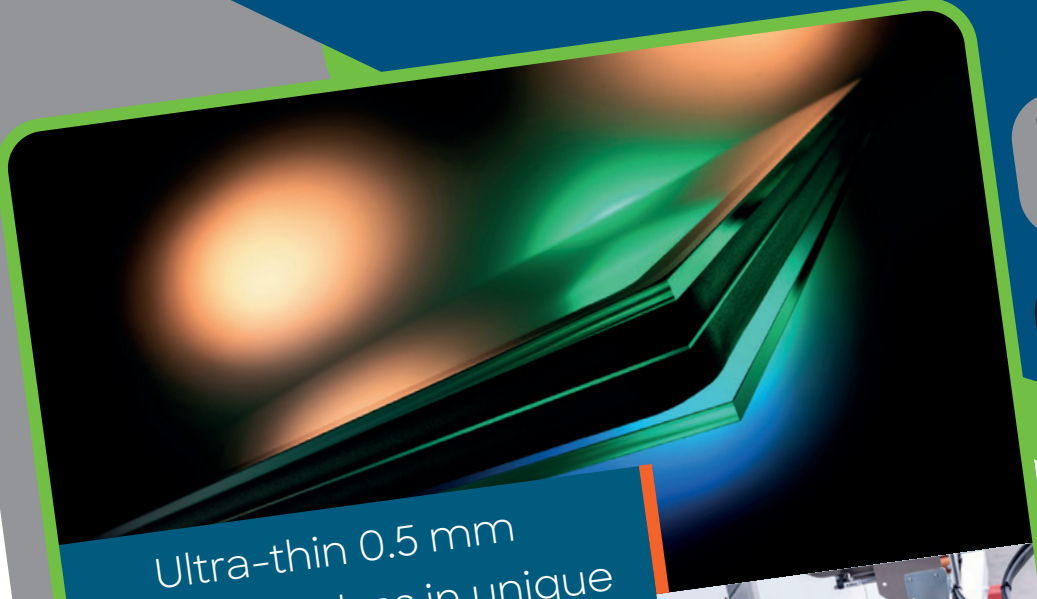
Glass-Technology International

THE LEADING MAGAZINE FOR THE INTERNATIONAL FLAT GLASS INDUSTRY

May/June • Year 36 • No. 3/2025



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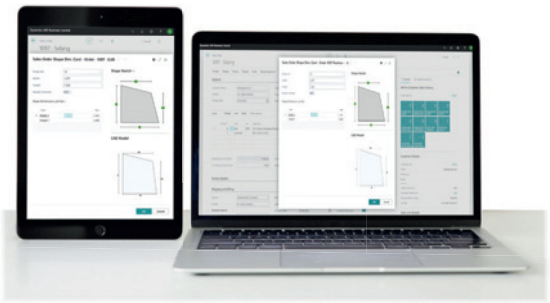

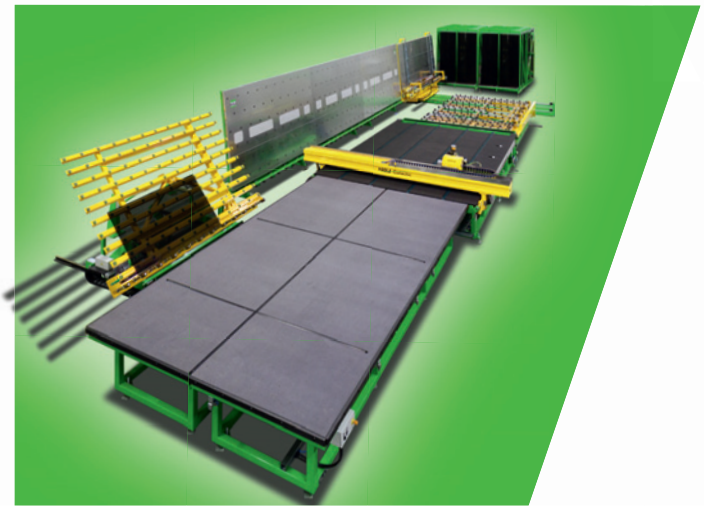

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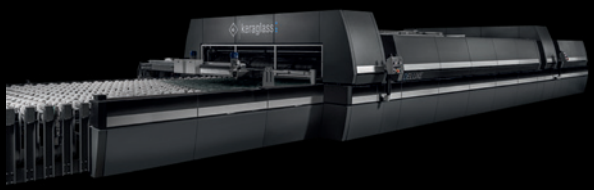

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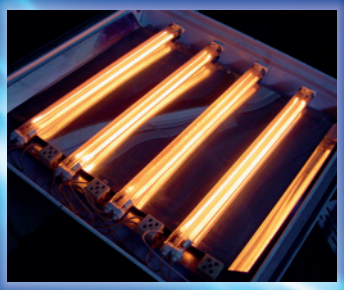

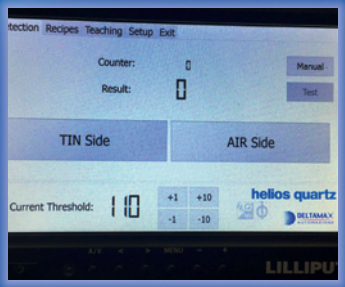

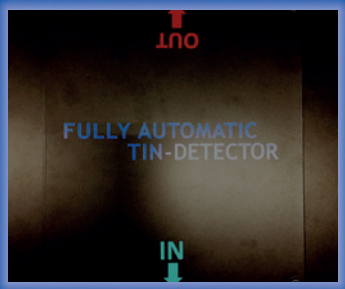

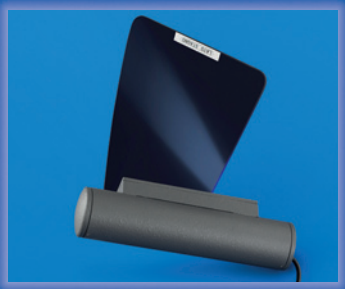

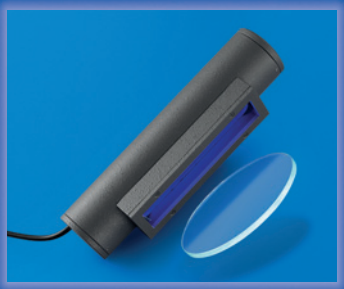

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Year 36
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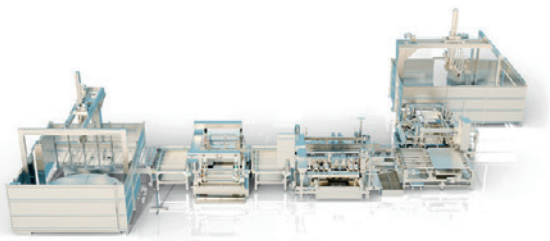

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Glass-Technology International

THE LEADING MAGAZINE FOR THE INTERNATIONAL FLAT GLASS INDUSTRY

2025 TRADE FAIRS CALENDAR

The magazine will be distributed at the following Events

issue	exhibition/conference	date	venue	deadlines
2025	FLAT GLASS 2025 world directory			Editorial files: 31-01-2025 Deadline Adv files: 10-02-2025
2025 1	AUTOMOTIVE GLASS FORUM 3rd EDITION	16 April	BOLOGNA Italy	
	FIT SHOW	29 April 1 May	BIRMINGHAM United Kingdom	Editorial files: 14-03-2025 Deadline Adv files: 21-03-2025
	GLASS TEXPO	7-8 May	SAN ANTONIO (TX) USA	
2025 2	GLASSTECH CANADA	14-15 May	TORONTO Canada	
	CONSTRUMAT	20-22 May	BARCELONA Spain	Editorial files: 11-04-2025 Deadline Adv files: 18-04-2025
	CHINA GLASS	26-29 May	BEIJING China	
2025 3	GPD - GLASS PERFORMANCE DAYS	10-12 June	TAMPERE Finland	Editorial files: 16-05-2025 Deadline Adv files: 21-05-2025
	GLASSTECH MEXICO	16-18 July	MEXICO CITY Mexico	
2025 4	GLASS SOUTH AMERICA	3-6 September	SAO PAULO Brazil	
	GLASSPRO INDIA	10-12 September	MUMBAI India	
	VITRUM	16-19 September	MILAN Italy	Editorial files: 23-07-2025 Deadline Adv files: 31-07-2025
	ALL VITRUM EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE VITRUM PREVIEW			
2025 5	GLASSBUILD AMERICA	4-6 November	ORLANDO (FL) USA	Editorial files: 22-09-2025 Deadline Adv files: 26-09-2025
	GLASSTECH ASIA	6-9 November	JAKARTA Indonesia	
2025 6	EURASIA GLASS	15-18 November	ISTANBUL Turkey	Editorial files: 15-10-2025 Deadline Adv files: 20-10-2025
	ZAK GLASS TECHNOLOGY	4-7 December	MUMBAI India	

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Glasstech Mexico 2025
Centro Citibanamex, Mexico City
16.07.2025 - 18.07.2025
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Glass South America 2025
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03.09.2025 - 06.09.2025
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1: When loading rate is below 80%.
2: Take the furnace data of B or E width as an example.

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LATTUADA

Fourth edging machine installed at Vidraria Armando

What a milestone for **Lattuada**: four edging machines installed at the same customer, over more than 20 years of collaboration, and a fifth is already on its way. This latest machine installed is a TL 11 PC H35, specifically designed to process ultra-thin glass with a minimum height of just 35 millimetres. This is a choice that once again reflects the trust **Vidraria Armando** places in the quality of Lattuada's solutions and the reliability of its support. Lattuada thanks Vidraria Armando for this strong and long-lasting partnership, and also JLE, agent for Portugal of the company, who once again handled every step of the purchase and installation with expertise and dedication.

WWW.ADELIOLATTUADA.COM - WWW.VIDRARIAARMANDO.COM

NGA

Next President and CEO Lakisha Ann Woods

The National Glass Association (NGA) is pleased to announce Lakisha Ann Woods, CAE, as NGA's new President and CEO as of July 14, 2025. Woods will replace 35-year NGA veteran Nicole Harris in the association's staff leadership role.

Woods is the former EVP/Chief Executive Officer of the American Institute of Architects (AIA) where she grew revenue 40 percent and grew membership to a historic high of over 100,000. Woods also previously served as President and CEO of the National Institute of Building Sciences (NIBS) where she led efforts to expand the organisation's programs and markets while growing and strengthening its membership base. Prior to joining NIBS, Woods was the Senior VP and Chief Marketing Officer at the National Association of Home Builders (NAHB), where she oversaw a 27 member team responsible for all marketing and revenue generating programs, including sponsorship sales and partnerships with major national companies. Woods is also a Past Chair of the Board for the American Society of Association Executives (ASAE), served on the MPI Advisory Board and is a Certified Association Executive (CAE). She also previously served as Vice Chair of the U.S. Green Building Council Board of Directors and on the Advisory Board of Crosswalk. She holds a Bachelor of Science degree from the University of Maryland in College Park and lives with her husband and daughter in Howard County, Maryland. "We are delighted that Lakisha will lead NGA following Nicole's well-deserved retirement, announced late last year," said Rick Locke, CEO of Montana Sash & Door and 2024-2025 NGA Board of Directors Chair. "I want to thank the NGA CEO Search Committee, and especially Ron Crowl, Senior Advisor, Windows, Doors and Glass at FeneTech, a Cyncly company, and 2024-2025 NGA Board of Directors Immediate Past Chair, who led the search effort over many months. It was a thorough search effort, and we were unanimous that Lakisha's credentials and experience will continue to grow NGA's excellent service and results for our members and the glass and glazing industry."

WWW.GLASS.ORG

ŞIŞECAM

Global supplier summit

Şişecam, celebrating its 90th anniversary this year, came together with its business partners at the third Şişecam Global Supplier Summit.

Can Yücel, Şişecam CEO, emphasised that progress is a road travelled together with the ecosystem and said, "Şişecam's ninety eventful and rewarding years represent decades of progress, resilience and partnership. Our culture is built on progress which creates value for all, and value can only be maximised when we create together. Today, simply focusing on individual perspectives and responsibilities fall quite short. To truly move forward, we must think together, think differently and care for one another."

A Call to "Design Change Together"

Stating that the summit's theme, "United to Collaborate – Navigating Together," is not just a slogan but also a call to action, Can Yücel continued, "We are committed to building a future-ready ecosystem that is rooted in sustainability, digital transformation and operational resilience. I urge you to consider innovation not just as an opportunity, but as a shared responsibility. Because what you bring to the table today will shape our future. Let's change together. Let's create together. Let's navigate together."

WWW.SISECAM.COM/EN

GLASS FUTURES & GRENZEBACH

Partnering for innovation

UK-based **Glass Futures** is an organisation that identifies and delivers routes to industrial decarbonisation. Together with **Grenzebach Group**, a leading supplier of glass production solutions that's head-quartered in Hamlar, Germany, it plans to install a cutting-edge R&D rolled glass line in St Helens, UK - all aimed at creating a low-carbon future for the glass production industry.

The collaboration supports Glass Futures' objective to enhance operational efficiencies within the glass manufacturing sector by driving innovation and sustainability towards net zero. As part of this initiative, Grenzebach has supplied vital components, including an innovative annealing lehr, a cutting line and a state of the art control system to enable high-quality and sustainable glass production.

WWW.GLASS-FUTURES.ORG

VITRO ARCHITECTURAL GLASS

Spandrelite™ Glass elevates façade design

Vitro Architectural Glass has launched its latest innovation, Spandrelite™ glass. Designed to enhance the aesthetic versatility of building façades, Spandrelite™ glass is a painted glass solution that transforms essential structural elements into stunning visual features, offering architects and designers a dynamic tool to achieve their design visions. "Spandrelite™ glass is a game-changer for architects seeking to blend function with beauty," said Wendy Carroll, Senior Project Manager, Vitro. "By providing architects with a product that can elevate ordinary structural elements, we empower them to create visually striking buildings with elevated design cohesion and performance."

Spandrelite™ glass comes in three colours -black, white and warm grey- that complement a wide range of architectural glasses. It helps obscure unsightly building components while delivering exceptional durability and resisting moisture, heat and UV exposure. Spandrelite™ glass is shipped as annealed and must be heat-treated as part of final processing to fully cure the coating and to withstand impact and scratches that pose a threat to exterior glass. As a result, pre-coated stock sheets of Spandrelite™ glass can easily be kept in inventory by fabricators across the country for faster order fulfilment. Spandrelite™ glass is available from hundreds of Vitro glass fabricators in the USA and Canada - ensuring consistent quality, faster production times and streamlined delivery for new builds or replacements.

WWW.VITROGLAZINGS.COM

LANDGLASS

LandGlass installs second tempering furnace for U.S. glass fabricator

A renowned architectural glass company based in the United States has once again chosen **LandGlass** as its trusted equipment partner. Established in 1975, the company serves commercial glass contractors, as well as manufacturers of shower doors and store-front systems. As a member of the PPG Certified Fabricator Program, it is widely recognized for its commitment to high-quality fabrication and customer service. Following the successful operation of a LandGlass JetConvection glass tempering machine installed in 2014 -which continues to deliver excellent quality and long-term stability- the company has recently commissioned its second LandGlass tempering machine: the UltraJet glass tempering furnace A2870.

Engineered to temper 3.2 millmetre-thick glass with maximum dimensions up to 2,800 by 7,000 millimetres, the UltraJet A2870 glass tempering furnace delivers outstanding flatness and is suitable for laminated glass processing. This new installation enhances the customer's capacity to supply both the architectural curtain wall segment and the residential interior market.

With over 30 years of experience and a full portfolio of advanced equipment, the company has solidified its position as one of the Midwest's top glass fabricators in the USA. The addition of the UltraJet glass tempering furnace further reflects its commitment to innovation and continued reliance on LandGlass's industry-leading tempering technology.

WWW.LANDGLASS.CC

PYROGUARD

Intertek listings for Forster profiles in the Middle East

Pyroguard, a leading independent provider of fire safety glass, has achieved Intertek certification for a wide range of its fire-rated glazing systems in collaboration with Forster steel profiles, marking a significant step forward in the company's expansion across the Middle East.

The newly certified systems, tested to EN 1364-1 and EN 1634-1 standards for applications such as curtain walling and screens, are now listed on Spec Direct – Intertek, the Middle East's leading building product certification database, and available to Forster's accredited fabricator network across the region.

The certifications follow a successful test and audit programme covering a range of Pyroguard products by Intertek in accredited laboratories, widening the company's scope of compliance with regional building codes and fire safety standards.

Lee Coates, Pyroguard's Business Development Director for the region, said, "We're delighted to have secured these Intertek listings, which represent a major milestone in our Middle East growth strategy. Working closely with Forster Profile Systems, we can now offer specifiers and contractors a wider choice of fully certified fire safety glazing solutions to support code-compliant project delivery."

The listings include large-format sizes, butt-jointed applications and 30, 60, 90 & 120-minute fire rated systems, as well as a range of 30 & 60 minute products from Pyroguard Advance, the company's latest range of cuttable fire safety glass, featuring a unique and innovative gel interlayer for exceptional fire protection.

Many of these certified products are already stocked locally and readily available for quick distribution across the region.

Cristina Perez Domper, Regional Operations Manager - South Europe and MEA Building & Construction at Intertek, said, "We're pleased to support Pyroguard in achieving Intertek certification for these glazing systems. Our rigorous testing and certification process ensures that only high-performing products make it to market, giving designers and contractors peace of mind when selecting approved materials for critical fire safety applications."

Pyroguard is planning further certifications in the coming months, with additional products in the pipeline for future listings

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GFE

Call to improve regulations for end-of-life vehicle recycling

Glass for Europe, alongside seven other industry and environmental organisations, has co-published a joint call for stronger measures to improve the high-quality recycling and reuse of materials from end-of-life vehicles. More automotive glass recycling will be crucial for the future of the flat glass sector and should, therefore, be enshrined in the text of the EU End-of-Life Vehicles (ELV) Regulation. This call underlines that specific requirements are needed in the ELVR for the dismantling and separate treatment of end-of-life glass components, such as windscreens and windows. This is essential to achieving high-quality recycling since glass parts that are shredded with other materials cannot be recycled into new glass.

