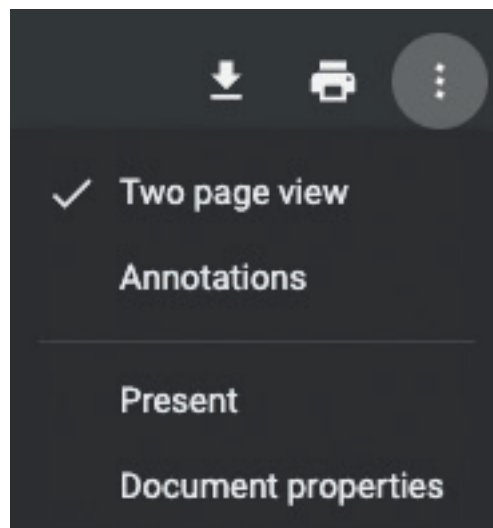


WINDOW + DOOR

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WINDOW+ DOOR

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SOLVE INDUSTRY

Challenges

IN-HOUSE MANUFACTURING, UNIVERSITY-INDUSTRY RELATIONSHIPS, AND ELEVATING EFFICIENCY AND DECARBONIZATION

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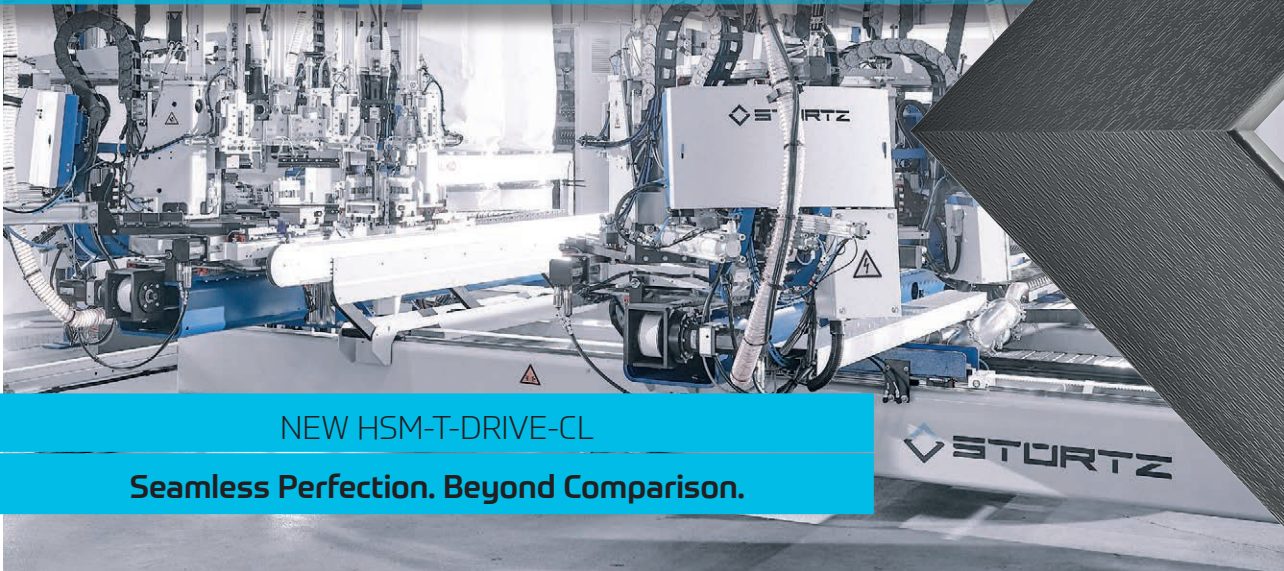
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On the Cover: The Vision 800 oscillating tempering furnace offers customizable solutions for architectural glass. Photo: Keraglass SrL.

PROVIDING ONE OF A KIND SCREEN TECHNOLOGY

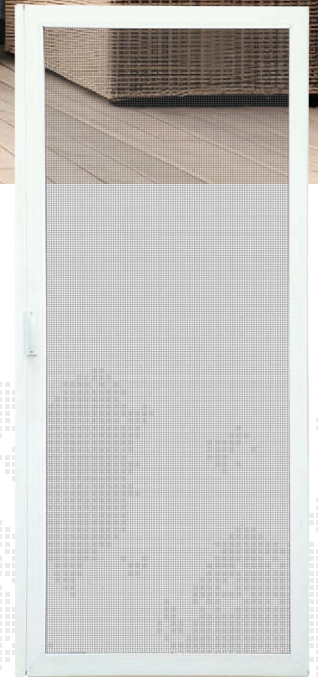
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The Future Is Here

A visit to the YKK AP Technologies Lab generates excitement about the potential of robotics in construction

BY LAURIE COWIN



Through conversations and industry reading in the past few years, I've noticed several companies establish working relationships with universities. Whether it's at the local, regional or even global level, there are benefits to be had for companies, universities and the fenestration and manufacturing industries.

I'm fortunate to live in the greater Pittsburgh area, home to Carnegie Mellon University, a preeminent institution particularly in the sciences and robotics. YKK AP has been conducting research with CMU since 2019. In part because of this relationship, YKK AP Technologies Lab chose Pittsburgh as its home for the xTech Lab, the research and development center of YKK AP Technologies Lab.

I had the opportunity to visit it in September and speak with Shiori Fukada, senior vice president, CIO and CDO of YKK AP, about the virtual factory, goals of the lab and various technologies at play.

LC: What is the virtual factory?

SF: The virtual factory is a digital twin of a physical production environment. It replicates every aspect of the factory, from machinery and materials to workflows and data, enabling us to simulate, analyze and optimize manufacturing processes in a virtual space. This approach allows us to test changes, identify inefficiencies and enhance productivity without disrupting actual operations. It's also a tool for training and collaboration across different teams and locations.

LC: What are the ultimate goals of the lab?

SF: The ultimate goal is to drive innovation in the manufacturing and construction industries by integrating advanced digital technologies such as AI, machine learning and immersive realities. We aim to enhance operational efficiency, sustainability and product development processes while fostering collaboration between industry, academia and technology leaders. The lab also serves as a research hub where new ideas and technologies are explored before they are implemented at scale.

LC: What technologies are you exploring?

SF: We are exploring how virtual, augmented and mixed reality can revolutionize product design, project management and on-site operations within YKK AP and the broader construction industry.

LC: How is CMU involved?

SF: CMU plays a pivotal role as our research partner. They bring cutting-edge expertise in artificial intelligence, robotics and human-computer interaction, which are crucial to our exploration of virtual and augmented realities. Through this collaboration, we leverage CMU's academic research to advance our projects, particularly in the areas of digital twins, machine learning algorithms and immersive environments for industrial applications.

This lab is just one example of what can come out of a relationship with a university. See the article on p. 20 for more stories of companies that work with universities. ■

Produced by



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News

IN THE KNOW



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Miter Brands Announces Sale of Martin Door and CRi SoCal, Provides Post-Storm Aid to Houston

Miter Brands announced the sale of Martin Door and CRi SoCal. Miter Brands completed the sale of Martin Door to Midland Garage Door. Martin Door plans to benefit from Midland Garage Door's market reach and operational expertise.

Miter Brands also finalized the sale of CRi SoCal to Builders FirstSource Inc. Founded in 1986, CRi SoCal is an installer of high-end windows and doors in Orange County, California, which plans to enhance Builders FirstSource's installation capabilities and opportunities to serve customers throughout Southern California.

Miter Brands also hosted a distribution event to donate emergency supplies to assist those affected by Hurricane Beryl. Miter partnered with Builders FirstSource and the Greater Houston Builders Association, to host the six-hour event in Houston. Representatives passed out relief supplies, including more than 38,000 bottles of water, 3,556 batteries, 200 flashlights, gloves and extension cords, among other items.

Amadou Sar Acquires Vienna Glass Co.

Amadou Sar has officially acquired Vienna Glass Co. Sar previously worked as the vice president of sales, marketing and estimating for EFCO Corp. and in the same position for Wausau Window & Wall Systems.

Sar states that the company's project delivery remains unaffected by the

leadership transition. The company will continue to do business from its current Manassas, Virginia, facility. All Vienna Glass professionals agreed to remain in the company and retired owners Ron Glaze and Scott Williams will remain on board through a transition period.

Harvey Windows and Doors Is FlexScreen's Newest Licensee

FlexScreen announced a partnership with Harvey Windows and Doors as its newest licensee.

"Bringing production in-house is a new chapter in our long-term relationship with FlexScreen and enables us to provide a better experience for our customers," says Brian Allaire, general manager, Harvey Windows and Doors.

Quaker Windows & Doors Hosts Groundbreaking Ceremony

Quaker Windows & Doors broke ground on its Eldon phase III construction project. The facility expansion includes the addition of a vertical paint line and the expansion of Quaker's insulating glass production capabilities. Officials hope these advancements will enhance the company's ability to meet the growing demand for high-quality commercial, residential, and luxury windows and doors.

MFM Building Products Breaks Ground on Warehouse Expansion

MFM Building Products broke ground on a 33,000-square-foot warehouse expansion project in Coshocton, Ohio,

that will lead to further expansion in 2025. The new building will adjoin the existing facility that currently houses MFM finished goods and provide inventory space for raw materials. The expansion will also free up space in the company's manufacturing facility for the addition of several new production lines in the third quarter of 2025.

