

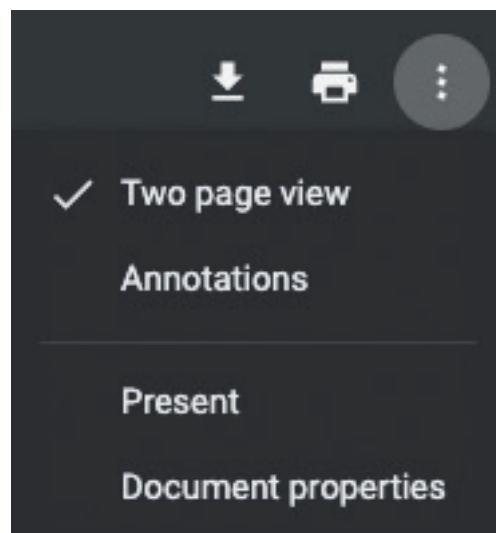
GLASS MAGAZINE®

THE GLASS AND GLAZING AUTHORITY

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THE GLASS AND GLAZING AUTHORITY • MARCH 2023

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INTERNATIONAL

Women's Day



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On this International Women's Day, Glassfab Tempering Services would like to extend our sincerest appreciation to all the amazing women in our organization. Your hard work, dedication, and contributions are truly invaluable and have helped shape our company into what it is today. You are a source of inspiration, and we are proud to have you as part of our team.

At Glassfab, we recognize and value the unique perspectives and skills that each individual brings to the table. Your contributions to our company are immeasurable and we are grateful for the daily impact you have on our success. We believe in creating a supportive and inclusive work environment where all can thrive and reach their full potential.

On this special day, we celebrate the achievements and accomplishments of all the women at Glassfab and continuously foster a culture of gender equality in all aspects of our business.

Here's to another year of celebrating the strength and empowerment of women everywhere.

Happy International Women's Day!



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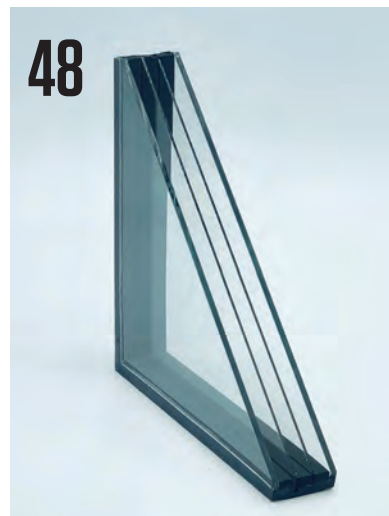
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On the cover: The striking blue glass-clad 67-story Fontainebleau Las Vegas is set to open during the fourth quarter of 2023 following more than 15 years of uncertainty. Construction for the hotel tower began in 2007, and the project topped out in 2008. However, the tower became a symbol of the Great Recession, with work stalling on the job in 2009, and the project going into Chapter 11 bankruptcy. It sat idle and unfinished on the Las Vegas strip for more than 10 years as the project underwent several ownership changes, before Fontainebleau Development and Koch Real Estate Investments purchased the tower and restarted construction. Located on Las Vegas Blvd. adjacent to the Las Vegas Convention Center expansion, Fontainebleau Las Vegas will feature 3,644 luxury hotel rooms and 550,000 square feet of convention space. Photo by Mark Mediana DREX Agency.



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TECHNICAL RESOURCE

Review the updated GANA Glazing Manual, International Year of Glass Edition

HISTORIC ANNIVERSARY

NGA celebrates five successful and productive years of its NGA-GANA combination

ONSITE

Updates from the BEC Conference 25th anniversary, March 5-7 in Las Vegas

GLASSBLOG



SAFETY

Tips for Working in Cold Weather

By Rachel Vitello, Glass Magazine, NGA



BEC CONFERENCE

Update from Vegas

By Max Perilstein, Sole Source Consultants



PROJECT MANAGEMENT

3 Crucial Lessons

Matt Verderamo, Alliance Exterior Construction

EVENT COVERAGE

On-site industry event coverage featured in Glass Magazine Weekly and on GlassMagazine.com. Pictured: The 2023 Fenestration and Glazing Industry Alliance Annual Conference, held in February in Coronado, California.



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PROJECT SHOWCASE

Lincoln Center's David Geffen Hall

New York, NY



The new Lincoln Center David Geffen Hall, designed by Diamond Schmitt and Tod Williams/Billie Tsien Architects, was decades in the works but completed ahead of schedule and under budget since the pandemic forced the closure of the Avery Fisher Hall.

The first priority was to improve and revitalize the acoustics inside the main theater, to make sure it was the best-in-class acoustic experience for the New York Philharmonic. What resulted is a completely new theater inside the building, not just a renovation, creating an intimate and inclusive experience for the audience.

Everything in the building, from door handles to floorboards to railings, feels reassuringly solid. Pulp Studio fabricated over 8,700 square feet of flat and curved, laminated glass railings, using an acid etch glass to meet the design aesthetic and provide an enhanced level of privacy. The bent glass was chemically strengthened for increased surface protection and Pulp Studio's proprietary Precision Edge[®] technology was used on all the flat glass for a refined and professional look.

Social/Public Spaces: Tod Williams Billie Tsien Architects / Concert Hall: Diamond Schmitt
Photos: Michael Moran Glass: Lafayette Metal & Glass Company – Hauppauge, NY
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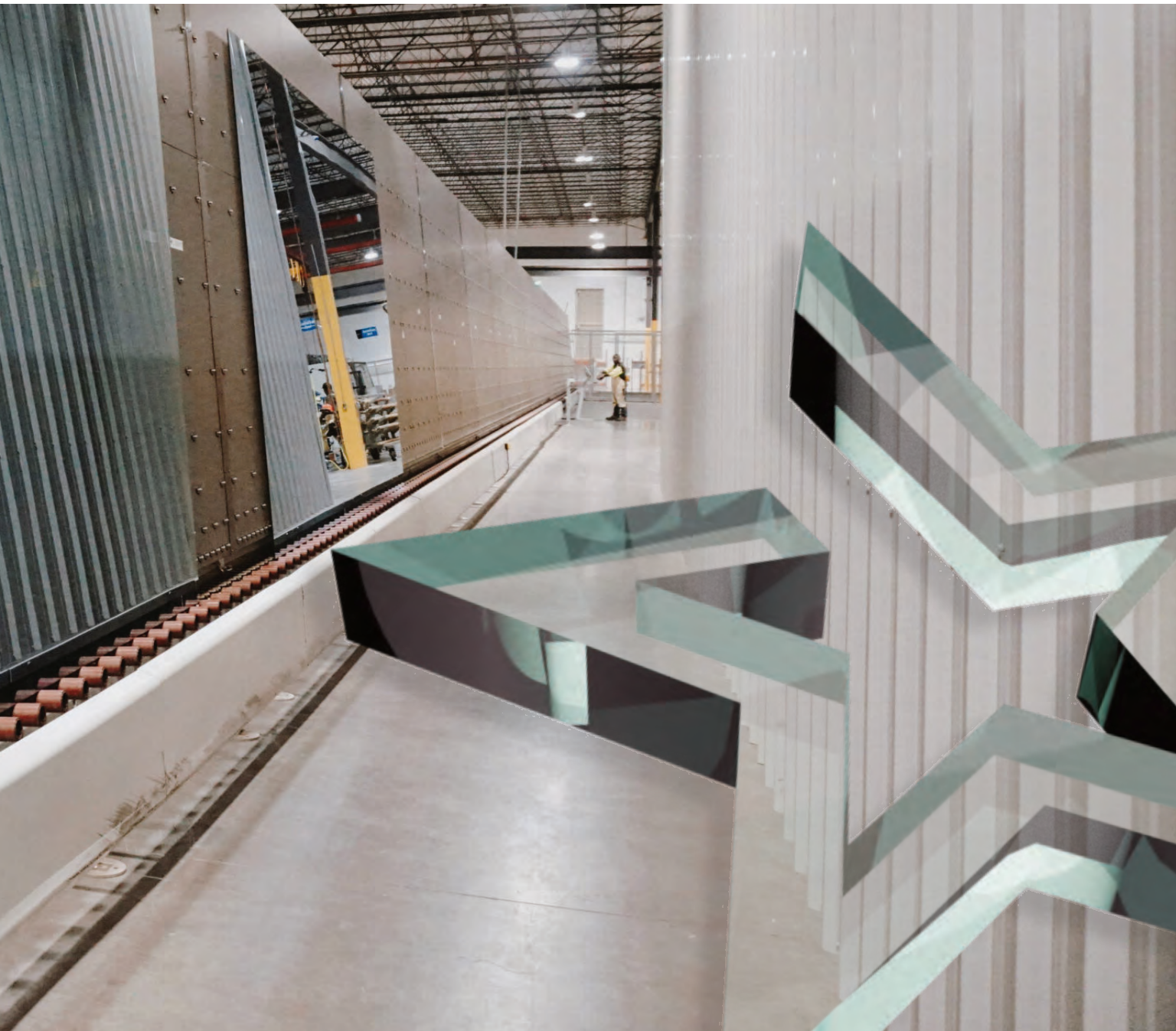
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An Unbelievable 25 Years



KATY DEVLIN
Content Director,
Editor-in-Chief
kdevlin@glass.org

At the 25th anniversary of the BEC Conference in Las Vegas this month, we celebrate the remarkable advancements in glass during the previous 25 years, and we look ahead at what the next 25 might hold. In anticipation of the industry's leading gathering of glazing contractors, I issued a call to industry leaders to get their take on where we've been as an industry and where we're headed.

Performance

The previous 25 years saw insulating glass and low-emissivity coatings become standard, all while the industry developed higher-performing glazing systems with thermal breaks and emerging technologies such as dynamic glass.

"The biggest change in the glass industry since 1998 is the opportunity to use technology to improve fenestration performance with cost-effective low-emissivity glass," says Nicholas Bagatelos, head of Net Zero Envelope. "The next 25 years will see cost-effective R-20 walls using vacuum insulating glass, warm-edge electrochromic solutions, aerogel coatings and transparent photovoltaics for fenestration component battery charging. Buildings are going to get a lot smarter, better, more comfortable and less expensive. The glass envelope will lead the way."

Technology

The industry made the transition from analog to digital as glass companies "got rid of the old scale ruler and huge blueprints," explains Melanie Dettmer, business development, NGA. In its place came "the use

of 3D software to automate manufacturing and project coordination," says Bagatelos.

Looking ahead, Bagatelos anticipates an emergence of artificial intelligence in glass "to connect our industry more directly with the owner, contractor and building designer. This will allow for streamlined envelope orders that will load directly from owners' 3D models into fenestration manufacturers' robotic equipment.

Automation

The digitalization in glass changed the factory as well, with a move toward automation, says Syndi Sim, vice president of marketing and business development for DFI Solutions. "Whether you are exploring options for new product lines, facing labor shortages or production capacity, automation is at the heart of all these situations. I have also seen the Internet of Things as a significant catalyst for automation, and the importance of complete automation to ensure all systems are integrated, optimized and run efficiently," she says.

Consolidation

The face of the industry has

been transformed through mergers and acquisitions. "[Private Equity] has changed the landscape of the industry on many levels, as has consolidation. Both will continue to transform the business over the next 25 years," says Rich Porayko, head of Construction Creative Marketing & Communications.

Complexity

Many of today's glass and glazing assemblies would have seemed impossible 25 years ago. "How we define the terms 'big' glass and 'thin' glass has changed dramatically and will continue [to change]. The normalization of the use of unitized wall systems has advanced into storefront systems," says Bill Sullivan, president and CEO at Brin Glass Co.

Such advancement will continue going forward, he says. "The use of thin glass in IGs will be the norm with the advancement in equipment to produce VIGs and thin triples; smart glass will look different than it does today. This will happen because our industry continues to attract some of the brightest talent available," Sullivan explains.