Dismantling glass components before shredding could enable recycling up to 500,000 tonnes of glass per year. Considering that each tonne of recycled glass used can reduce the consumption of raw materials by 1.2 tonnes and cut CO^2 emissions by at least 600 kg, this would represent a reduction of at least 300,000 tonnes of CO^2 and 600,000 tonnes of raw materials yearly, in the EU.

Some Member States, including France, Portugal, the Netherlands and Spain have already adopted national rules to increase automotive glass recycling. Glass for Europe supports the extension of such practices across the EU through mandatory dismantling requirements and clear quality standards for recycled materials.

This is why, as in the joint statement with stakeholders from the glass value chain last December, Glass for Europe joined this call to raise awareness among EU lawmakers active on the EU End-of-Life Regulation.

Glass recycling starts with glass dismantling. Future legislation should, therefore, ensure that this dismantling happens everywhere in the EU to achieve EU environmental objectives.

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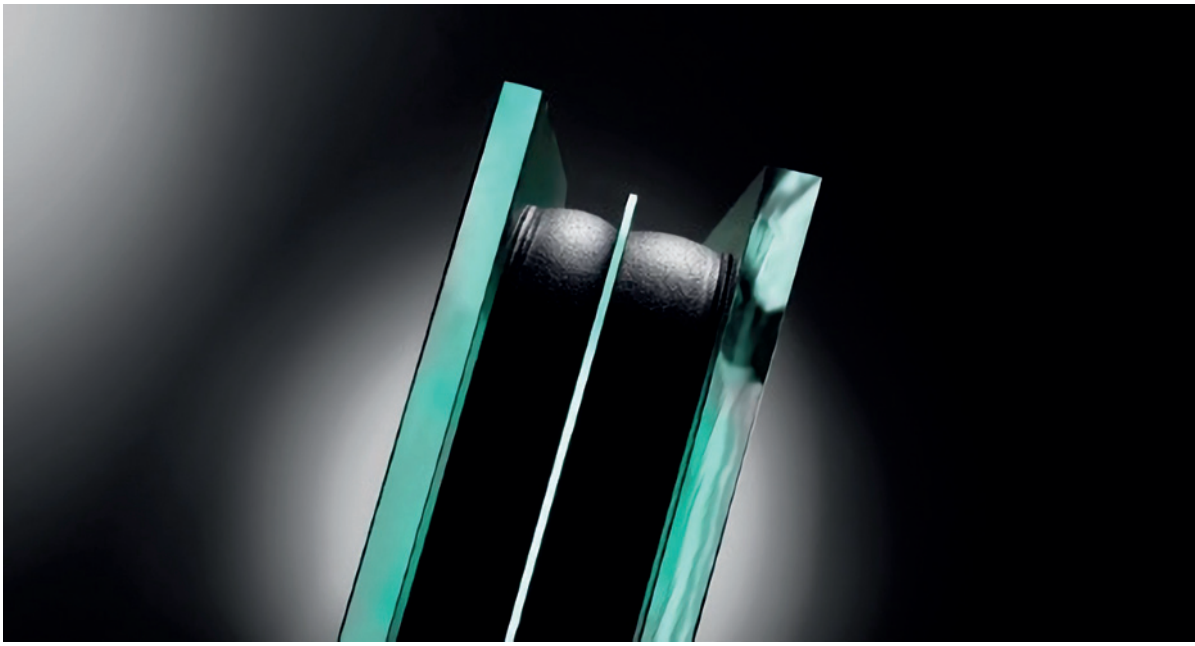
GLASTON

Orders received for ultra-thin insulating glass production



Glaston has received technology and equipment orders from **Regency Glass**, a well-known producer of high-quality insulating glass units (IGU) in the UK. Logged into Glaston's Q1 2025 order book, the orders include an ULTRA TPS® line for manufacturing insulating glass units with ultra-thin centre glass, MULTI'ARRISSER machines for edge processing and an FC Series X machine for glass tempering. All will be delivered in the second half of 2025.

Regency Glass has a long experience in providing insulated glass units for the replacement and new build market in the UK. Relying on Glaston's technology, the company is now expanding its production capabilities, specifically designed to produce ultra-thin triple-glazed insulating glass units.

The triple IG unit with ultra-thin centre glass down to 0.5 mm is significantly lighter than conventional triple IG units, and it offers high-performance glazing in a slimmer, more efficient package. These units offer up to 35 percent better U-values than conventional double glazing, while also addressing the issues of thickness and weight. Regency Glass's new triple glazed offering is only 5 percent heavier than a conventional double IG unit.

Regency Glass has a quality and efficiency-driven operating model. Glaston was the only vendor capable of providing the needed technology to meet their production quality and efficiency requirements. The customer has already automated its glass tempering process with Glaston's Autopilot and will continue utilizing those capabilities in the future, too.

"Building on top of the automation capabilities, Regency Glass had the opportunity to plan their new offering around the production process of new ultra-thin IGUs. The production design makes the most of the proven TPS® technology and a patented processing method created specifically for ultra-thin glass," said Sasu Koivumäki, Chief Sales Officer at Glaston.

"We focus on investments that will meet the future requirements of the glazing industry. To address the market's growing need for energy efficiency, we see a potential for ultra-thin insulating glass units with a better U-value that fit the existing window frame width. With Glaston's technology and process know-how support, we are confident we will maintain our established production quality and reliability when stepping into a new production field," said Wayne Fitzmartin, Chief Operating Officer, Regency Glass.

WWW.GLASTON.NET - WWW.REGENCYGLASS.CO.UK

ŞIŞECAM

Can Yücel replaces Görkem Elverici as CEO

Şişecam recently announced that former Chief Executive Officer of the Company Görkem Elverici resigned on April 30.

Starting May 1, Can Yücel was appointed as the new CEO and will also continue to serve as a Member of the Board of Directors.

As the only global company operating in all core areas of glass production, Sisecam is a global leader in glassware and chromium chemicals - among the top five producers in flat glass and glass packaging and one of the top three producers of soda ash worldwide.

Sisecam operates across four continents and 14 countries - including Türkiye, Germany, Italy, Bulgaria, Romania, Slovakia, Hungary, Bosnia and Herzegovina, Russia, Georgia, Ukraine, Egypt, India and the United States.

The company plays a pioneering role in flat glass, glassware, glass packaging, chemicals, auto glass, glass fiber, mining, energy and recycling industries. By placing innovation and technology at the core of its operations, Sisecam delivers its products to customers in over 150 countries through its robust supply chain.

WWW.SISECAM.COM

FOREL

North America appoints Chris Campbell as Area Sales Manager

FOREL North America, leading supplier specialised in the manufacturing of flat glass and IG processing machinery, announced the appointment of Chris Campbell as Area Sales Manager for Western Canada and USA, effective May 5, 2025. In this role, Campbell will oversee sales engagement and market development initiatives across the region, with a focus on driving growth and deepening customer relationships. He brings over 20 years of experience in the commercial and residential fenestration industry, rooted in engineering, technical expertise, and experience in sales leadership.

Chris Campbell's proven track record in high-performing sales environments and delivering exceptional client solutions makes him a perfect fit for expanding our presence in the North American market," said Scott Knisely, President of FOREL North America. "We're thrilled to welcome him to the team and look forward to the impact he will make. I'm excited to join FOREL North America at such a pivotal time," said Campbell. "I look forward to partnering with customers across North America to understand their unique needs and provide customised solutions that support their growth. Whether it's optimising production workflows, enhancing product quality, or scaling operations, I'm committed to delivering results that make a difference."

WWW.FORELSPA.COM

LUMESO

Future of flat glass strengthened by AI-solution

A young software company, **LUMESO** recently received the "German Innovation Award" in the categories "Excellence in B2B" and "Transformative Solutions." Its AI-based solution automates manual processes in internal sales - especially order data entry, which until now was often done manually from emails, PDFs, or drawings.

Lumeso thus not only simplifies and accelerates processes, but also increases job attractiveness: The software replaces monotonous data-entry tasks like typing up orders, giving employees significantly more time for value-adding tasks. This creates an environment for young professionals that not only allows but actively utilises digital competence and modern technologies.

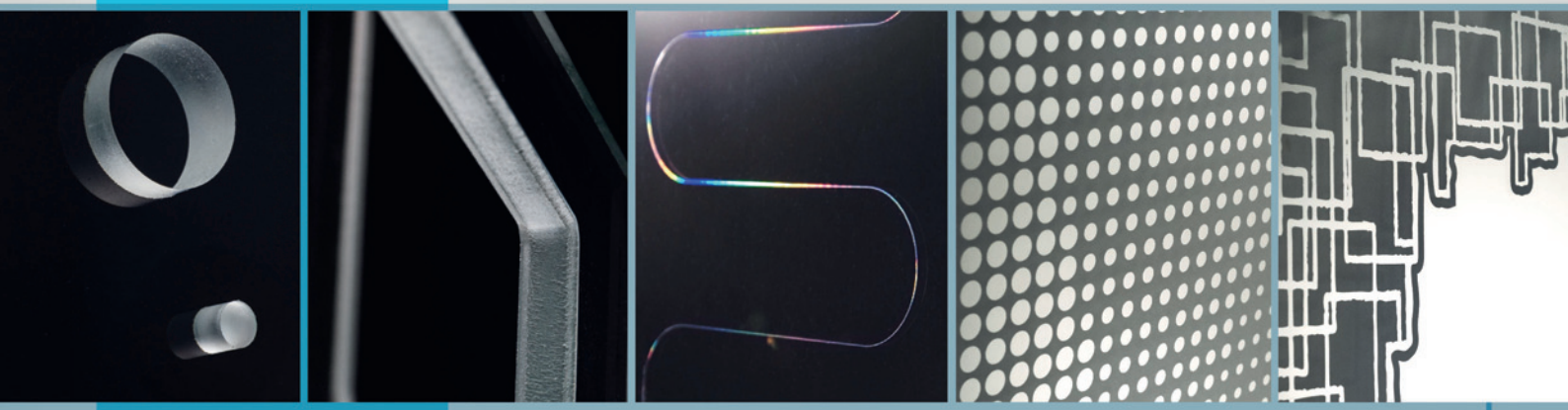
Industrial companies in Europe are struggling with a structural shortage of skilled workers while needing to make their production more efficient and sustainable. Lumeso's AI-based solution directly addresses this issue and strengthens the competitiveness of the flat glass industry through technology - without becoming a costly or lengthy IT mega-project.

Christian Kimmeswenger, CTO and Founder of Lumeso, said, "Our software is designed with an advanced interface so that it is compatible with a wide range of ERP systems used in the flat glass industry. It automatically reads incoming order data, adds missing information through intelligent queries, and transfers everything in a structured format to the ERP system - once approved by the responsible employee. This boosts efficiency, relieves staff, and simultaneously provides a more modern, future-oriented work environment."

Georg Katzlinger-Söllradl, CEO and Co-Founder of LUMESO, is excited about the German Innovation Award in two categories The award of the German Innovation Award in two categories shows that the development of modern software with real impact for the industry is being recognised - and it seems more important than ever for Europe. Well-known flat glass processors are already using the solution to shorten lead times, eliminate transmission errors, and achieve greater operational reliability in day-to-day business.

WWW.LUMESO.COM

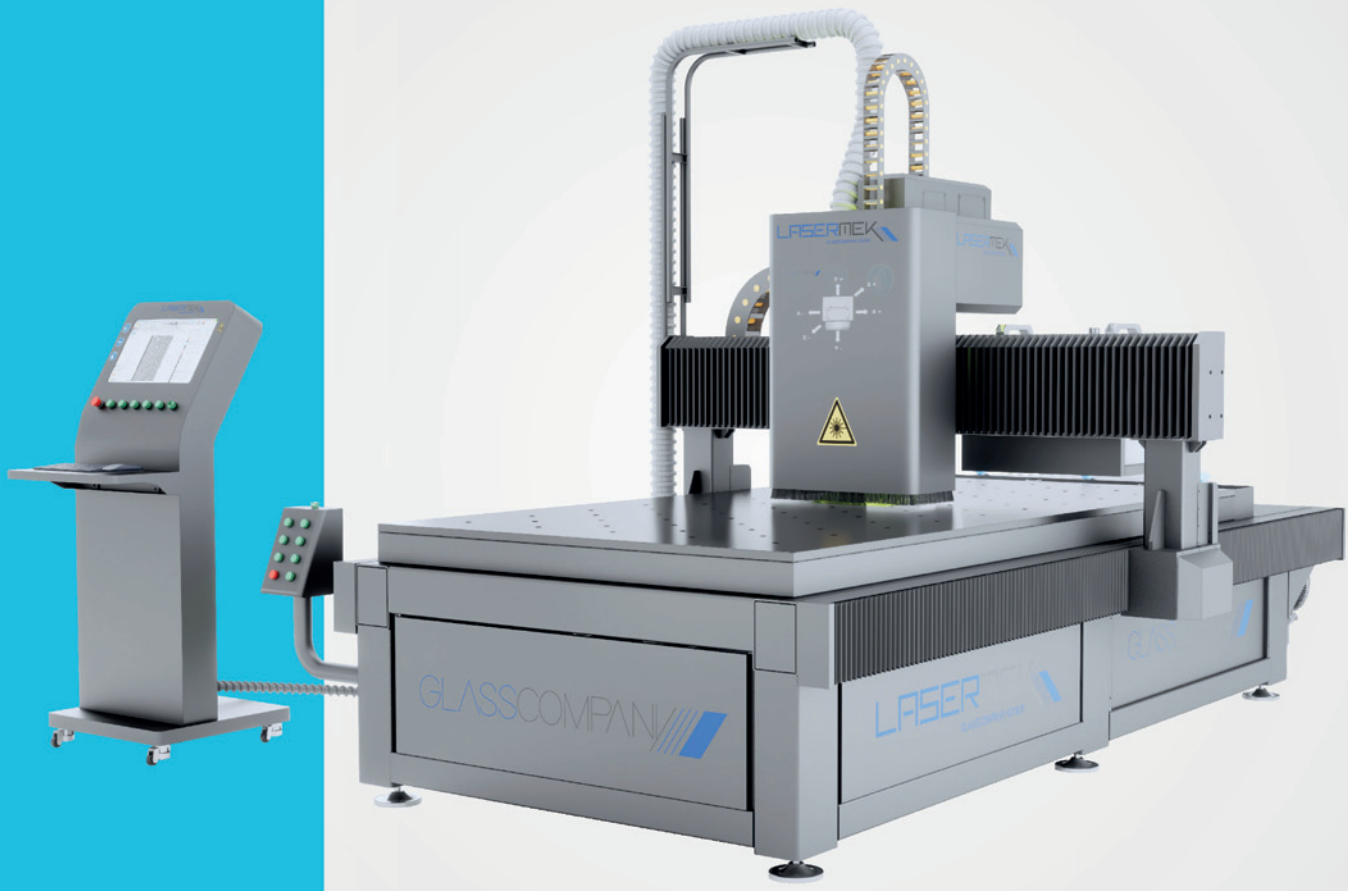
GLASSCOMPANY



DRILLING CUTTING LOW-E ENGRAVING ABLATION MARKING

LASERMEK

Innovative Laser Technology
for **Glass Drilling, Coating Ablation**
and **Sandblasting Effect**.



LASERMEK

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LISEC & WESTERN STATES GLASS

Longevity, quality and efficiency

Founded in 1990 and located in Los Angeles, California, **Western States Glass** has grown to become one of the big players in the glass industry of California. In 2020, a new owner took over the company and continued the tradition of excellence as well as the long-term partnership with **LiSEC**. Collaboration with LiSEC began as early as 1999 and has steadily grown stronger, with Western States Glass trusting in LiSEC's advanced machinery and comprehensive solutions to meet their production needs. The machines are easy to use and offer high productivity.