Vinylmax Windows Opens New Facility

Vinylmax Windows opened its new 150,000-square-foot building expansion in Hamilton, Ohio. The expansion enhances Vinylmax's production capabilities, enabling the company to incorporate equipment that will streamline operations, increase efficiency and support the creation of more products.

Rehau Offers Courses, Files and Drawing Resources

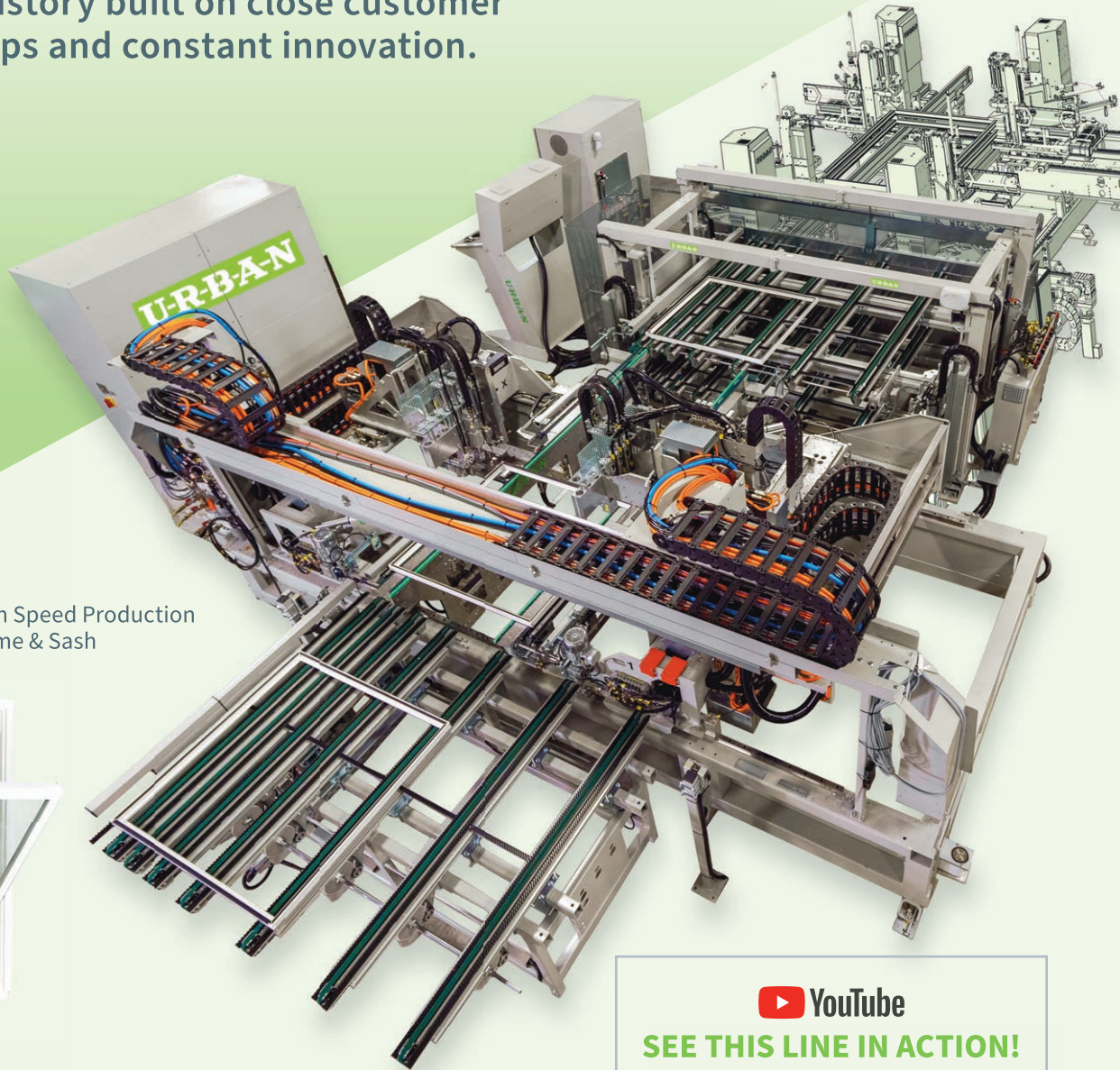
Rehau is offering extensive window and door resources, including American Institute of Architects continuing education courses, building information modeling files, and computer-aided design drawings and product specifications to support architects and specifiers.

Users can download detailed design and planning documents for free from Rehau's website. Rehau also offers four AIA continuing education courses relevant to windows and doors that explore the benefits of compression-seal technology, achieving sound abatement, the use of unplasticized polyvinyl chloride, or uPVC, windows in multifamily housing and the benefits of uPVC versus aluminum. These

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People



Kowalewski

C.R. Laurence appointed *Eric Kowalewski* as president. Kowalewski has extensive experience within the building materials industry.

He previously held senior leadership positions with PGT Innovations and Cornerstone Building Brands.



Bandy

George Bandy joined **Andersen Corp.** as its new vice president and chief sustainability officer. Bandy has over 25 years of leadership experience in the sustainability space,

working across a wide variety of industries, including sustainability leadership roles at Amazon and Mohawk Industries. Most recently, he served as chief sustainability officer at Darling Fibers.



Hershberger

Miter Brands appointed *Rod Hershberger*, co-founder of PGT Custom Windows + Doors and past chairman of

the board for PGT Innovations, to its board.



Reynolds

Kolbe Windows & Doors promoted *Elizabeth Reynolds* to the position of director of marketing. She will be responsible for leading

the company's marketing strategies and initiatives.



Czernicki

Kolbe also promoted *Tyler Czernicki* to director of customer support. He oversees the company's technical and certification

support. Most recently, Czernicki served as the production and final assembly manager for Kolbe double-hung windows.



Aronovici

Marvin hired *Sarah Aronovici* as vice president of information technology transformation and operations. In this

role, Aronovici will lead Marvin's enterprise business technology needs, infrastructure and cybersecurity services while helping to transform the company's IT operations.



Friese

Donald Friese, a renowned figure in the glass and glazing industry with over 60 years of experience, announced his return

to the industry following six years of retirement. He is best known for his leadership as chairman and CEO of C.R. Laurence Co. He plans to invest in education initiatives and serve as a strategic advisor to the **Frameless Hardware Company**.

"I have a deep love for this industry and immense gratitude for all it has given me," says Friese. "Now, it's my turn to give back and contribute to its continued success."

During his retirement, Friese and his son DJ established the Friese Foundation, a nonprofit organization dedicated to philanthropy. The foundation supports a range of organizations, including the American Red Cross, St. Jude Children's Hospital and the National Glass Association. ■

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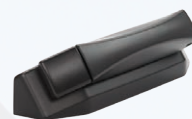
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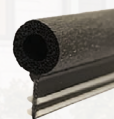
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Elevating Efficiency: Solutions for Window Performance

Navigating the challenges of high-altitude window installations with argon retention technologies

BY ADAM MITCHELL



THE BOTTOM LINE: High-altitude locations present unique challenges for maintaining energy efficiency in window systems, requiring advanced argon retention technologies, such as bagged capillary tubes and pre-equalized IGUs, to meet stringent energy codes while optimizing thermal performance and minimizing IGU thickness and weight.

The vista from a mountainside retreat can be breathtaking in more ways than one as window wall systems and large openings continue to be a dominate design trend.

However, the view from high altitudes presents a unique challenge when it comes to complying with regional energy codes.

This is where current and emerging argon “retention” technologies come in. Whether it’s “bagging” a capillary tube or using the latest pre-equalized insulating glass units, any sharp elevation change from fabrication will require some form of pressure management, ensuring that the energy efficiency of buildings remains within the increas-

ingly stringent energy specs.

Failure to use these technologies means that the thermal performance of an IGU cannot (i.e., shouldn’t) be calculated using argon and may very well leave your window system outside of the parameters set by the region.

Navigating the thin air of high-performance glass

Take, for example, a ¼-inch double-glazed IGU with a common low-emissivity coating on surface #2: without argon the U-value is 0.287 Btu/hr*ft²*F and with argon is the U-value is 0.239 Btu/hr*ft²*F. Argon contributes to a 16.73% increase in overall efficiency. This is a significant advantage in a real-world scenario.

Excluding any performance trade-offs, keeping strictly prescriptive, and assuming a window frame will arbitrarily increase the U-value of the window assembly, here are several instances where ensuring argon is retained means keeping with a double-glazed IGU versus moving to a triple-glazed IGU. For the purposes of this example, we’ll say the

Glazing Types

	Energy Star 7 – Northern 0.22 BTU / hr*ft²*F	Energy Star 7 – Northern (Performance) 0.26 BTU / hr*ft²*F	IECC 2021 (Zones 5 & 6) 0.30 BTU / hr*ft²*F	Aspen Residential 2021 0.26 BTU / hr*ft²*F
Double-glazed, no argon 0.32 BTU / hr*ft²*F				
Double-glazed argon 0.27 BTU / hr*ft²*F				
Double-glazed argon + 4th surface low-e 0.23 BTU / hr*ft²*F				
Triple-glazed, no argon 0.24 BTU / hr*ft²*F				
Triple-glazed argon 0.21 BTU / hr*ft²*F				
Triple-glazed argon + 4th surface low-e 0.17 BTU / hr*ft²*F				

1) Frame increase 0.03 BTU / hr*ft²*F 2) 62/27 or 366 low-e surface #2 3) IS20 surface #4 and #5 4) ¼-inch glass clear + ½-inch spacer

Advanced Argon Retention Technologies — Pros and Cons

	Finished at Site	Time for Site Equalization	Risks	Benefits
Pre-equalized IGU	No	None	<ul style="list-style-type: none"> • Transportation routes • Dwell time at non-site location 	<ul style="list-style-type: none"> • Allows enclosure at site immediately • Less risk of installation error
Bagged Capillary Tubes	Yes	Up to 48hrs	<ul style="list-style-type: none"> • Bag snagging or opening • Capillary tubes not capped properly 	<ul style="list-style-type: none"> • Economical and effective • Can dwell at various locations outside of the final site

window assembly is 0.03 Btu/hr*ft²*F.

