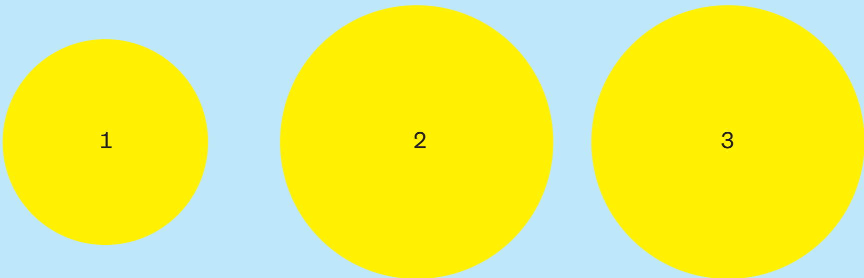
The past five years have been a wild ride. Extreme demand rocked the industry. Supply chain complications strained companies as they raced to acquire enough materials in a timely manner, for which they often paid premium prices. Labor shortages continue.

And yet, we persevere.

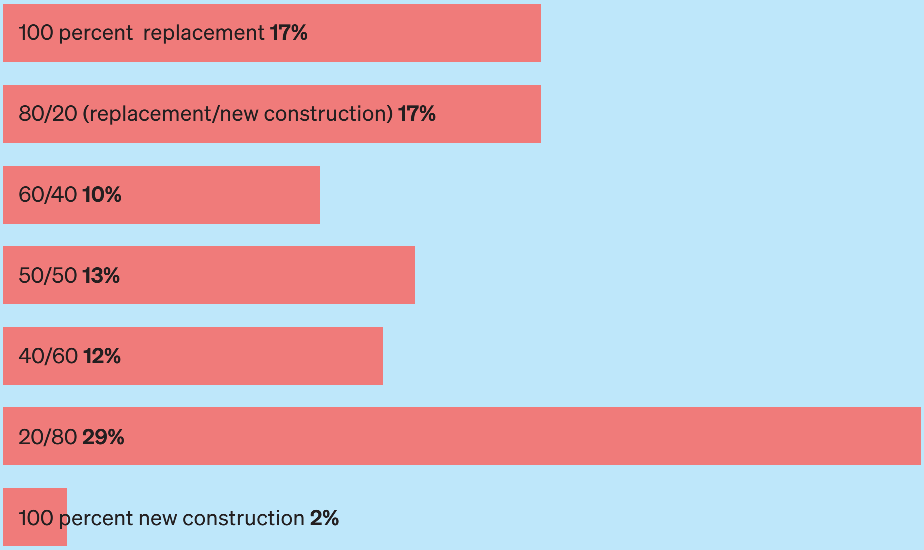
Despite a predicted economic recession, residential fenestration companies predict stable sales and plan to invest in their businesses. **By Laurie Cowin**

Meet This Year's Respondents

1. Supplier **22%**
2. Manufacturer **39%**
3. Dealer **39%**



Replacement vs. new construction in 2023



This year's Industry Pulse report indicates that supply chain and material woes have largely abated. Labor has reclaimed its top spot as a primary business challenge. Many have responded by investing in automation to free up available labor for more value-added tasks.

Products continue to evolve and get smarter, alongside the rest of the home. Whether through energy efficiency, smart features, customization options or more, manufacturers continue to deliver cutting-edge products that meet today's demands.

In addition to the survey Window + Door conducts each year for this report, this year's Industry Pulse also incorporates research data from the Window & Door Market Survey, the result of an exclusive partnership between Window + Door and John Burns Research and Consulting.

The following 10 pages examine each part of the window and door market from source to sale—its successes, its opportunities, where it's been, where it's going and more.

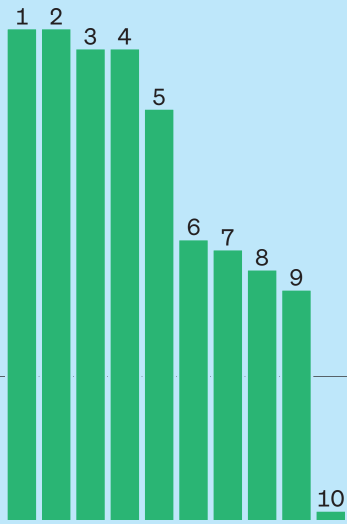
Challenges

— Interest rates
— Mortgage rates
— Hiring and retaining employees
— Production space
— Production efficiency
— Installers
— Competition
— Pricing
— Adding innovation
— Retirement
— Inflation and the economy
— Training
— New sales channels and leads
— Business partners

Opportunities

— Remodeling market
— Historical buildings
— Sales relationships
— Product innovation
— Dealer partnerships
— Productivity improvements
— Improved training and employee retention
— Gaining market share
— Software implementation
— Energy efficiency
— Labor growth

Investments, initiatives, innovation



Where do you plan to focus your investments in 2024?

1. Expand production capacity **49%**
2. Marketing **49%**
3. Training and education **47%**
4. Employee recruiting and retention **47%**
5. Machinery purchases/upgrades **41%**
6. Business management software **28%**
7. R&D and testing **27%**
8. Software integration **25%**
9. Expand locations **23%**
10. Lean manufacturing **1%**

● Today's corporate culture encompasses more than the business itself. Many companies prioritize being good stewards of the environment and the communities in which they operate. "It's very critical; it's part of our mission and values commitment," reports one survey respondent. Another notes, "We try to support things our employees believe in. It's actually a retention tool."

Dan Gray, director of sales, North America, Roto Frank of America Inc., shares that Roto is working on a five-year growth plan spanning through 2028. He anticipates it will "significantly" enhance the company's footprint in North America and that "all eyes are open on all different directions where we can purchase other companies or create partnerships to enhance the overall footprint."

The fenestration market is filled with merger and acquisition news, most recently the news about Miter Brands entering an agreement to acquire PGT Innovations for $3.1 billion. Other news of the past year includes Pella's acquisition of Lawson Industries, AmesburyTruth acquiring Lawrence Industries, ProVia acquiring Premier Profile Lamination, and more. (See all merger and acquisition news on WindowandDoor.com.)

Quanex acquired LMI Custom Mixing in November 2022, which Jim Nixon, VP of innovation new markets, Quanex, says helped further the company's goal to further diversity itself as a manufacturing company and enter new markets. "Innovation is a key theme to become a larger organization," he explains.

Acquisitions present a two-way street for both companies to learn from each other. For example, Nixon shares that strategic discussions demonstrate Quanex's willingness to grow, reinvest, and add capacity and technology to stay ahead of the competition. Organic and inorganic growth opportunities are all on the table moving forward.

The LMI acquisition had existing synergies with Quanex, but also introduced the company to new markets. "They [LMI], now Quanex Custom Mixing (QCM), do different things with the same raw materials," says Sean Hummel, director of research and development at Quanex. "I get to analyze QCM, what they're doing and why, and Jim gets to analyze Quanex R&D, understand what we're doing and why. It helps us broaden our footprint and understanding with the fundamental goal of going out there and finding new things that fit into the core competencies we already have.

"For our future, we also found it necessary to understand what we do at the heart of Quanex and what else we could be doing," he says.