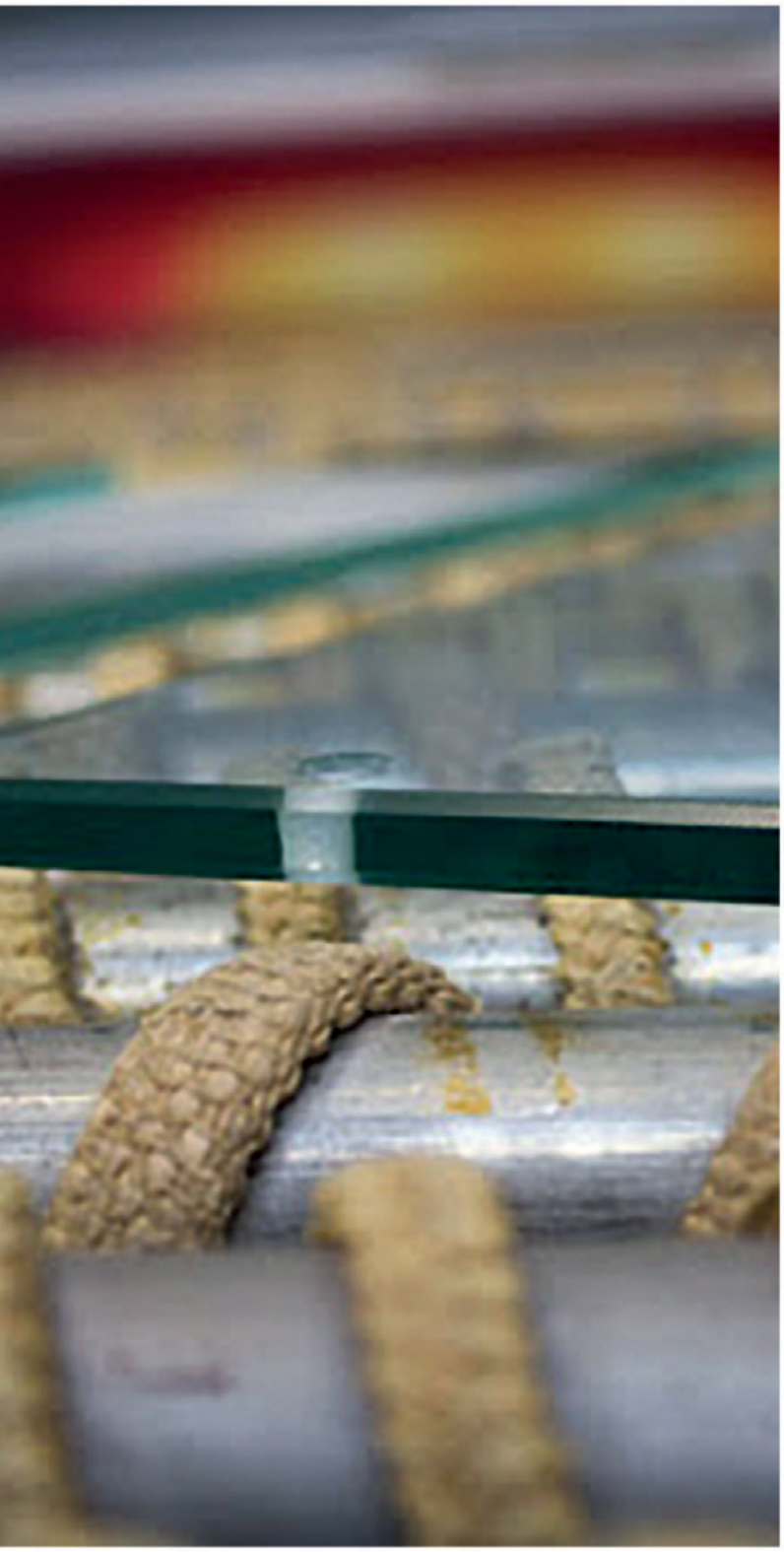
"I think it's simple, it's touch screen. I think that helps a lot and you know it's self-explanatory," said Western States Glass CEO Boris Djuric. He continued "I really like the design of LiSEC equipment. Maybe not that important but proves that LiSEC really cares about details and that wins me over as a customer. I really like that everything is designed well, plus it is very reliable and efficient."

For Western States Glass, LiSEC is a valuable partner because the Austrian company adopts an all-in-one solutions approach. This is not only beneficial for customers but also demonstrates their comprehensive understanding of the industry and their ability to provide complete solutions. Also, when it comes to service you can rely on LiSEC as the technicians are well-educated and solve problems quickly.

LiSEC's commitment to innovation is evident in their sophisticated products, such as the new quality scanner DQS-A with the DQS-A. The YouTube video showcasing this product has left a strong impression on Boris Djuric, further strengthening their trust in LiSEC's capabilities.

The future looks promising for Western States Glass. With the goal of increasing the number of employees and further advancing automation, the company plans to continue its partnership with LiSEC, relying on their high-quality machines and excellent customer service. "Our goal for the future is to even set the highest standards for product quality and faster service for our customers. We believe we can achieve this with the help of LiSEC solutions. Additionally, it's about enhancing productivity and eliminating unnecessary movements that could reliably be handled by LiSEC innovation to increase work safety," said Boris Djuric

WWW.LISEC.COM - WWW.WSGLASS.COM



High TEMPERATURE GASKETS

Texpack srl is a manufacturer of various products for the protective coating of rolling rollers in tempering furnaces in the flat glass industry and conveyor belts. For example:

1200N
Aramtex® discontinuous filament tapes
Aramtex® tapes are produced using 100% pure paraaramid yarns with discontinuous filaments, which are usually woven in several layers.

1210N
Aramtex® continuous filament tapes
Aramtex® tapes are produced using 100% pure paraaramidic yarns with continuous filaments, that are usually woven in several layers,

Texpack also produce textiles for the glass industry: roller coatings for tempering furnaces in flat glass production, as well as coverings for molding dies or handling clamps for hot glass.

1200C
Aramtex® discontinuous filament sleeve
The Aramtex® sleeve is produced using 100% pure aramid yarns with discontinuous filaments that provide it with greater softness and good mechanical resistance at a lower cost compared to sleeves made with continuous filaments.

1210C
Aramtex® continuous filament sleeve
The Aramtex® sleeve is produced using 100% pure aramid yarns with continuous filaments that give it better mechanical properties than discontinuous filament sleeves.

TEXPACK®

CERTIFICAZIONE SISTEMA DI GESTIONE DNV ISO 9001 - ISO 45001

ESA European Sealing Association e.V.

Texpack® srl - unipersonale - Via Galileo Galilei, 24 - 25030 Adro (BS) Italia Tel. +39 030 7480168 - Fax +39 030 7480201
info@texpack.it - www.texpack.it

GLASTON TPS®
insulating glass with ultra-thin centre glass is revolutionizing the glass industry

For many homeowners and builders, the challenge is to modernize outdated windows with low efficiency without complicating the replacement process. Glaston has a solution - triple TPS® insulating glass (IG) units with an ultra-thin centre glass down to 0.5 millimetres. A unique system configuration and a special process sequence patented by Glaston enable the automatic production of these new IG units.

Glaston is the inventor of TPS® (Thermo Plastic Spacer) insulating glass technology and introduced this leading warm edge technology to the market over 30 years ago. At glasstec 2024, Glaston presented this new manufacturing process for IG units with thin glass.

PATENTED MANUFACTURING PROCESS

The development of these energy-efficient, thin triple TPS® IG units required overcoming significant tech-

nical challenges. "Traditional methods for manufacturing these triple IG with an ultra-thin centre glass down to 0.5 millimetres proved unsuitable," said Uwe Risle, Director of IG Product Management at Glaston. "That is why we have developed a novel production technology that has been patented since fall 2024. This approach modifies the process completely, minimizing stress on the thin centre glass and reducing the risk of breakage."

The Glaston TPS® technology plays a decisive role in the production of these thin IG units. By ensuring exceptionally high insulation values and gas tightness, it measurably improves the performance of these IG units. In addition, the fully automated system reduces the need for manual handling, a key factor given the sensitivity of thin glass.

"This production line guarantees maximum flexibility for conventional and thin glass TPS® IG units, even in mixed operation," added Risle.

All processing stations within the line have optimum settings for processing the ultra-thin centre glass down to 0.5 millimetres thickness. The offset and complete encapsulation in the thermoplastic spacer and in the secondary sealing layer ensure that the thin centre glass is well protected.

Conventional glass thicknesses can be produced on this TPS® line using two automatic assembly machines including gas filling in high-speed mode. In accordance with the Glaston shape catalogue, a wide variety of shapes is guaranteed, including modern quadruple IG units with thin glass.

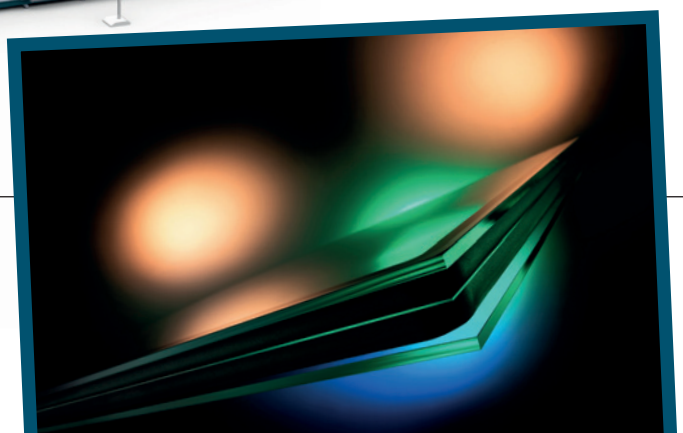
ENERGY-EFFICIENT IG UNITS WITH THIN GLASS

Triple TPS® IG units with ultra-thin centre glass down to 0.5 millimetres are significantly lighter than conventional triple IG units and offer high-performance glazing in a slimmer, more efficient package. These units offer up to 20 percent better U-values than conventional double glazing, while also addressing the issues of thickness and weight.

Thin glass TPS® IG is particularly well-suited for residential applications in both new construction and renovation. For new builds, their reduced weight simplifies transportation and installation. And functional issues, such as the closing problems of heavy sliding windows, can be eliminated.

"Thin triple TPS® IG units are especially beneficial in renovations," Risle said. "They not only provide a significant performance upgrade over less energy-efficient double units but also fit neatly into existing window frames, making them an ideal solution for easy window upgrades."

In addition, thinner glass has higher light transmission and significantly less raw material is needed to manufacture it. For many homeowners and builders, the combination of reduced frame support and lower U-value means a higher return on investment. Triple TPS® -IG units with an ultra-thin centre glass down to 0.5 millimetres are a real game changer in the glass industry and make a valuable contribution to meeting the growing demand for more energy-efficient homes.



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Laser marking strides see HEGLA reimagine glass identification

With the technical potential of laser marking always more extensive, a pane can now be uniquely identified and assigned its own identity even at the most basic level. In advanced configurations, operators can store data, trace product histories and even control processes simply by scanning. Here the ES-Guard Mobile from HEGLA boraident offers a practical introduction to laser marking technology - with a mobile system designed for use across various processing stations.

The ES-Guard Mobile offers a practical and professional solution to entering the world of laser marking.

HIGH-RESOLUTION MARKING WITHOUT SURFACE DAMAGE

Markings are created using the high-resolution UniColor process, which applies an ultra-thin layer of ceramic particles through laser printing. "This marking method meets the highest aesthetic standards while also establishing the basis for digital applications," explains Dr Thomas Rainer, Head of Organisation and Development at HEGLA boraident. Logos, data matrix codes and alphanumeric characters can all be used to create customised designs. The resulting print is scratch-resistant, weatherproof and lightfast. In contrast to traditional laser engraving, the surface remains entirely undamaged, eliminating the risk of stress cracks or changes to the structural integrity of the glass.

MANUFACTURER'S MARK: AN INTRODUCTION TO LASER MARKING

For many processors, the starting point for glass marking is the application of a manufacturer's mark. "It could be toughened glass, a shower enclosure or some other kind of special pane," notes Thomas Rainer. "This is where laser marking ticks all the boxes with its high-resolution results, appealing aesthetics and the flexibility to make instant design changes with no set-up required." Markings can be applied at any stage of processing, whether immediately after cutting or after the tempering furnace. The ES-Guard Mobile is simply moved to the required processing station ready for marking.

The ES-Guard Mobile is portable and suitable for use across various processing stations.

DIGITALISATION WITH THE DATA MATRIX CODE

The integration of a data matrix code adds a digital

Introducing a new era in glass marking, the ES-Guard Mobile by HEGLA boraident delivers high-resolution, non-damaging laser prints with full digital integration. Easily movable across stations, it enables traceability, real-time process control and customisation - ideal for manufacturers embracing smart, flexible and aesthetically superior glass tracking.

When the glass ID is included in the code, the number can be read by a scanner or mobile device.

dimension to laser marking. When the glass ID from the ERP system or PPS is included in the code, the number can be read by a scanner or mobile device. Displaying information from the ERP system with the proper data authorisation unlocks additional benefits. When glass is damaged, for example, fast identification of the systems involved helps prevent further waste and promptly initiates a remake. "There are many options for using marking in production," explains the laser professional. "Some customers rely on scanning to confirm automatic completion; others use the marking to prepare shipping documents or ensure error-free system processing."

TRACKING AND OPTIMISATION

Advanced configurations use data matrix code scanners to facilitate pane tracking. Production progress can be visualised in real time and used for cockpit displays or process optimisations. "Once printed, the marking is available throughout the product life cycle," Thomas Rainer highlights. Downstream processors also have the option of using the glass ID and data matrix code for their own applications. With proper data storage and access permissions, the information remains retrievable even years later, showing who delivered a product, when it was manufactured and how it was processed. Customers typically use this feature to link glass dimensions, fire protection certificates and product properties such as coatings.

DATA TRANSFER FROM THE CUTTING SYSTEM OR ERP

The ES-Guard Mobile is portable and can be used across various processing stations. It is positioned next to an existing conveyor table, allowing the print head to mark the glass directly on the surface. Integration with the ERP system is supported, along with data transfer from a cutting table (via the ES-Guard Connector). Markings can be applied at any position, including in the subsequent frame profile area. Various colours are available to choose from, ranging from a subtle grey to high-contrast black.

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Depending on the configuration, information from the ERP system can be displayed.

TK global reach powered by Italian engineering and service

BEYOND MACHINES: TK'S ON-SITE EXPERTISE AND SUPPORT

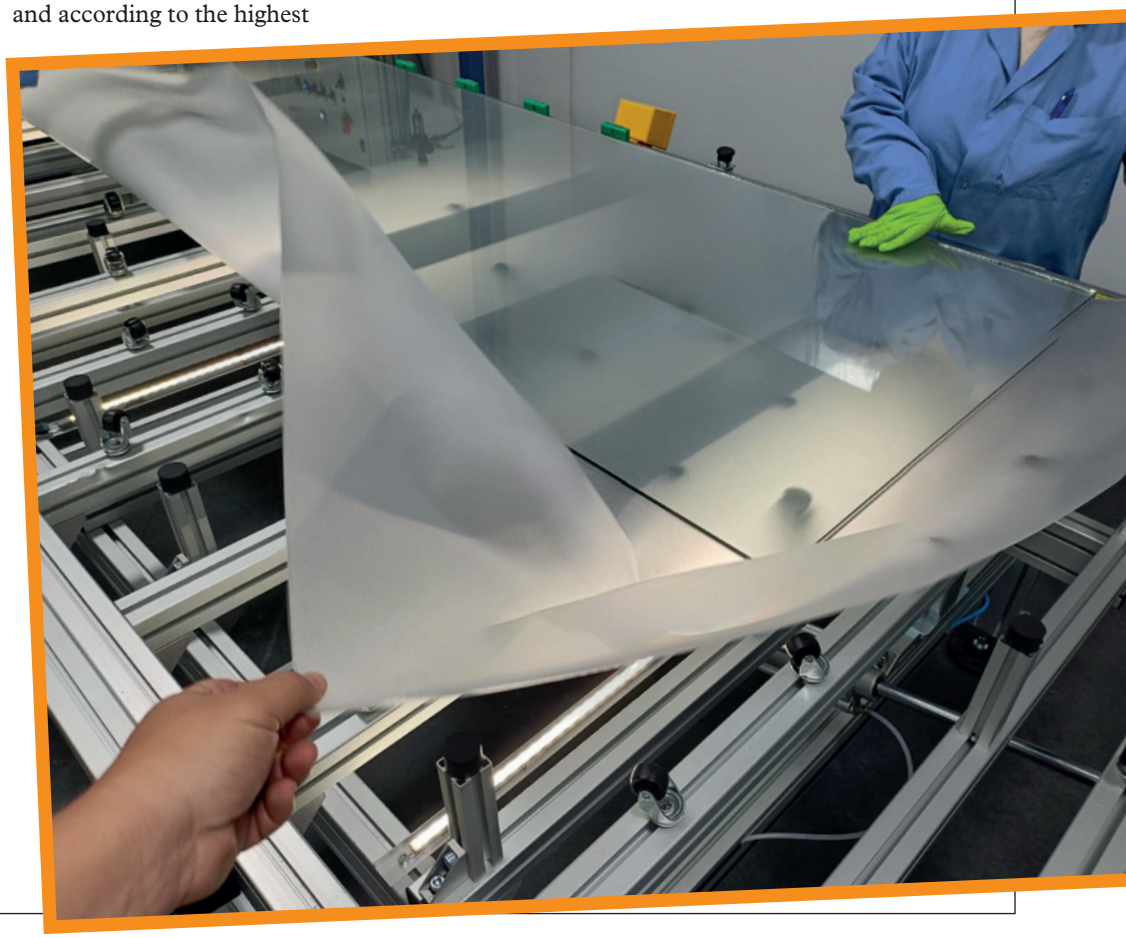
A leading Italian manufacturer of cutting-edge ovens for glass lamination, tempering, chemical temper and HST (Heat Soak Testing), TK is making its mark globally by focusing upon comprehensive customer support that extends far beyond the initial sale. The company's commitment to being present on the ground, providing expert technical assistance for installation, maintenance and in-depth training, is proving crucial for ensuring the smooth and successful operation of their advanced machinery worldwide. With a steadfast dedication to Italian technology and the exclusive use of high-quality European components, TK distinguishes itself in the industry by not

With its state-of-the-art ovens -all made in Italy- and a deep commitment to on-site support, TK is redefining global glass processing. Prioritizing expert installation, training and maintenance, the company ensures optimal machine performance - empowering customers in over 60 countries to achieve efficiency, reliability and lasting success.

only delivering reliable and high-performance equipment but also by fostering strong, long-term partnerships with its clientele base now present in more than 60 countries around the world. Understanding that the seamless integration and efficient utilization of their specialized furnaces are paramount to their customers' success, TK makes it a priority to have their skilled technicians present at every critical stage.

EMPOWERING CLIENTS THROUGH COMPREHENSIVE TRAINING AND MAINTENANCE

From the initial installation phase, TK's expert team is on-site, ensuring that the machinery is set up correctly and according to the highest standards. This hands-on approach minimizes potential complications and lays the foundation for optimal performance. Furthermore, the company recognizes that ongoing support is vital. Its technicians remain readily available for routine maintenance, troubleshooting and any unforeseen technical issues - ensuring minimal downtime while maximizing productivity for its customers. A key aspect of TK's customer-centric philosophy is the comprehensive training provided by its on-site specialists. These dedicated professionals equip



customers with the knowledge and skills necessary to operate and maintain the sophisticated machinery independently. This thorough training empowers users to maximize the capabilities of their TK ovens - leading to both greater efficiency and higher quality output. Indeed the company believes that its responsibility to clients doesn't end with the delivery of machines. Being physically present, offering its expertise for installation, assistance and thorough training, is fundamental to ensuring customers can leverage TK technology effectively and achieve their business goals.