Because of argon, a double-glazed IGU can be used, even in the Northern zone of the newest Energy Star 7 program.

You get the picture—argon is important, but it’s not always easy to just fill up the window.

The location where these IGUs are fabricated is important. For example, atmospheric pressure (excluding weather) at sea level is 14.7 PSI. At 2,000 feet above sea level the atmospheric pressure is 13.7 PSI (7% loss), 5,000 feet is 12.2 PSI (17% loss) and 8,000 feet is 10.9 PSI (25% loss). Thus, an IGU fabricated at sea level will attempt to “bow out” as the pressure inside can be up to 25%+ greater than the outside. The opposite is also true for fabricators at elevation.

Where the unit is fabricated has major impacts on concavity, flatness and primary seal resilience.

The issue with capillaries

The main way to alleviate concavity or convexity, and the risks that come with it, was to use capillary tubes (breather tubes). These are tried and true. The issue, however, resides in venting to the atmosphere.

How much argon is lost? In the field, this is hard to measure, if ever. This is why IGUs that undergo large elevation changes have traditionally been calculated with air opposed to argon. But as we can see in the previous diagram, performance codes are tightening the reins on capillary tube technology.

The benefits of current technology

There are a couple of options on the market, which allows one to calculate the thermal performance inclusive of argon.

- Bagged capillary tubes—Using a patented mylar bag attached to the capillary tube allows the capillary tube to inhale-exhale argon as the IGU goes through elevation changes in transport. The tube is then crimped off at the final installation site.
- Pre-equalized IGUs—A pre-equalized IGU is sealed at the plant with a pre-determined pressure appropriate for the final installation location. Often this means the glass is concave-convex leaving the facility and arrives fully flat at the final location.

Both options have pros and cons illustrated in the chart above.

In many cases, pre-equalized units offer peace of mind that the unit is fully sealed and allows for rapid install. However, shipping routes, temperature and onsite availability must be considered. If the IGU dwells in a yard much below its rated altitude and it is cold, the glass may touch due to further reduction in air density. Bagged capillary tubes are a great solution but carry some added risk that accompanies all capillary tube installation and may require dwell time at site.

As a window manufacturer, both choices provide optimal thermal performance. Being aware of each option’s

strengths and weaknesses will help navigate expectations from the homeowner, architect and window dealer.

Charting the course for an elevated world

The path to sustainable design at higher altitudes is one carved with deliberate choices and technical innovations. The desire to keep sightlines, window thickness and weight to a minimum often means relying on double-glazed IGUs. Including argon in the thermal performance calculation is pivotal in maintaining code compliance.

“The City of Aspen is a great example of a local government with a very aggressive energy code pushing high-performance windows. They recognize the beneficial impact of including argon and the current technology needed to implement it,” says Thomas Culp of Birch Point Consulting. “They want to help enable the window manufacturers, dealers and builders by saying, ‘Hey yes, you can use these new products, and we accept your thermal performance calculations because of this.’”

High altitude may be synonymous with low oxygen, but in the world of architectural glass, it’s where ideas and technologies need to breathe the most. Together with window manufacturers, leading fabricators are paving the way for better thermal performance of the overall window system. ■

Adam Mitchell is marketing manager at AGNORA.

Optimize Decarbonization through Retrofit

How a focus on existing building stock can meet carbon reduction goals

BY LAURIE COWIN

A focus on retrofitting buildings will help meet carbon reduction goals, said Stephen Selkowitz, principal, Stephen Selkowitz Consultants, during his presentation, “The Last Single-Glazed Building—Options to Update U.S. Buildings with High-Performance Windows,” at the NGA Glass Conference: Isle of Palms in February 2024.

The United Nations’ Global Roadmap outlines how the world can achieve net-zero emissions by 2050. U.S. President Joe Biden signed an executive order in 2021 to make the federal government carbon-neutral by 2050, aiming for a 65% reduction in greenhouse gas emissions by 2030. These lofty goals require big thinking, says Selkowitz.

Many fossil fuels are converted into electricity. Because 75% of electricity goes into buildings, says Selkowitz, buildings are right up there with transportation in terms of carbon emitters. Building envelopes are a huge opportunity to reduce electricity, thereby reducing carbon emissions.

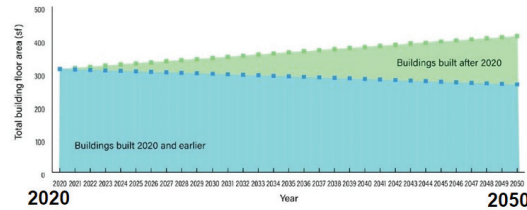
Selkowitz also differentiated between energy use and carbon emissions. A building can use a lot of energy, he says, but if it comes from zero carbon electricity, they’re not using much carbon.

Existing building stock

“Although we should pay attention to new construction, we have to look at retrofit and renovation,” Selkowitz says.

New and Existing Buildings as Share of Building Floor Area

(Residential + Commercial)



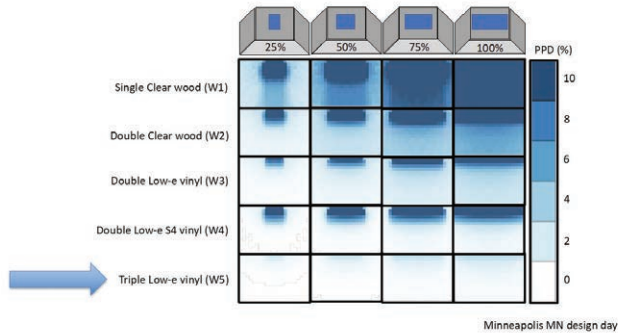
Source: ACEEE calculations based on data in EIA AEO 2020.

New construction:
1-2% of stock

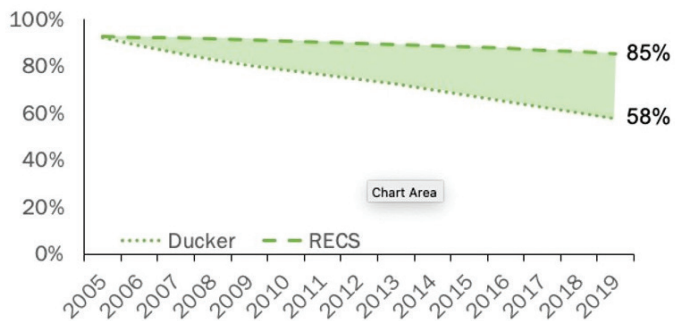
Renovation/Retrofit:
2-4% of stock

(wide variation by country, city, building type,...)

Market Drivers for Thermally Improved Window Retrofits



Current Stock - Residential Windows



* Estimate ranges derived from Ducker, RECS, and U.S. Census data

New construction is an estimated 1% to 2% of stock while retrofits are 2% to 4% of stock, he says. “If you don’t touch existing buildings today, you’ll never meet the 2050 goals,” Selkowitz asserts.

Buildings are durable. As such, there is still a lot of single glazing out there. According to data from 2020, 60% of U.S. window stock is single glazing. More than 50% of the buildings that will be in place in 2050 already exist, so we must address existing glazing Selkowitz says.

Drivers behind high-performance buildings include energy efficiency, demand responsiveness, resiliency, decarbonization and carbon/energy reduction. But building owners and occupants also prioritize cost, comfort, outdoor views, well-being, indoor air quality and productivity. “In the end, you won’t do anything people can’t or won’t afford,” says Selkowitz. “We must couple improvements in fenestration and glazing that give efficiency but deliver benefits.”

Residentially speaking, comfort perhaps is the biggest market driver for thermally improved window retrofits. Triple low-emissivity vinyl yields the highest comfort in both draft and cold radiation effects. See the chart on p. 14 for a look at comfort levels in different types of residential windows.

Also of note is that building elements age differently. Façades last an estimated 15 to 50 years, while HVAC systems last about 15 to 30 years. Therefore, a building can go through several HVAC systems in the span of one window life. “The building industry is attuned to looking at HVAC and lighting, but not as much at building envelope solutions,” Selkowitz says.

Although retrofitting and renovation can be complex and costly, there are bigger net savings to be had. One commercial example is the retrofit of the Empire State Building in 2013. The team removed 6,514 double-glazed windows and re-manufactured them on-site as triples. The triples reduced the HVAC loads so the HVAC could be replaced with a smaller, cheaper system. HVAC savings resulted in faster window paybacks.

What the industry can do

So, what can the glazing industry do to create pathways toward net-zero glass/

windows/façades? Selkowitz outlined five points.

1. Technology innovation.
2. Promote affordable, scalable, market-ready solutions.
3. Create jobs to develop these solutions.
4. Emphasize non-energy benefits such as quality of living and workspaces.
5. Have a voice in national and regional program development.