For more, look to our coverage of the BEC Conference on GlassMagazine.com and @GlassMag on Twitter. The conference runs March 5-7 at Caesars Palace Las Vegas and is hosted by the National Glass Association. ■

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NEED-TO-KNOW INFORMATION
FROM THE NGA

BEC CONFERENCE

BEC CONFERENCE CELEBRATES 25 YEARS

The National Glass Association will host the 25th anniversary of the Building Envelope Contractors Conference this month in Las Vegas. The conference, taking place March 5-7, 2023, at Caesars Palace, will offer two days of need-to-know information for glazing contractors of all sizes.

“At BEC, we will be celebrating 25 years of community and incredible industry evolution,” says Katy Devlin, NGA content director and Glass Magazine editor-in-chief. “Since I began attending BEC more than a decade ago, it has been a place for connecting with peers, brainstorming solutions and learning what industry-altering changes are on the horizon. And this year will be no different. We will celebrate 25 years of BEC and look forward to what’s to come.”

Information-packed sessions will address current topics such as codes and regulations for glaziers, solutions to address generational and mentorship gaps, integration and compatibility with new technology, and forensic approaches and solutions to mistakes. An examination of the state of the industry will focus on the future of glass and potential industry-altering disruptions on the horizon. Plus, day-two sessions focused on labor will provide attendees with actionable takeaways to help owners with recruitment, retention and training. ■

NGA PUBLISHES GANA GLAZING MANUAL, INTERNATIONAL YEAR OF GLASS EDITION

The National Glass Association published the updated GANA Glazing Manual, International Year of Glass Edition. The manual is recognized as the definitive source of information in the glass and glazing industry and describes primary and fabricated glass products, quality standards, design considerations, general and specific glazing guidelines and glazing in hazardous locations. This comprehensive manual is often cited as the “must-read” publication for anyone new to the industry and the reference resource for glass and glazing veterans.

New sections in the IYOG edition include sustainability, recyclability, physiological benefits, vacuum insulating glazing, daylighting and biophilia, glass protective barriers, glass in photovoltaic applications, and bird-friendly glazing. Glass in buildings serves many purposes, often simultaneously, to enhance the comfort and protection of occupants. Improvements and new products and applications continue to impact the built environment, and all of these are reflected in this newest edition.

“NGA’s GANA Glazing Manual is the essential reference manual for everyone working in the glass and glazing industry,” says Urmilla Sowell, NGA technical services and advocacy director. “The IYOG edition highlights the many functions of glass in buildings as a key material to address energy performance initiatives, human comfort and security, as well as health benefits to building occupants and the animals that share our environment.” ■

DID YOU KNOW?

The NGA offers a Codes & Standards Help Center for members. The Help Center features answers to tough technical codes and standards questions, compiled by NGA’s technical services team.

For example, access answers to common sustainability questions. What is a PCR? Where can I find the PCR for flat glass and processed glass? Can windows help to reduce the environmental impact of buildings? What types of glass can be recycled?

Find the answers to these questions and more at glass.org/member-help-center.

NGA GLASS & GLAZING ADVOCACY DAYS

The NGA is planning its second annual Glass & Glazing Advocacy Days in late March 2023 in Washington, D.C. NGA member companies can attend and meet their representatives in person. Policy priorities at the 2022 event included energy-efficient buildings and incentivizing high-performance façades, building resilience, glass recycling on commercial construction projects, supply chain and domestic manufacturing, registered apprenticeship programs and labor, school security, and bird-friendly glazing. NGA’s advocacy one-pagers for legislators are available for download at glass.org/priority-issues. ■

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GLASS ADVOCATE

Wellness and Sustainability Lead Conversations at NGA Glass Conference: Miramar Beach

Industry technical leaders at the NGA Glass Conference: Miramar Beach in Miramar Beach, Florida, focused on two themes: advocacy for architectural glass as a sustainable material and the many ways it enhances occupant experience in buildings. The three-day conference, held Jan. 24-26 and hosted by the National Glass Association, included meetings of the NGA Advocacy, Forming and Fabricating Committees.

Topics on the agenda included building security, daylighting and how light affects the development of human eye health, current and future insulating glass technologies to meet and exceed increasing model energy code stringency, and how architectural glass recycling can contribute to sustainability goals.

Volunteer appreciation

The conference included a Volunteer Celebration Dinner where the NGA recognized industry volunteers who offer their time and expertise to the betterment of the industry through participation in NGA committees and task groups.

The NGA's highest honor, the C. Gregory Carney Award, went to Timothy Moore, vice president of process engineering for W.A. Wilson. "[Tim] has served our industry for decades on many engineering sub-committees and committees. ... He is a man of few words, avoids attention but is always willing to contribute. He is a great listener who takes a very introspective and collective approach to problem-solving," says Urmilla Sowell, the NGA's vice president of technical services and advocacy.

"Please don't expect him to hand you the answer, but rather to ask questions that help lead you to the solution. It's nice to have someone who can provide you with a quick solution, but it is invaluable to find that person who incorporates you in the problem-solving process."

The NGA also presented Volunteer Appreciation Awards to Jon Griggs of Guardian Glass; Julia Schimmelpenningh of Eastman Chemical Co.; Kayla Natividad of NSG Group/Pilkington North America; Marc Deschamps of Walker Glass; and Rob Carlson of Tristar Glass. The Redwood Forest Foundation will plant a redwood tree in a Northern California redwood forest in the name of each award recipient, intended to reflect the commitment towards sustainability and honor efforts towards elevating the NGA's technical longevity.

Committee updates

The **Advocacy Committee** works to promote codes, standards and regulations that positively affect glass in the built environment; educate the industry, stakeholders and consumers about the benefits of glass; and increase communication and education about the importance of NGA advocacy initiatives. Attendees heard news on the NGA's upcoming Advocacy Days in Washington, D.C., a new task group on recycling architectural glass and more.

The **Forming Committee** gave updates on several sustainability initiatives, including a presentation on the impacts of the Inflation Reduction Act

on Environmental Product Declarations for primary and fabricated glass.

The **Fabricating Committee** included updates on the wide range of activities from its various segments: Decorative, Energy, Fire-rated Glazing, Insulating, Laminated Glazing, Mirror, Protective Glazing and Tempering. For example, attendees heard a presentation on a new active shooter test method and participated in a discussion of the Embodied Carbon in Construction Calculator (EC3) as a tool for benchmarking sustainability data.

The **Installing Committee** will gather in March at the BEC Conference in Las Vegas.

New resources

NGA's various task groups have been busy creating resources for the industry, available for download and/or purchase in NGA's online store at glass.org/store.

Two highlight publications from 2022 include NGA's GANA Glazing Manual International Year of Glass edition, which features a multitude of updates from the previous version published in 2008, and the NGA Glossary of Architectural Glass & Glazing.

In 2022, the association also published 14 new and updated Glass Technical Papers, a new design guide on Thermal Bridging Considerations at Interface Conditions, and a new AIA presentation on Designing with Glass: Cast and Heat-Formed.

Next meeting

The next meeting of NGA's Forming, Fabricating and Advocacy Committees will be at the NGA Glass Conference from July 25-27, 2023, in Tacoma, Washington. Learn more about the event at glass.org/nga-glass-conference-tacoma-2023. ■



GLASS INFORMATIONAL BULLETIN

Glass in Photovoltaics

Glass is uniquely suited for the design and fabrication of solar cells, modules and arrays. While many different technologies are used in the engineering and science behind these solar power devices, they all have one thing in common: they convert light energy into electrical energy through the photovoltaic (PV) effect. Generally, PV applications utilize glass for these purposes:

- Cover glass or superstrate glass protects the active substrate from chemical, mechanical and environmental damage and may serve as a base for thin-film circuitry.
- Back glass or substrate glass provides structural support, protection, cosmetic appeal, and may serve as a base for thin-film circuitry.

Types of glass

The most common glass composition for PV applications is soda-lime float glass with a low-iron content to increase the solar and visible-light transmittance. Borosilicate glass is also used because of its excellent optical quality and resistance to thermal shock. When selecting a glass type, properties to be considered include:

- Impact resistance
- Mechanical strength
- Distortion
- Fall-out resistance
- Breakage characteristics (visibility, particle size, safety)
- Thermal breakage resistance

Cover glass or superstrate

An optically clear material such as glass represents the ideal choice for cover glass applications because the electrical output of any PV device is directly proportional to its ability to collect the maximum light energy. When specifying PV cover glass, consider glass types that allow maximum light energy to reach the photovoltaic collector circuitry behind it. Anti-reflective coatings are commonly used to increase transmission. The glass should be as flat and smooth as possible and free of any deformation in the surfaces or mid-plane of the glass. This is important for the active “window” area, but also at the edges to ensure the integrity of the laminated assembly. In addition, uniform thickness is important because thickness variations can decrease transmittance efficiency. Thickness itself is a consideration since the longer the distance the light must travel through the glass, the more photons are lost through absorption.

For soda-lime cover glass, optical clarity may be improved by specifying a low-iron composition. The composition must be able to resist soiling and staining, or the glass surface may be coated to impart self-cleaning properties. The glass must exhibit a wide “bandpass”

ability to provide a high transmittance at all wavelengths. Sometimes a pattern of small prisms is imprinted onto the surface of the glass to gather and focus more light energy. This glass is referred to as patterned, cast or rolled glass. The pattern is normally used on the No. 2 surface to avoid increased scheduled maintenance to prevent build-up of dirt and impurities that diminish efficiencies in the PV module.

Mechanical strength is of critical importance for cover glass applications despite its relative thinness. Because the cover glass is exposed to the elements, it is subjected to many stressors, including temperature extremes, wind loads, hail and other impacts. It must also withstand heavy, long-term exposure to UV, cleaning agents and caustic chemicals, both natural and man-made. In addition, laminating and framing-related stresses due to bonding dissimilar materials can present mismatch of coefficient of thermal expansion, which can result in field failures. Because of these factors, heat-treated glass is often specified to add strength and resistance to thermal shock.

Back glass or substrate

The back glass of a PV cell module is a cover glass that is on the side of the



This Glass Informational Bulletin is excerpted from the NGA Glass Technical Paper “Glass Properties Pertaining to Photovoltaic Applications” (FB39-14). Download at glass.org/store.



GLASS INFORMATIONAL BULLETIN—GLASS IN PHOTOVOLTAICS

module not facing the sun. The type of glass used may be annealed, heat-strengthened or fully tempered. Because transmittance is not important, it can be fabricated from standard soda-lime float glass and produced with a tint, pattern or texture to fit into building-integrated photovoltaic (BIPV) or spandrel applications. Slight curvatures can be incorporated to add aesthetic appeal when desired. While surface deformation causing optical distortion is not an issue, flatness at the edges enables efficient fabrication of the laminated assemblies and assures the structural integrity of the assembled modules in the field.

Types of PV cells

There are two basic types of PV cells that incorporate glass. One is composed of a single flat crystalline material (typically silicon), which is “doped” with certain impurities such as phosphorus and boron to give it semiconductor properties. Onto this “wafer,” a conductive grid is placed to provide electrical connections within the module and to the outside. This monolithic substrate is then encapsulated and sandwiched between a cover glass and a back glass, with the entire assembly laminated and mounted within a frame with other cells to form a single solar module or an array consisting of multiple modules. In this design, the glass serves as protection and, in some cases, as a concentrating lens.