Another way to grow is to look inward. Hummel says the company has examined itself over the past couple of years and had a revelation that Quanex is not a window and door company, but rather a manufacturing company that does a lot in the window and door space. Technologies that define their core competencies include extruding, roll forming, formulating and others. "It became clear that to expand, you can't keep growing as a window and door company," he says. "We've been strengthening our core competencies, broadening our footprint and thus developing more core competencies. It opens up thoughts you didn't have before; it's a vision."

Roto acquired Ultrafab in 2022, and there are five North American manufacturing facilities between the two companies. Gray says this is especially important as one of COVID's legacies is companies sharing their business with multiple suppliers and seeking locally made products. "That presents a huge upside for us to acquire some new business, especially given the local manufacturing of our products," he says. "It seems like the false gains over the pandemic have brought us back to about 2019 volume levels," he estimates. "That's why we focus so heavily on new business acquisition; that's what will sustain us if the market does fall off where we currently are."

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Sales *and the market*

● "Things are starting to settle down post-COVID," says Greg Koch, vice president of sales and marketing, Deceuninck North America. "Customers are once again focusing on lead times, prices, services and quality. During the peak of COVID, the industry was dealing with such over-demand that the fundamentals took a back seat. But now, it is back to the basics. We are back to competition."

Koch further explains that when businesses invested in the capacity to manage the over-demand during the COVID period, those companies are now managing and optimizing those investments. "It is likely that the market in 2024 will be strongly influenced by the price of materials, housing trends and interest rates," he projects. "If those factors remain the same as 2023, we see 2024 being very challenging for manufacturers."

Roto's Gray reports a "mixed bag" in 2023, which ended down about 10% to 14%; a figure he says that was "below expectations but not unexpected." Despite a down year, Gray notes it allowed the company to bring its delivery service performance back to peak levels, which had been a struggle during COVID.

Gray also anticipates a bumpy 2024, especially the first half. As such, he says Roto is focused on new business development that will help bolster the company, especially as some of its existing customers may experience a downside.

As affordability and high interest rates continue to challenge the new home market, some manufacturers anticipate a high interest in remodeling. "It is proven that homeowners typically will opt to remodel and maintain when the new home construction market tightens, which is the case today," says Michael Sugrue, president, Winchester Industries. "Therefore, we expect to experience continued strong sales in 2024."

Data supports this; based on figures from the U.S. Census Bureau, John Burns Research and Consulting estimates that 24 million homes will reach their prime remodeling years by 2027. Approximately 80% of homeowners are locked in at rates below 5%, and the average homeowner has a near all-time high of $365,000 of equity in their home. Both factors combined mean many don't want to leave their homes and low rates behind, so they are choosing to remodel instead.

Some business areas are more optimistic, such as machinery and software. Morgan Donohue, president, Erdman Automation Corp., says Erdman is coming off its largest sale year ever, in which it was up more than 15%. Although its insulating glass lines continue to lead the way for sales and volume, he says, special projects and FlexScreen, with which Erdman entered a partnership in 2022, "are not far behind."

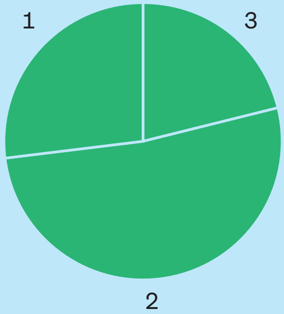
"We will react to a slowdown or recession if that comes, by continuing to invent and develop technologies," says Donohue.

Machinery manufacturers see the continued benefits of modernizing manufacturing plants. Mike Biffl, vice president of sales and marketing, Sturtz Machinery, says the company maintained solid business in 2023, which he attributes to companies modernizing their plants. "We do not see as much capital investment for companies trying to increase production as much as see them moving to update machinery that is nearing its end of life," he says. "We have focused on educating customers about the advantages of newer equipment with updated controls, better accuracy and consistency, and the most modern safety enhancements."

A+W anticipates sales to continue their upward trend. "Sales come from companies that have homegrown software, which can't keep up with changes in the industry, or don't have a current software solution," explains Chris Kammer, marketing coordinator, A+W Software North America. Although recession talk has slowed smaller companies from committing to software solutions, he says it "hasn't stopped the enterprise companies."

Did 2023 sales meet your projections?

1. As projected **27%**
2. Lower than projected **52%**
3. Higher than projected **21%**

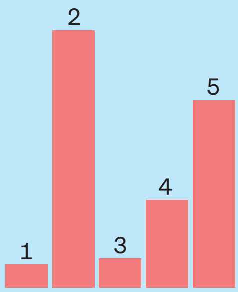


45%

of window and door companies reported YOY volumes growing in Q3-2023.

How did profit margins in 2023 compare to the previous year?

1. Increased greatly **4%**
2. Increased moderately **44%**
3. Decreased greatly **5%**
4. Decreased moderately **15%**
5. Stayed consistent **32%**



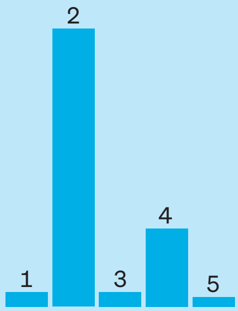
49%

of window and door companies reported YOY revenue growth in Q3-2023.

Source: John Burns Research and Consulting

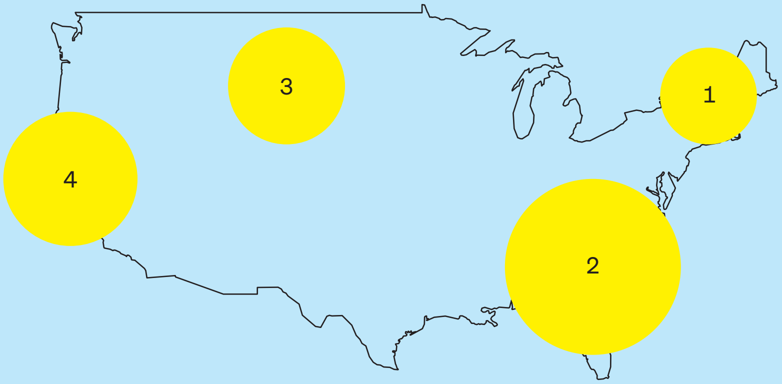
What are your sales expectations for 2024?

1. Increase greatly **3%**
2. Increase moderately **57%**
3. Decrease greatly **3%**
4. Decrease moderately **16%**
5. Stay consistent **21%**



Which geographic area do you expect to see the most growth in 2024?

1. Northeast **13%**
2. Southeast **43%**
3. Midwest **25%**
4. West **19%**



Product trends

● Vinyl windows remain the dominant product in demand—more than twice as much as the next most-requested product of multi-panel doors—according to this year's survey.

How it looks, how it works
Aesthetics, including color, remain in the top two most-requested product features, and manufacturers continue to innovate and deliver. Deceuninck launched its Eclipse black through-color PVC extrusion for windows and doors at GlassBuild America in October. Koch shares that the company will implement this technology in its window and door systems in 2024. "We've cracked the color matrix code and we're excited about it."

Alongside Eclipse, Deceuninck plans to dedicate R&D to serving the commercial market. "Most of this is focused on sustainability and energy savings, which are critical across residential, multifamily and commercial construction segments," says Koch.