GLOBAL REACH WITH PERSONALISED COMMITMENT: THE TK PARTNERSHIP ADVANTAGE

TK's proactive approach to customer support has resonated strongly with glass processors across the globe. By investing in on-site technical assistance, TK demonstrates a genuine commitment to building lasting relationships and ensuring that customer operations run smoothly and successfully. This dedication to quality -in both the company's machinery and its service- solidifies TK's position as a trusted partner in the global glass processing industry. As TK continues to expand its global reach, the company's unwavering commitment to providing personalized, on-site support, underpinned by Italian technology and European quality, remains a cornerstone of its success and a key differentiator in the market. Such dedication ensures that glass processing businesses worldwide can rely on TK not just for advanced machinery, but for a strategic partnership that guarantees operational fluency and long-term achievement.

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ask@tkitaly.com
www.tkitaly.com

STRATO

safety glazing certification council

ISCC International Sustainability & Carbon Certification

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EVA FILM
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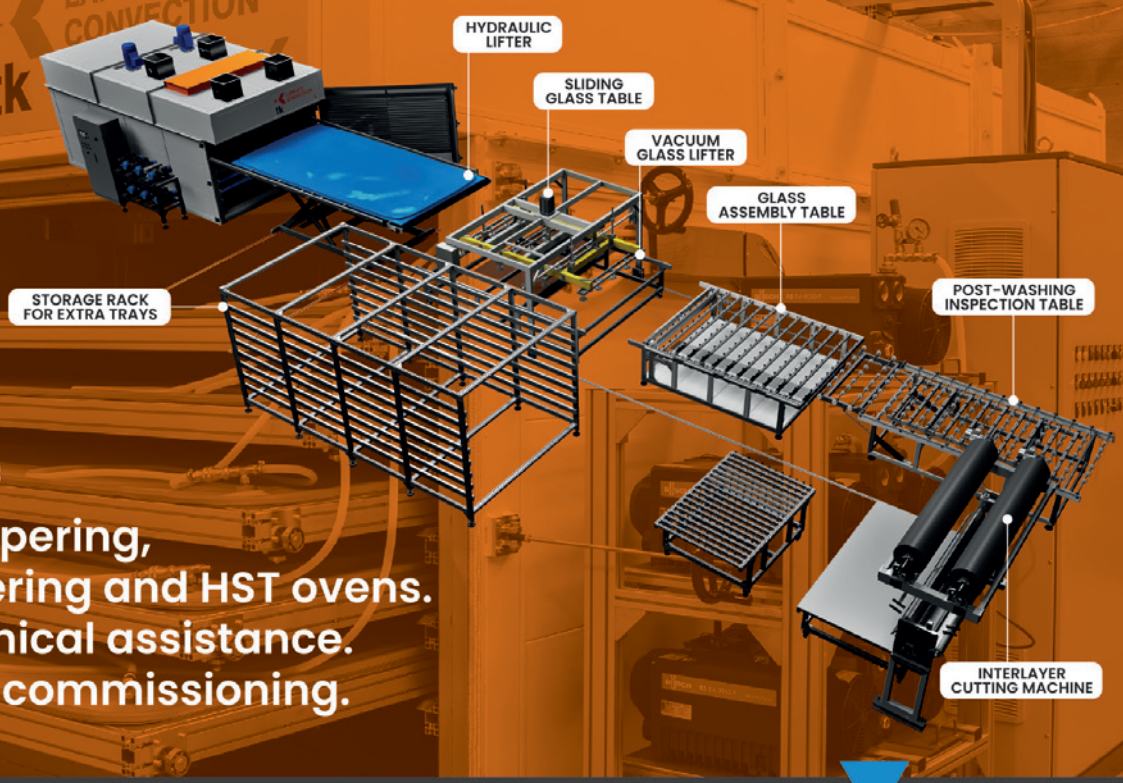
Worldwide shipment
and technical support.
Indoor and outdoor applications.

Italian Ecosystem for Safety Glass Manufacture

tk pure Italian technology



Manufacturer of
laminating, tempering,
chemical tempering and HST ovens.
Worldwide technical assistance.
Installation and commissioning.

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SCHIATTI: machines and superservice heroes

SCHIATTI are reintroducing themselves as caped heroes, but this is not overconfidence. Superheroes of service is how the company wants you to imagine them, because their job is not only selling machines.

The careful analysis of a customer's structure, spaces, future goals and actual productive capacity allows Schiatti to provide advice on the most suitable solution.

Every piece is preassembled, tested, and then brought on-site, where their technicians complete the start-up by integrating it with all the necessary training for operators.

And they don't leave at this moment, either: Schiatti services follow you for ordinary maintenance and promptly intervene, also in cases of any unexpected events. Many years after the purchase, the company guarantees each spare part and the same assistance.

FPS50BS: TOP OF THE RANGE WITH A KNACK FOR THE SPEED

As the flagship of their product range, the straight edger FPS50BS represents Schiatti's technological excellence. Super-equipped with bakelite wheels for an extra shining polish, this machine stands out for its

extraordinary working speed that reaches 10 metres per minute. It capably manages glass thicknesses from 3 to 55 millimetres with an installed power of 22.7 KW. The conveyor system with rubber pads on steel guides doesn't need continuous lubrication, while the touchscreen PLC allows the total control of all the parameters and troubleshooting.
Need more data?
Minimum dimensions: 100x100 mm
Max. load: 1800 kg
Height of working surface: 840 cm
Capacity of the tanks: 340 l
Air consumption: 20 Nl/min
Total weight: 4.135 kg

TECHNOLOGY, RELIABILITY, INNOVATION AND ENERGY SAVINGS

Schiatti technology is based on three pillars: reliability of the machines, continuous innovation in their technology (increasingly in smart and automation perspective) and attention to the energy saving. The closed circuit system for water refrigeration and double speed motors are only a few examples of our commitment towards solutions that combine high performances and low consumptions.

NEXT APPOINTMENT: GLASSTECH MEXICO (MEXICO CITY, JULY 16 TO 18, 2025)

Meeting in person is always a precious opportunity to know Schiatti and their machines. In July representatives will be in Mexico with the FPS20R: a 10-wheels straight edger for flat edges with arrisses. This machine has a spring-loaded conveyor system for the mechanic adjustment on glass thickness, advantage that frees the operator from changing the working settings at each glass change.

BENELUX

Strategic partnership sees BEST MAKINA team-up with PIETERMAN GLASTECHNIEK

A leading manufacturer specialized in insulated glass processing machinery, BEST MAKINA recently announced its new strategic partnership with PIETERMAN GLASTECHNIEK, a respected name in both glass technology and automation in the Benelux region. Through this agreement, the latter will act as the official distributor of the Turkish industry titan's product range in Belgium, the Netherlands and Luxembourg.

In a partnership that marks a significant step forward for BEST MAKINA and Pieterman Glastechniek, both aim to strengthen their presence in providing more localized, high-quality solutions to customers in the dynamic Benelux glass market. Indeed the collaboration will introduce products that meet European quality standards while offering a more cost-effective alternative - giving glass processors in the region access to reliable, high-performance machinery with improved return on investment.

DELEGATION ON A MISSION

A key milestone in forming this partnership was the visit of Pieterman's senior team to BEST MAKINA's facilities in Türkiye. The delegation -consisting of CEO Eddy Indesteege, Account Manager Carmen Ernest and Sales Director Tim Myny- toured the factory, observed production processes and evaluated BEST MAKINA's manu-

ABOUT BEST MAKINA

Based in Kocaeli, Türkiye, BEST MAKINA has been designing and manufacturing machinery for insulated glass processing since 1999. The company combines engineering precision with innovation, exporting to more than 100 countries worldwide.

facturing techniques and strategies firsthand. The Pieterman team expressed their admiration for the professionalism, transparency, and technical depth they witnessed during the visit. One of the aspects that impressed them the most was BEST MAKINA's strong commitment to dealer protection policies, which align closely with Pieterman's values of trust and long-term collaboration. The open communication and warm hospitality they experienced further solidified the decision to move forward with the partnership.

Eddy Indesteege, CEO at PIETERMAN-GLASTECHNIEK

Oguzhan Kukul, Plant Manager at BEST MAKINA

A SOLID REPUTATION

Over the past 26 years in developing reliable, innovative glass processing equipment, BEST MAKINA has established a strong reputation exporting to over 100 countries around the world, from East to West, including key markets in Europe. Their product range includes gas filling and non-gas filling insulated glass unit (IGU) production lines, sealing robots, stand-alone glass washing machines, glass arrising machines, spacer processing machines, and transfer solutions — all designed 100 percent in-house to meet the high standards of the modern insulated glass industry.

WHEN COLLECTIVE INTELLIGENCE WINS

Pieterman Glastechniek, known for its deep market knowledge and technical support capabilities, will now offer BEST MAKINA's machines as part of its portfolio. The collaboration will also focus on providing after-sales service, installation support, and training to ensure customers receive the highest level of performance and care. "We are delighted to expand our sales and service network with a company that has a 76-year history," said BEST MAKINA plant manager Oğuzhan Kukul. "Pieterman's strong presence and trusted relationships in the Benelux region make them an ideal partner to represent our brand and values," to which Pieterman Glastechniek's Eddy Indeestege added: "BEST MAKINA's equipment complements our mission to provide innovative, cost-effective solutions with strong service support for the glass industry. We are excited to bring their technology to our clients and further expand our service offering." As the industry continues to develop, this collaboration is expected to deliver greater value to customers through enhanced product availability, technical expertise, and seamless support.

ABOUT PIETERMAN GLASTECHNIEK

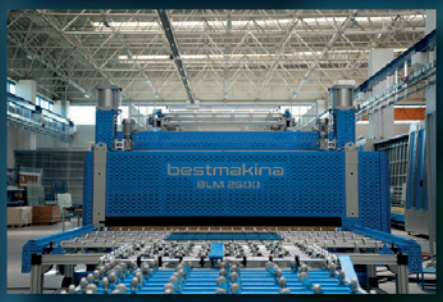
Headquartered in Belgium, Pieterman Glastechniek is a leading provider of machinery, tools, and automation solutions for glass processing companies throughout the Benelux region. The company is known for its technical knowledge, responsive service, and strong industry partnerships.

bestmakina

Common Language of Glass World...

Based in Kocaeli, Türkiye, BEST MAKINA has been designing and manufacturing machinery for insulated glass processing since 1999. The company combines engineering precision with innovation, exporting to more than 100 countries worldwide.





Insulated Glass (IGU) Production Lines	Glass Washing Solutions
Stepped Glass Production Lines	Vertical Arrising Lines
Laminated Glass Production Lines	Spacer Bar Processing
Automatic & Manuel Sealing Solutions	Transfer Solutions

MEET US AT GLASSTECH MEXICO 2025 !

We're excited to exhibit at Glasstech Mexico for the first time! We're stepping into Mexico with proven expertise across Europe, Argentina, Chile, and Costa Rica — and a strong drive to reshape the region's glass solutions network.

J-07 16-18 July
Centro Banamex

– Explore –

VIPROTRON Introduces Temper Scanner 5D: Redefining Glass Quality Control

ALL-IN-ONE 5D INSPECTION

The Temper Scanner 5D combines five detection technologies in a compact, turnkey system:

- Distortion Measurement: Identifies waviness and edge deformation with ±4 milli-diopter precision.
- Anisotropy Detection: Measures stress zones in accordance with DIN SPEC 18198.
- White Haze Detection: Locates surface residues not visible until final use.
- Bright Field and Reflection Channels: Reveal scratches, inclusions and coating defects.

True Edge™ technology ensures full-surface inspection, including the edges—essential for architectural glazing and high-spec applications.

With the launch of the Temper Scanner 5D, German manufacturer Viprotron presents a major innovation for the global flat glass industry. This high-performance inspection system enables glass processors to gain full control of optical and structural quality with unmatched precision and repeatability.

All in one Software, no interfaces involved.

REAL-WORLD RELIABILITY AND PROVEN REPEATABILITY

A standout feature of the Temper Scanner 5D is its excellent repeatability and reliability under industrial conditions. Camera systems are actively temperature-controlled, and automated calibration ensures stable results.

Florian Temper, COO of vandaglas Eckelt GmbH, shared his experience: "After nearly a year in operation, the scanner continues to impress with outstanding performance. Repeatability and measurement precision remain consistently high across all test scenarios. The system proves to be extremely reliable—peak-to-valley results are accurate and fully traceable. Our comprehensive reproducibility tests, including those conducted across the transport direction, confirm complete confidence in the collected data. Particularly noteworthy are the precise evaluations of distortion, haze, and glass or coating defects. While the video focused on anisotropies, these additional analysis channels are equally impressive."

GPD 2025 PRESENTATION: ADVANCING FURNACE OPTIMIZATION

Kai Vogel, Managing Director and owner of Viprotron will present the Temper Scanner 5D at the upcoming Glass Performance Days (GPD) 2025 in Tampere, Finland. The presentation, titled "New Technology for a precise and repeatable Measurement of Distortion after the Furnace," will delve into how this technology enhances furnace control and product quality, as well as documentation.

CONCLUSION

With modular expandability, precise and repeatable results and easy integration into existing lines, the Temper Scanner 5D confirms Viprotron's position as Number 1 in glass inspection.

For more information, visit: viprotron.de/temper-scanner-5d and https://youtu.be/nHloGWa6ky8?si=EWG-SB4RfNYDt-ej

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Viprotron GmbH
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64319 - Pfungstadt
Germany

CUGHER GLASS 6-Axis Anthropomorphic Robots: The Future of the Glass Industry

Cugher Glass, a leading name in flat glass automation, is now at the forefront of industrial robotics integration. Long recognized for its innovative and custom-engineered solutions, Cugher has expanded its expertise to include 6-axis anthropomorphic robots—a technology that is reshaping production standards across the entire glass manufacturing chain.

The use of these robots enables significant optimization of production processes. Their precise, repeatable movements drastically reduce handling errors and glass sheet damage, helping maintain high quality standards. At the same time, the ability of robots to operate continuously and minimize downtime leads to a measurable increase in productivity and a substantial reduction in operating costs.