The other type of PV cell is referred to as a “thin-film” in which conductive coatings, inks, solar dyes, and/or active circuitry are deposited in layers only microns thick using chemical deposition techniques typically onto the second surface of the cover glass. There



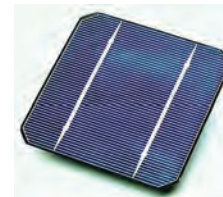
Thin film flexible PV panels on rooftop. Photo Ken Fields, Creative Commons



Concentrator photovoltaics modules on dual axis solar trackers. Photo Creative Commons



Tilt-up solar PV module array on rooftop. Photo Lucas Braun, Creative Commons



A conventional crystalline silicon solar cell. Photo U.S. Department of Energy

are also instances when the coating can be applied directly onto the back glass in rigid thin-film applications or a flexible polymer substrate in flexible thin-film modules. Doped tin oxide coatings are deposited onto the glass by chemical vapor deposition to provide a transparent conductive coating. This process is used in most thin-film PV applications.

Thin-film solar modules are popular in BIPV applications where they can be

integrated into rooftop shingles, skylight glazing and other architectural elements.

Another application of PV technology is concentrated PV. These applications use large solar module arrays with special focusing lenses or mirrors designed to maximize the number of photons reaching the active PV material, thereby increasing output. In this way, solar concentrators can lower the cost of solar power by producing more electricity per cell than standard PV modules. ■



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Private Equity Firm Acquires Virginia Mirror Co. and Virginia Glass Products

The management of Virginia Mirror Co. and Virginia Glass Products partnered with Gemini Investors to recapitalize the company. Gemini Investors is a private equity firm focused on making investments in growing middle market companies led by strong management teams, say officials. The entire leadership team at VMC and VGP will remain in place, and Gemini will continue to support the company's growth strategy.

The recapitalization allowed the founding family to transition ownership of the company to the management team and an investment group with a long, successful track record of growing private middle market businesses in partnership with the management team, officials say.

Founded in 1993, Gemini Investors is a private equity investor in middle market private companies. Since inception, the firm has invested more than \$700 million in over 170 companies throughout the U.S.

"I am thrilled that we have found an excellent partner in Gemini Investors," says John Korff, president, and CEO of Virginia Mirror Co. and Virginia Glass Products. "They understand our culture, approach, and respect the glass, and mirror industry. We look forward to growing our offerings and footprint in partnership with them, our customers and suppliers in the years ahead."

Lixil Acquires Basco

Lixil Corp., maker of water and housing products headquartered in Tokyo, has

acquired Basco, a U.S.-based shower door manufacturing company. The strategic acquisition enables Lixil to expand its comprehensive kitchen and bath portfolio in the Americas and provide consumers with full showering and bathroom solutions, say officials.

Basco employees will be retained by Lixil; the company will run as a separate business unit for the foreseeable future.

Roto Acquires Fenestration Sealing Products Manufacturer Ultrafab

Roto Frank Window and Door Technology announced its acquisition of Ultrafab Inc., a supplier of sealing products to the fenestration industry in the United States and Canada. Ultrafab, a family-owned company located in New York, operates three production sites in the U.S. and employs around 300 employees.

Marcus Sander, CEO of Roto Frank Window and Door Technology, feels that Roto's appeal as a partner to U.S. window and door fabricators will be enhanced through the integration of Ultrafab.

"You could say the combination of Ultrafab and Roto is a perfect match," Sanders says. "Together, we set the benchmark for customers in the fenestration industry when it comes to product range, technical expertise, quality and service. Customers will see more benefits as a result of this acquisition."

Guardian Glass Acquires Vortex Glass

Guardian Glass and Vortex Glass announced an agreement for Guardian to acquire the assets of Vortex, a Florida-based fabrication business.

Vortex offers laminated and

insulating glass that meets the stringent Florida Building Code for hurricane impacts and supplies customers in Florida and the Caribbean Islands with complete tempered glass packages for residential and commercial construction, including office partitions, shower doors and glass railings.

By bringing Guardian Glass' products and operations together with the fabrication capabilities of Vortex, Guardian is better positioned to assist customers in meeting advancing safety and energy conservation codes for buildings, say officials.

Enclos Acquires Pfeifer Structures America

In December 2022, Minnesota-based Enclos Tensile Structures Inc. acquired Texas-based Pfeifer Structures America from its parent companies P&E Holding and Pfeifer Structures Holding Inc. Tom Wuerch will remain the president of ETS, with Garry Becker and Bill Schmidt as executive vice presidents. The North American head office will remain in Dallas with satellite offices in New York and a presence in Florida, California, Colorado, Canada and Mexico.

The acquisition of Pfeifer Structures America fits Enclos' strategy to provide the most comprehensive custom building envelope solutions to owners, architects, engineers and general contractors.

By purchasing Pfeifer Structures America, Enclos, a specialty facade contractor and provider of custom curtainwall, expands its offerings to include custom tensile membrane structures, structural glass systems and kinetic structures across North America.

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Pujol Acquires Teknokilns

Hornos Industriales Pujol acquired the glass division of the Italian company Teknokilns. The agreement includes the entire client portfolio, as well as the services, know-how and engineering for the manufacture and development of thermal tempering furnaces of the Italian company, which will be manufactured entirely in the production plant that Pujol has in Barcelona.

The agreement is part of the company's expansion plan and strengthens Pujol's position in transformation processes associated with safety glass.

This acquisition also means covering a gap in Pujol's product portfolio and will allow Pujol to position itself as a preferred partner in the manufacture of transformation solutions of safety glass, both for laminated glass and tempered glass.

Trex Commercial Products Changes Name to Sightline Commercial Solutions

Formerly known as Trex Commercial Products, the railing and platform solutions provider that previously marketed products under the Trex Commercial and Staging Concepts brands is now Sightline Commercial Solutions.

Now owned and operated out of Minnesota, the newly named company will continue as a fabricator and supplier of architectural railing, metal, glazing and portable platform solutions for the commercial, sports venue, live entertainment and performing arts industries.

Vos Glass Finds New Headquarters

Grand Rapids, Michigan-based glazier Vos Glass has a new headquarters. Vos Glass has purchased a single-story, 59,582-square-foot building at 3800

Stahl Dr. SE that formerly housed the Sparks Belting Co.

The new building is about 25,000 square feet larger than Vos Glass' former headquarters. The additional space will give Vos room to increase its industrial shop space and expand its fabrication department, according to a news release. In addition, the company will add a CNC machine to improve its aluminum and door fabrication.

PEOPLE NEWS



Scalfano

The **National Glass Association** expanded its advocacy and technical services department with the addition of *Georgia*

Scalfano as technical services sustainability manager. In addition to overseeing NGA's efforts in sustainability for the glass and

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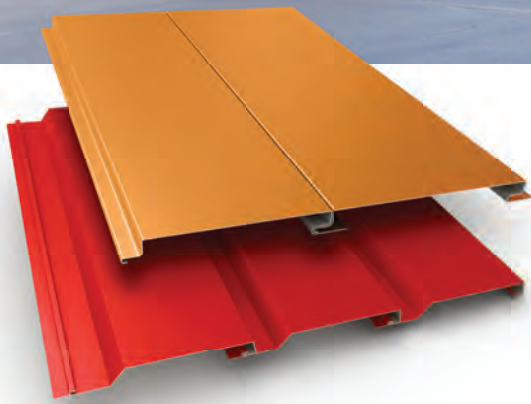


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glazing industry, Scalfano will serve as the association's liaison to related government and industry standards development organizations for sustainability issues.

Scalfano most recently worked for Pape-Dawson Engineers Inc. and BMW Manufacturing Co. LLC. During her tenure at Pape-Dawson Engineers, Scalfano worked closely with government and regulatory agencies to ensure projects were as efficient and sustainable as possible. "I believe strongly in the importance of advocating for sustainable solutions," says Scalfano. "This is what inspired me to study environmental and ecological engineering with a minor in environmental policy—to pursue a meaningful career in the industry."



Cummins

Permasteelisa

appointed *Liam Cummins* as CEO. Cummins succeeds Klaus Lothar, who is retiring from the group

after three decades of service. Lothar will remain a non-executive director of the group's holding company. Cummins joins Permasteelisa from Kier Construction, where he worked as group managing director. Prior to Kier, he held senior executive roles for 16 years at Laing O'Rourke.

"We are delighted to have Liam at the helm of Permasteelisa, further deepening our expertise in construction services and bringing strong leadership to underpin our ambitions for the business," says Peter Bacon, chairman of Permasteelisa.



Frenzel

Schott AG appointed *Andrea Frenzel* as its newest member to the Schott AG Board of Management, where she will be responsible

for three business units and two overarching corporate functions in her new position on the board. She succeeds Hermann Ditz who is retiring. "We are pleased to have Dr. Frenzel, a

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NEWS TO KNOW

successful, internationally experienced manager, join our company,” says Dr. Bolle, chairman of the Supervisory Board of Schott AG.



Wang

There are two new members of the **National Fenestration Rating Council’s**

Board of Directors. *Julian Wang* is an associate professor in the Department of Architectural Engineering and an affiliate faculty member within the



McDonald

Department of Architecture and the Materials Research Institute at Penn State. Wang’s research focuses on interdisciplinary applications of building physics, especially photometry and radiometry, in sustainable, healthy and interactive building environments by leveraging advanced data sensing and processing techniques and computational design methods.

David McDonald is a code and regulatory affairs specialist with Marvin and is based in Warroad, Minnesota, where he has an advocacy role within industry trade associations, test standard development organizations, and the ICC International Codes.



Krenn

Winco Window Co. announced the retirement of *Bill Krenn*, president, who has been with Winco since 1996 and served in various

capacities, including director of human resources, treasurer, vice president and chief financial officer before being appointed as the company’s president in 2017. As president, Krenn ensured that the overall direction of the company’s sales outreach and operations remained in concert with the vision of the family ownership. Gantt Miller III, AIA and owner of Winco, is assuming Krenn’s responsibilities until a replacement is named. ■

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timely and proper payments are available, even when market conditions are adverse. It is essential to understand the payment terms of agreements, and then strictly observe the technical requirements for any contract adjustments to help minimize the potential that payments or adjustments will be denied.

New markets

Softness in the market can also lead companies to extend their offerings to reach additional revenue streams—in either services or products. Practically, this kind of flexibility is good and can help companies weather more challenging times. Unfortunately, we regularly see these additional offerings made without the controls to help shield the primary business model from the risk of these new ventures.

Putting aside issues of learning new technical proficiencies, new business offerings often present the most risk due to a lack of due diligence and insurance coverage. Moves into new markets as a downturn hedge tend to include shifts into interiors and more decorative products. Issues of intellectual property rights for designs and patterns, as well as specific hardware, need careful examination and sourcing or this lack of diligence risks infringement litigation. Likewise, business offerings that are not at least tangential to the core operations risk a lack of insurance coverage because the new operations can provide an insurer a policy exclusion or defense to damages resulting from the new work.

What to do: Coordinating with insurance carriers and brokers helps maximize new offerings and protects against doomsday losses and later claims. Carefully consider the nature of any business change to ensure that gaps for specialty insurance like professional liability or errors and omissions are filled.

LEGAL

DOWNTURN RISK MANAGEMENT

WHEN THE MARKET IS MOST CHALLENGING, RISK MANAGEMENT COSTS CAN'T BE SHORT-CUT
BY MATT JOHNSON



Glass and glazing have their cycles like all industries. In good times, costs and overhead can prove less concerning. Leaner times often lead to expenses being carefully monitored. But it is precisely when the market is most challenging that risk management costs can't be short-cut. It is essential to remember that contract, insurance, quality and employee management can provide their most value during downturns.

Contracts

Downturn cost-cutting can be especially problematic with respect to contract review. Limiting—or skipping—appropriate and thorough review of job agreements often happens due to a desire to limit seemingly extraneous legal or internal time costs. And while cost control is

necessary, downturns often give rise to agreement terms that can lead to bet-the-company positions.