Several technology options exist, and more are on the horizon to achieve net-zero buildings. These can include façade replacement, sash replacement, glazing replacement, secondary window systems, film add-ons, shading replacement and daylighting control.

Thin glass, or skinny triples, continue to make progress. Other growing technologies include quads and vacuum-insulating glass. Aerogel continues to remain largely in the research realm. ■



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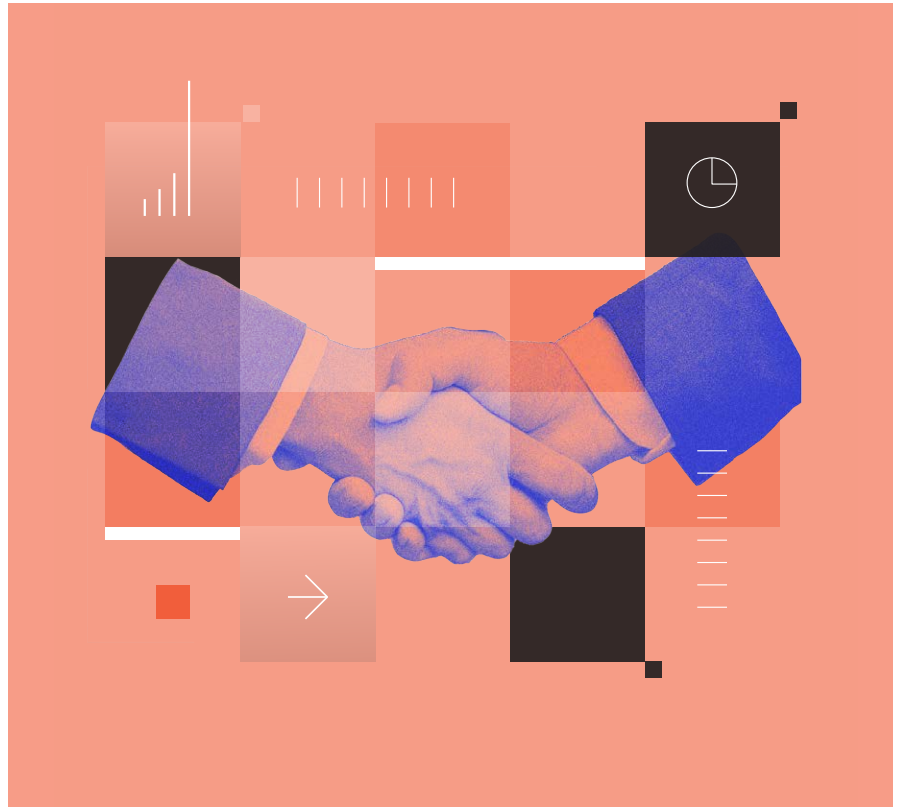
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M&A Boom: Fenestration Heats Up

The expectation of lower interest rates as a positive driver of deal activity will accelerate M&A through the remainder of the year

BY ANDREW PETRYK



THE BOTTOM LINE: M&A activity in the window and door industry has surged in 2024, with major acquisitions indicating strong buyer interest, a bullish outlook and expectations of continued growth fueled by lower interest rates.



Read more about Stately Doors & Windows on windowanddoor.com.

M&A activity in 2024 has ramped up in the building products market, and the window and door industry is no exception. Strategic interest continues to be high, with marquee acquisitions early in the year of PGT Innovations (Miter Brands) and Masonite (Owens Corning) serving as bellwethers for strong buyer appetite and a bullish outlook toward underlying fundamentals supporting industry growth.

In April, Quanex Building Products Corp. announced the acquisition of Tyman plc., parent company of AmesburyTruth. The \$1.2 billion cash and stock offer values the business at a 9.0x EBITDA multiple at transaction announcement. Quanex has identified the combination as “transformational,” significantly enhancing its scale and global reach with the addition of Ty-

man’s highly complementary offering in window and door hardware, commercial access solutions, seals and extrusions verticals. Tyman serves markets through three regional divisions (North America, UK and Ireland, and Europe). The acquisition is expected to be accretive and will bring Quanex’s pro forma revenue to approximately \$2 billion.

Private equity

Private equity has reemerged equally hungry to deploy capital with strong support from the capital markets where lenders have shown an increased willingness to fund acquisitions.

Industrial Opportunity Partners announced it was forming a new platform, IBP Solutions, through the proposed acquisition of Masonite’s Architectural division. The business

supplies doors and door systems to customers in the hospitality, healthcare, education and office industries.

Cornerstone Building Brands completed the acquisition of Harvey Building Products in April 2024. Harvey is a manufacturer of windows and doors under the Harvey, SoftLite and Thermo-Tech brands. CBB is a portfolio company of Clayton, Dubilier & Rice, which it acquired in 2022 through a take-private transaction.

Luxury brand divestments

Private equity surfaced as the buyer of luxury brand Reilly Architectural from Pella Corp. this July. Kin Capital Partners, which owns portfolio company Stately Doors & Windows (Stately), acquired the business, which specializes in turnkey custom hardwood

and steel doors and windows for luxury homes primarily located in New York (Hamptons, Manhattan) and Florida.

The acquisition marks Stately's eighth in four years under private equity ownership, bringing the company's annual revenues to \$100 million and growing its geographic footprint to nine locations in six states up and down the East Coast. Stately previously focused expansion efforts across the southern U.S. With the acquisition, Stately becomes the nation's largest ultra-luxury door and window provider according to a company statement. "We see opportunity everywhere in the ultra-luxury market, because we have scaled to a size and skillset that allows us to provide something unique to our customers," said Jude David, Stately co-founder and executive chairman.

Pella is also divesting luxury brand Duratherm. Duratherm will be sold to

management under the leadership of CEO Tim Downing. Downing previously owned Duratherm before Pella acquired it in 2016 and led the business through Pella's ownership. Duratherm is a Maine-based manufacturer and designer of custom hardwood windows and doors serving builders and architects.

A strong end to 2024

We expect M&A to accelerate through the remainder of the year, particularly with the expectation of lower interest rates as a positive driver of deal activity given the lower cost of growth and acquisition financing. BGL's active pipeline of deals in the building products industry is another solid indicator of market strength. Our current clients—which include a mix of residential and commercial building products companies, some of which are window and door

businesses—represent a cross-section of entrepreneurially and family-owned as well as private equity-backed sellers for which we anticipate strong interest from both strategic and private equity buyers. ■

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Continuous Improvement, Continuous Investment

When considering your company's capital expenditures, weigh the associated positive and negative outcomes

BY MELANIE SCHERER



THE BOTTOM LINE: When evaluating capital expenditure decisions, window and door companies should carefully consider warranty terms, performance expectations and the need for equipment or software optimization to protect their continuous improvement goals.

As lawyers for window and door companies, we spend a lot of time pondering the nuances of damage limitations and exclusions relative to claims for products as assembled by manufacturers. Contemplating your company's own capital expenditures can present a different sort of challenge when weighing contractual provisions and determining potential impacts to your company's investments. Here, we will cover three important considerations for any window and door company to consider when evaluating a potential capital expenditure (capex) transaction.

1. Warranty and managing risks

When it comes to warranty terms and protections, it's certainly not an apples-to-apples comparison when shifting the focus to warranty coverage

for your capex investment. While a typical fenestration product warranty may offer terms and exclusions that make sense to address a straightforward window or door product issue, the same can't be said for protections offered to your company's capex purchase.

The potential for significant exposure can arise from even a small deviation with far-reaching consequences. For example, you acquire new equipment to integrate into your manufacturing processes. What if something goes wrong? What avenues are offered for resolution? What protections are in place to make your company whole in the event there is an issue causing defects or delays in your manufacturing process? Be careful to consider the "what ifs" that may get lost in the excitement of a new acquisition.

With large expenditures, there is usually more room to negotiate those protections and resolutions to address your specific concerns. Never assume what will happen if something fails to work as anticipated; instead, identify the potential risks and points of failure in advance, and include the avenues to resolve those issues to eliminate uncertainty as much as possible.

2. Identify and negotiate performance expectations

Like warranty considerations, any major expenditure will be made with the expectation that a certain level of performance can be achieved and provide for contractual resolutions should those targets not be possible. Negotiating that performance into your contract should be part of such transactions regardless of the nature of the capex investment.

3. Do your homework—further invest in your investment

A new piece of equipment or software may boast all kinds of bells and whistles, but typically even the best capex investment is not a plug-and-play situation. Take the time and make further investment to ensure this new asset is optimized to meet your company's actual needs. A thorough internal review and implementation should be undertaken to identify what will be required to achieve the full potential of your new investment, both before and after the capex transaction occurs. Sometimes this can be done through allocation of internal resources to make the appropriate determinations and return on investment analysis.

A more significant capex investment may benefit from retaining external input if specific expertise or analysis is needed, particularly for software and technology investments that could have widespread impacts on your company, considering the actual day-to-day impacts to the ultimate users.

Enticing upgrades and new technologies are investments that must be made with care. Never back off from negotiating for the specific protections you require for your company. Full consideration of the positive and negative outcomes that should or could arise from moving forward with those investments is essential to protecting your company's goal of continuous improvement. ■

Melanie Scherer is an attorney with the Gary Law Group, a law firm focusing on legal issues facing manufacturers of windows and doors.

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¹Comparison of R-values of fiberglass to wood doors (both without glass). ²2023 Builder Brand Use Study conducted by Zonda.