Andy Karr, senior product manager, Aperture Solutions–U.S., Cornerstone Building Brands, also notes the interest in sustainability. "Right now, there's a lot of buzz and excitement in the market about the new Energy Star 7.0 requirements. People from all walks of the industry are really curious about what this new standard is all about, what it takes to meet it, and especially, how to sell it to consumers effectively."

Material science is, in part, what can bolster efficiency and innovation in the industry. "Thinner sightlines and bigger windows are in demand, so our R&D team will have their hands full with that, plus the continual pursuit of top-tier material science for those products," says Koch.

European products are also making their way to the U.S. "We are seeing an increase in demand for high-performance European platforms for commercial applications, such as our tilt-and-turn windows," notes Koch. "In fact, European manufacturers are now importing to the U.S., focusing on the East Coast. These products are moving out of the niche category in the U.S. and becoming much more visible and sought after."

The sheer size of windows and doors also influences hardware and other components. Beyond aesthetics, it's critical to develop hardware that can accommodate these higher weights and larger sizes while maintaining a reasonable operating force.

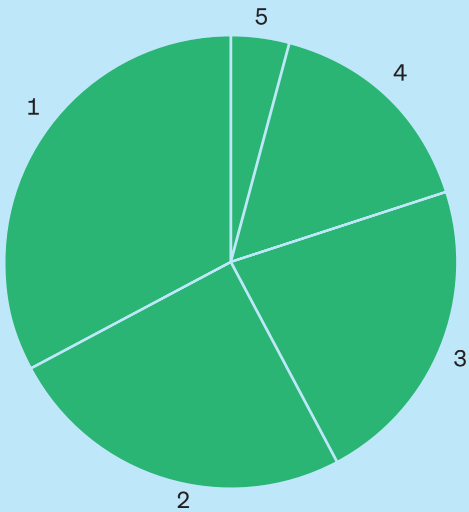
Michelle Nissen, vice president of product management, AmesburyTruth, agrees. Minimalist hardware that can handle heavy glass loads while supporting energy efficiency and impact-resistance goals is in demand. Other trends

"Right now, there's a lot of buzz and excitement in the market about the new Energy Star 7.0 requirements. People from all walks of the industry are really curious about what this new standard is all about."

Which products were most in demand in 2023?

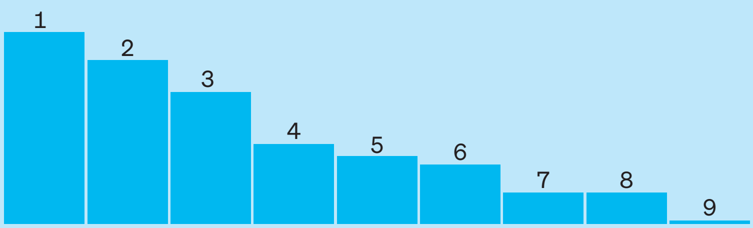
Where will you focus new product development dollars in 2024?

1. Energy efficiency **33%**
2. Aesthetics **25%**
3. Functionality **22%**
4. Technology and "smart" functions **16%**
5. Other **4%**



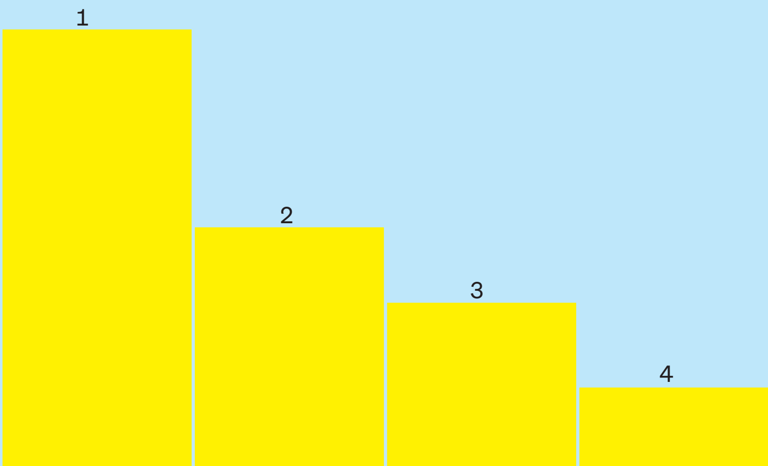
What technologies have you implemented, or are considering, to enhance energy efficiency?

1. Triple pane **48%**
2. Fourth-surface low-E **41%**
3. Gas fill **33%**
4. Thermally broken aluminum **20%**
5. None **17%**
6. Skinny triples **15%**
7. Dynamic glass **8%**
8. Concealed hardware **8%**
9. Aerogel **1%**



Did you update, or are you in the process of updating, Energy Star-certified products to the new standards?

1. Yes, I have updated some products **47%**
2. Yes, I am planning to update some products **26%**
3. No, I did not update products; they already meet the standards **18%**
4. No, I did not update products; I am letting the Energy Star certification lapse **9%**



63%

of companies offered new products in 2023

75%

of companies plan to offer new products in 2024

she notes are cost-effective components, window-opening control devices and black hardware.

Technology in the home

Sugrue shares that market demand ultimately dictates R&D. "In addition to energy efficiency, we're always seeking to provide cutting-edge hardware for better operation and security," he says. "Today's homeowners are demanding unique color options for vinyl and hardware. Therefore, our R&D is continually evolving based on market demand." These can include Wi-Fi locking features for entry doors, black vinyl products that won't deteriorate and connected technology.

Roto signed a distribution agreement with AutoSlide last year, a company that brings touchless technology to sliding and hinged patio doors. "Automation is one of the biggest trends in the marketplace today, without a doubt," says Gray. Some of that trend relates to aging-in-place and making homes more accessible for all individuals. For example, automated windows and doors could enable a senior citizen or person with disabilities to operate the window when they otherwise couldn't. Design can also help with this, in that a window could be placed at a lower height for operation and better views while seated.

Michael Lofty Gierges, EVP of home and distribution, Schneider Electric, anticipates automation and tech-enabled products to grow as home developers and smart home technology manufacturers work to improve overall interoperability and occupant safety, comfort and control over energy consumption.

"The world needs a common language for Internet of things devices to talk together, and AI will be a solution to make homes smarter and easier to operate. To make this happen, manufacturers will need to become more involved with connecting their specialties and areas of expertise to the overall home ecosystem, bringing intelligent home capabilities to the consumer," Gierges says.

"The U.S. has just begun implementing automation at the onset of construction, hinting at an evolution of residential building," Gierges continues. "This transformation comes at a necessary time, when 61% of U.S. citizens expect any newly built home or apartment to be equipped with intelligent home products. Because of this, we are seeing more and more homebuilders go above and beyond basic codes and regulations, standardizing electrification and digitization throughout the entire building process. The advanced intelligence behind smart home solutions gives homeowners a leg up in utility savings and reducing carbon emissions. By understanding when and where energy is wasted, and acting upon the biggest energy guzzlers, up to 30% of home energy costs can be reduced without compromising on comfort."