Payment terms include the best examples of clauses that become more aggressive when business slows. With money tighter, “paid-if-paid” or “paid-when-paid” clauses become more structurally enforced. Retentions increase and months-long payment terms are not uncommon. Where little attention is paid to these clauses during contracting, the ability to negotiate fairer payment terms is lost. And if problems arise in the future, contractual leverage is lost and can leave glaziers without an effective remedy to ensure they are rightly compensated for their work.

What to do: Contract and legal review can be essential tools to help ensure that



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The Bottom Line

Risk comes with any business and is present in all business cycles. It is essential to remember that investments in contracts, insurance, employee management and quality can provide their most value during downturns.

Employees

Even if business offerings remain in core competencies, downturn risk management must also focus on employees and quality. In slower periods, companies often make meaningful efforts to retain those employees who show the highest performance standards, while less-essential personnel are furloughed or simply let go. Risk comes with any ad-

verse employment action, in good times and bad. The risks are especially pronounced, however, when times are lean and employees have less readily available employment opportunities. Following established personnel policies, and properly documenting human resources decisions, are essential risk mitigation concerns when markets turn south.

What to do: Human resources and employment-related expenditures help ensure smooth operations and avoid situations jeopardizing companies, whatever the market conditions present. Reviewing and updating employee policies and handbooks may seem like a needless effort in a downturn, but proper use and enforcement of established policies help defend against allegations of retribution and wrongful termination.

Quality

Quality can suffer during downturns too, even where the most experienced employees remain. Having to do more

with less is essential when times are tough. The key is to know when “doing more” leads to cutting corners. Quality work and products must remain paramount concerns even when fewer people are being asked to do even more. Maintaining a crucial focus on quality maximizes the revenue from each project by limiting cost bleeds through warranty service or customer accommodations due to less-than-quality work.

What to do: Quality costs retain value in-house by limiting post-completion expenses and nurturing business partner relationships to help maximize future opportunities. With fewer opportunities during slower periods, maintaining positive working relationships with those doing work can be the best mitigation strategy of all. ■

Matt Johnson is a member of The Gary Law Group, a Portland, Oregon-based firm specializing in legal and risk issues facing manufacturers of glazing products.



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FINANCE

WHICH CUSTOMERS QUALIFY FOR NET-30 TERMS?

BY MARCO TERRY



Most commercial customers insist on 30- to 60-day payment terms, also known as net 30 or net 60. Construction business owners accept giving net payment terms to customers because they want to keep them happy. However, giving these payment terms can have financial consequences if not done correctly.

Consider this common scenario. As fears of a recession increase, your customers protect their cash flow by requiring longer payment terms. Customers who previously asked for 30 days may now ask for 45 days or even 60 days. Those who asked for 60 days may seek to stretch payments up to 90 days.

You still need to cover your company's payroll and other expenses. Since your customers take longer to pay, you may need to use your cash reserve to meet your expenses. However, if your reserve is inadequate, you will have cash flow problems.

There is a bigger issue. Business credit gets worse with recessions, which may curb credit access, slow collections and spur business bankruptcies. Both small and large businesses face many of the same recession risks and some customers who were low credit risks may become high credit risks. This increased risk may leave you with bad debt. The best way to handle this challenge is to avoid giving payment terms to risky customers.

How to determine your customer's creditworthiness

The easiest and most effective way to determine a customer's creditworthiness is to use a business credit report. These reports don't have the same restrictions as consumer reports. Anyone can buy a credit report from one of the credit bureaus. The best-known providers in the industry are Dun and Bradstreet, Experian's Smart Business Reports, and Ansonia Credit.

Credit bureaus gather company information from several sources and use them to compile their reports. Their most important data comes from companies that share client payment trends. This data is critical because you can use it to determine how your client pays other vendors.

How to read a credit report

Each provider offers reports with different levels of information. While they all use proprietary formats, they provide similar information. Business credit reports can be open to interpretation. They have limitations and are not perfect. Evaluate reports carefully but use them only as one tool to help your decision-making. Focus your attention on these areas:

- **Suggested credit line.** Credit bureaus use algorithms to suggest a maximum payment term line to your client. Use this suggestion only as guidance.
- **Payment trends.** This data lets you know how quickly your client pays other suppliers and if they pay on time or are consistently late. Some reports also show the payment trends for the last three or six months. Worsening trends could suggest the company is tightening its belt or facing cash flow problems.
- **Largest, average and smallest line.** This information shows the size of a client's largest, average and smallest credit line. It's best if the credit you extend to your customers is close to the amount of the average line. Avoid offering amounts approaching the largest line, especially if there is a significant difference between the largest and average lines.
- **Number of reporting lines.** This guidance shows the number

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of vendors reporting payment information for a company. Use it as a measure of confidence—more vendors are always better. Do not consider a report to be reliable if it shows data for only a couple of vendors unless you are evaluating a small company.

- **Legal filings.** This section shows Uniform Commercial Code filings, liens, lawsuits and similar items. Companies in the construction industry tend to have more legal filings than companies in other industries. This legal information is not necessarily an indication that they are in trouble. Examine the liens and lawsuits carefully, though.

How to make large credit decisions

Using a single credit report for a small trade credit line should be fine. However, consider buying detailed reports from different

bureaus before offering a large line to a client. Each credit bureau uses its own data sources. Getting reports from different companies gives you a more comprehensive picture of your customer.

Using several reports may cost as little as a few hundred dollars but could easily exceed that. The cost depends on the reports you purchase. Spending a few hundred dollars to help reaffirm a large sale is not a bad investment. However, spending a few hundred dollars to avoid a large, risky sale is an excellent investment.

What to do if your customer is a high credit risk

Every so often, you may see reports that show high-risk profiles, which include companies with limited credit information and companies with negative information. It's recommended that you avoid offering payment terms in both cases. The risk

The Bottom Line

Recessions increase the number of net-30 on invoices that turn into bad debt, but a simple method can catch them before they become a cash flow problem.

of financial loss could be high. This decision lowers your risk but will be disappointing to the prospective customer. ■

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



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Example of finish damage on a commercial building due to chemical moisture.



WHAT YOU NEED TO KNOW ABOUT CORROSION AND ALUMINUM

BY TAMMY SCHROEDER

Color retention, chalk resistance and adhesion typically are noted in warranties for finishes on architectural aluminum products. But it's very unlikely you'll find a warranty that mentions corrosion.

This is because the warranties are for the finish itself, not the underlying metal where corrosion could take place. Durable, high-performance finishes can help protect architectural aluminum from corrosion, even if this is not explicitly stated in the warranty.

What is corrosion?

Corrosion is the gradual degradation of a substance, often associated with metal, by chemical action. Corrosion may conjure up images of a rusting ship on the seafloor, old machinery left immobile in a field or a pitted Viking-age sword from an archeological dig.

These common examples of corrosion involve the oxidation of iron and iron alloys resulting in rust. Rust

forms on iron in the presence of water and oxygen then flakes off, exposing the underlying metal and allowing rust to form again.

Aluminum, on the other hand, does not rust in the presence of oxygen and water. Instead, it forms a relatively stable oxidized layer that protects the metal from further corrosion. In fact, this is how anodized finishes are created, by tightly controlling and enhancing the oxidation process. A correctly applied, properly specified finish can establish a flawless protective layer on architectural aluminum to prevent corrosion.

Understanding and preventing corrosion in aluminum

Under certain conditions, aluminum may progressively corrode in the presence of other chemicals, namely sulfates and chlorine. These chemicals come into contact with architectural aluminum through two main sources:

acid rain, such as in urban areas with heavy pollution, and salt spray, such as in coastal climates.

Aluminum is most likely to corrode at flaws and grain boundaries where the oxide layer is inconsistent, such as the edge of a product, a bend or a scratch. When the protective finish is compromised, corrosion can take hold. Minor damage can lead to significant corrosion if moisture that contains chlorine or sulfates collects on exposed aluminum without a pathway to drain or evaporate.

Great care should be taken when working with strong acidic or alkaline substances, like mortar or muriatic acid, which can damage finishes. Metal tools can scratch and gouge finishes. The cleaning of painted and anodized aluminum finishes should be done using mild soap solutions at most, but these low-maintenance finishes only require a rinse with clean water.

If the protective finish layer stays whole and intact, it's more likely that the aluminum also would be protected from corrosion. When selecting a finish for aluminum material that may be exposed to corrosive conditions, specify it to meet the highest performance standards available from the Fenestration and Glazing Industry Alliance. For anodized finishes, this is AAMA 611 for Class I anodize. For paint, this is AAMA 2605 for 70-percent PVDF resin-based architectural coatings. Unless a particular project is in an extreme environment or improperly applied, one should expect these high-quality finishes to last several years beyond the warranty period. ■

Tammy Schroeder is the director of marketing at Linetec. She can be reached at tammy.schroeder@linetec.com or 800/236-2589.

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AN INTERVIEW WITH BRUNO BIASIOTTA

OLDCASTLE BUILDINGENVELOPE'S NEW CEO SHEDS LIGHT ON COMPANY STRATEGY, OPPORTUNITIES IN ENERGY EFFICIENCY AND MORE



BY KATY DEVLIN
CONTENT
DIRECTOR,
EDITOR-IN-CHIEF

In October 2022, Oldcastle BuildingEnvelope announced Bruno Biasiotta as CEO. Biasiotta brings 30 years of business leadership to his new role at OBE, a 7,000-employee company that operates 85 locations in North America, Europe and Australia.

Most recently, Biasiotta served as CEO of Nortek Air Management, a private equity-backed company in the HVAC sector. Before Nortek, he was president and CEO for Philips Lighting, and he spent 17 years at Johnson Controls leading multiple businesses as vice president and general manager of the Building Efficiency Division.

Last month, I was able to sit down with

Biasiotta to discuss his career experience, his initial observations of the glass industry and emerging technologies, and his thoughts on OBE strategy moving to the future. We also talked about his background—his family's immigration from Italy; his upbringing in Cleveland, Ohio; and his experience playing Division 1 soccer at Cleveland State University. And we chatted about Biasiotta's ambitious plan to visit 80 OBE locations in 90 days.

Here are some highlights of my conversation with Biasiotta. For more, visit obe.com.

You are a new face to the glass industry. What would you like people to know about you and your background?

Many people don't know this about me, but I was born in Italy. I was seven years old when my family immigrated to the U.S. My mom and dad were older in life when we immigrated. We came to Cleveland, where my mom and dad had family, and my dad had a job.

I grew up in a very typical Italian-American immigrant family, where family, hard work, and respect were paramount and above all. For me that shaped me, not only personally but in how I attempt to see and lead business. My father and my uncles used to work in factories like we have at OBE and others I've run in the past.

I start there because, foundationally, I think it's really important; it shaped who I am and the perspective I have.

What skills and experiences from your previous roles have helped prepare you for leadership in the glass and glazing industry?

Throughout my career, I have had the tremendous opportunity to work for and with some terrific people and companies. As a result, I've led manufacturing and industrial companies that had multiple business models and faced numerous changes. I've learned from every role and importantly that every role and culture is different and has its own opportunities. Needless to say, I've gotten bloodied and bruised along the way and you learn what not to do. I'm certain we will unlock the potential in OBE and along that journey we are likely to get bruised and bloodied as well. That's what great companies do.

I don't know the [glass] industry. I'm very clear about the fact that first I want to listen and learn.

I really respect the industry based on what I've read and what I've seen thus far. And hopefully, I will be a quick learner and bring a different perspective to what I think is a great industry.

Like the HVAC industry, I'm keen on the fact that the glass industry is a local business based on local relationships. That is a critical fact that can not be ignored. My belief is value is created only by have a deep understanding of our end markets. This is especially true in the glass industry, because every market behaves a bit differently and customers have to be disciplined yet agile to compete and win. So must OBE. We can't afford to practice.

Let's talk strategy. What are some of your long- and short-term strategic goals for OBE?