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Sean Hummel (center) works with student interns at Quanex.

A WINDOW INTO

Higher Ed

Industry companies establish relationships with higher education at the local, national and global levels to advance the industry

BY LAURIE COWIN



T

he building products space is ripe with opportunities for innovation in materials, products and manufacturing. A swell in companies involved with universities to further research and development further bolsters the fenestration's commitment to future- and forward-thinking solutions.

YKK AP America is one such company developing relationships with universities at the local, national and even global level. "Like many in our industry, we are finding universities and schools are great sources of not only talent but also solutions to business problems," says Ray Shelton, vice president of sustainability and communications, YKK AP America.

Local benefits

One of YKK AP's relationships is with Mercer University near Macon, Georgia, where YKK AP recently opened its \$125 million residential manufacturing facility. YKK AP America signed on as the inaugural gold member of the Mercer Corporate Partners Program with an annual gift commitment to support the Stetson-Hatcher School of Business, the School of Engineering, and the Center for Career and Professional Development, according to a release on Mercer's site.

As part of this, YKK AP will gain the highest level of access to Mercer career events, membership in the university's Enterprise Learning Partnership program and other special student/faculty access with the business and engineering schools.

Shelton says the opportunity with Mercer aligned perfectly with the company's investment in its Macon manufacturing plant and signals the company's ongoing commitment in the middle Georgia area. The benefits are two-fold. First, he says, is the benefit to Mercer of developing relationships with employers and areas of study within the university.

"Providing our business and engineering students special access to these corporate partners means they will be exposed to the latest in manufacturing technologies and business practices," says Dr. Julie Petherbridge, dean of the Stetson-Hatcher School of Business. "We cannot think of a better way to prepare them for the world of work and their future endeavors."

Secondly, YKK AP employs engineers. Shelton notes it can be difficult to hire enough skilled em-

ployees, particularly in the middle Georgia region.

"We really want to make sure we're tapping into a pipeline of talent early and the developers of those talent—colleges and universities," Shelton says. "Mercer and other universities are interested in understanding what our need is both from a people perspective and a business perspective. We want to understand how we can mutually develop programs to solve our needs." Shelton continues that the YKK AP is interested in developing internship and mentorship programs.

At the enterprise executive team level, Shelton hopes this relationship with Mercer will serve as a good model for partnerships with other educational institutions. Already, YKK AP has other targeted relationships, including one with Middle Georgia State University where they tackle specific skills management gaps. If current and future employees don't have a good skills match for a particular plant or line, then YKK AP aims to have a developmental program in place to nurture the needed skills. Shelton explains a company needs to take inventory of what gaps exist and how to fill them as a part of the developmental process to know what skills to focus on.

A reciprocal relationship

Qualex connected with the University of Akron in 2018 to start an internship program for the dual benefits of being part of the community and developing a wider talent base in its core competencies. Mechanical and chemical engineering were Sean Hummel's, Qualex's director of research and development, first two interests; the scope of the relationship spread from there. "We connected with a few of the professors, and it made sense to start working with them," he explains. "They have a lot of equipment and instruments we don't have, and vice versa. Currently, we have two projects with the University of Akron that are very forward-looking, very material science related. Exploration, if you will."

On the marketing side, Cristina Murray, director of marketing, Qualex, attended a luncheon where Qualex CEO George Wilson received an award, which led to discussions between Murray, the business school dean, the marketing department chair and more. The school ultimately asked Murray to give a presentation about B2B marketing,

which many students are unaware is an option.

Manufacturing opportunities abound in Akron's Rust Belt location. "I want to really make [the students] think differently about manufacturing," Murray says. They ultimately did a Project Runway-type challenge in the classroom where students learned about Quanex and then presented solutions to real-world challenges. The final three teams presented to George Wilson, CEO; Kim Garcia, director of global HR; and Murray's team. "It was an awesome experience for them," says Murray. "They really had to apply everything they learned about the company and give us suggestions for recruiting the future. It was also great for us to know what was top of mind for students."

It's a two-way street. Not only do the students learn from the professionals at Quanex, but Quanex learns from the students and has gained solid interns. "We have to work as a united front within this industry to really help them see the wonderful possibilities that are out there for them," Murray explains.

"A large piece of this is getting with the universities to educate them on who we are," says Hummel. "It's neat to help them get excited. Every one of the projects with the university have at least one student researcher on it; they're the ones primarily doing the work. It's so cool to see how young kids think these days. It's very creative."

Hummel notes the importance of pairing students' intellect and creative thinking with manufacturing's modern hurdles. "That marriage winds up being pretty important," he says. Creativity lies in problem-solving. The rules of chemistry still apply with polymer science and engineering, but how to get from point A to point B can differ. Hummel likens it to mixing a cake. The ingredients remain static, but the order in which the ingredients are added, and the method in which they're mixed can drastically alter the outcome. "There are rules of play," he says, "but not one way to do it right. You look at the freedom of understanding cause and effect, then push the boundaries of how you get there."

Hummel views it as his job to show



Top: YKK AP participates in career fairs to gain talent and educate students about opportunities. **Above:** YKK AP's Macon facility hosted a mini summer logistics camp at Middle Georgia State University so students could learn about logistics rules from Macon's professional team.



an intern what the industry is about. “I was asked once what I require from an intern,” he recalls. “The answer is ‘nothing.’ I went into it wanting to give something. I view it as my job to show them what the industry is about. They come here and have projects to work on and fail if need be. But we guide them, they make all the decisions, and they get to do it. We’re looking for free thinkers.” And the stats speak for themselves: all three of Hummel’s interns returned to work for the company.

Global Perspective

Partnering with local higher education has obvious and targeted benefits, but local institutions aren’t the only options. Earlier this year, YKK AP Inc. announced its support for a Harvard University Graduate School of Design research program in Kurobe City, Toyama Prefecture, and Kyoto City,

Kyoto Prefecture, Japan. The initiative aims to explore design solutions and foster cross-cultural exchange in landscape architecture, urban planning and design, and environmental sustainability. Two research periods will focus on “Resilient Design in Local Cities” and “Advanced Landscape Architecture Measures for Environmental Issues.”

YKK AP aims to contribute to advancing sustainable urban development practices while fostering meaningful connections between academia, industry and local communities, according to a news release. Employees will gain exposure to cutting-edge research, interdisciplinary collaboration and real-world challenges that ultimately will enhance the company’s internal capacity to innovate, problem-solve and develop practical applications of sustainable design principles in the built environment.

Shelton notes the research locations in Japan, where YKK AP’s headquarters are, and the U.S.-based Harvard allow the company to tap into different pieces of the global enterprise. “We are very much a U.S. business with YKK AP America, but we have the benefit of being tapped into the global enterprise, which has that deep set of roots in terms of design and an organizational size and structure that allows for this level of investment and commitment to a multi-year program,” says Shelton.

Shelton says the company’s founding principles are sustainability themed and what they call the “cycle of goodness,” or “the idea of always giving back into society, the environment or nature. No one benefits without rendering benefits to others.”

Research and technology

In yet another university relationship, YKK AP Technologies Lab opened its 7,576-square-foot research and development center in July in Pittsburgh in partnership with Carnegie Mellon University. YKK AP and CMU have partnered since 2020.

The lab will focus on R&D around new and emerging technologies, as well as the digital transformation of YKK AP Inc.’s business and construc-

tion in general. The company intends for a “virtual factory” to create enhanced efficiencies in the production and installation of YKK AP’s windows and doors, as well as improve logistics and global management systems.

During the lab’s grand opening, CMU students and YKK AP hosted a dynamic demonstration showcasing how advanced robotics can automate installation of core components of a building. “Our goal as an organization is to improve construction productivity and quality through the research and development of virtual reality, augmented reality and mixed-reality technologies,” says Fukada Shiori, chief digital officer, YKK AP Technologies Lab (NA) Inc., in a news release.

“The entity is really a laboratory for study,” explains Shelton. “The goal is very much technology, research and development oriented. A big goal was to place it in a location that would foster really great relationships with research; CMU is a preeminent institution in that space.”

Because it’s such a new entity, Shelton says there is a lot of flexibility for its future. “They went into it with a wide-open mandate with what it can be,” he explains. Efforts right now revolve around maximizing how to partner with CMU and leverage research opportunities.

Beyond partnerships

Opportunities abound beyond official partnerships. Design challenges, such as those through organizations like SkillsUSA, provide opportunity for involvement. Companies can also offer themselves as subject matter experts, judges or mentors for schools.