Labor

● The labor shortage has reclaimed the top challenge spot from the supply chain and material struggles that dominated the pandemic years. One survey respondent said a goal for the year is to keep pricing steady and down as much as possible, partly to offset the "dramatic" rise in labor costs.

Soliciting employee feedback, and taking action on that feedback, is one way to create a desirable working environment. Colleen Pritchett, president, Aperture Solutions – U.S., Cornerstone Building Brands, said the company conducted employee net promoter survey scores twice in 2023. "These surveys played a pivotal role in shaping our employee-centric approach, with a heightened focus on enhancing communication and active listening throughout our company," she says.

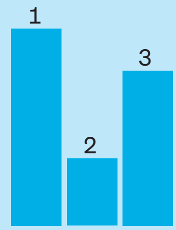
Donohue says Erdman offers a higher wage than others in the area, but beyond that lies a solid company culture. "We care for each other and want to be together," he says. "Our team atmosphere and center focus all contribute to a culture that is kind, considerate, fair and rewarding to all."

Koch, meanwhile, says Deceuninck focuses on finding the right people to begin with. "When we are searching for production workers, it is important to find the right skillset in someone with the right mindset and an eye on growth," he says.

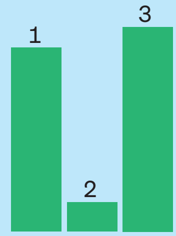
Connecting with schools and local organizations is also critical to many companies' recruitment efforts, as is fostering a spirit for manufacturing. "Right now, a lot of

Staffing levels in 2023 vs. 2024

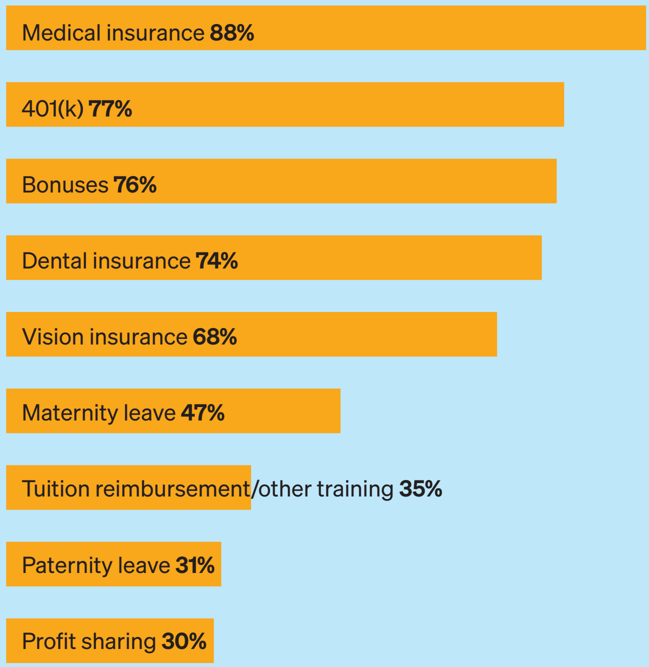
● 2023
1. Added staff **47%**
2. Eliminated staff **16%**
3. Staff levels stayed the same **37%**



● 2024 (projected)
1. I will hire more staff **44%**
2. I will eliminate staff 7%
3. Unsure **49%**



What benefits do you offer employees?



20%

Residential window and door companies report a 20% increase in direct labor costs in 2023.

Source: John Burns Research and Consulting

6.5y

Average employee tenure

younger people entering manufacturing do so because of the necessity for a job. In turn, they don't always stick with it. Collectively, we need to make manufacturing jobs more attractive." Deceuninck uses tools like training and mentoring programs to create a culture where employees can grow and advance, he says.

Labor is also a challenge for machinery manufacturers, both internally and for their customers. Because today's machinery is more complex, engineers and technicians need a broader skillset, says Sturtz's Biffl. "Keeping an eye out for talent and hiring before the need is immediate helps us to have the right people in place as our needs increase."

Because Sturtz's customers struggle to find operator and maintenance technicians with the appropriate skill set, he says part of their job selling machinery is to help them understand the "level of expertise required to maintain our equipment at optimal performance levels. This was not the case in years past, but we need to help our customers find the right talent to help them be successful with their capital projects."

Sturtz's employee referral program encourages current employees to recommend candidates for recruitment, which has "worked very well," according to Biffl. "We rarely have a referral for someone that our team would not want to work with, so we have a level of confidence that the referred candidates will be good fits for our internal culture. We have also enhanced our benefits package over the past couple of years," he says.

Recruiting and retention strategies

By Chris Kammer, marketing coordinator, A+W Software

- **Training:** Constructive training helps new employees grow and feel trusted.
- **Trust:** Build and maintain trust between employees and upper management because trust enables better problem-solving by employees, teamwork, increased productivity, willingness to work harder, allows employees to think outside the box, etc.
- **Feedback:** Encourage input and feedback.
- **Growth:** Offer opportunities for career growth.
- **Work-life balance:** Encourage a healthy work-life balance.
- **Communication:** Communicate regularly with your team and encourage an open-door policy.
- **Surveys:** Conduct employee retention surveys and act on the feedback, whether it is good or bad.
- **Employee referral programs:** Allow employees to bring in people they trust, which can build a stronger team.

Materia

● The supply chain complications and material shortages of the pandemic years appear to have largely abated, leaving a shift in purchasing behavior in its wake. "Contractors and builders adapted with a forward-thinking approach, incorporating buffer time into their production schedules to ensure product availability," says Matt Gibson, director of marketing, Aperture Solutions – U.S. Cornerstone Building Brands.

He anticipates that "meticulous" planning may fade as lead times normalize. As such, some may see service-related challenges. "Distribution centers and lumber yards addressed availability issues by diversifying their product offerings to encompass a broader spectrum of manufacturers. While this diversification enhanced their ability to cater to customer needs, it also introduced heightened technological and service demands in managing such an extensive product portfolio. Balancing expertise across multiple distinct product lines will inevitably present a challenge at the service counter," he predicts.

Housing affordability is at a 20-year low, which may encourage some manufacturers to rethink products. "Whether it be through innovation, sustainable solutions or more economical materials like composites, the market will expect support from window and door components manufacturers," says AmesburyTruth's Nissen. "Developing materials solutions that support customers in gaining efficiency in their fabrication processes is increasingly

als and the supply chain

important as customers continue to deal with challenging labor markets."

On the machinery side, most manufacturers note parts shortages are no longer an issue. The one exception is control components, says Erdman's Donohue.

Relationships between companies further strengthened during the pandemic, which carries through to today. "I am grateful for all of our partners; none of us does anything without partners," Donohue says. "I welcome any relationship that makes us better. The only way that happens is if it improves the other person, group or organization. If that happens, we help each other be better. Focus on others' needs and watch yours be taken care of."

More attention to material optimization is another COVID legacy, which current advanced machinery and software help develop. "Software systems can help optimize PVC bar usage as the material is cut and fabricated," explains Sturtz's Biffl. "The bigger opportunity comes in reducing errors that result in scrap and remakes. A small decrease in scrap, achieved by eliminating opportunities for human error, significantly impacts material usage and labor efficiency."

73%

of companies reported material price increases in 2023. Material prices increased, on average, 0%-30%.

64%

of companies anticipate material price increases in 2024, while 21% are unsure.