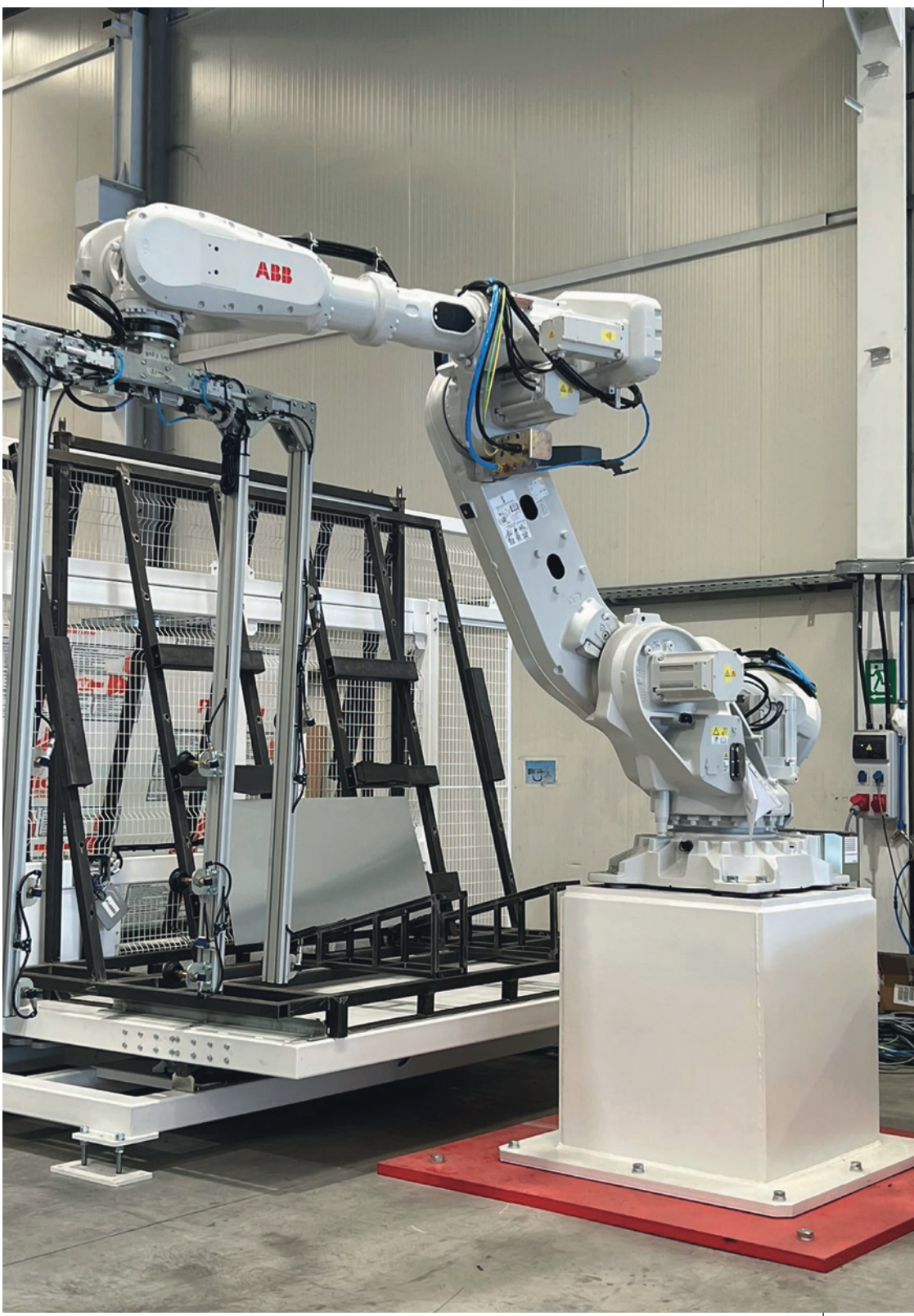
RISK ELIMINATION

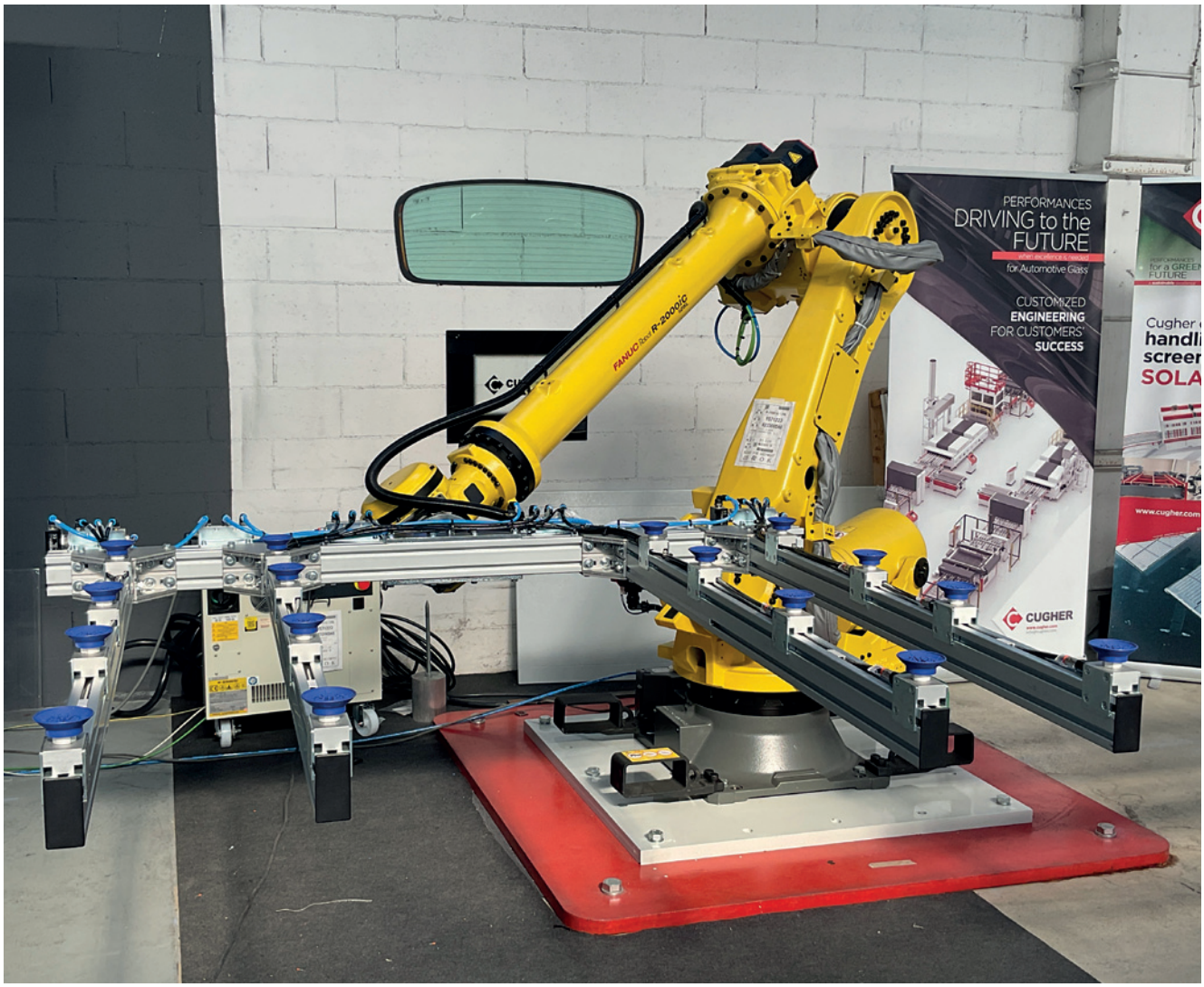
From a safety perspective, the adoption of anthropomorphic robots marks an important step forward. Tasks that involve lifting and moving large or heavy sheets—often risky for human operators—are now handled by robotic systems, eliminating injury risks while freeing up staff for higher-value operations. Their versatility also allows robots to adapt to a wide range of tasks, including loading, unloading, stacking and managing sheets of various shapes and sizes, expanding their usefulness across the entire production line.

QUALITY CONTROL

The final product quality also benefits directly from robotic precision. Controlled, calibrated movements reduce the likelihood of micro-scratches and breakages, preserving the integrity of each sheet throughout every stage of processing.

Supporting these advanced functions, Cugher integrates high-performance vision systems that add intelligence and adaptability to its robotic platforms. This synergy allows robots to recognize, in real time, the size, orientation and position of glass sheets—critical for tasks like cutting, grinding or tempering, where perfect alignment





is essential. Vision systems also make it possible to handle fragile or irregularly shaped materials with care, significantly lowering the risk of damage, especially for oversized or non-standard formats.

FLEXIBILITY AND EFFICIENCY

Another key advantage is operational flexibility: with vision systems, robots can quickly adapt to changes in production parameters without requiring extensive reprogramming. This enables faster response to customized production demands and reduces setup time. Finally, during stacking and packaging phases, vision-guided robots can optimize sheet arrangement and ensure secure packaging for transport, improving logistics efficiency.

The integration of 6-axis anthropomorphic robots with vision systems represents a real evolution toward more efficient, safer and higher-quality glass manufacturing. For glass producers, this technology is now a critical competitive asset. With its tailored, high-performance solutions, Cugher supports manufacturers in their digital transformation journey—delivering reliable systems that are ready to meet the demands of a fast-changing market.

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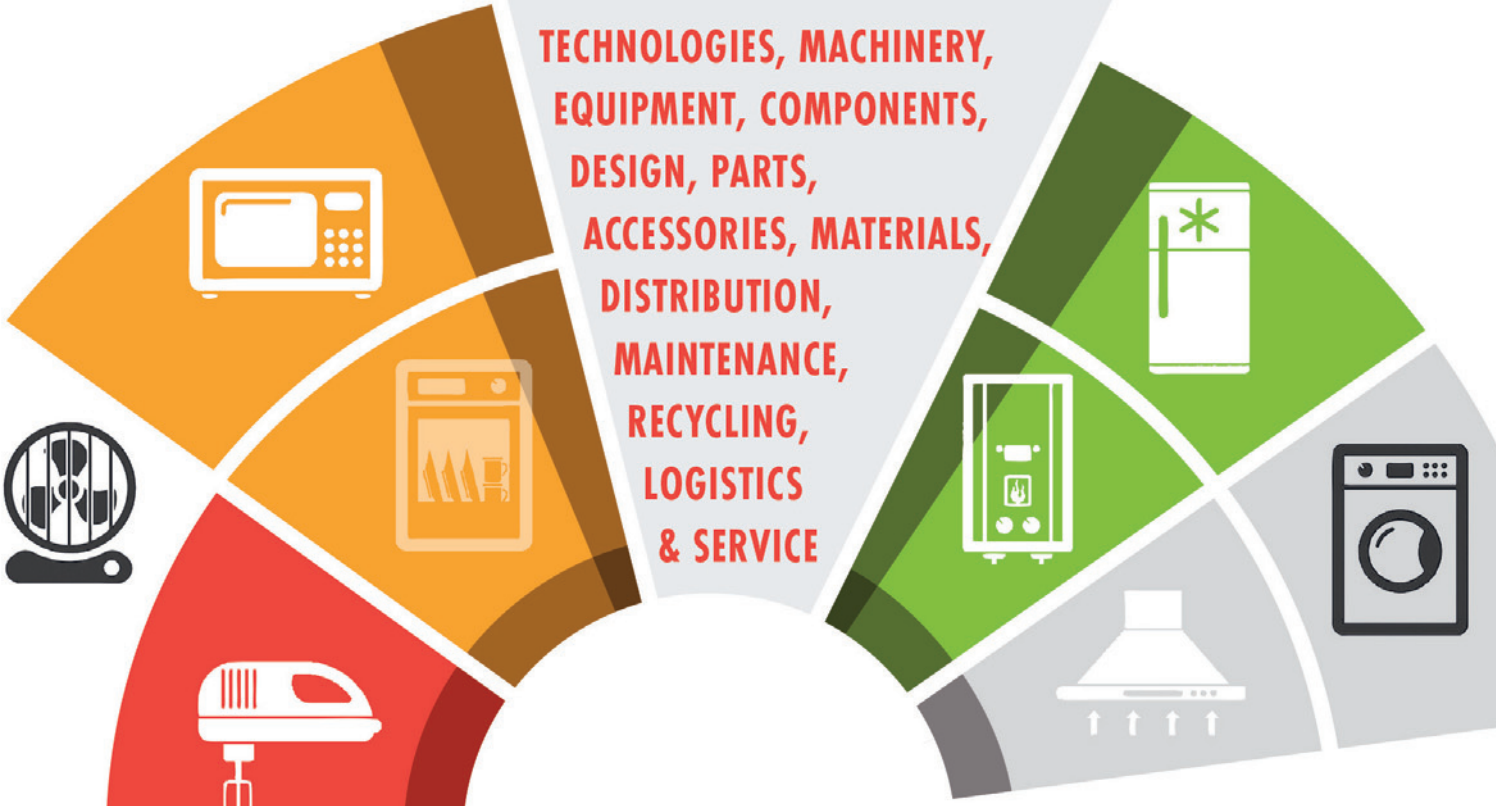

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Laser technology in flat glass processing the - LiSEC sensation

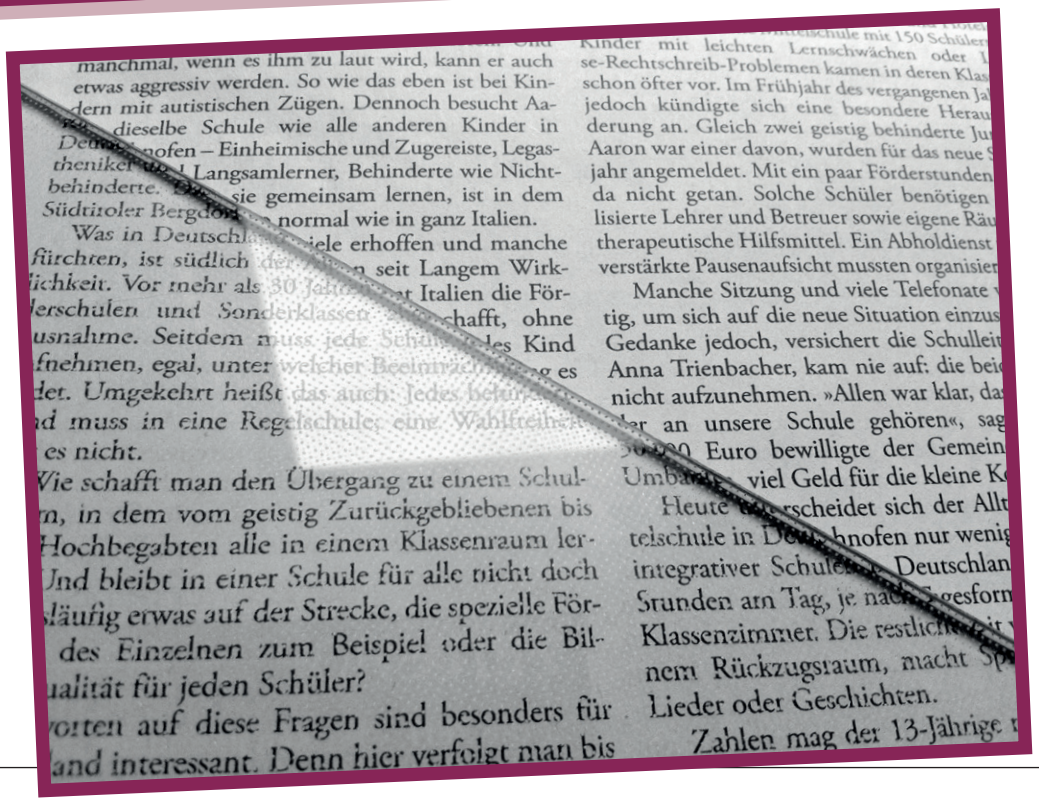
Transforming flat glass processing with its speed and contact-free efficiency, LISEC's laser technology delivers cleaner results, minimal thermal impact and greater design freedom. Whether it's intricate surface treatments and anti-slip structuring, decoating, drilling or durable labeling, such optimised precision is setting new standards for quality, safety and sustainability in the industry.

APPLICATION 1: SURFACE TREATMENT

Logos, serial numbers or decorative patterns are often applied to glass. Conventional engraving methods can lead to cracks, uneven depth or thermal effects. Laser engraving enables precise and even markings without direct contact with the glass surface - thus reducing the risk of defects and damages.

ANTI-SLIP

The anti-slip laser structuring creates small indentations upon walk-on glass


manchmal, wenn es ihm zu laut wird, kann er auch
etwas aggressiv werden. So wie das eben ist bei Kin-
dern mit autistischen Zügen. Dennoch besucht Aa-
dieselbe Schule wie alle anderen Kinder in
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normal wie in ganz Italien.
Was in Deutschl iele erhoffen und manche
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Wie schafft man den Übergang zu einem Schul-
m, in dem vom geistig Zurückgebliebenen bis
Hochbegabten alle in einem Klassenraum ler-
Und bleibt in einer Schule für alle nicht doch
läufig etwas auf der Strecke, die spezielle För-
des Einzelnen zum Beispiel oder die Bil-
ualität für jeden Schüler?
orten auf diese Fragen sind besonders für
land interessant. Denn hier verfolgt man bis
Kinder mit leichten Lernschwächen oder
se-Rechtschreib-Problemen kamen in deren Klas
schon öfter vor. Im Frühjahr des vergangenen Ja
jedoch kündigte sich eine besondere Herau
derung an. Gleich zwei geistig behinderte Ju
Aaron war einer davon, wurden für das neue
jahr angemeldet. Mit ein paar Förderstunden
da nicht getan. Solche Schüler benötigen
lisierte Lehrer und Betreuer sowie eigene Räu
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verstärkte Pausenaufsicht mussten organisier
Manche Sitzung und viele Telefonate
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Gedanke jedoch, versichert die Schulleit
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Euro bewilligte der Gemein
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integrativer Schule Deutschlan
Stunden am Tag, je nac gesforn
Klassenzimmer. Die restlich
nem Rückzugsraum, macht
Lieder oder Geschichten.
Zahlen mag der 13-Jährige

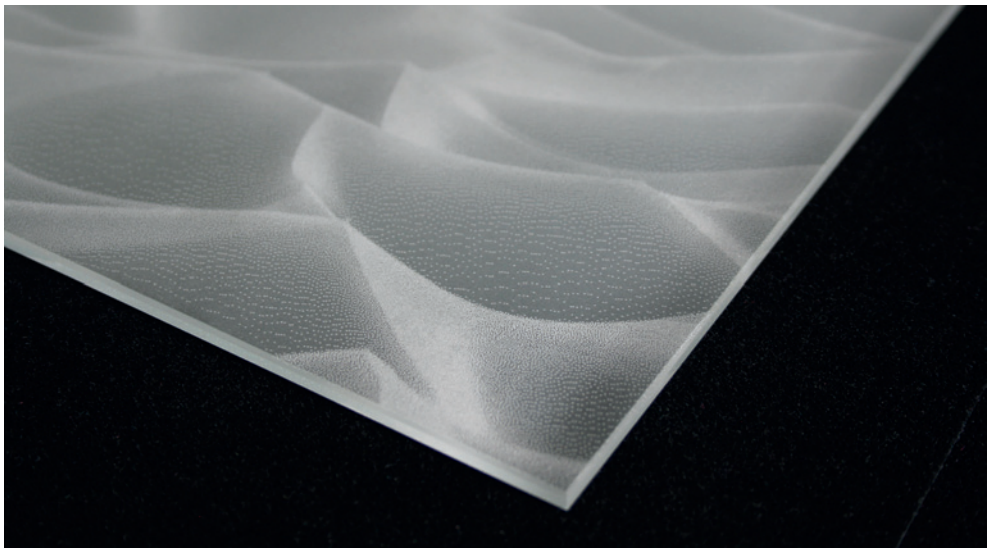
surfaces (even on already tempered glass). These create a suction effect that prevents slipping in wet conditions. The structures are durable, easy to clean and leave 90 percent of the glass surface untouched. The slip resistance is certified by the Materialprüfinstitut MPI in accordance with DIN standards up to class R10.

BIRD FRIENDLY GLASS

With LiSEC laser processing technology, glass can be made visible to birds by means of superficial laser structuring to protect them from collisions. The structures are weather and UV resistant, durable and easy to clean. The laser process does not require any additional consumables and can be used on all types of glass (float glass, laminated glass, tempered glass even post-tempering) and in combination with insulating glass, low-e and sun protection coatings.

DECORATIVE GLASS

The laser is a precision tool ideal for decorative surface designs. Laser points are generated on the glass surface at high speed, either by removing material or by melting the glass surface. This allows images, logos, designs and patterns to be applied directly to glass. Another application is laser-matted glass surfaces which are less sensitive to fingerprints and dirt than those that have been pro-



cessed by sandblasting or etching.

APPLICATION 2: DECOATING

Pulsed infrared lasers are used for contact-free ablation. Coatings such as paint, mirror coatings, enamel, low-e coatings or conductive coatings can be removed with razor-sharp edges. Neither grinding marks nor grinding material residue are left on the pane. The exposed glass remains undamaged and unclouded.

APPLICATION 3: GLASS LABELING

The marking of glass is becoming more and more important for product tracking, brand awareness and anti-counterfeiting. The LMS (Laser Marking System) from LiSEC can be used to apply letters, numbers, logos and machine-readable codes to glass surfaces in an abrasion-resistant manner. Marking lasers and reading technology can be integrated into a production line or a cutting table or even used as a mobile system. Whether it's barcodes, data matrix or QR codes, alphanumeric characters, serial numbers or tempered stamps - laser marking technology offers flexible and permanent labeling options.