Our strategy is focused around two key areas:

- Make our customers more successful than they are.
- Build on the great talented people that we have.

This starts by focusing on culture. We have 7,000 people, and those people have families. It's important that first we drive results and drive them the right way so that we can build an enduring company. OBE has been a kind of holding company versus an operating company. We're looking to transform that—to unlock what we think is some significant potential in OBE by turning it into an operating company.

We are also focused on leveraging our capabilities. We have assets that we can capitalize on more broadly and intentionally and we have strong market positions.

We are going to focus on making the customer the center of everything we do. A lot of people say that, but for us, that is really our North Star. ... We must focus on inverting the pyramid, putting the

I DON'T THINK WE REALIZE THE TRUE WEIGHT THAT WE CAN CARRY. AS AN INDUSTRY, WE NEED TO RECOGNIZE THAT AND TOOT OUR OWN HORN A LITTLE BIT. WHETHER IT'S FROM A REGULATORY OR LEGISLATIVE PERSPECTIVE, I THINK WE CAN HAVE A STRONGER VOICE AND MORE IMPORTANT SEAT AT THE TABLE.

customer on the top and people like me on the bottom. ... Our focus is to really try to do everything to exceed customer expectations and get better every day. We're a team. We're in this ecosystem together and we all have to win.

We're monitoring technology and mega trends to get a sense of where and how we want to play. For us it's about having a clear focus and where we have a right to win and make customers successful in parallel.

Let's talk about energy efficiency and sustainability—key areas of focus in the glass industry that also intersect with activities in your previous business sectors. What are your expectations for the glass industry as it faces increasing demands for better and better building performance?

When we look at the whole building industry—the built environment whether new construction or retrofit—there is a convergence of decarbonization, net zero, energy efficiency, well buildings along with new technologies. We have this pent up demand in the built environment in terms of retrofit and deferred maintenance, we need new advancement in technologies, we have increased regulatory and legislation. All of this is coming into play in the glass industry. We are the nexus of this change.

What does this mean for us in terms of business models? How we play with the various building technology companies and other adjacent players? How do we help customers and effectively integrate with mechanical

and electrical side of the world as we attempt to address decarbonization in a holistic way? There was a point in time when many of these systems and technologies were operated in an independent way. Now they are very much interdependent and essential in achieving net zero.

What has surprised you about the glass industry since you joined?

One thing that has really surprised me is that the ecosystem is similar to the mechanical side. The markets behave very similarly, for example, in how people make purchasing decisions.

Additionally, what has surprised me is how fragmented the market is. It was like that in some of the other industries as well, but not to the degree that I see in the glass industry. We have some very local players.

What have you been particularly excited by in the glass industry?

Going back to the conversation on energy, I believe that the glass industry has a very unique position in the built environment. We have such an impact on the thermal efficiencies of buildings, on [health and wellness of occupants in] buildings. I don't think we realize the true weight that we can carry. As an industry, we need to recognize that and toot our own horn a little bit. Whether it's from a regulatory or legislative perspective, I think we can have a stronger voice and more important seat at the table. ■

Next-Level

PERFORMANCE

Glass solutions for superior thermal efficiency, flexible solar control and energy generation

By Katy Devlin, Tara Lukasik, Rachel Vitello

The glass industry plays an essential role in addressing the climate crisis. Buildings account for an estimated 40 percent of the problem of global carbon emissions, with building operations alone producing 27 percent of total emissions, according to Architecture 2030.

Glass can be a critical component in addressing operational carbon emissions by reducing energy use in existing and new buildings, says Stephen Selkowitz, principal of Stephen Selkowitz Consultants and affiliate at Lawrence Berkeley National Laboratory.

A recent study from Glass for Europe emphasized the difference high-performance glazing can make:

- Replacing all existing windows with

“readily available high-performance glazing” by 2030 would cut annual energy use by 29 percent and annual carbon emissions by 28 percent.

- Replacing all existing windows with “improved high-performance glazing” by 2050 would cut annual energy use and carbon emissions both by 37 percent.

Selkowitz estimates similarly dramatic savings for the United States if all existing commercial windows were “magically” retrofitted with next-generation glass technologies, such as highly insulating dynamic glass. “If we convert all windows, we move from a net drain of \$20 billion [in energy costs] to a net gain of up to \$15 billion [in energy savings],” he explains.



Driving performance

There is more than just energy savings and climate benefits driving the use of higher-performing glass technologies. The market is seeing new codes and standards that will require the use of better glass products. And new legislation is providing major incentives for numerous types of improved glass and glass-related technologies.

Energy Star 7.0

The recently published Energy Star version 7.0 greatly increases thermal performance requirements for windows. Meeting the more stringent performance thresholds in the Northern Climate Zone, which covers about 40 percent of



Økern Portal in Norway features more than 32,000 square feet of triple glazing to meet thermal, safety and sound requirements. Twelve different glass assemblies were produced with Super Spacer flexible warm-edge spacer from Quanex in sizes up to 47 inches by 118 inches. The outer panes have a highly translucent, color-neutral solar control coating, Guardian Glass SunGuard SuperNeutral 70S, while the inside has tempered or laminated glass in various thicknesses. Dark Arkitektur was the architect. The aluminum producer was Hydro, Wicona oversaw the façade, and Staticus completed the installation. Glaseksperten A/S from Hjørring, Denmark, was the glass fabricator. Photo courtesy of Quanex.

State stretch codes

New York and Massachusetts are nearing adoption of new stretch energy codes that set more stringent thermal performance requirements than the federal energy codes, says Culp. While the stretch codes are technically voluntary, leaders in big cities such as New York City and Boston are planning to adopt them as the local code requirements. The stretch codes “want to be very aggressive,” says Culp. Where adopted, the codes will require that new buildings include the highest-performing glass units.

Inflation Reduction Act

The Inflation Reduction Act of 2022 includes numerous provisions that will drive performance improvements in buildings. According to Culp, the IRA includes \$1 billion in state and local government grants intended to accelerate adoption of the latest energy codes and a zero-energy code. The IRA also expands tax deductions for energy-efficiency improvements in commercial buildings and includes tax incentives for high-performance building products. Two notable inclusions include sizable tax credits for electrochromic glass, and for photovoltaics and building-integrated photovoltaics.

the United States, will require the most advanced double-glazed insulating glass units or, more likely, triple- or quad-glazed IGUs, says Selkowitz. “We will need about 10 to 20 million triple-glazing units per year.”

ASHRAE 90.1

The recently published building energy standard ASHRAE 90.1 2022 includes on-site renewable energy requirements, thermal bridging requirements and additional energy credit requirements, including credit for higher performance fenestration, shading, daylighting, and on-site renewable energy, says Tom Culp, energy code consultant for the National Glass Association and owner of Birch

Point Consulting. The new version of the code looks to reduce “energy use by half. And they are on target to hit net-zero by 2031, over the next three cycles,” Culp says. “The codes are moving faster than they ever have before.”

IECC

The in-process 2024 version of the International Energy Conservation Code (IECC) is also “moving very aggressively with strong steps towards electrification and net-zero,” says Culp. Code proposals include new on-site renewable energy requirements that are even higher than in ASHRAE 90.1, new additional energy credits requirements and new thermal bridging requirements.

Solutions in glass

This article is part of Glass Magazine's extensive All About Glass & Metals series for the architectural community and presents a range of next-level performance technologies available from the glass industry. The article spotlights thermal glass products, including improved IGUs, vacuum insulating glass and thin-glass solutions. Additionally, it looks at dynamic glass, which provides solutions for solar control, and at building-integrated photovoltaics, which can provide on-site energy generation.

The complete All About Glass & Metals series also includes:

- Glass and wall system definitions
- Current standards and specifications
- Tips by glazing specification section: performance, products and installation
- General tips regarding the specification of interior glass and protective glazing
- Real-world examples of building orientation, interior glass and protective glazing applications
- Process challenges of complex façades
- Market and product trends
- Guide to the high-performance façade equation

Download the series at the NGA store.



Of note, high-performance framing systems are crucial to whole-system performance—a high-performance IGU in a poor-performing frame will result in an underperforming glazed system. This article focuses just on advanced performance technologies in the glass unit itself. For additional information on advancements in glazing framing, the role of glass and glazing systems in daylighting design, and additional façade performance considerations, reference the “Guide to the high-performance façade equation” portion of the All About Glass & Metals series.



Advanced IGUs



Basics

Widely used in commercial and residential construction since the 1960s, insulating glass units, or IGUs, consist of two or more lites of glass separated by a hermetically sealed air space to provide more thermal, sound and solar insulation than possible with single-glazed fenestration. Advanced IGUs offer additional performance improvements through a variety of methods, including filling the air space with gas (argon, or, for even better performance, krypton), using warm-edge or other higher thermal performance spacers, or adding additional lites (and thus additional cavities) to the unit. For better solar control, low-emissivity coatings can be added to the No. 2 surface, and now, thanks to advancements in coatings, the No. 4 surface, of a traditional double-glazed unit.



Performance

Highly insulating glazing solutions—doubles with improved spacers and two low-e coatings, or multi-cavity units—will likely be required to meet the more stringent energy codes and standards mentioned in the previous section, says Culp. The U-factor requirements in the New York and Massachusetts stretch codes, for example, will push for “triple glazing or fourth surface low-e, with gas fill and better frames,” he says.

The updated Energy Star requirements will also pose challenges. In the previous version, about 80 percent of the residential window market met the .27 center of glass U-factor requirement for the Northern climate. The new Energy Star 7.0 moves that number to a U-factor of .22. Only the very best performing double-glazed units currently on the market would be able to meet the new requirements, Selkowitz says. “For the

first time in 20 or 25 years, we’re having to take a hard look at that standard double-glazed, argon-filled, low-e unit.”

History

The double-glazed IGU was patented in the United States in 1865 by Thomas Stetson and was commercialized in the 1930s. According to estimates from Ducker Worldwide, IGUs accounted for about 12 percent of the U.S. market share of new residential glazing in 1970 and quickly grew to about 70 percent by 1980. By 1990, nearly all new windows sold into the residential market were insulating.

The popularity of improved IGUs with low-e coatings accelerated quickly in recent decades, and the product now accounts for about 80 percent of the market, according to Ducker. However, multi-cavity IGUs represent only a slim market share for residential glazing at about three percent.

IGUs with emerging technologies, such as VIG, suspended film or Aerogel, remain more niche performance solutions.

Development

The global insulating glass window market is projected to reach U.S. \$17.2 billion by 2026, growing at a compound annual growth rate of 6.1 percent from 2021 to 2026, according to ResearchAndMarkets.com. The growing trend of green rating systems in various countries is likely to contribute to the growth of the insulating glass window market, with North America projected to be the largest regional market.

The insulating market has also become more complex with the addition of several emerging insulating glass technologies that offer a step change in thermal performance. Such technologies include vacuuming insulating glass and thin-glass multi-cavity IGUs, which are both explored in-depth later in this article. Other technologies include IGUs with a suspended film, which has been available on the market for several decades, or units with Aerogel in the

cavity, which is currently available but only in a translucent state.

Challenges

The North American insulating glass market has faced challenges moving beyond traditional double-glazed units. Traditional multi-cavity IGUs, while popular in Europe, have gained only minimal traction in the United States. “There are obstacles to triple pane. Many manufacturers say it is too heavy, too wide, too expensive. It has long ROIs,” says Selkowitz.

The industry is also facing new challenges with krypton gas-filled insulating units. Krypton had gained popularity in recent years as a higher-performing gas option for IGUs. However, the cost of krypton has increased due to higher demand for krypton in the communication sector and due to new difficulties in accessing krypton, which is sourced in large part from Ukraine and Eastern Europe, says Selkowitz.