Most companies (62%) said they have not had to re-engineer products or change product offerings due to material availability; 26% have.

Which materials are most difficult to acquire?

50%

of companies reduced backlogs vs. last year.

20%

reported increasing backlogs.

78%

of companies report more than three-quarters of projects are on schedule.

Source: John Burns Research and Consulting

Machinery and automation

57%

of respondents added production capacity in 2023.

71%

plan to add capacity in 2024.

Although only **16%** of companies note they use AI in their business, those that do indicate its usefulness in marketing, identifying efficiency improvement opportunities, customer inquiry management, software scripting, engineering and supply chain.

● Machinery manufacturers have a positive outlook. Erdman's Donohue reports customers have not indicated a coming slowdown, nor does he see one. Biffl reports strong current demand and predicts it will continue and experience "moderate growth" through 2024.

Opportunities abound for machinery, especially as products continue to evolve. "Triple-glazed windows will continue to be a discussion point and focus for future growth," predicts Donohue. "[There will be] constant improvement for product performance on the window side."

Biffl speaks about the opportunity for earlier collaboration with their customers. "Historically, our customers have done a lot of their product development before approaching us," he says. "We see more openness in the earlier stages with the idea of improving product manufacturability. This has enabled us to develop new products that meet specific needs."

Automation and retirement of old equipment are the two main growth areas in 2024, according to Biffl. Labor shortages have led to more interest in automation, he says. "Companies are interested in finding ways to automate repetitive tasks to allow their employees to perform more value-added functions."

"In addition," he continues, "there are companies running antiquated equipment that is no longer as reliable and does not meet today's safety standards. Companies are coming to us to discuss plans to retire the old equipment and modernize their operations while improving overall employee safety." He notes the increased workplace safety culture in recent years and how customers now expect the latest enhancements to keep employees safe without sacrificing usability and maintainability.

A+W Software's Kammer shares that helping companies without software solutions understand the importance and capabilities of correctly implemented software, and helping customers upgrade current solutions to be more efficient, are among the biggest opportunities in 2024.

Kammer summarizes the benefits of software and machinery working together: "When software and machinery work together (aka automation), companies can streamline maintenance tasks, improve preventative maintenance tasks, better manage their current equipment to enable it to work longer, increase efficiency, monitor their production throughput and yield (optimization), and anticipate upcoming machinery needs and buy equipment before the current machine(s) needs replacing."

Software and machinery companies alike are homing in on solutions to increase productivity and automate repetitive tasks. Kammer notes that A+W is doing more on handheld devices and tablets to improve worker mobility on the shop floor. The company is also further exploring AI's potential.

Improving financials and helping companies gain insight into their finances is another area where software is powerful. "Smart devices that save time and money for customers are top of mind," says Kammer. "Software can help workers save time when scanning on the shop floor, at shipping and at delivery. This allows our customers to invoice and move products faster." Barcodes and CIM/production terminals help reduce or eliminate paper on the shop floor. This is all part of a larger trend Kammer sees toward customers targeting the financial aspects of business and focusing on more accurate costing data. ■

The 2024

Forecast

Highlights from the latest construction forecasts reflect a U.S. economy that is shadowed by inflation, higher interest rates, labor challenges and geopolitical risk **By Tara Lukasik**

Editor's Note: The following is based on forecast presentations from the 2024 Annual Outlook Forecast Conference from Dodge Construction Network, the Construction Economy Outlook semiannual webcast by ConstructConnect, and Connor Lokar's annual economic forecast keynote presentation from GlassBuild America 2023.

● Economic uncertainty hung over 2023 and is carrying over to 2024, but many industry experts remain cautiously optimistic about the year ahead, predicting a stronger and more consistent construction market.

Economy on edge, economists split on recession predictions

In looking at the macroeconomic pressures facing the U.S. economy, including stubborn inflation, high interest rates, tight lending standards, labor shortages, rising energy prices and geopolitical turmoil, it's impressive that the economy has remained recession-free. Resilient consumers, a healthy labor market, and public funding for manufacturing and infrastructure helped, but the challenges of 2023 will shift over into 2024, according to Richard Branch, chief economist for Dodge Construction Network.

"We're anticipating that 2024 will bring about more consistent growth, as well as more opportunity in the construction sector," says Branch, "but the economy will remain challenged at least over the next three to six months [of 2024]. Still, we're remaining confident that the U.S. economy will remain recession-free."

Branch, however, adds that this is dependent on the assumption that the Federal Reserve is done raising interest rates. Dodge forecasts that the Fed will start cutting rates around the midpoint of 2024. "The takeaway here is we know the construction sector is an extremely interest-rate-sensitive portion of the economy, particularly in sectors like the residential market," says Branch. "We think that by the end of the year, the U.S. economy is going to be on much more stable footing, which should create more opportunity in the construction market."

Other economists are not as optimistic. During a presentation at 2023 GlassBuild America, Connor Lokar,

Total Construction Starts

2023	+1%	$1,124B
2024	+7%	$1,206B

senior forecaster, ITR Economics, projected that the overall U.S. economy will most likely enter recession in the coming months. Lokar anticipates the recession will be mild but will demand that companies plan for a downturn to ensure they are protected, and may even offer time for them to explore new opportunities during the slower business cycle. "This is not going to be as bad as 2008 or 2009. The businesses that will get into trouble are those that don't plan for it," he says.

As the industry faces skilled labor shortages and falling productivity, competency and efficiency will be increasingly valuable among the workforce.

Extras

- Dodge estimates that U.S. gross domestic product growth will slow in 2024.
- The Congressional Budget Office forecasts GDP to speed up, averaging 2.4 percent a year from 2024 to 2027, in response to projected declines in interest rates.

Inflation is still volatile but slowly stabilizing

In terms of major economic indicators, inflation has remained at the top of the list over the past year. "We've seen significant progress over the last year," says Kermit Baker, chief economist, American Institute of Architects. "A year ago, [the numbers] were a little over 8%. A few months ago, we saw them hit a low of 3%; they've come down dramatically. Generally, we're moving in in the right direction, even though we're not done with the inflation issue yet."

Alex Carrick, chief economist, ConstructConnect, shares the sentiment on falling rates. "As interest rates stabilize and then begin to decline after Q1 or Q2 of [2024], the homebuilding sector will revive."

"What we're seeing from an interest rate perspective, it's hard for developers to make the returns, and they're going to seek returns elsewhere," says Jay Bowman, principal, FMI Corp., referencing private construction.

Extras

- The Federal Reserve's latest macroeconomic projections indicate a gradual reduction in inflation rates, averaging 2.5% in 2024, decreasing to 2.2% in 2025 and aligning with the Fed's 2% target by 2026.
- Credit should start easing during the back half of 2024, but the banking sector will continue to be skittish, says Branch.
- Construction expenditures are forecast to increase 3.7% yearly in nominal terms through 2024, according to the Construction: United States report by Freedonia Group.

Material price inflation about to turn

Talk in the construction industry has been dominated by the issue of bid and material prices, and Dodge's Branch says that the industry will continue to see good news. "It [composite index of building materials] is contracting after that steep run-up that we saw in the wake of the pandemic."