APPLICATION 4: LASER DRILLING

Lasers provide a precise, non-contact and fast method for drilling glass. Traditional methods such as mechanical drilling or water jet cutting can lead to cracks or uneven holes and require large amounts of water and high forces, resulting in high costs and wear. With a laser, small and large holes can be drilled precisely and almost without force, leaving the glass undamaged. The LiSEC Laser Drilling Processing (LDP-A) enables clean and precise holes with minimal material loss and is characterized by flexibility, efficiency and environmental compatibility.

CONCLUSION

The advantages of laser technology are precision, speed, contact-free processing and minimal thermal load. These properties make it ideal for challenges in glass production, especially in surface and interior processing, decoating and labelling.

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MAZZAROPPI: a TP Compact without a dedicated cabin for VETRERIA AURORA

There was no need to install a dedicated electrical cabin for tempering all types of glass, including low-e glass. This was a huge advantage for Vetreria Aurora, an Italian company based in the province of Brescia (just outside Milan), which opted for a TP Compact furnace from Mazzaroppi.

"At the moment," said Federico Mazzaroppi, the company's Marketing Manager, "Vetreria Aurora is the only furnace in Lombardy (the region of Italy in which Brescia is located)— that operates without a dedicated electrical cabin."

A REVOLUTIONARY SOFTWARE THAT IS SET TO CHANGE THE WAY YOU WORK

How can glass be tempered from 4 to 19 millimetres thick — including low-emissivity glass — without requiring higher power? The answer lies in the latest

innovation from Mazzaroppi: the patented Efficiency 5.0 software.

Thanks to this management software, Mazzaroppi furnaces can minimise peaks by selecting the peak power according to the production type.

This approach ensures more intelligent and uniform heating of the glass sheets, maximising consumption during all phases of the cycle.

"For Vetreria Aurora, containing consumption was an essential consideration when choosing a furnace" Mazzaroppi explained.

"The customised TP Compact that we created for them using our new patented software will improve the company's productivity and the quality of its tempering while ensuring consumption is up to 70 percent lower than that of other solutions on the market."

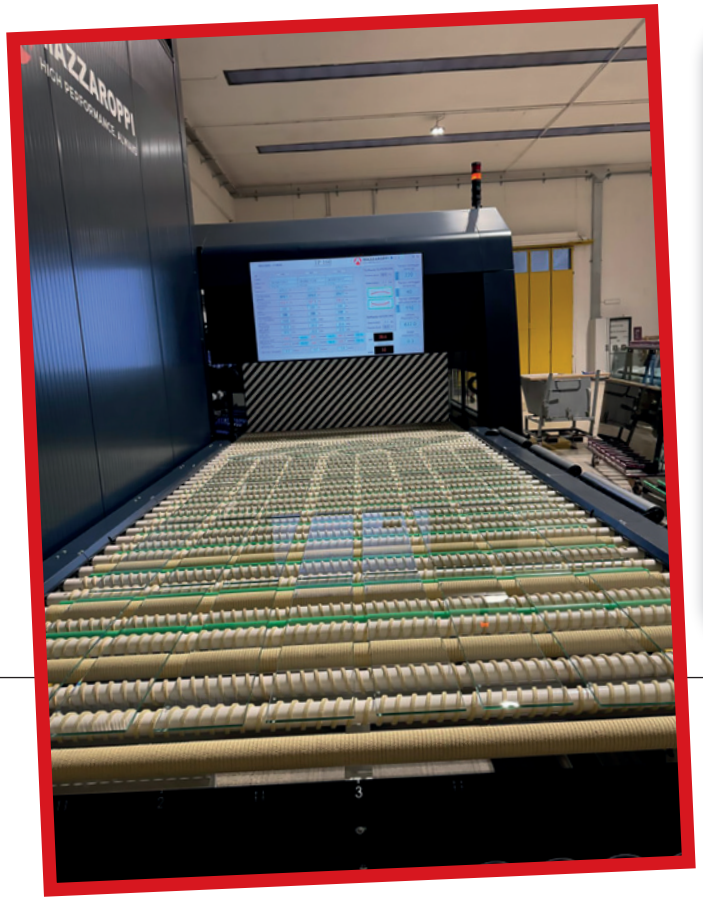
TEMPERING WITH ONLY 180KW IS POSSIBLE!

What is the maximum power required by Vetreria Aurora today to achieve excellent results? Only 180 kW.

The TP Compact Mazzaroppi furnace chosen by Vetreria Aurora is a 1600 x 3600 mm convection model capable of handling all types of glass. Furthermore, it does not require any masonry work as it can be installed without leaning against a wall, providing another way to reduce oven costs while maintaining optimal performance.

The Mazzaroppi team was supported by their local sales partner, Si.ste Trading, for the sale and installation of the furnace.

"Efficiency 5.0 is a real revolution in the management of consumption in glass tempering furnaces," Mazzaroppi said. "However, software alone cannot ensure the superior performance of Mazzaroppi furnaces. Each furnace is a highly optimised project, made with excellent raw materials and technologies that we are constantly perfecting. These are machines designed to last decades, and the durability of a hardening furnace is now inextricably linked to the optimisation of its energy consumption."



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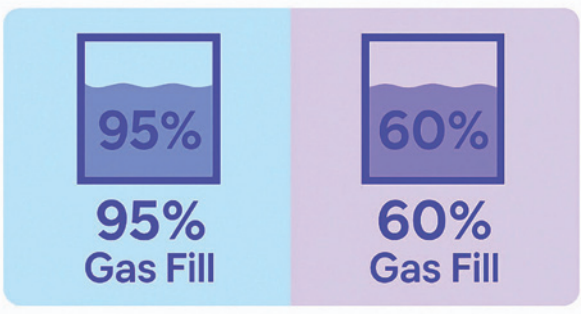
SPARKLIKE Case study: How an argon tester revealed quality issues in sealed units

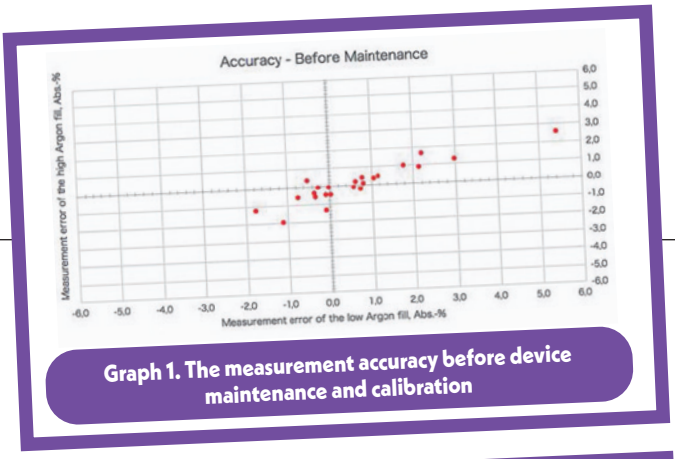
Accurate measurement with argon tester and strict quality control are essential components in the production of high-quality insulating glass units (IGUs). As industry standards become increasingly stringent, manufacturers and suppliers must employ reliable methods to ensure product quality and performance. This case study involving two UK-based companies demonstrates the critical importance of precise gas measurement and proper calibration in maintaining consistent product quality.

A small glass manufacturing company reached out to Sparklike's distributor for a demonstration to find out if there are inconsistencies in the insulating gas content of their IGUs. Producing around 20-30 IGUs per day, the company also sources an additional 200 units weekly from a larger supplier. As part of the demonstration, the company conducted gas content testing on both their own products and those sourced from their supplier. The self-produced IGUs had consistent gas content levels of 88 to 95 percent, confirming adherence to their internal quality standards. However, the gas content levels of the purchased units showed significant deviations, measuring only 60 to 65 percent. This discrepancy raised concerns and prompted the company to address the issue with their supplier.

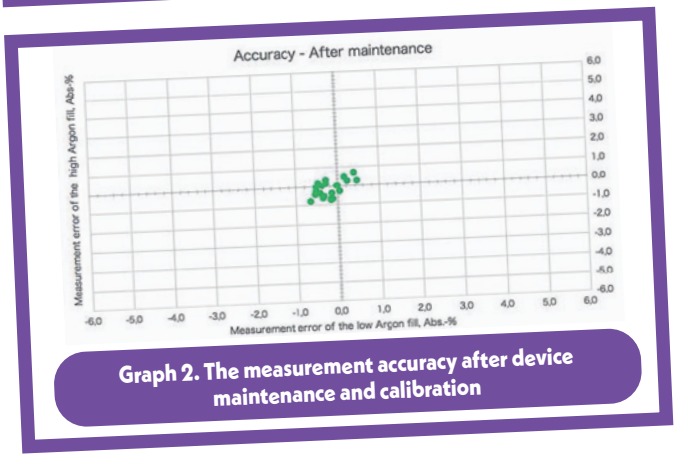


TAKING ACTION

Using data gathered from Sparklike Handheld gas measurement device, the smaller manufacturer brought the issue to the at-



Graph 1. The measurement accuracy before device maintenance and calibration



Graph 2. The measurement accuracy after device maintenance and calibration

tention of their supplier. As a result, the supplier has returned both of their own Handheld devices for calibration—one of which had not been calibrated since 2012 and the other since 2014. This incident highlights the necessity of quality control routine and calibration and maintenance to ensure the continued accuracy of gas measurement devices.

THE IMPACT

Following this discovery, the smaller company is now looking to invest in its own argon tester, Sparklike Handheld, to maintain full control over the quality of its production.

LESSONS LEARNED

- Accurate Measurement is Critical: This case underscores the importance of precise gas measurement in maintaining consistent product quality. Even small deviations in gas content can indicate potential quality issues.
- Regular Calibration is Necessary: Gas measurement devices require regular calibration to ensure they provide accurate readings. Neglecting calibration can lead to incorrect measurements and ultimately compromise product quality.
- Proactive Quality Control: By implementing robust quality control measures and using reliable equipment, manufacturers can build trust and accountability across the supply chain. This approach not only benefits the manufacturer but also their suppliers and customers.
- Reputation Risk Cannot Be Ignored: Poor quality control has broader consequences beyond defective products. In this case, the supplier's reputation suffered when their customer identified inconsistent gas fill rates. Once a customer finds a quality issue, trust is damaged, and this can result in lost business opportunities or strained partnerships. Maintaining a strong reputation requires ongoing commitment to quality control and transparency throughout the production process.

CONCLUSION

This case study serves as a reminder that ensuring the quality of insulating glass units requires the right tools and processes. Regular gas content measurement and device calibration are key factors in achieving consistent quality and maintaining compliance with industry standards. Whether a small manufacturer or a large supplier, accurate measurement practices are fundamental to delivering products that meet customer expectations and regulatory requirements.

Meet Sparklike at stand E1 during GPD – Glass Performance Days June 11 and 12 at Tampere, Finland.

Sparklike Oy
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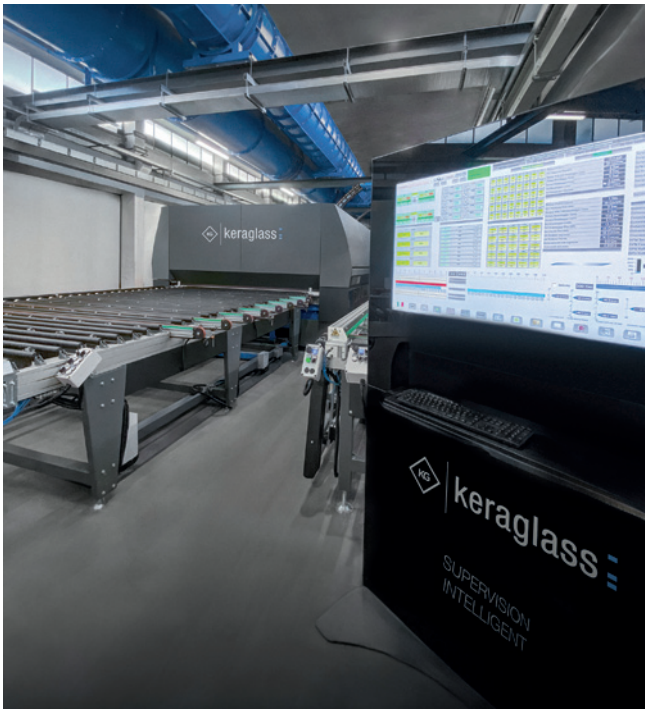
GLASSFER invests in advanced KERAGLASS technology



The Glassfer company, a historical reference point in glass processing, has recently successfully completed the installation of Keraglass' Vision 900 Convection furnace, further upgrading its fleet of machines with a high-efficiency, high-precision solution.

Glassfer, founded in 1953, is based in Erba, in the Italian province of Como, and has over 70 years of experience in flat glass processing. It stands out for its high level of customisation and ability to meet the needs of architects, designers and companies with products that combine functionality, aesthetics and technical performance, thus consolidating its position of excellence at an international level.

QUALITY, FLEXIBILITY AND RELIABILITY

"The integration of the Keraglass Vision 900 kiln," commented Glassfer President Carlo Pina, "represents a further step forward for us in the process of digitisation and production optimisation, in line with a corporate vision oriented towards excellence and sustainability. After a thorough technical analysis, we firmly chose the Keraglass system for maximum

quality, flexibility, reliability and attention to energy consumption.

"With Vision900, we have the possibility to temper all types of glass, from painted float to low emissivity up to a thickness of 2.8 millimetres. Furthermore, the relationship established with Keraglass' technical and commercial staff played a fundamental role in the choice of the system; together we shared experiences and solutions, customising the project according to our requests and production needs."

EXCEEDING THE HIGHEST STANDARDS

The Vision 900 stands out for its high performance in terms of heating speed and uniformity, guaranteeing a reduced thermal impact, minimising the risk of breakage and significantly improving the quality of the finished product. The plant, equipped with the interconnected "Supervision Intelligent" system, meets the technical requirements of Industry 4.0 and 5.0 standards, guaranteeing higher energy savings than traditional tempering furnaces on the market.

With this investment, Glassfer confirms its willingness to expand its production capacity and intercept new markets, strengthening its role in the sectors of contemporary architecture, design furniture and high-performance shipbuilding.

For Keraglass, investing in cutting-edge technologies is an essential element to continue innovating and offering value to customers.

Glassfer is grateful for this new technological milestone, a symbol of continuous growth and solid industrial culture in partnership with Keraglass.

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The enduring ‘win-win’ synergy between FILTRAGLASS and MANEKIYA GLASS CO

A manufacturer and processor of glass based in Higashiosaka City within Japan’s Osaka Prefecture, MANEKIYA GLASS CO. has been working with FILTRAGLASS for three years now, having installed the latter’s DP.165.F water treatment systems in its factories back in 2022. Here’s why GTI Senior Editor Nick Fouché reached out recently to its president, Yoshishige Okuyama, for a direct report on the experience and benefits the Japanese company has gained so far from this collaboration.

Glass Technology International: Yoshishige, with its signature commitment to innovation and sustainability, Filtraglass is now an internationally-established water recycling benchmark for the glass industry. Indeed the systems developed by the Vilamalla-based company can be found throughout the United States, Europe and Asia today. Many companies have already opted for its solutions - all with a view to optimising their processes and reducing their environmental impact. Why did Manekiya Glass Co. decide to invest in water recycling?

Yoshishige Okuyama: Our company has always been committed to innovation and technology in glass manufacturing. During our more than 70 years of experience, we have set up factories in different parts of the country in order to meet the needs of our clients. That is why we prioritise productivity and efficiency, and we believe that having the latest technology is essential to achieving this. A few years ago, we realised that reducing the amount of water used in our processes could represent a significant improvement, and we immediately began to look into water recycling solutions.

GTI: How did you hear about Filtraglass, and why did you choose their technology over other options on the market?

YO: We were looking for an effective and reliable solution to improve water management, but above all, we wanted something specific to the glass industry. That's when we came across Filtraglass and its water treatment systems through its sales representative, Tokyo Glass Materials (TGM). We were impressed by their extensive experience in the sector -more than 20 years- and their specialisation in the glass industry. It was exactly what we were looking for. Aspects such as the customisation of the machines, ease of integration and technical support made us decide to go with them.

GTI: What changes have you noticed in the production process since the initial installation?

YO: One of the most notable changes has been the significant reduction in water consumption. The system filters 100 percent of the water used during glass processing. This directly influences the quality of the final product. We achieve clean, clear, residue-free flat glass; in other words, an optimal finish, which is essential for us. Another major advantage is reduced preparation time thanks to shorter cleaning cycles. When the processing machine is operated together with the treatment system, clean water circulates continuously. This not only speeds up subsequent maintenance, but also helps to prevent potential machine failures. We value the benefits of this water treatment system, which effectively removes floating residues from the water and transforms them into dry solids. As a result, our washing machines remain much cleaner because the glass that enters them is completely free of glass dust residues.

GTI: What other benefits have you noticed?
YO: The installation of Filtraglass systems has improved machine performance, resulting in a longer service life. Production line interruptions have been reduced to a minimum, as water recycling is carried out using a closed circuit and there is no need to empty the tanks. In addition, the process is programmable, allowing us to choose the most suitable times. All of this has enabled us to increase the efficiency and productivity of our factories.

GTI: What prompted you to purchase more Filtraglass systems?
YO: After seeing the benefits of the first system installed in our factory in 2022, we had no hesitation in continuing to invest in this technology. We have purchased several more machines since 2022 and plan to purchase even more in the future. It's worth noting that this measure helps us comply with increasingly strict regulations. In other words, it's both an initiative to improve productivity and a commitment to protecting the environment. Furthermore, reduced water consumption, optimised processes and excellent technical support have given us the confidence to continue expanding this solution across our facilities. We believe that implementing water recycling measures is a key and necessary investment for the future of the glass industry, both from an economic and environmental point of view.

GTI: How has your experience been with the Filtraglass team over this time?
YO: From the very first contact, both their team and their sales representative Tokyo Glass Materials (TGM) have demonstrated a high level of professionalism and commitment. Their extensive knowledge of the sector and their determination to offer the most appropriate solution in each case is evident. They have custom-designed each machine to ensure efficient installation. In addition, they have provided support at every stage of the process and are always available to answer any questions, which gives us great peace of mind.