Resources

The NGA published the Performance Improvements in IGUs glass technical paper in 2016 and updated it in 2022. The document was developed by volunteers from the following industry companies:

- Guardian Glass
- Standard Bent Glass
- Viracon

Download the resource.



Additionally, watch a webinar from Selkowitz discussing the latest IGU technologies, and the research and development still in progress, that will aid in the reduction of a building's carbon footprint and bring us closer to the goal of a net-zero energy building





Building Integrated Photovoltaics

Basics

Building-integrated photovoltaics are solar energy-generating systems incorporated into a building envelope. BIPVs can be used in windows, façades, canopies, skylights and more, providing opportunities for energy generation on all surfaces of a building. Glass is an essential component in most BIPV products, protecting solar cells and modules while maximizing solar and light transmission.

Performance

BIPV meets the requirements for sustainability and integration of alternative sources of energy. Growing the use of on-site renewable energy is critical to achieving net-zero energy and carbon targets and will also help increase grid resiliency and U.S. energy independence, according to the NGA document High-Performance Glazing Promotes Building Resiliency.

New versions of the energy codes, including the recently published ASHRAE 90.1 2022 and the in-development 2024 IECC, include requirements for on-site renewables, which would include BIPVs.

History

Photovoltaic technology was invented in 1954 when Daryl Chapin, Calvin Fuller and Gerald Pearson developed the silicon PV cell at Bell Telephone Laboratories, according to the U.S. Department of Energy's Energy Efficiency and Renewable Energy office. BIPVs came to fruition in the 1990s. The evolution of the technology in recent years has helped it to become more mainstream, says Jemssy Alvarez, product manager with Vitro.

Development

Alvarez says he expects to see BIPV in more places in and around buildings as owners and architects look to more sustainable energy sources. "I think you're going to start seeing park benches that are going to have solar panels installed so people utilizing those facilities will have the ability to charge their phones;



and more atriums and canopies and skylight applications with PV integrated because it's a natural fit," he says.

Additionally, industry manufacturers have developed BIPV products that offer a range of aesthetic options for designers, including transparent or near-transparent BIPVs that offer the benefits of traditional glass systems while generating energy.

"Transparent solar window products are aesthetically pleasing and energy efficient windows. They look and function like traditional windows, but also double as renewable energy generation sources that help provide clean electricity to the home or building," says Veeral



Ubiquitous Energy transparent solar window project at Michigan State University in East Lansing, Michigan. Photo courtesy of Ubiquitous Energy.

Hardev, vice president of strategy for Ubiquitous Energy.

Ubiquitous Energy is in the early commercialization phase with transparent solar window products, says Hardev. “We are currently building our first high-volume transparent solar window manufacturing facility here in the U.S. We expect that this facility will start producing window units as large as 5 feet by 10 feet in 2025,” he says. “These window units will be sold into the residential and commercial markets directly through our partners, including [Andersen Windows & Doors], as well as commercial building developers and contractors.”

Challenges

A challenge of BIPV is cost. Alvarez says it’s hard for BIPV to compete with the pricing of what someone will pay in electricity. “However, in time, the cost of energy isn’t going to get any cheaper and at some point, there’s going to be a parity between what you can do with these renewable sources and what it will cost you from the standard,” he says.

Resources

The NGA developed the Glass Properties Pertaining to Photovoltaic Applications as a primer on the role of glass in photovoltaics, including the types of glass used, and the roles of glass as both a

cover or backing for photovoltaics. Find an abridged version of this document on page 15 of this issue of Glass Magazine.

The document was originally developed in 2014 (updated in 2019). Download the complete glass technical paper.



3

Vacuum Insulating Glass



Basics

In vacuum insulating glazing, or VIG, two glass panes are hermetically sealed together around the edges, separated by micro spacers, and the air between the glass panes is extracted. The vacuum is very effective at minimizing conduction and convection heat losses, lowering the U-factor at a very thin cavity depth.

Performance

VIG's overall insulating performance rivals that of traditional windows with an R-value of 10, approaching a properly insulated wall rated at 12 or higher, says Daniel Sutton, product manager for Vitro Architectural Glass.

"Historically speaking, the insulating value of windows has been dramatically less performing than a wall with insulation," he says. "With vacuum insulating glazing, now you're leveling the playing field in terms of the insulat-

ing performance that is roughly on par with wall insulation."

History

The concept of VIG was first described in a 1913 German patent by Zoller. The first commercial VIG product, Spacia, was launched by Nippon Sheet Glass in 1996.

Development

"Where VIG is going, it's now getting into bigger sizes with architects and designers. The bigger the size, the bigger the windows, the better we can get more natural light in," Sutton explains.

Additionally, manufacturers will begin moving toward temperature/heat-strengthened glass because of its versatility, Sutton says.

Challenges

VIG comes with some fabrication challenges. According to NGA's technical pa-

Left: A residential project in Shaanxi, China, with VIG in windows and skylights. The glass is laminated LandVac VIG from LandGlass. Photos courtesy of VIG GlassTechnologies.

per on VIG, the units are limited in size. Units must have at least two 90-degree corners and shapes are limited to fairly simple parallelograms or simple arcs. VIG is also not available as bent glass.

Sutton says another limitation with VIG is its dependence on what low-e coating is used within the vacuum space; hopefully, as the technology evolves there will be more freedom to use different high-performing low-e coatings to meet different energy restrictions or energy code mandates.

A limitation of VIG is that there is limited North American-based domestic sourcing for VIG, so access and cost can be a challenge. Sutton says Vitro hopes to mitigate this in the future and begin VIG manufacturing in the U.S.

Resources

The NGA developed the Vacuum Insulating Glazing glass technical paper to offer guidance on VIG market applications, performance and size applications. Energy performance, acoustic improvements, size and shape options, as well as testing standards, and a thorough list of terminology specific to VIG are also outlined in the technical paper.

The document was developed by volunteers from the following industry companies:

- NSG Group, Pilkington North America (task group chair, Kayla Natividad)
- AGC Glass Co. (now part of Cardinal Glass Industries)
- VIG Technologies LLC
- Viracon
- Vitro Architectural Glass

Download the document.

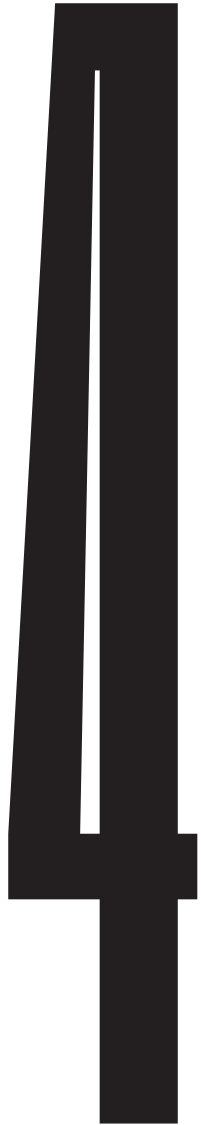


“Where VIG is going, it’s now getting into bigger sizes with architects and designers. The bigger the size, the bigger the windows, the better we can get more natural light in”



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Thin Glass

Basics

The glass industry is looking to thin glass—generally considered any glass less than 1.6 millimeters thick—in two key applications to greatly improve window system thermal performance. First is the use of thin glass used as interior lite or lites in multi-cavity

IGUs. The second, more recent, application is thin glass in window retrofit systems.

Thin glass is produced in two methods: horizontal float soda line (a process used by NSG Group) and vertical fusion drawn boro-aluminosilicate (a process used by Corning).

Performance:

Thin glass when used in a multi-cavity IGU allows for large thermal performance improvements without adding much weight. Additionally, thin-glass IGUs are much thinner than traditional multi-cavity IGUs and can more easily be accommodated by existing framing systems.

“With the thin triple, you get about an R-8 center of glass,” says Selkowitz. “And if you have a slightly larger and wider glass package, you can add two pieces of thin triple glass (making a quad IGU) and get R-14 center of glass. ... This is great news as it offers new opportunities for glass to provide improved thermal comfort, reduced HVAC size and deeper energy savings.”

Development

Thin-glass triple glazing was invented by Selkowitz in the late 1980s, achieving an invention registration in 1991. However, “no one wanted triples back then and thin glass didn’t exist,” Selkowitz says. Then came the fast emergence and growth of smartphones and flat-screen televisions in the 2000s, which created a new market for thin glass.

Today, thin glass is readily available and affordable. “There is a whole industry out there that knows how to make, cut and transport thin glass. It’s a pretty fast learning curve to bring this to industry,” Selkowitz says.

Thin-glass multi-cavity IGUs have been produced in North America for several years by Alpen High Performance Products, says company president Brad Begin. The company began working with the U.S. Department of Energy on developing thin-glass triples for commercial use in 2018. By 2019 it launched it as a product offering following extensive testing and field validation. By mid-2023, the company expects to pass a million square feet of thin-glass products sold into the market for both commercial and residential applications.

“Thin triples are at niche volume now, but [the technology] has the potential to

“Thin triples are at niche volume now, but [the technology] has the potential to be more mainstream...”

be more mainstream,” says Selkowitz. “From the technology side, there is nothing to hold it back. The price is fine. The handling is fine. What’s needed is the market pull side.”

Thin-glass retrofit products are newer but are already at the installation stage. Alpen received a patent for its thin-glass high-performance secondary window in 2021. Begin says that retrofit products help to address the “real elephant in the room, which is trying to address how we make existing buildings better. ... On the commercial side, even though half of the U.S. building stock [has] single or low-performing double [windows], only a very small percentage of existing stock does anything with replacement or upgrade.”

Challenges

“The one thing you can’t do with thin glass is temper it,” says Selkowitz. However, there is ongoing research in the

industry to address tempering issues and Begin notes the industry has “six different market-ready solutions that solve the issue.”

The thin-glass industry has also been limited by size. Though Begin says Alpen sources thin-glass sheets that are typically 50 to 60 square feet, with access to sizes of 70 square feet or larger.

Resources:

The January NGA Glass Conference: Miramar Beach included two presentations on thin triples:

- Thin Triple Glazings: Potentials, Status, Futures Concept → Products, by Selkowitz
- Thin Glass from a Fabricator Front Line Perspective, by Begin

The presentations will be available as webinars from the NGA in late 2023. Visit glass.org for more information.



Electrochromic glass “allows building owners more control of their building’s interior environment while delivering unparalleled exterior tint uniformity to meet the new realities of climate change and energy codes,” says Garret Henson, Viracon’s vice president of sales and marketing. Pictured is Viracon Plus Smart Glass powered by Halio, which has the appearance of a low-e glass when in a clear state and the appearance of a natural gray when tinted.

Dynamic Glass

Basics

Dynamic glass, sometimes referred to as smart glass, switches between clear and tinted states on demand, providing glare control and reducing a building’s energy load for heating, cooling and lighting while offering unobstructed views. Dynamic glass technologies make it possible to change the light transmission characteristics of the glass at required times. These features make it an efficient and environmentally friendly tool for filtering heat and light for more efficient climate control in enclosed spaces. While the glass industry

produces smart glass products intended to provide privacy solutions, this section focuses on switchable products designed for solar control.

Performance

There are currently three primary technologies for dynamic glass that are used in the built environment: electrochromic, photochromic and thermochromic. The principle common to them all is the use of materials whose exposure to electrical voltage, heat or sunlight changes their composition and consequently their color and texture.

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\$7.5b

The market for smart glass is expected to reach \$7.5 billion by 2028

Electrochromic glass technology uses a small DC voltage to change a thin coating from clear to tinted and darken the interior of a piece of glass, all within only a few minutes. This color-changing technology can block 99 percent of sunlight and is considered one of the most energy-efficient solutions, contributing greatly to LEED scores in architecture. Photochromic glass materials change their color composition when exposed to ultraviolet wave radiation, usually from sunlight, and darken while absorbing the light and heat of the sun. And thermochromic glass materials change color and darken when exposed to higher temperatures.