Shelton also speaks to the ability to provide opportunities for underrepresented communities in the architecture, engineering and design space. “Leadership roles in the communities in which we operate are very important in terms of our guiding principles and philosophy,” he says. “Give underserved communities and youth a view of areas they may not have known were opportunities to explore. We see it as our responsibility to provide those opportunities and shine a light.” ■

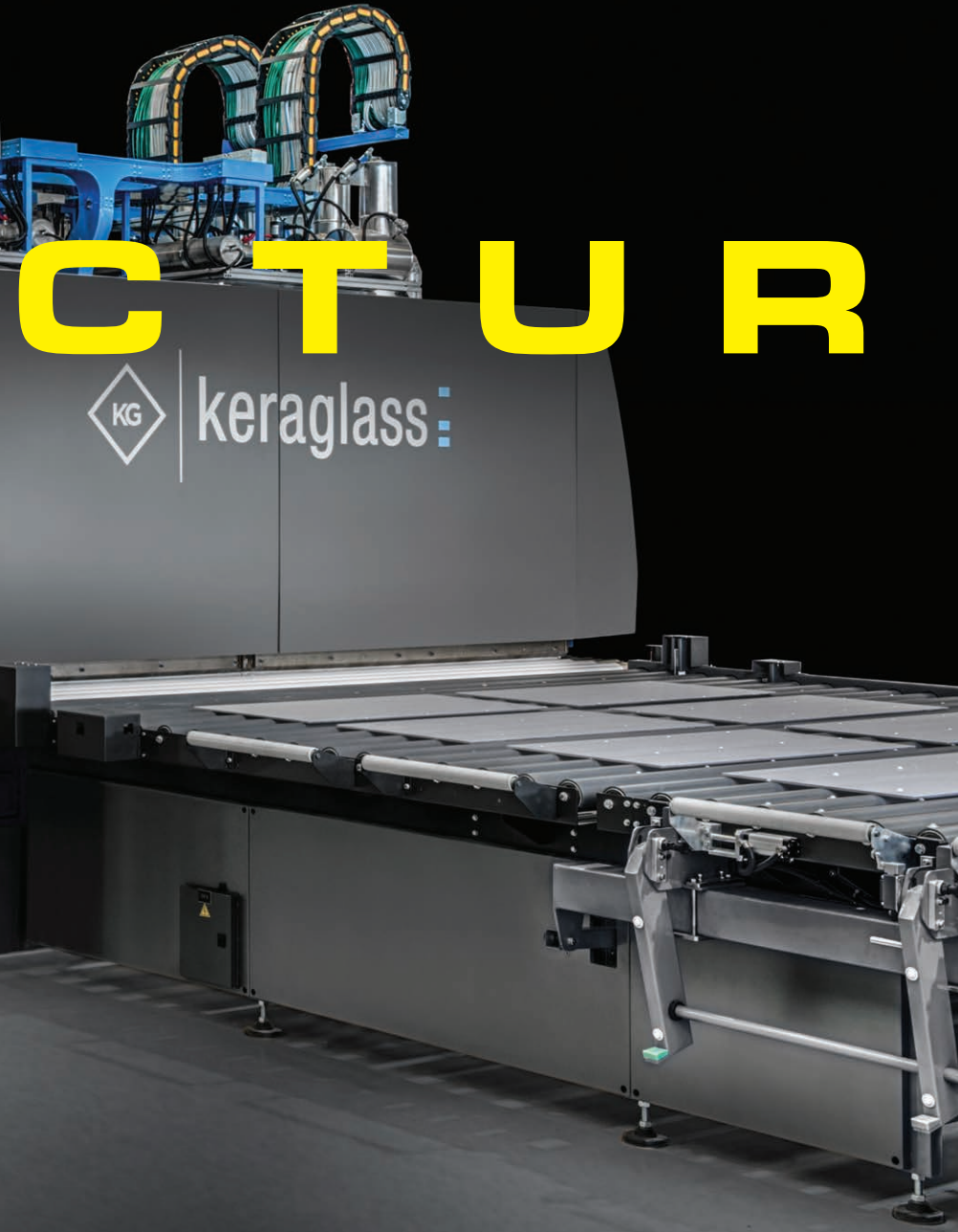
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MANUFACTURA

The fenestration industry is taking control and reshaping automation by adopting in-source manufacturing to boost efficiency, grow customization and enhance resiliency

BY TARA LUKASIK

The Vision 800 oscillating tempering furnace offers customizable solutions for architectural glass. Photo: Keraglass Srl



The adoption of automation in the fenestration industry is accelerating as demand for windows and doors remains robust and the labor market remains tight. Companies are increasingly turning to automation to manage diverse product lines. This shift has led to a greater need for efficient material handling, heavy-lifting capabilities and machinery that can accommodate new product innovations. High-speed automation is becoming essential for manufacturers to maintain productivity and meet market demands.

In March, John Burns Research and Consulting reported that 19% of residential window and door companies expected to focus on production automation in the next 12 months. And at the beginning of the year, Window + Door's 2024 Industry Pulse reported that 41% of residential fenestration companies plan to invest in purchases and upgrades of machinery to free up available labor for more value-added tasks, a 38% difference increase from last year's survey.



ASC Econoclave systems offer precise, high-quality lamination with reduced operating costs. Photo: ASC Process Systems

SUPPORTING INCREASED PRODUCTION

An increase in automation can influence the decision to bring manufacturing operations in-house. If the benefits of reduced labor costs, improved efficiency and quality control outweigh the costs of setting up and maintaining in-house manufacturing facilities, companies might find it more economically viable to bring production in-house. In-house manufacturing can also allow for quicker customization and shorter lead times, greater control over product development and customization, reduced reliance on external suppliers and risk of supply chain disruptions, and protection of proprietary information and processes. It can even elevate safety by reducing human touchpoints.

In Window + Door's 2024 Top Manufacturers Survey, three-quarters of respondents indicated they already fabricate insulating glass units in-house, and almost two-thirds have other in-house operations, including extruding, laminating, tempering and more. Most already use automation in their business and two-thirds plan to add more in the next year.

In particular, the insulating glass production market is projected to double in both size and value within the next six years, according to Business Research Company, with the largest surge coming from growth in residential construction. And as the need for more multi-unit properties grows, residential construction will continue to drive demand for insulating glass windows.

"Triple-glazed windows will continue to be a discussion point and focus

for future growth," predicts Morgan Donohue, president, Erdman Automation Corp., in the 2024 Industry Pulse. "[There will be] constant improvement for product performance on the window side."

STRATEGIC IN-HOUSE AUTOMATION

In speaking to the benefits and drawbacks from doing more in-house rather than outsourcing, Laura Phillips, vice president of engineering, Pella Corp., says numerous options must be considered. "Our vertical integration strategies are considered capability by capability. Each time we decide to make instead of buy, we consider the impacts across the value chain," says Phillips.

"At Pella, this decision is about more than just cost. We answer questions like whether the capability aligns with



The Turbo-CL ContourLine welder offers seamless welding on visible surfaces. Photo: Sturtz Machinery Inc.

our organizational strategy; whether in-sourcing reduces organizational risk; whether we can produce it efficiently, safely and with high quality; whether we have an accessible workforce; and whether it will contribute to our profitability. Each decision must be weighed carefully, as there are pros and cons with every make-or-buy scenario.”

The current state of the industry, characterized by supply chain disruptions and labor shortages, is compelling organizations to adopt a more in-house manufacturing approach, says Bruce Wesner, senior director of automation and reliability, MITER Brands. “Recent supply chain issues and availability of skilled and production labor shortages are driving organizations to vertically integrate (in-source) more into their manufacturing strategies to be able to ‘control

MACHINERY AND AUTOMATION

Added production capacity in 2023

57%

Plan to add capacity in 2024

71%

Use AI in the business

16%

Source: 2024 Industry Pulse

the controllable’ more effectively,” says Wesner. “Building a capable internal team to support new processes and advanced technology is critical. Adding automation to offset operations labor challenges that drive safety, quality and productivity needs to be central to in-sourcing. Developing an internal support team along with partner OEMs that work closely to ensure optimum productivity is essential.”

A large segment of the market is already heavily invested in automating insulating glass unit manufacturing to meet the growing market demand. “Alpen is making the most significant equipment investments in its history to automate and significantly scale thin-glass triple- and quad-pane insulating unit glass manufacturing capacity,” says Tim Maierhofer, chief operating officer, Alpen High Performance Products.

“Our motivations for investing in this automation are centered on a desire to ‘meet the market moment’ by allowing the company to feed thin-glass IGUs to window and door manufacturers interested in this solution for their own product lines. Window and door manufacturers need short lead times and reliable suppliers producing high-quality products that can keep up as their demand grows.”

IN-HOUSE LEARNING CURVES

A significant labor shortage has the fenestration industry looking to attract and retain younger talent. Companies must prioritize ergonomics, automate repetitive tasks so employees are free to perform more value-added functions, and offer engaging, technology-based work environments. In-house work offers engaging opportunities for those businesses willing to address learning curves, offer additional training or enact strategies to manage the transition.

“In-sourcing processes and adding automation always come with challenges. Simple things like assuring adequate initial and ongoing training are planned and executed, along with making sure appropriate critical spare parts are available to drive equipment uptime and availability,” says MITER’s Wesner. “The use of new technologies like augmented reality service support is relatively new and can be critical to provide visual assistance to technical support teams that may not be able to be directly hands-on with equipment downtime events. The AR technology can also be used to teach maintenance and automation team members who may not have all the skills or competency needed to do the work.”

For Pella, automation has been an effective tool to improve the experiences of both customers and team members. “It has helped Pella become more reliable for our customers and has made difficult manufacturing jobs easier, resulting in improved team member engagement and retention. With more automation in our plants, our team has focused on elevating technology acumen through training

LABOR

21%

Report more difficulty finding workers in 2023, compared to 50% in 2022

91%

Plan to hire new workers in 2024, compared to 84% in 2023

34%

Recruitment is the biggest labor challenge, compared to 53% in 2023

Source: 2024 Industry Pulse

to extract value from the automation and to sustain and improve it over time,” says Pella’s Phillips. “We have also built teams with deep technology expertise to develop and deploy automation across our operations. In many cases, these capabilities allow us to be more proactive in our decisions about what we can insource.”