Supply chains also improved in 2023, with the Global Supply Chain Pressure Index hitting a historical low in October 2023 and almost all material divisions seeing stable or improving lead times, showing that supply disruptions are in the rear-view mirror, for now, according to real estate and investment management JLL Capital Markets.

Labor challenges continue

Limited labor availability is expected to persist for the long term, according to the U.S. Bureau of Labor Statistics. Due to ongoing shortages and an increase in people leaving the industry, overall growth of the construction labor force will slow from its current, already inadequate, pace in 2024. While advancements in technologies can ease some of these pressure points the labor market causes, it cannot fully replace the need for labor.

"The number of people hired has been tailing off. You might think that indicates a declining demand for workers, but I think it indicates how hard it is to find workers to fill those positions," says Ken Simonson, chief economist, Associated General Contractors of America. "The unemployment rate in construction has come all the way down to the same level as the overall economy, to 4% or less, and that's really exceptional."

In North America, as the industry faces skilled labor shortages and falling productivity, competency and efficiency will be increasingly valuable among the workforce. Retention and upskilling are critical for the next year and beyond.

"The big challenge for contractors is going to continue to be finding workers," says Simonson. "And I think that will be with us for many years."

NAHB predicts that residential construction will finish 2023 down 11%, dropping an additional 3.4% in 2024, due to over 1 million [units currently] under construction.

Companies may wish to take advantage of broader incentives, like the Inflation Reduction Act tax credits available for companies who hire registered apprentices, which may build demand for apprenticeship programs, potentially expanding workforce training opportunities and benefitting employers.

Extras

- The BLS projects that the labor force participation rate will continue to decline in 2024, although at a slower rate than that seen before the onset of the 2007–09 recession, falling 2.0 percentage points to 60.9% in 2024.
- Simonson forecasts that construction wages will rise 5% to 7% over the next year.
- The Associated Builders and Contractors report the construction industry needs more than 342,000 new workers in 2024 and expects an increase in staffing in the first half of 2024.

Geopolitical conflicts and trade tensions loom

The Israel-Hamas conflict raises concerns about potential wider Middle East tensions, possibly impacting energy and other raw material prices. U.S. sanctions on Iran could further escalate these issues, and the ongoing tensions between the U.S. China could also stoke inflation.

In February 2023, the Aluminum Extruders Council reported on the White House proclamation adjusting imports of aluminum into the U.S. and significantly increasing costs for aluminum smelted or cast in Russia. Tariff rates on most metals and metal products will double from 35% to 70%. U.S. imports of unwrought aluminum and alloys from Russia amounted to 191,809 tons, or roughly 4.4% of the more than 4.4-million-ton total last year, compared with 8.9% in 2018 and 14.6% in 2017.

Rising energy prices and geopolitical tensions are new risks added to the matrix that Dodge examines. Branch also cited rising tensions in Russia, Ukraine and the Middle East as possible obstacles in the coming year. "Geopolitical risk remains intense," he says, but Dodge forecasts that "tensions will start to ease in the coming three to six months."

Extras

- The U.S. initiated a 200% tariff on all Russian-made aluminum in February 2023, which applies to about $2.8 billion worth of materials.
- Chinese materials used in the glass, glazing and metal industries are still subject to the 10% tariff that went into effect September 2018, despite a U.S. International Trade Commission report that found American importers have borne most of the costs.
- In June 2023, the Aluminum Extruders Council asked the Commerce Department to reform its tariff exclusion process for U.S. aluminum extrusion products.

High rates, lending standards hurting residential starts

Single-family construction organically leads the construction sector into decline or recovery, according to Branch. "Residential leads commercial buildings, like retail leads institutional buildings like hospitals and schools." Dodge forecasts that the total dollar value of residential starts is expected to end 2023 down 13%, before rising 11% in 2024.

"The residential market split, with single family going one way toward a pseudo recovery, and multifamily going the other, peaking in December 2022, and falling since," adds Branch.

However, Danushka Nanayakkara-Skillington, assistant vice president for forecasting and analytics, National Association of Home Builders, predicts that residential construction will finish 2023 down 11%, dropping an additional 3.4% in 2024, due to "over 1 million [units currently] under construction."

ConstructionConnect's Carrick believes that falling rates are the key to a thriving residential market. "As interest rates stabilize and then begin to decline after Q1 or Q2 of [2024], the homebuilding sector will revive." ConstructConnect's forecast predicts a 4.4% increase in 2024 for total residential starts, with a more robust 15% increase expected the following year.

Single family—Starts tied to mortgage rate pressures

In the residential sector, Dodge predicts single-family construction will end this year down 12%, measured

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in units, before climbing 3% in 2024. Branch notes that while the bottom for single-family starts has passed, mortgage rates need to ease before the sector will see stronger growth. “New home sales, tightly correlated to new home construction starts, are up 5% on a year-to-date basis [as of November 2023],” says Branch. “With mortgage rates where they are, we’re not going to see a big run up in single-family construction anytime soon. People are still buying homes right now even with mortgage rates where they are.”

Branch believes that downward pressure on mortgage rates will come in Q1 2024, creating more stability and propagating single-family construction through late 2024 and 2025.

“The market needs lower interest rates for people to consider selling their homes that they refinanced when rates were low,” Lokar says.

Multifamily—Recalibration and increase for 2024

Multifamily work is expected to follow a similar pattern, dropping 13% by the end of 2023, with a 3% increase in 2024. Following a peak at the end of 2022, starts in this sector have declined, due in part to tightening credit standards for multifamily and slowing household formation, with younger people cohabitating or living with family, lowering demand. Still, says Branch, this is simply a fall from the peak of activity. “[Before 2021], these are the highest levels for multifamily construction, going back to the ‘80s,” says Branch. “There’s still a lot of activity going on, so perhaps this is just a recalibration or a realignment following a little rush of development in 2021–2022.”

Companies that leaned into multifamily contracts during the sector’s boom of the last several years should prepare for slowdown in the near term, Lokar says. “If you’ve been living off multifamily, [the sector] is entering recession,” he says. “Starts were down 28.1% in the last quarter, and permit pulls have cratered.”

Commercial construction edges lower

The commercial sector, which includes stores, offices, warehouses and hotels is expected to fall 6% to $156 billion in 2023, then another 2% to approximately $153 billion next year, Dodge predicts. “If you pull the warehouse sector out of that minus 2%, construction starts for commercial are actually positive,” says Branch.

“Commercial construction pretty much moves lock-step with the economy, and follows the single-family market,” Branch continues. “The economy slows down construction, and commercial starts slow down with it.”

Extras

- The National Association of Home Builders projects that residential construction will drop 3.4% in 2024, single family will rise 3.7% in 2024, and multifamily will see a 17.3% decrease next year.
- Lokar believes that the single-family market is now bounding into recovery, but that multifamily is heading for a tough year.
- Branch says consistent new home sales around the 700,000-unit range through the first nine months of this year are needed; currently it’s at about 684,000 units a month.
- FMI Corp. predicts the residential market will fall 7.1% in 2024; private multifamily could be down close to 20% by 2025.
- Dodge predicts infrastructure growth with a 13% rise in sewage and waste disposal and a 21% rise in water-supply systems, indicators that point to the demands of a growing population and a rise in new single-family and multifamily development.