The electrochromic technology segment dominated the global smart glass market, according to Grand View Research, with a share of 83.6 percent in 2021 due to low driving voltage, high blockage ratio of ultraviolet (UV) rays and capability to integrate with large glass panels.

History

Dynamic glass products have been around for over 100 years and are only recently being implemented and some are based on modern discoveries. The science behind the electrochromic process goes back to patents in 1843 from Scottish engineer Alexander Bain, while thermochromic glass was under

development in laboratories as early as the 1960s and the first photochromic technology was offered in 1966 by Corning Glass Works Inc.

Development

Over the past few decades, advancements in smart window research have moved the technology well beyond the lab. The market for smart glass is expected to reach \$7.5 billion by 2028, according to Grand View Research. Additionally, according to Culp, the adoption of smart windows is expected to grow quickly with the Inflation Reduction Act adding dynamic glass to the Investment Tax Credit, covering up to 30 percent of the costs associated with dynamic glass for eligible projects and moving it towards cost parity with traditional glazing and shading solutions.

Next-generation thermochromic windows may use different materials that absorb light instead of reflecting it, creating a continuous tint as temperatures rise, similar to electrochromic windows. One thermochromic material that's long been studied is vanadium dioxide (VO₂), which can transition at higher temperatures (about 154 degrees Fahrenheit), increasing its ability to reflect infrared light. This allows visible light to continue to stream in, brightening the room, while lowering the amount of incoming heat, keeping the room cooler.

Challenges

Electrochromic glass, the most common technology for switchable glass, does have limitations when it comes to switching speed and shows characteristics of blue glass appearance in the tinted state. There are also challenges for widespread use, such as expense and an installation process that requires some additional training.

Resources

The NGA published the glass technical paper Dynamic Glazing for High Performance Buildings, which discusses the characteristics of dynamic glazing that can mitigate against the influence of the sun. The paper was updated in 2018.

Download the document.



The NGA's current Dynamic Glazing task group includes volunteers from the following companies:

- Cardinal
- Intertek
- NSG Group/Pilkington
- Particle Works Inc.



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HEALTH + SAFETY



The Emory Musculoskeletal Institute in Brookhaven, Georgia, was designed to be a patient-centered facility. According to officials from YKK AP America, the project was designed to meet LEED Gold certification and features a range of sustainable solutions, including sensor lighting, automatic tinting dynamic glass, indoor monitors that trigger increased fresh air flow in and an app that allows touchless entry, elevator calls and adjustment of thermostats



How glass protects occupants, promotes wellness

By Urmilla Sowell

Editor's Note: The following is based on Urmilla Sowell's presentation, "Buildings and Health," delivered in December at the United Nations headquarters in New York City to recognize the closing of the UN's 2022 International Year of Glass. Learn more about IYOG and watch a recording of the UN event at glass.org/iyog.

Building design with ample access to natural daylighting and views has been found to support occupant cognitive function, physical health and psychological well-being. Daylighting helps with mental health, focus, happiness, improved sleep and reduced depression. And glass is essential to meeting design goals and creating a healthy built environment.

However, architects and owners look to glass and glazing to do even more for building occupants. Increasingly, glass is being relied upon to protect occupants against natural disasters and man-made threats, and to prevent wildlife, such as birds, from colliding with buildings.

This article outlines how glass improves lives for building occupants, contributing to human health and safety where people live, work, heal and play.

and lighting, making high-touch areas more hygienic or avoidable.

YKK AP America supplied its thermally broken YCW 750 XT and YCW 750 XT IG curtain wall system for the project. SageGlass provided the electrochromic dynamic glass, and Glass Systems was the glazing contractor for the project.

Right: 02 Dunsmuir in Vancouver, British Columbia, Canada, features large glass assemblies of low-emissivity, triple glazing. Garibaldi Glass fabricated the glass, Guardian Glass was the manufacturer, and Flynn Group of Companies was the glazing contractor. The triple-glazed units include a lite of Guardian SNX 62/27, thermal-edge TGI Spacers from Technoform North America, and 90 percent argon fill in both air gaps.

Below: National Glass Association Technical & Advocacy Director Urmilla Sowell speaking at the International Year of Glass Debrief event at the United Nations in December 2022.

Productivity

Numerous studies show that access to daylighting and quality views in a building provides better learning, faster healing, higher employee productivity and higher retail values. Students achieve 5-to-14 percent higher test scores and learn 20-to-26 percent faster when classrooms have access to daylighting. Workers in daylit office buildings are 18 percent more productive, and store owners have found out that they can enjoy a 15-to-40 percent increase in retail sales when their storefront has access to daylighting. In addition, a new study published in December suggests that daylit buildings may reduce the risk of children developing myopia.

Mental function

People who work with a view of the outdoors have 10-to-25 percent better mental function and memory and can process information faster than their colleagues without views of the outside. For surgical patients in hospital rooms with views of the outside environment, there is a 22 percent decrease in pain medication and their hospital stays are 8.5 percent shorter than those patients with rooms without an external view.





Resources

For additional information on the essential role of glass in promoting human health, safety and wellness, visit glass.org/store for access to the following resources and technical papers from the National Glass Association.

- Daylighting Glass Technical Paper
- Benefits of Decorative Glass in Daylighting Applications
- Protective Glazing Manual
- Security Glazing Glass Technical Paper
- School Security Glazing Glass Technical Paper
- Bird-Friendly Design Guide
- Technical Resource Hub for Daylighting

Visit glass.org/ondemand-webinars for related videos, including:

- Recent Advancements in Glazing Technology, Fenestration Performance and Energy Codes
- Glass Options for a Healthy Built Environment
- Glazing: An Integral Part of Biophilic Design
- The Health & Wellness Benefits of Daylighting
- The Glazing Industry's Impact on the Active Shooter Standard

The NGA continues to develop additional resources to address the essential role of glass in promoting occupant health through several task groups. A task group of volunteers is currently in contact with researchers studying the physiological impacts of light on human health and the implications of glazing. Volunteers from the following NGA member companies are leading industry efforts through the task group.

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Thermal comfort

Glass brings light into buildings while keeping the weather out. High-performance window systems can dramatically improve occupant comfort: they have lower heat loss, less air leakage, warmer window surfaces that minimize condensation while also allowing less noise from outside into the building. Optimized window design can reduce energy consumption in our homes by 10 to 50 percent. In commercial buildings, well-designed window systems can reduce lighting and heating and cooling costs by 10 to 40 percent.

Acoustics

The world health organization lists noise as one of its top three pollutions along with air and water. Noise can cause short- and long-term health problems such as sleep disturbances, cardiovascular effects and hearing impairments as well as affect our ability to learn and perform at work. Properly designed and retrofitted windows and doors help reduce sound transmission by up to 90 percent.

Ventilation

Humans spend about 90 percent of their time indoors. Indoor concentrations

of pollutants are often two to five times higher than typical outdoor concentrations. Indoor concentrations have increased in recent decades due to high-performance building design with increased air tightness and increased use of synthetic building materials. Air pollutants are linked to adverse health effects such as irritation, fatigue, respiratory diseases, heart disease and cancer. Conscious material selection and proper building ventilation can help prevent “sick building syndrome.” Glass is part of the solution to improve indoor air quality.

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— Glazing Consultant,
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Operable windows can be included in building design strategies for natural ventilation. Natural ventilation uses pressure differences to move fresh air throughout buildings. Fresh air is needed to alleviate odors, provide oxygen for respiration and to increase thermal comfort.

Views

Biophilic design is based on the concept that humans desire to be connected to and surrounded by nature. Feeling a connection to nature can have various psychological benefits, including improved attention and focus, stress recovery, better mood, increased productivity, and improved well-being. Glass is often featured in biophilic design allowing occupants to maintain a connection to nature while indoors. Glass facilitates views of nature outside and allows light to enter to support plants or trees growing inside the building.

Protection

Protective glass and glazing save lives in the event of hurricanes, tornados, fires, seismic events, floods and more. For example, impact-rated glazing systems can stand up to hurricane-force winds and debris, protecting people and interiors. While fire-resistant glazing systems provide a safe path for exit in event of a fire.

Security

Glass also protects occupants against man-made threats, from bomb blasts to active shooters. Of recent note are advancements from the glazing industry to address school and building security. The architectural glass industry supports the implementation of school security design strategies, including security windows, in model building codes. In active shooter events, windows can be the first line of defense, slowing down an attacker when installed as security glazing resistant to forced entry, allowing more time for schools to enact emergency plans and for first responders to arrive.

Wildlife protection

Glass is not only beneficial for humans, but it can also protect wildlife. The glass industry has produced glass to protect birds and marine turtles alike. Bird-friendly glass, in particular, has gained attention and adoption in recent years. An estimated 365 to 988 million birds are killed each year due to collisions with reflective surfaces of buildings. Bird-friendly glass, which features markings or coatings visible to birds, can prevent collisions and loss of wildlife. ■

Urmilla Sowell is the vice president of technical services and advocacy for the National Glass Association.

PRODUCTS

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SOLUTION: PRIWATT GLASS SOLUTIONS FOR HEALTH CARE BUILDINGS

Technology has become a lucrative part of the healthcare industry as providers increasingly realize the role it can play in helping them provide better care. For the architects and developers involved in creating these new, high-tech healthcare spaces, this means keeping an eye out for various technologies that can increase patient comfort, save time and money for healthcare facilities, and allow providers to focus on taking care of what matters most.

One tool that can help enhance safety and privacy measures and speed up daily operations is Smart Glass Technologies' PriWatt Switchable Privacy Smart Glass, which ensures "privacy on demand" and has been used in numerous healthcare installations such as Mount Sinai Kravis Children's Hospital in New York, Toronto North York Hospital in Canada, and the Moffitt Cancer Center in Florida.

Increased patient privacy. The switchable smart glass panels can be easily switched from clear to opaque ensuring an increased level of patient privacy during medical consultations and procedures in examination rooms, patient rooms and operating theaters. It also allows patients to see other people, reducing feelings of isolation and promoting a sense of connection.

Observation without contamination. Cross-contamination from highly



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SWITCHABLE GLASS CAN BE EASILY INSTALLED AS ANY REGULAR LAMINATED TEMPERED GLASS

contagious pathogens such as MRSA is a growing problem in hospitals. A key benefit of switchable privacy glass is that hospital staff can easily observe a patient by flicking a switch, without risking cross-contamination of infectious diseases.

Reduced noise. Research has shown that noise can be extremely disruptive and plays a negative role in healing. Decreasing noise in patient care areas helps the healing process and facilitates a faster recovery. Laminated smart glass installed in an acoustic partition significantly absorbs and decreases noise from people and hospital equipment.

A hygienic alternative. Switchable glass is antibacterial and simple to clean and maintain—a top priority for healthcare facilities—making it a hygienic alternative

to traditional hospital curtains and blinds. Harmful germs can easily gather on the surface of blinds and curtains, and these are difficult to sterilize.

Simple installation and operation. Switchable glass can be easily installed as any regular laminated tempered glass. It can be installed by any certified glazier and safely connected to power by a certified electrician. The provider or patient can manipulate the power settings within seconds of via the remote or wall switch.

Smart Glass Technologies' focus on privacy, versatility and environmental health is what makes their switchable smart glass a game-changer for the healthcare industry.

Learn more at smartglasstech.us, 786/472-6712. ■



01

01. Bird-friendly glass

With the 4Bird product family, Saint-Gobain offers a range of glasses with effective bird protection combined with Cool-Lite solar control coatings that allow the architect to design without compromising the aesthetics or performance of the building envelope. The first products available in the series are 4Bird Frit, a series of screen-printed patterns; 4Bird Etch, a series of acid-etched patterns; and 4Bird Lami, a series of laminated glass.