“Because of the increase in equipment complexity created by automation, Alpen has added management leadership and engineering skills experienced in automation and controls programming,” adds Maierhofer. “Alpen has also committed to partnering with local educational institutions offering technical degrees by setting up robust internship programs with students to develop skills in areas like CNC programming and controls.”

QUANTIFYING INVESTMENT AND ROI

Companies invest substantial capital into automated machinery and, as such, return on investment is an important calculation. Many expect to see it within 24 months. The decision to bring manufacturing in-house can be influenced by initial investment costs, technological advancements, industry trends and global economic

conditions, which can vary by company and individual circumstances.

Automation and retirement of old equipment are the two main growth areas in 2024, according to Mike Biffi, vice president of sales and marketing, Sturtz Machinery, who spoke in the 2024 Industry Pulse about the upcoming need for machinery manufacturers to modernize their manufacturing 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,” says Biffi.

“Achieving ROI is always the goal,” says Wesner. “We have seen improvements in safety by eliminating the human factors of lifting heavy materials, repetitive trauma, etc. And we have seen significant savings on the quality side, too, by having the new technology and automation improve processes, yielding improved first-pass quality and significant improvements in field warranty defects.”

“To the extent of making the case for investments, Alpen has done extensive work to model expected returns on investment for equipment being added to the company, but validating those models isn’t yet applicable to Alpen as our investments are largely coming at us now, or will in the near future,” says Alpen Chairman Brad Begin. “Based on our experience to date, however, we are confident our conservative assumptions are likely to exceed expectations—particularly on the demand side of the equation.”

Pella sees automation adding value across many operational categories including safety, quality, delivery, profitability and team member engagement. “A few key principals we use to guide decision-making on automation include not automating bad processes and making sure the opportunity or problem to solve is clear,” says Phillips. “We believe that robust operational processes and culture enabled through technology unlock maximum value.”

Investing in in-house manufacturing remains a solid strategy for any manufacturer looking to optimize their outputs with the right equipment and processes. ■

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TEAMS

HOW TO LEAD TEAMS
THROUGH REVERSE MENTORING
BY STEFANIE COUCH

As a millennial woman who has spent years in the trenches of the building materials industry, I've seen firsthand the challenges and opportunities that come with being a part of and leading a diverse, multigenerational team. Now, as the owner of Build Women and Grit Blueprint, I'm passionate about sharing the lessons I've learned to help others succeed in this dynamic and growing industry. ►

STEPS TO SUCCEED IN THE FENESTRATION INDUSTRY

1. Understand generational differences

Before we can effectively lead, we need to understand the unique perspectives and experiences that each generation brings to the table. From the seasoned veterans of the baby boomer generation to the tech-savvy Gen Y (millennials) and the ambitious Gen Z newcomers, each group has its own strengths and communication styles.

Baby boomers, born between 1946 and 1964, are recognized for their strong work ethic and commitment to their careers, favoring face-to-face communication and a more hierarchical approach to leadership.

Following them, Generation X, born between 1965 and 1980, is characterized by a pragmatic approach to work, valuing independence and a healthy work-life balance, while adeptly bridging the gap between analog and digital technologies. Millennials, born between 1981 and

1996, are marked by their comfort with technology, a strong desire for work-life balance, and a preference for collaborative and less hierarchical leadership styles. Generation Z, born between the late 1990s and early 2010s, integrates their status as digital natives with a pronounced emphasis on flexibility, mental health and personal well-being, seeking work environments that support remote opportunities and adaptable schedules.

2. Embrace diversity

While these generational differences can sometimes lead to misunderstandings or conflict, they can also be a source of strength and innovation. By embracing the diversity of our teams, we can leverage the unique skills and perspectives of each generation to create a more effective and dynamic workforce.

For example, the technological savvy and new ideas of millennials and Gen Z can help to modernize processes and improve efficiency, while the experience and industry knowledge of the

baby boomers and Gen X can provide valuable insights and guidance. By fostering a culture of mutual respect and collaboration, we can create a team that is greater than the sum of its parts.

3. Build effective communication

One of the key challenges in leading a multigenerational team is communication. Each generation has its preferred communication styles and methods, and what works for one group may not work for another. As leaders, it's our job to bridge these gaps and create an environment where everyone feels heard and understood.

This might mean adopting a variety of communication methods, from traditional face-to-face meetings to emails, text messages, Slack and even social media. It also means being aware of our own communication biases, and trying to understand and accommodate the preferences of our team members.

4. Listen actively

Effective communication isn't just about speaking; it's also about listening. Active listening involves not only hearing what someone is saying but understanding and empathizing with their perspective. This focuses on not listening to "respond" and truly listening to what others are saying. This can be particularly important when dealing with generational differences, as it allows us to understand the underlying values and motivations that drive each group.

By practicing active listening, we can build stronger relationships with our team members, foster a culture of mutual respect, and create a more inclusive and effective team.

5. Adapt leadership styles

Just as each generation has its own communication preferences, they also have preferred leadership styles. As leaders, we need to be flexible and adaptable, adjusting our approach to meet the needs of our team.

This might mean adopting a more hierarchical style with baby boomers, who often value clear roles and responsibilities, while taking a more collaborative

approach with millennials, who tend to prefer a more egalitarian leadership style. By understanding and adapting to these preferences, we can create a more effective and harmonious team.

6. Empower each generation

One of the most effective ways to lead a multigenerational team is to empower each generation to contribute in their own way. This might mean leveraging the technological or creative skills of the younger generations to drive innovation, while drawing on the experience and wisdom of the older generations for guidance and insight.

By recognizing and valuing the unique contributions of each generation, we can create a culture of mutual respect and collaboration, where everyone feels valued and empowered to contribute to the success of the team.

Leading a multigenerational team in the building industry can be challenging, but it can also be incredibly rewarding. By understanding and embracing generational differences, building effective communication and adapting our leadership styles, we can create a dynamic and effective team that leverages the unique strengths of each generation. One way to work effectively with multigenerational teams is to implement reverse mentoring.

DIVING INTO REVERSE MENTORING

Before we delve into the benefits of reverse mentoring, it's important to understand what it is. Reverse mentoring is a concept where younger employees mentor their older colleagues. This is a shift from the traditional mentoring model where the older, more experienced employee mentors the younger one.

This innovative approach to mentoring was first popularized by Jack Welch, the former CEO of General Electric. He recognized the potential of younger employees to teach their older counterparts about technology, and thus, the concept of reverse mentoring was born.

WHY REVERSE MENTORING?

Reverse mentoring is not just about

teaching older employees how to use the latest technology. It's about fostering a culture of mutual respect and understanding. It allows both parties to learn from each other, breaking down generational stereotypes and promoting a more inclusive workplace.

For instance, in the construction and building materials industry, a place where labor and training are constantly a hot topic, reverse mentoring can help bridge the gap between the old and new ways of doing things. Younger employees can share their knowledge about the latest construction technologies, while older employees can share their experiences and insights gained over the years.

Now that we know what reverse mentoring is and why it's important, let's explore the benefits it can bring to your organization.

1. Continuous learning

First and foremost, reverse mentoring promotes a culture of continuous learning. I have seen the wide benefits of a "spirit of curiosity" in my life and career. It encourages employees to stay curious and open-minded, fostering a growth mindset. This can lead to increased productivity and innovation.

2. Breaking down stereotypes

We all tend to think more highly of our "generation" and the natural way we function at work. Reverse mentoring can help break down generational stereotypes. It allows both parties to see each other as individuals, rather than just members of a particular generation. This can lead to improved communication and collaboration, creating a stronger work culture.

3. Building stronger relationships

Reverse mentoring can also help build stronger relationships between employees. By spending time together and learning from each other, they can develop a deeper understanding and appreciation for each other. This can lead to improved teamwork and a

stronger sense of community within the organization.

In the construction industry, where teamwork is crucial, this can be particularly beneficial. It can help create a more cohesive team, leading to improved project outcomes, safer jobsites and higher profits.

STEPS YOU CAN TAKE

You might be wondering how you can implement this practice into your organization.

1. Identify the goals

The first step in implementing reverse mentoring is to identify the goals you want to achieve. This could be anything from improving technological literacy to promoting a more inclusive workplace. By having clear goals, you can tailor your reverse mentoring program to meet these objectives.

2. Select the right mentors

The success of a reverse mentoring program largely depends on the mentors. Therefore, it's important to select mentors who are not only knowledgeable but also patient and understanding. They should be willing to share their knowledge and learn from their mentees.

3. Provide training

While younger employees may be tech-savvy, they may not have the necessary skills to be effective mentors. Therefore, it's important to provide them with the necessary training. This could include training on how to communicate effectively, how to give constructive feedback and how to handle difficult situations.

Reverse mentoring is a powerful tool that can help bridge the generational gap in the workplace. It promotes a culture of mutual respect and continuous learning, leading to a more inclusive and productive workplace. So why not give it a try in your organization? You might be surprised at the positive impact it can have. ■

Stefanie Couch is a leader in the construction industry, heading Build Women and Grit Blueprint.