GTI: Would you recommend Filtraglass technology to other companies in the sector and, if so, why?
YO: Most certainly I would, and here's why: not only does Filtraglass technology help to reduce water consumption and improve production sustainability. It also optimises factory performance thanks to lower maintenance and longer machine life. This makes it an investment that translates into both economic and environmental benefits, something that is essential in the glass industry today and for the future.

GTI: How do you see the future of the glass industry?
YO: The planet needs greener industry, and we believe that the future lies in sustainability and efficiency. Optimising resources and reducing environmental impact will be key factors in the competitiveness of companies. In this regard, innovation plays a fundamental role. That is why we believe that solutions such as those offered by Filtraglass are necessary, since they ensure that companies can adapt to a more environmentally responsible future without compromising quality or productivity.

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Reshaping global glass manufacturing with CMS's smart tech

In the following exclusive interview with GTI Senior Editor Nick Fouché, CMS Head of Business Development and Digital products Laura Bonaiti recently discussed how her company is spearheading a digital revolution in glass production from intuitive machine interfaces to predictive maintenance and real-time data platforms as it redefines efficiency, sustainability and customer support in a rapidly evolving industry landscape.

Glass Technology International: Laura, it's clear that two phenomena are playing out concurrently in global flat glass production today: on one hand, the number of machines available on the market has grown significantly; on the other, the companies using them are experiencing a growing difficulty scouting for specialist operators with specific skills. It can lead to inefficiencies that are costly for glass fabrication companies. With a view to understanding if there's any solution to the problem, how are you facing it at CMS?

Laura Bonaiti: At CMS we're very attentive to all these aspects because our focus has always been on meeting the needs of customers. Specifically, since hardware quality is essential, we believe two aspects in particular make the difference for customers here, namely: the human-machine interface, and having a partner - not just a supplier.

GTI: How, then, is CMS responding to the demand out there?

LB: CMS is working on four key points: creating the most intuitive and user-friendly machine interfaces ever, adding fabrication process expertise in our software so that the machines guide the operators step by step, and providing our customers with increasing amounts of data on how they carry out the process in order to make it more efficient - for savings and increased productivity. Finally, we're introducing a service paradigm shift from reactive service (acting when we receive a call from a customer) to proactive support, which involves contacting customers even before the problem arises to stop the machine.

GTI: How exactly are you helping CMS customers save money and increase productivity?

LB: In collaboration with the SCM Group to which it belongs, CMS has created an Internet of Things platform called CMS Connect. It's a web portal that our customers can access and from which they can monitor their production process efficiency and consumption in real time. This not only means they can optimize the performance of the installed machines, but they can also take targeted action to reduce energy waste and minimize environmental impact. Analyzing the data via the platform allows strategic decisions to be made, improving productivity and prolonging the plant life cycle. In this scenario, CMS is configured as a technological partner, contributing in real terms to the transition towards responsible production models.

GTI: Proactive support seems like a dream come true. How do you achieve it?

LB: That happens through a dedicated project, again in collaboration with SCM Group. CMS has developed a service specifically for service departments, called CMS Control Room. It's a smart system that collects operating data from our machines in real time and exploits technologies such as machine learning and business intelligence to automatically predict potential critical issues before they occur. Our technicians see which machine is potentially at risk and can call the customer to prevent the problem.

GTI: Can you give a concrete example?

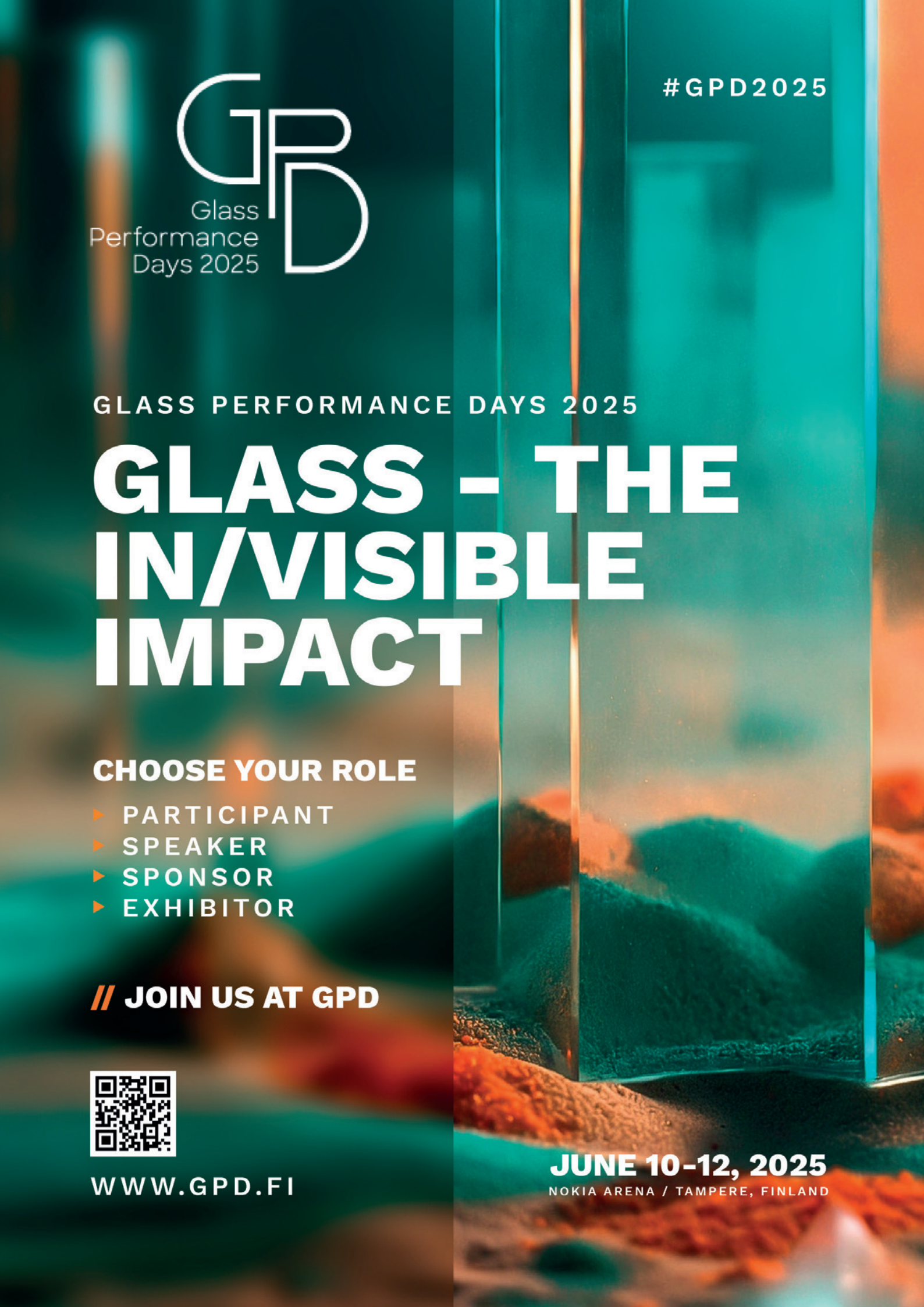
LB: Willingly. Through our CMS Control Room we receive information about spindle vibration in our installed machines. The software is programmed to distinguish normal vibration modes from abnormal ones. We can even estimate how long until a component will fail based on the vibration it emits. The CMS Control Room informs our technicians that the spindle in a specific machine is vibrating abnormally, and our personnel proactively call the customer to explain the issue and propose a solution before the machine stops.

GTI: Revolutionary indeed! What other aces do you have up your sleeve for the future?
LB: In order to allow CMS users to solve their problems independently, our technicians are also working on developing a Solution Library, a sort of CMS Wikipedia where they can ask, for example, how to import a 3D object. The system automatically answers questions, as well as providing videos and articles.

GTI: Given that the digital world is constantly evolving, what's the key to the success in solutions offered by CMS?
LB: In today's rapidly changing environment, it's essential to adopt an approach that's based on Design Thinking: a method that combines creativity and strategy while focusing on actual customer needs. This allows us to develop digital solutions that are not only technologically innovative but, above all, relevant and useful for our customers. Listening to customers, observing the context in which they operate, and co-designing with them gives us a continuing competitive advantage.

GTI: What are the main challenges when driving digital transformation in a traditionally mechanical sector?
LB: I'd say one of the main challenges there is to bring together two worlds that have historically spoken different languages: mechanical, based on precision, robustness and reliability, and digital, which features speed, continuous updates and agile business models.

GTI: Finally Laura, how important is internal cultural change and precisely how are you managing it?
LB: A good question to conclude with and it's appropriate that you mention cultural change. Indeed it's the real driver -or brake- for change as we're not just speaking here about introducing new digital products. Instead we need to rethink the way we tackle challenges, make decisions and collaborate within the organization. In a traditionally mechanical sector such as ours, this transition requires a structured change management approach capable of involving people, expertise and processes at all levels. We train our staff through our internal campus, using specialized companies as well as through field support. Investing in personnel training is really key because people are what truly add value to a company.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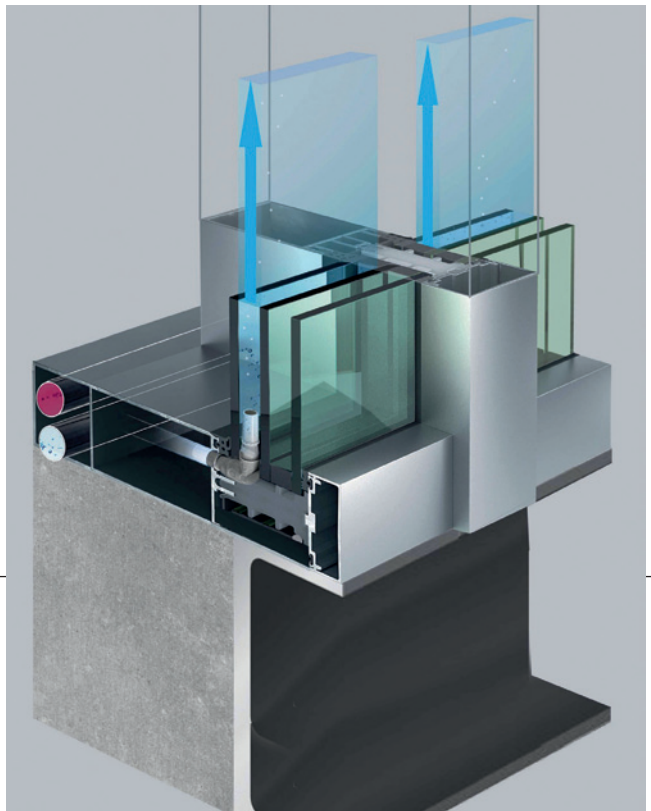
Next-generation WATER-FILLED GLASS technology heralds greener building future

As it overhauls resource efficiency in architecture with its cutting-edge glazing application, WATER-FILLED GLASS is replacing insulating gases with water. The company is harnessing solar energy to regulate temperature, reduce emissions and enhance comfort - all to offer smarter, scalable solutions for retrofitting in construction in the global push toward decarbonization.

Founded in 2020 by Loughborough University Associate Professor Dr Matyas Gutai along with Daniel Schinagl and Abolfazl Ganji Kheybari, British start-up Water-Filled Glass Ltd. is pioneering a transformative approach to glazing by using water-filled panes to harness sunlight and power an innovative energy-saving system. Indeed the company's patented technology is designed to make heavily-glazed commercial buildings significantly more sustainable.

A GAME-CHANGING TECHNOLOGY

Water-Filled Glass (WFG) is a patented glazing solution that enhances energy efficiency, thermal comfort and acoustics. Unlike conventional glazing, WFG replaces insulating gases with a sealed vertical sheet of treated water. This water layer absorbs solar heat, regulating indoor temperatures naturally and eliminating the need for external tinting or shades. With water's high thermal capacity, the system captures and redistributes heat - reducing heat gain in summer and heat loss in winter to maintain an optimal indoor temperature all year-round. The water from each glazing unit circulates to a heat exchanger which



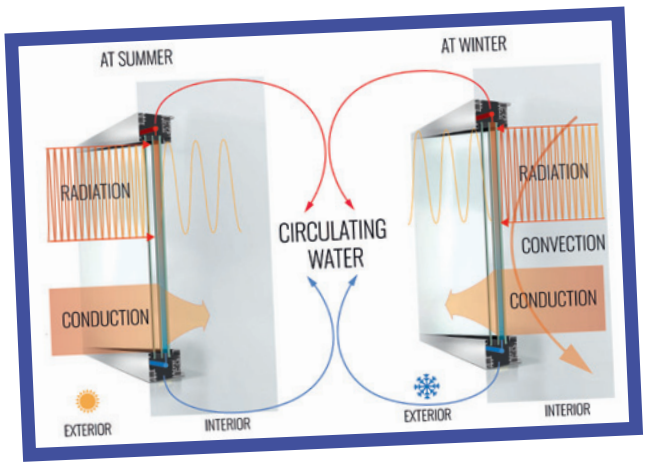
allows the thermal energy to be reused, improving thermal comfort and boosting overall efficiency. Compared to traditional double-glazing, WFG reduces energy consumption by up to 72 percent, and by 61 percent compared to triple glazing (Low-E coating). The technology's effectiveness has been validated in leading scientific journals - including Applied Energy and Energy and Buildings.

COMFORT WITHOUT COMPROMISE

Here WFG offers the best of both worlds, namely crystal-clear transparency with superior thermal management. In offices where glare and overheating often lead to blocked windows, WFG eliminates the need for blinds - allowing for uninterrupted natural light. Studies show that 65 percent of workers block natural light to prevent glare, but WFG's dynamic heat absorption resolves this issue. Additionally, its water layer absorbs external noise, fostering a calmer and more productive indoor environment.

RETROFITTING RENDERED EFFICIENT

With windows accounting for 40 percent of energy loss in buildings, retrofitting with WFG presents a powerful solution. Non-residential buildings contribute 32 percent of global CO2 emissions, with heating and cooling making up 45 percent of this total. WFG's second skin retrofit system can be installed inside existing facades without the need for costly scaffolding, permits or tenant relocations. Unlike full window replacements, WFG reduces project costs by preserving original architectural features and eliminating unnecessary demolition waste. The technology also supports partial building retrofits, allowing targeted installations on selected floors. By retaining the existing curtain wall and using weekends for installations, businesses can minimize operational disruption. Implementing WFG at scale could prevent up to 500 million tons of CO2 emissions annually - making it a key player in the drive toward decarbonization.



INDUSTRY PARTNERSHIPS AND GLOBAL RECOGNITION

Water-Filled Glass Ltd. has partnered with WICONA to integrate WFG into their cutting-edge TEmotion NG system. TEmotion NG with WFG was presented publicly for the first time at BAU 2025. This advanced façade solution was also showcased at the Future Façade conference on May 7-8, 2025, in Utrecht. Additionally, WFG has earned a prestigious spot at the 2025 Venice Architecture Biennale - a globally recognized event that welcomes approximately 300,000 visitors and participation from around 60 countries. Its inclusion underscores the growing industry recognition of WFG's potential to redefine sustainable architecture. As the glass industry seeks impactful solutions to reduce operational carbon emissions, Water-Filled Glass Ltd. continues to demonstrate its leadership with its groundbreaking, scalable technology - one window at a time.

WATER FILLED GLASS
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Walsall, WS9 8LZ
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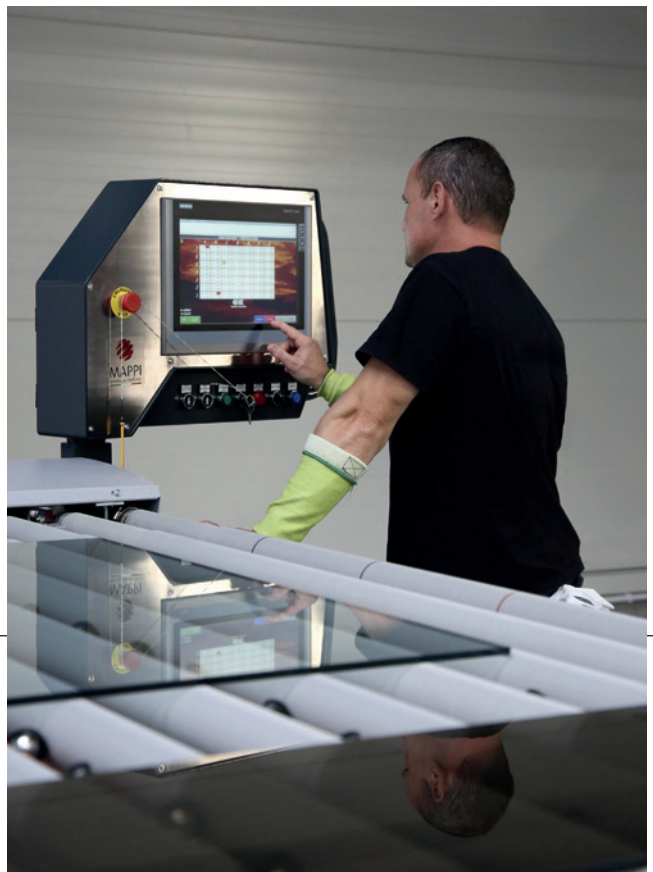
Tel.: +81-80-4894-3501
www.waterfilledglass.com

Powering down and starting up without thermal shock? With MAPPI, it's possible (and worth it)

The possibility of shutting down a glass tempering furnace at the end of the day and restarting it the next morning—without risking thermal shock or facing excessive restart costs—is a hot topic in the industry.



Even among seasoned professionals, cycling tempering furnaces on and off raises frequent questions. Some believe that turning off the furnace can damage metal components or cause such severe heat loss that any potential energy savings are nullified. Others argue that it simply isn't worth the hassle.

WHERE DO THESE BELIEFS COME FROM?