+[33] 1-88-54-00-00 | SAINT-GOBAIN.COM

02



03

02. Glazing solution

Faour Glass Technologies' Slimpack XL Stack Hurricane is engineered using Florida Product Approval for HVHZ large-missile with design pressures of +/- 75 pressure per square foot. The XL Stack is now available in up to five panels of 12-foot by 8-foot heights capable of completing a 40-foot-high opening. This new glazing solution offers discerning residential and commercial building owners the option to use the innovative frameless Slimpack XL window system in vertical and stacked applications. Engineered with structurally glazed horizontal joints, Slimpack XL Stack eliminates aluminum mullions, providing unobstructed views.

813/884-3297 | FAOURGLASS.COM

03. Annealing lehr

Grenzebach's new annealing lehr adapts the cooling capacity during glass manufacturing. Individually controllable with increased flexibility at the annealing point, providing users with new options to achieve the ideal glass tension for a wide range of production scenarios. The new design and improved cooling technology offer powerful added values and also result in significantly reduced energy consumption. This also includes increased occupational safety and optimized maintenance possibilities.

+[49] 9069-8224-00 | GRENZEBACH.COM/EN-US

04. Glove coating

Magid's new VersaTek coating adapts to almost any environment so workers can get the job done without having to sacrifice safety, comfort, grip or dexterity. Specially engineered stabilizers allow this coating technology to read the environment and adapt to amplify the worker's grip when working in wet, dry, slick, abrasive or oily conditions. Workers can also maintain natural hand movements and precision when handling small parts. This coating delivers over 50 percent more abrasion resistance than other glove coatings, say company officials.

800/867-1083 | MAGIDGLOVE.COM



04



05



06

05. Resource hub

Guardian Glass' Resource Hub provides customers and the wider glass community of fabricators, wholesalers, architects, specifiers, glaziers and dealers with 24/7 online access to a digital platform that offers technical information on glass, engineering, analytical and specification tools; marketing resources; and interactive training. It includes a comprehensive technical library that allows self-service on technical inquiries. After creating a user profile, customers can log in to start enjoying the benefits of the new digital platform.

866/482-7374 | GUARDIANGGLASS.COM

06. Cloud platform

The Sphere Viewer is a solution that combines 360-degree photo and point cloud data into a single, cloud-based location inside the Faro Sphere platform. With Sphere Viewer, accessible with a Faro Sphere and HoloBuilder account, users can visualize and share captured data in one place. Virtual collaboration and remote construction project management remove work siloes, reduce errors and project delays, and are designed to make it easy to make quick decisions backed by secure, synchronized data, say officials.

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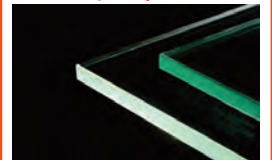
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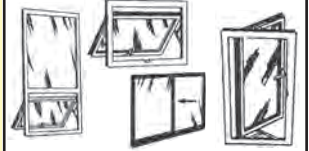
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BEHIND THE SCENES OF PULP STUDIO'S HISTORY CHANNEL FEATURE

Pulp Studio, based in Gardena, California, hosted both The History Channel and its special guests Tim Allen and Richard Karn for a behind-the-scenes factory tour given by Pulp Studio's chief operating officer Kirk Johnson for the show "More Power."

More Power is a show where Allen, Karn and DIY expert April Wilkerson tackle one tool-centric theme per weekly episode by testing their limits and exploring how these tools help keep the world running. The show aims to "celebrate the coolest, most powerful and iconic examples of each tool."

How the episode came to be

While the episode featuring Pulp Studio aired in fall 2022, it was actually filmed back in the fall of 2021. Spoke Studios, which is owned by Tim Allen, approached Pulp Studio about an episode they were planning focused on heat. The studio had found out about Pulp Studio through its website and recent projects the company had worked on.

"The idea behind More Power is they look at different ways that power is generated, made, what it's used for and different applications. We felt it would be prudent that we go ahead and meet with them," says Kirk Johnson, COO of Pulp Studio.

Johnson said the focus of his conversation with Allen and Karn was on both annealed bent and tempered bent glass, chemical strengthening and fabrication in general. For the five hours that were spent filming, Johnson demonstrated to the two hosts the technical challenges and craft involved



Pulp Studio employee works from the factory floor in Gardena, California.

in printing and bending glass of various sizes, the effects of thermal stress on glass production and how Pulp Studio minimizes the risks of glass shattering when not cooled properly.

What did Allen and Karn think of the factory?

Johnson said that the two hosts were impressed by Pulp Studios' green initiatives. The factory has solar panels that produce about half of its own consumption, so the factory only pulls half from the [electrical] grid.

They also recycle glass, paper, plastic and cardboard and have a closed loop deionized water system, meaning the only thing dumping into the drains is from the restrooms, kitchen or break room.

"We also just have a really great facility. It's 158,000-square feet, we have our own ERP system and always try to keep it clean and as not-chaotic as we can. They seemed impressed," Johnson said.

Shining a spotlight on the industry

Johnson said their team really wanted to

take the opportunity to shine a spotlight on the glass industry as a whole.

"People don't know a lot about glass, so I think over time this will help get more glass education and information out to the general public, which is always a good thing," Johnson said.

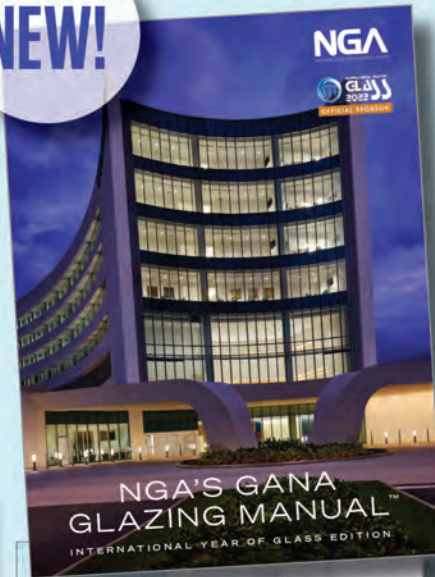
"As the employment landscape changes so dramatically with companies like Google, Amazon and Apple that attract young people, we need to be attracting the next generations of folks into the industry. I do hope it helps spark some interest where people will entertain joining our industry. It was somewhat intrusive to disrupt our production schedule to shoot the show, but we felt Pulp would benefit, our industry would benefit and maybe more people would be interested in employment in glass."

Johnson added that people have been loving hearing about the episode across Pulp's social media accounts. Overall, he is happy to have the morale boost for employees at the factory and to have had an opportunity to bring some attention to an otherwise often overlooked industry. ■

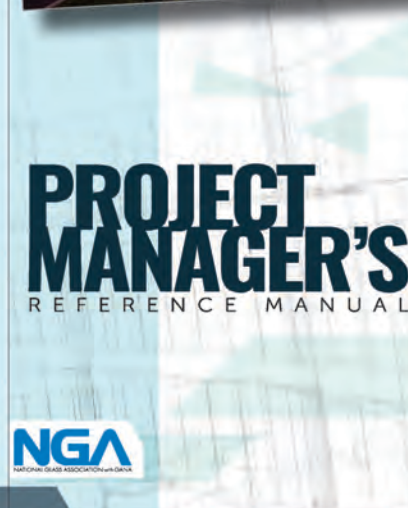
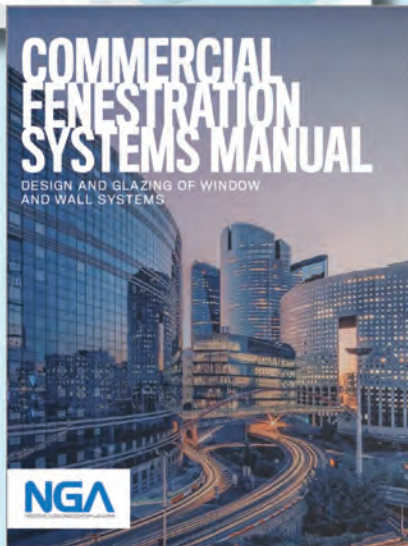
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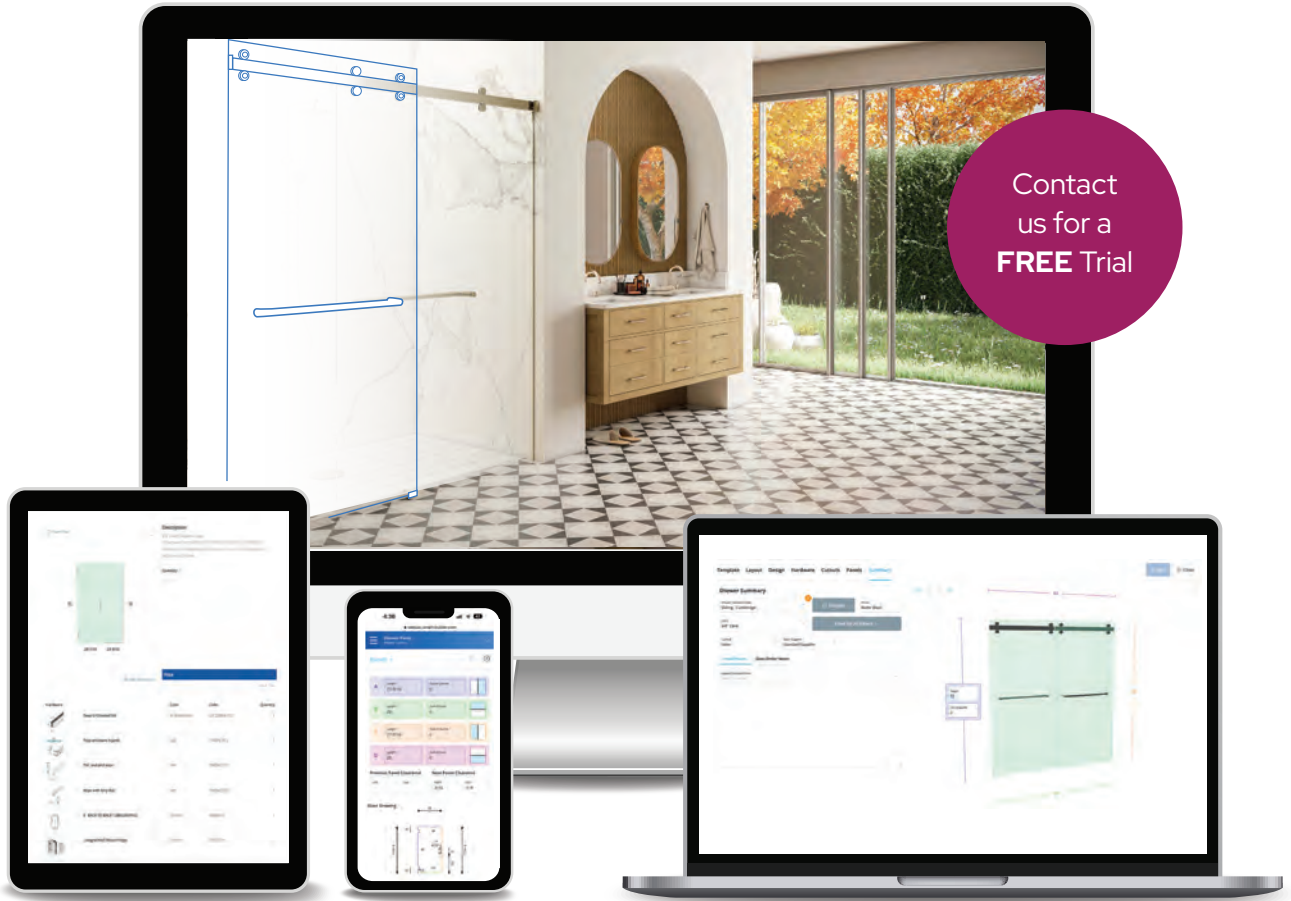


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