Visit GlassMagazine.com for the full commercial construction forecast. ■

Residential Construction Starts

2023

-13%

Apartments, two-family houses

-12%

One-family houses

2024

+3%

Apartments, two-family houses

+3%

One-family houses

“There’s a growing sense here that the single-family market is at least past the bottom.”

Richard Branch, Chief Economist, Dodge Construction Network

State of the

Market

Specialty Fenestration Products A Bright Spot in An Uncertain Economy

The market will move cautiously in the year ahead, but a growing need for residential safety and security solutions will drive the specialty fenestration market **By Andrew Petryk**

"The market will move cautiously in the year ahead but expect specialty fenestration to continue to experience outpaced growth with less cyclicality compared to traditional products as key secular trends will drive the need for safety and security solutions across the residential and commercial construction markets."

● Within the residential window and door landscape, the market is segmented between traditional manufacturers who produce high-quality windows and doors from a diverse base of materials, and manufacturers of specialty fenestration products who supplement traditional solutions with value-added features or size and shape configurations not offered by the broader market.

Ballistic, fire-rated, impact-rated, privacy and acoustic glass solutions are a few of the convenience, safety and security-oriented features that continue to be a bright spot in the sector, outperforming broader product categories and experiencing strong revenue growth at attractive margins.

Rising demand for safety and security-oriented solutions

Safety solutions are seeing a surge in demand as these products are increasingly becoming requested and, in some cases, mandated specifications in the build-out of residential and commercial buildings. Civil unrest, riots, looting and theft are driving demand domestically for security and safety solutions across a wide range of applications beyond residential, including schools, government buildings, retail, pharmacies, financial institutions and many other industries.

Secular trends will drive the need for safety and security solutions across the residential and commercial construction markets in 2024.

fragmented and we expect consolidation to accelerate in the coming years as many companies within the industry look to bolster their presence in the space to meet the rising demand across the U.S.

- Pella acquired Lawson Industries in May 2023, which specializes in impact-resistant aluminum windows and doors; the expansion expands Pella's presence in the South Florida region.
- PGT Innovations acquired a remaining 25% equity interest in Eco Enterprises in May 2023. Miami-based Eco serves South Florida, offering aluminum, impact-resistant windows and doors.
- Private equity sponsor Blue Ridge Construction Capital invested in Euro-Wall Systems in August 2023. The Florida-based company manufactures impact-rated folding, sliding, stacking and pivoting doors that meet Miami-Dade ratings.

Like the build-out of ADA-compliant building features in the late 1980s and early 1990s, it is expected a similar trend will ultimately occur in safety and security applications, with increased mandates entering the market and driving building designs to include solutions that adhere to security and safety desires. Even when not mandated, architects frequently specify "above-code" products in the build process to preempt anticipated changes in building codes, and help in "hardening" homes, which helps to lower insurance rates, create favorable mortgage terms, increase tax credits and even raise a home's resale value in some markets.

Securing homes against extreme weather

The rising occurrence of extreme weather events is also helping move specialty fenestration products to the forefront and leading to growing interest in resilient infrastructure programs such as the Insurance Institute for Business & Home Safety's Fortified program, the Department of Energy's Better Buildings Initiative, and the "green" RELi system and National Green Building Standard. These voluntary construction programs help strengthen homes and their windows and doors against severe weather, including damage from high winds, hail, fires, flooding and more.

The number of designated Fortified homes more than doubled in the past three years, with the installation of impact-resistant windows and doors in some 50,000 homes throughout the Gulf Coast and Southeast states. "Other states have wisely taken notice," says Roy Wright, president and CEO, IBHS. "We are turning the tide and seeing a marked shift, with more than half of all Fortified designations earned in the last three years."

Consolidations expected to accelerate

The safety and security market is highly

Sentiment heading into 2024 in both the traditional and specialty fenestration market is strong, with many companies investing in product development and their sales organization to grow market share and expand geographically. Looking to the new year and beyond, expect specialty fenestration to continue to experience outpaced growth with less cyclicality compared to traditional products, as key secular trends will drive the need for safety and security solutions across the residential and commercial construction markets. ■

Andrew K. Petryk is a managing director at Brown Gibbons Lang & Company, an independent investment bank serving the middle market that publishes the Building Products Insider, a nationally recognized research publication discussing critical industry trends and perspectives from leading executives.

Products

FENESTRATION FINDS

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01

03

02

01. C.R. Laurence

C.R. Laurence's Series 690/695 sliding door systems are suitable for residential and commercial applications. The 695 is engineered to reduce the force necessary to slide the panel and deliver smooth operation. The series features quiet operation. The amount of visible hardware is reduced, enabling the design of all-glass interior spans. An optional grid system is also available. **800/421-6144 | CRLAURENCE.COM**

02. panoramah!

The ah! HVHZ sliding system is a large, hurricane-approved, sliding and fixed glass panel with a 1 ¼-inch-wide interlock that maintains all the aesthetics already present throughout the panoramah! system. It allows for myriad combinations, including manual or motorized operation, single-track to multi-track, and different opening and locking possibilities. **+(41) 2180-4170-0 | PANORAMAH.COM**

03. VBH

VBH's ArTech tilt & turn system is treated with Activeage Hi-Protection coating. ArTech is available in surface fit, jigless, rebated and concealed-hinge variants, all with standard level and PAS24 security level options. Upgrading between the two requires only minimal hardware changes. With high-security performance, security spec windows have been tested to forces of 5.5 kilonewtons, nearly double the forces specified in PAS24. **+(01) 6342-6326-3 | VBHGB.COM**

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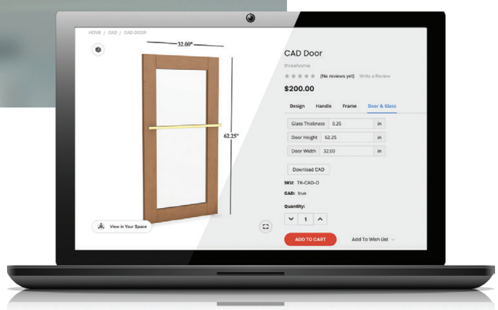
Product/Solution



3D Door Configurator Solution // **Threekit**

Key features

- Beautiful 3D and photorealistic 2D visuals
- Augmented reality for perfect placement
- Complex rules and logic engine to enable unlimited scale

View our door configurator software

Discover how to bring door products to market

When it comes to custom door sales, buyers want the ability to engage with the product in an immersive way online, but also get the extra support they need to feel confident in a high-stakes purchase. The tighter the interplay between the two, the higher the likelihood of success.

Challenge

Sixty-nine percent of door buyers are “unlikely” to continue the buying process by visiting the showroom based on the brand’s website experience.* Today’s buyer wants sales process continuity but the digital experience, especially for custom doors, falls short. **Shoppers are unable to customize and visualize the product, and this leaves them feeling less than confident in moving forward with the purchase.**

Solution

Threekit is the leading visual commerce solution for door brands who want to extend the best possible shopping experience to their buyers. Through its scalable platform, **Threekit pairs a complex rules and logic engine with beautiful 3D and virtual photography that enables shoppers to see the custom product they want to buy** and drive confidence in their purchases.