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01



03



02

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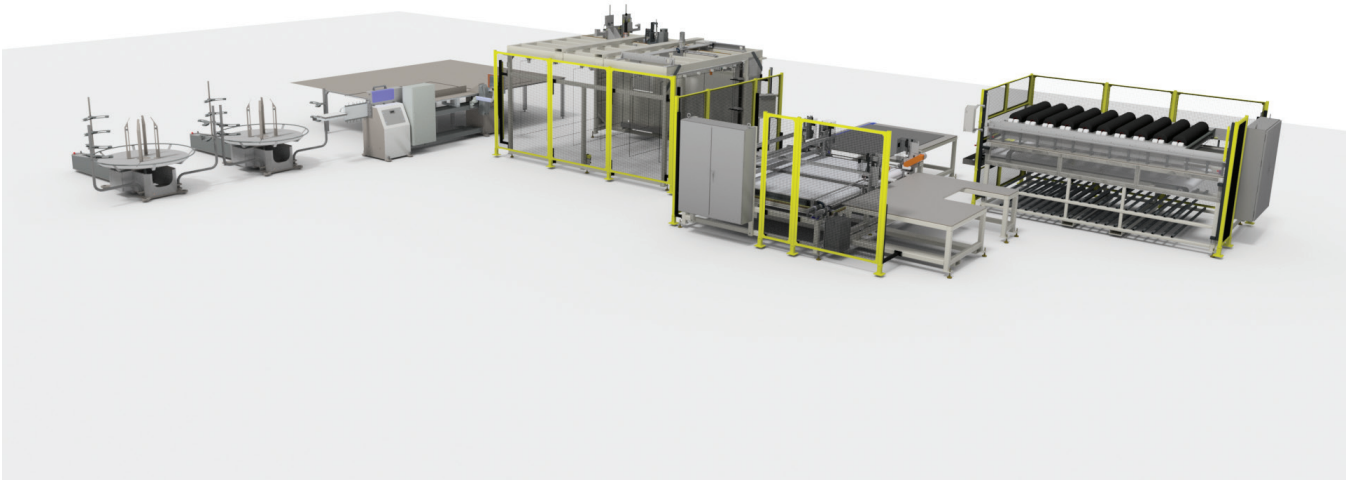
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Challenge

Since introducing FlexScreen, manufacturers have expressed great interest in increasing productivity and decreasing costs by making it themselves. Although FlexScreen knew this would be the evolution of their product, the process was not simple or efficient enough for that to happen—until now.

Solution

FlexScreen worked with Erdman Automation Corp., the premier automation company

in the window and door industry, to design and build an almost fully automated manufacturing line for FlexScreen.

What used to take an entire production crew can now be done with four people in less than 1,500 square feet of space. Smaller, less automated lines are also available. Erdman's genius engineers delivered what is quite simply the fastest, most efficient window screen line in the world, and now it's available to every window manufacturer.

FlexScreen appeared on U.S. business reality television series Shark Tank in 2020, winning a deal with inventor and entrepreneur Lori Greiner. "FlexScreen is one of the most innovative household products we've seen on Shark Tank," says

Greiner on the FlexScreen automated window screen line and FlexScreen/Erdman partnership. "Licensing the manufacturing technology was the next logical step in making FlexScreen the industry standard. I'm excited to be a part of history in the making and proud to partner with Joe and his amazing team."

For more information, visit erdmanautomation.com, 763/389-9475, and flexscreen.com, 888/983-3539. ■

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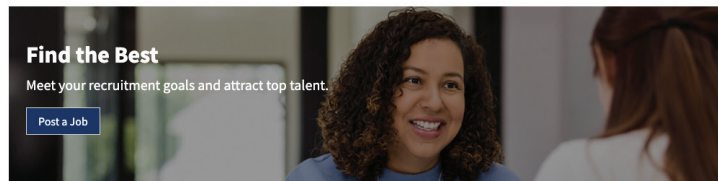
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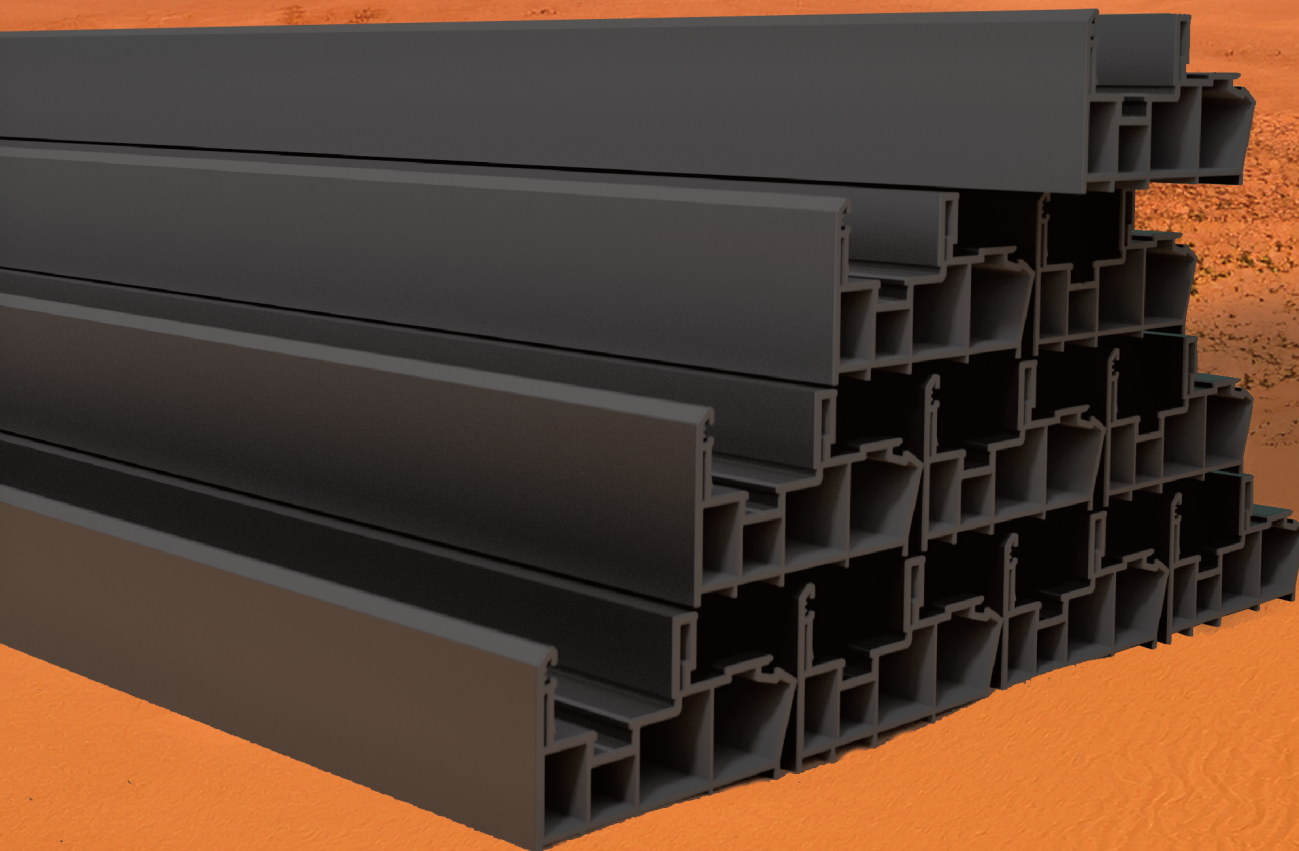
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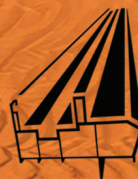
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Vista Series 4000 windows installed at Levant Senior Cottages. Photo courtesy of Crystal Pacific Window & Door Systems.

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ENERGY-EFFICIENT WINDOWS OFFER CONTEMPORARY STYLING, EASY OPERATION, AND DAYLIGHTING AND CLIMATE COMFORT FOR SENIOR RESIDENTS.

Project: Levant Senior Cottages in San Diego, California.

Products: Crystal Vista 4000 sliding, picture and trapezoid shape fixed vinyl windows.

Description: The Levant Senior Cottages in Southern California offer an affordable response to

the urgent need for senior housing. The community includes 127 studio and one-bedroom units in 18 single-story, five-unit buildings and two elevator-serviced, two-story buildings.

Crystal Pacific Window & Door Systems, the West Coast production affiliate of Crystal Window & Door Systems, supplied

over 400 of its Vista 4000 energy-efficient vinyl windows, all glazed with dual-pane tempered 3/4-inch insulating glass units using Cardinal low-emissivity coating, warm-edge spacing systems and argon gas filling. With narrow sightlines, all the window frames and sashes were extruded with white vinyl.

"The affordable housing market is critically important, and Crystal's energy-efficient windows and doors are perfect for these projects," says Steve Chen, president, Crystal Windows. "We are proud to supply affordable housing developments such as Levant Senior Cottages all across the country." ■

Modern Muntins

By Tammy Schroeder

Architectural glass was available only as plate glass in the 19th century, or as sheet glass in the first half of the 20th century. Muntin grids were introduced to facilitate larger glazed areas for natural daylighting. With the advent of the float glass process after World War II, available glass size reached 7 feet or more in each dimension, but the aesthetic of the muntin grid's appearance remained a desirable feature for traditional architectural designs.

For aluminum-framed window and door systems, architectural finishes offer an economical option to replicate historic copper and zinc, and a safer way to mimic lead. Finished aluminum also can offer the appearance of old steel framing or putty and wood-framed windows without the maintenance.

Applied and between-glass muntin grids generally are finished separately from the framing members. This offers the choice of finishing the grids to match the framing or selecting a different color or finish type. For example, between-glass muntins will never be touched and could have a lower performance finish. In contrast, applied grids are very likely to be touched, and require a higher performance finish.



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