Results

Threekit enables leading door brands to show 100% of their custom catalog to end-users, and helps them streamline formerly complex sales processes. For more information, visit threekit.com. ■

threekit

* "The Great Door Sales Transformation," Threekit, 2023.

01

02

03

01. Roto North America

The Roto NX Power Hinge is designed for sash weights up to 440 pounds on tilt & turn windows and up to 660 pounds on turn-only windows. Roto offers an anti-slam device in addition to the hinge. It is designed for tilt & turn sashes with an opening width of 80 millimeters. The hinge side is made with a silver powder-coated surface or can also be delivered in a RAL color of the customer's choice.

860/526-4996 | ROTONORTHAMERICA.COM

02. Kolbe Windows & Doors

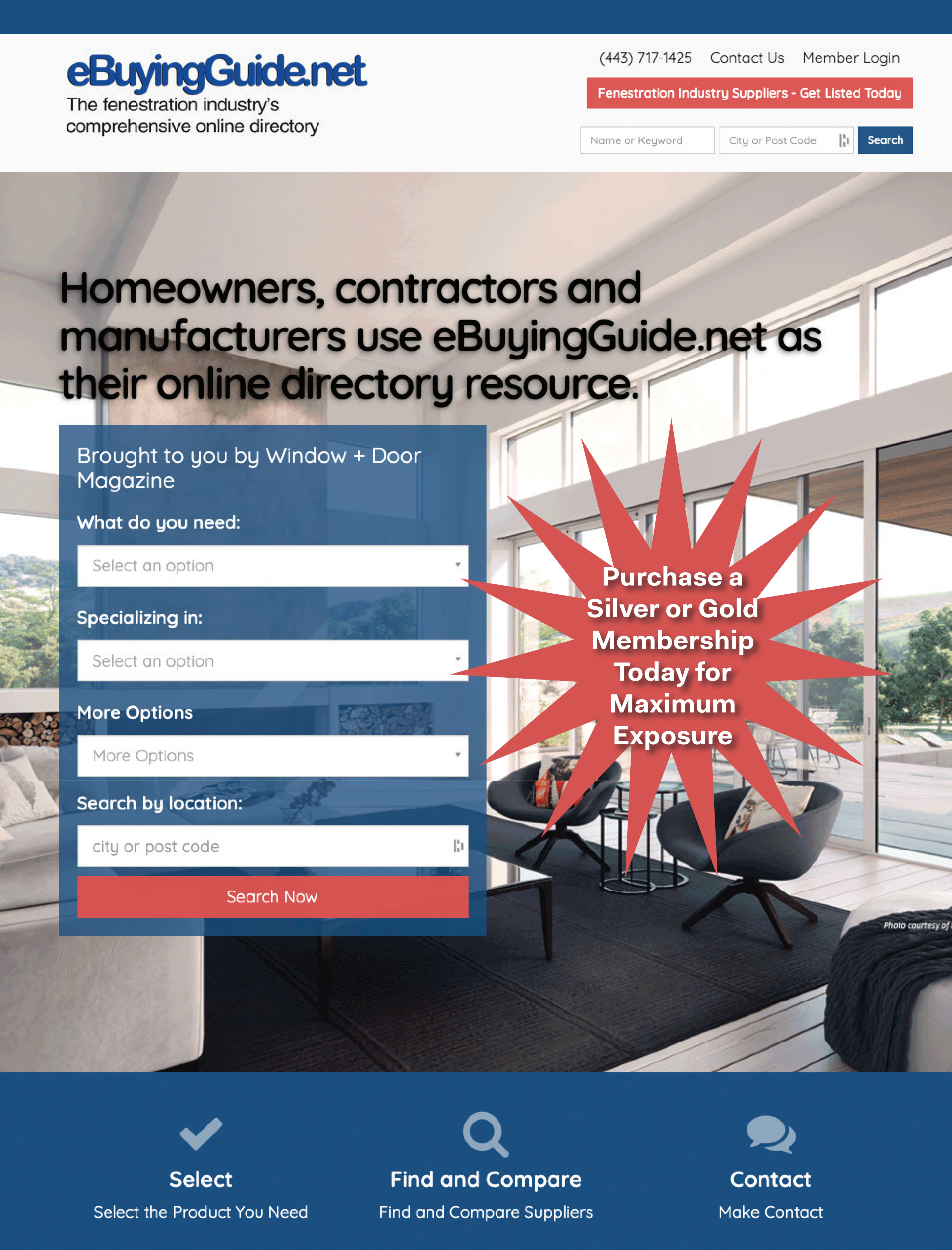
Kolbe's Hoppe swing door hardware now includes both a European and an American style handle set option with multi-point locking functionality. The American style handle set features a locking cylinder located above the handle, while the European style lock is situated below. Unique functionality allows quick door locking with the deadbolt, independent of the multi-point extensions.

715/842-5666 | KOLBEWINDOWS.COM

03. Business Pilot

Customer details, lead information and sales appointments entered into the Business Pilot system are pulled through to the Paradigm Vendo platform, ready for quoting and selling jobs virtually or in the home. Quote and sales information from Paradigm Vendo is then fed back to Business Pilot, where contracts, finance, installation dates, purchase orders and stock can be managed. It also collates live data into personalized dashboards to help contractors manage business more efficiently.

+(33) 3050-7506 | BUSINESSPILOT.CO.UK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Specializing in:
Select an option
More Options
More Options
Search by location:
city or post code
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NATURAL LIGHTING, VENTILATION AND PRIVACY ARE BALANCED THROUGHOUT A CONTEMPORARY CRAFTSMAN HOME IN CALIFORNIA

Project: Venice Beach Contemporary Craftsman.

Products: Marvin Ultimate Series; FleetWood Window & Door's Series 3070 multi-slide and pocket door system; and Velux curb-mounted skylight.

Description: The Venice Beach Contemporary Craftsman, or VBCC House, was designed by Conner + Perry Architects with special attention to fenestration and orientation, ensuring that natural lighting, ventilation and privacy were balanced throughout the structure. This design strategy, along with the use of natural materials and a visual connection to the landscape, aims to create a calming oasis within the vibrant atmosphere of Venice Beach, California.

Glass sliders on either side of the house, clerestory windows in the main bedroom suite and a skylight on the second floor all contribute to the desired aesthetic.

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Is Technological Adoption at a Standstill in the Fenestration Industry?

By Eric Thompson

The industry has been discussing thin triples for years now, but large-scale adoption simply hasn't happened.

Consider this development (or lack thereof) in relation to the new Energy Star 7.0. Thin triples are a technology that could readily enable manufacturers to hit Energy Star 7.0 figures. Instead, many manufacturers are opting for conventional triples in their Energy Star solutions if they aren't opting out of the program entirely.

This is in part because manufacturers have some understandable hesitation about consumer demand for Energy Star 7.0 products. The technology required—whether thin triples, conventional ones or something else—to meet the new specification inevitably drives a higher price point.

Will homeowners spring for it? What does it mean for the residential window and door market? I think it means that all stakeholders need to remain proactive—and a big part of that involves investing in the right technologies to establish the right business strategies today to stay ahead tomorrow.

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