It all comes down to thermal insulation. Glass tempering furnaces operate at extremely high temperatures—typically between 650°C and 700°C, or even higher. If insulation is inadequate, shutting down the furnace causes the temperature to drop rapidly to ambient levels. This steep thermal drop places heavy stress on materials and components. In such cases, we agree: the risks outweigh the benefits.

MAPPI, however, uses premium-grade, high-performance insulating materials that retain internal temperatures of 450°C and 500°C for many hours after shutdown. This means the furnace cools down very slowly, maintaining a relatively high thermal level for an extended period. This helps prevent extreme or abrupt temperature drops, because while heating a furnace consumes energy, letting residual heat go to waste is a cost no one can afford.

LESS ENERGY TO POWER BACK ON

When a MAPPI furnace is restarted in the morning, the heating process doesn't begin from room temperature (20°C) but from around 450 to 500°C. This means the system only needs to recover about 150 or 200°C, resulting in significant energy savings. At the same time, the steel frame and structural components aren't subjected to sudden temperature shifts, which drastically reduces the risk of microcracks, deformation, or internal tension.

How does MAPPI make this

happen? The secret lies in the precision design of each furnace's insulating panels, the selection of materials with low thermal conductivity and a steel structure engineered to handle controlled thermal variations—rather than the extreme stress caused by full cooling cycles. From an engineering perspective, the thermal gradient (ΔT) directly impacts the lifespan of furnace components. By reducing the gap between operating and idle temperatures, MAPPI furnaces help preserve the structural integrity of the furnace, extend its service life and ensure a long-term return on investment in efficiency and performance.

REAL SAVINGS—NO COMPROMISE

Reduced thermal dispersion leads to real energy savings. No heat is wasted overnight, and far less "fuel" (or electricity) is needed to bring the furnace back to operating conditions. Additionally, the absence of thermal shock results in easier maintenance, lower costs and less frequent interventions.

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With SWISSPACER, architectural icon merges design and efficiency

PHOTO: SARAH BLEE | © NEUTELINGS RIEDIJK ARCHITECTS

The Heldentoren complex on Heldenplein in Knokke-Heist consists of three buildings on a shared underground car park: the almost 70-metre-high tower, a 7-storey building and a pavilion.

Gracing the beach promenade of the popular Belgian seaside resort of Knokke-Heist, The Heldentoren is a new architectural landmark which, with its two sister buildings, offers breathtaking panoramic sea views to its residents. Here insulating glass featuring the Swisspacer Ultimate warm edge spacer bar ensures maximum living comfort behind the surrounding glass façades.

NEW BEACH LANDMARK

Heldentoren, already a new highlight near Heldenplein, inaugurated in 2024 and, at 67 metres, towers far above the surrounding beachfront architecture. The urban ensemble directly on the newly designed Heldenplein consists of the residential tower with 43 apartments, a second 7-storey building with 10 apartments and a smaller pavilion that houses a restaurant and an additional apartment on the upper floor. The

Enhancing the Heldentoren in Knokke-Heist with superior energy efficiency and living comfort, SWISSPACER Ultimate has offered its characteristic elegance to yet another stunning architectural landmark. Positioned in Belgium's most exclusive coastal setting, the 2024 success story offers panoramic sea views through high-performance glazing while blending sustainable design with striking aesthetics.

ground floors are reserved for dining and retail and are connected to Knokke's new promenade on the Elizabetlaan. All three buildings are connected by a shared underground car park and follow the same architectural language.

STYLISH APARTMENTS WITH THE BEST VIEWS

The ensemble was designed by Neutelings Riedijk Architects from Rotterdam, planned by the Belgian engineering firm Bureau Bouwtechniek using BIM models and realised by TM Eiffage Vlaanderen Heldentoren. The investor and client is SALT Projects, a Belgian Real Estate Developer based in Knokke-Heist that specialises in the development of modern residential residences for design lovers in Belgium's most expensive real estate region.

For the tower sculpture, the architects have staggered four multi-storey structures, each of which is set back above the storey below, thus exposing large roof terraces. The result is a horizontal structure that is orientated towards the heights of the surrounding buildings and at the same time forms an exciting contrast to the verticality of the tower. The tower tapers upwards and, despite its height, the horizontal rhythm of its structure creates an elegant contrast with the verticality of the surrounding buildings, offering a dynamic visual presence in Knokke's otherwise homogeneous skyline.

WEATHERPROOF CERAMIC FAÇADE

The façades of the ensemble play with organic forms: rounded corners and wrap-around balconies offer residents generous views of both the city and the sea. To meet the challenges of the coastal climate and its constantly changing weather conditions, only corrosion-tested components with carefully selected surface finishes were used. Neutelings Riedijk Architects developed a special ceramic façade for the project. Its glazed surface is UV- and frost-resistant, providing long-term durability against thermal stress, salty sea air and wind-blown sand - without the need for main-

PHOTO: SARAH BLEE | © NEUTELINGS RIEDIJK ARCHITECTS

The ceramic façade of the buildings, specially designed for the project, has an undulating relief with vertical lines. The light reflections create a constantly changing interplay of light and shadow on the glazed surface.

The double and triple-glazed insulating glass units are protected against heat loss with Swisspacer Ultimate warm edge spacer bars. According to internationally recognised guidelines, Swisspacer Ultimate is one of the best warm edge spacer bars on the market.

PHOTO: RONALD SCHLUNDT BODIEN | © NEUTELINGS RIEDIJK ARCHITECTS

tenance. The dark ceramic panels, finished in a rich midnight blue, are structured with vertical lines that refract sunlight - creating a striking interplay of light, colour and texture that adds to the building's sculptural presence.

HIGH-QUALITY GLASS SOLUTIONS WITH WARM EDGE SPACER BARS

On the second façade level behind the narrow bands of ceramic panels and glass balustrades, the façades are almost completely glazed. Slim aluminium frames, also finished in deep midnight blue, hold the window and door openings, which feature a combination of sliding, hinged and fixed glazing elements. Double or triple-glazed insulating glass units protect the partly two-storey apartments from wind and solar heat, reflect warming UV rays, and at the same time offer high light transmission, allowing natural daylight to penetrate deep into the living spaces.

In terms of both performance and appearance, glass manufacturer Polypane chose the Swisspacer Ultimate warm edge spacer for the insulating glazing. "The requirements for the thermal conductivity of the insulating glazing were high", said Franky Symoens, CEO of Polypane. Triple glazing with a Ug value of 0.6 W/(m²K) and double glazing with a Ug value of 1.0 W/(m²K) were used as well as Swisspacer Ultimate for the glass edge. This spacer bar enables particularly low Psi values and thus supports the energy efficiency of the overall system. Swisspacer Ultimate is one of the world's leading warm edge spacer bars. It minimises heat loss at the edge of the glass and has been proven to improve the energy efficiency of windows and façades. This reduces CO_2 emissions and has a positive impact on the building's overall carbon footprint. With its matte surface, it blends seamlessly into any design concept.

The Heldentoren ensemble is not only an architectural masterpiece. It's also a symbol of Knokke-Heist's commitment to modern, sustainable living in the heart of Belgium's most prestigious seaside resort.

The window profiles match the colour of the ceramic panels and provide support for the window and door openings with sliding and hinged elements. The balcony balustrades are made of glass so as not to spoil the sea view.

PHOTO: RONALD SCHLUNDT BODIEN | © NEUTELINGS RIEDIJK ARCHITECTS

ABOUT SWISSPACER

Swisspacer operates globally and is a leader in the innovation of warm edge spacer bars. Its products impress with their excellent functional and aesthetic properties. The product portfolio is supplemented with the component Swisspacer Air, which enables pressure equalisation inside the insulated glass unit. Swisspacer has published EPDs in accordance with EN15804+A2 'cradle to grave'. Founded in 1998, the company belongs to the Saint-Gobain Group.

PROJECT DATA

Project:	Heldentoren
Location:	Heldenplein, Knokke-Heist/BE
Client:	SALT Projects, Knokke-Heist/BE
Architecture/Design:	Neutelings Riedijk Architects, Rotterdam/NL
Architecture/planning:	Bureau Bouwtechniek, Antwerp/BE
Construction company:	TM Eiffage Vlaanderen Heldentoren, Brussels/BE
Glass manufacturer:	Polypane Glasindustrie NV, Temse/BE; Finiglas Veredelungs GmbH, Dülmen/DEU (curved glass)
Glass:	Polycool All Seasons 39, Polyplus Super HR-1
Spacer:	Swisspacer Ultimate
Completion:	2024

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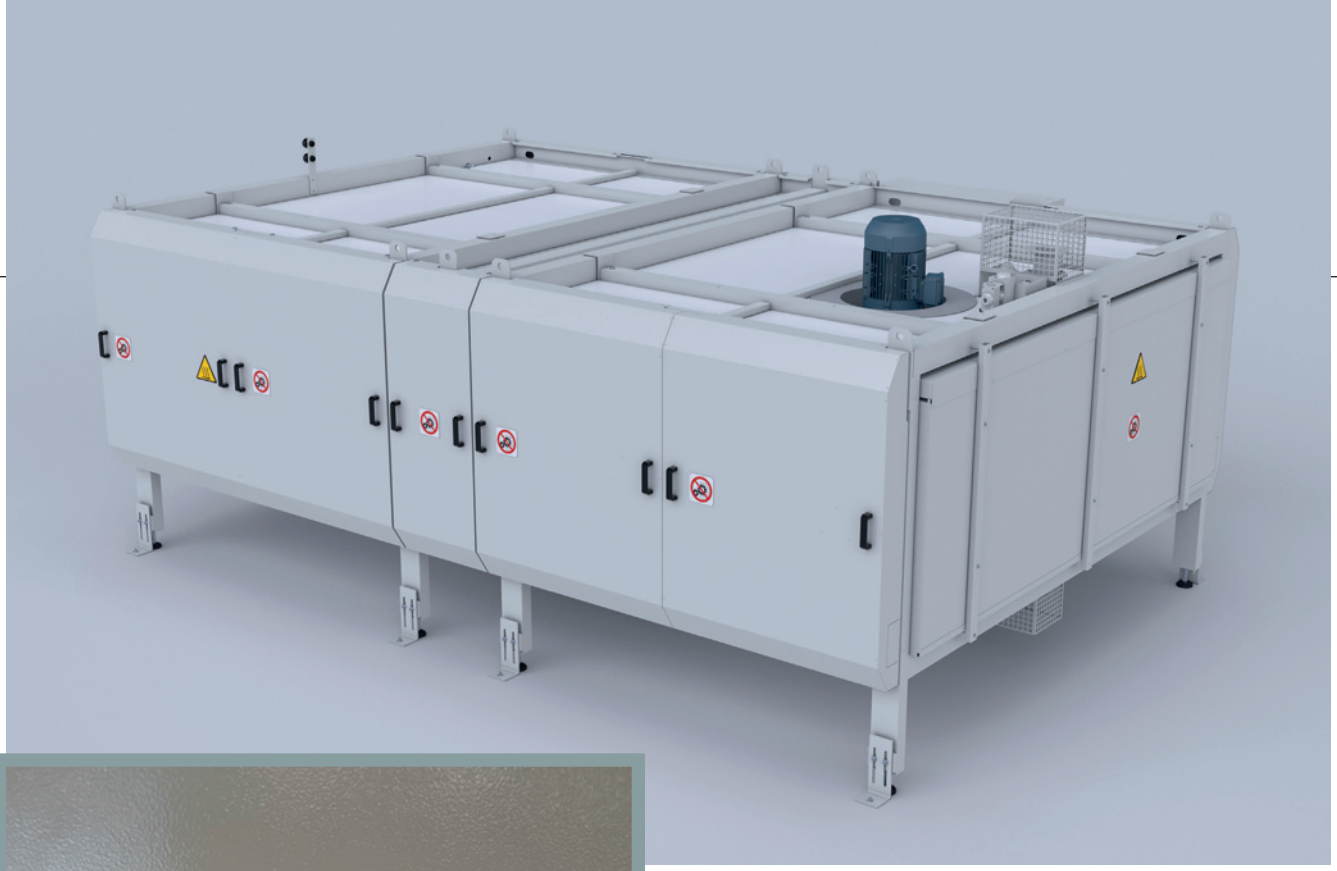
BOVONE EVA oven: designed to simplify, built to last

The new EVA 3.2/2.2 oven from Bovone meets the needs of glass processors by offering an intuitive system, high-quality results ease of use, quick configuration and a maximum installed power of 45 kW.

In the world of laminated glass processing, every detail matters — not only in terms of the final product quality, but especially in what happens before: workflow organization, cycle reliability, time management, operational simplicity, and energy consumption.

The new EVA 3.2/2.2 oven from Bovone was developed precisely to meet the real, everyday needs of glass processors — without unnecessary complexity, and with everything required to boost productivity and streamline process management.

Bovone's experience translates into a solid, intuitive system, carefully engineered for each stage of the lamination process. Ideal for large-scale production and diversified operations, it



delivers high-quality results with full control of every process phase. Thanks to two independent heating chambers, which can operate simultaneously with different parameters, it is possible to optimize time and manage multiple cycles with maximum flexibility. The convection oven system ensures uniform thermal distribution, enabling consistent outcomes across all batches, even with variable configurations.

The 10 inch touch-screen HMI (Human-Machine Interface) gives operators full digital control of the process: easy to use and quick to configure. The oven autonomously manages both the heating and cooling phases, with programmable curves displayed in real time. A digital vacuum gauge with an integrated light signal provides immediate feedback once the optimal vacuum level has been reached.

A key operational advantage is the maximum installed power of just 45 kW, lower than the current market average. This allows for reduced energy consumption without compromising on quality or process stability. In a context where energy efficiency has a growing impact on daily production costs, every kilowatt saved is a tangible gain.

The Bovone EVA oven is built to meet modern production needs, with usable chamber dimensions of 3,200 by 2,200 millimetres, an internal height of 430 millimetres and a load capacity of up to 700 kilograms per chamber — delivering maximum versatility in terms of size, geometry and throughput. The generous internal height also enables the lamination of curved glass, broadening the application range of the system. All this, combined with the option for fast and secure remote assistance, ensures operational continuity even in the event of technical needs.

Designed to support the pace of everyday production, the EVA 3.2/2.2 oven is a reliable, high-performing tool that integrates seamlessly into any working environment — from standard orders to more complex jobs. A tangible asset for those seeking consistent results, optimized cycles and technology engineered around their workflow.

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GLASSMEK: Where GLASS COMPANY innovation, efficiency and intelligence all converge

An Italian company based in Pesaro, Italy, GLASS COMPANY offers its complete range of internally-developed technological solutions in GLASSMEK for both flat and technical glass processing - all in a set of special machines designed according to the principles of Industry 4.0 and 5.0 which combine advanced automation, low consumption, ease of use and digital intelligence.

In a Glass Company product line that brings together a diverse series of machinery and systems, all GLASSMEK solutions are designed to guarantee maximum production efficiency and energy sustainability, as well as total connectivity with MES/ERP systems.

A LASER RANGE FOR HIGH-PRECISION, LOW-ENERGY-IMPACT GLASS PROCESSING

LaserMek lies at the heart of the GLASSMEK range. A laser system line for ablation of paint coatings and silvering, it leaves glass completely transparent, drilling with diameters up to 110mm and thicknesses of up to 25mm, with engraving and creation of satin effects on coated glass, transparent glass and technical glass. Available in both an open bench configuration and a closed version (box), LaserMek can be customized according to customer needs - both in terms of the size of the work surface and the laser source used (fiber, nanosecond, picosecond, etc.). Thanks to advanced electronics and an intelligent integrated control system, LaserMek guarantees micrometric precision, constant quality and above-average energy efficiency. Besides allowing processing with constant and repeatable centesimal tolerances over time and a perfectly perpendicular

and smooth finish of the cut or drilled glass edge, these latest generation optical components also allow a significant reduction in electricity consumption with minimal impact on the production line - making the entire process more sustainable and convenient in the long term. The various patents presented and awaiting validation, the high attention to operator safety (compliant with CE regulations applied to laser machines) and highly intuitive management software, (compliant with the connectivity and traceability requirements required by industrial digitalization plans) all allows simple and intuitive programming - even for non-specialized operators, thereby reducing setup times while improving productivity.

FIREMEK. FOR EASY-TO-USE FIRE-RESISTANT GLASS PRODUCTION

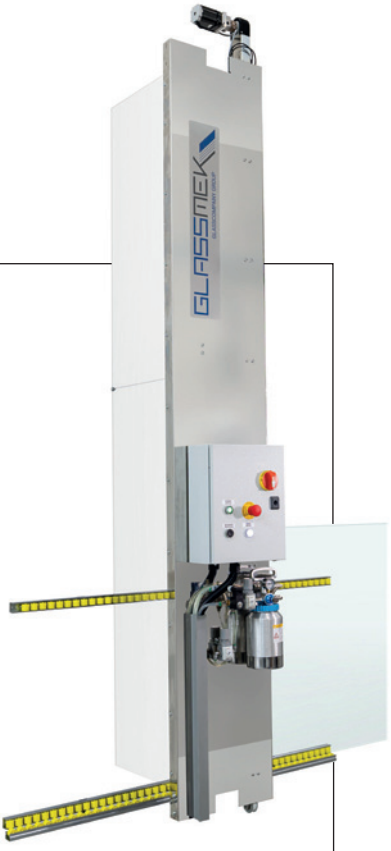
Another flagship of the GLASSMEK range is FireMek: the compact, automated line for the production of fire-resistant glass (class E, EI, EW). A result of careful research and development, FireMek combines advanced technologies and ease of use, offering a high-performance industrial solution - accessible even to SMEs. The line integrates reactors for chemistry, heat treatment systems for cross-linking, automatic control and monitoring systems - all of which guarantee the reproducibility, compliance and traceability of the final product - making it compliant with international fire safety standards while minimizing waste and processing costs. The technological optimizations applied to the production of the silica-based intumescent mixture, which guarantees transparency and stability over time, unlike the old organic-based resins, when heated with optimized management of the heat flow also allow substantial energy savings, with high yields against reduced consumption.

VISIONMEK: DOUBLE GLASS WITH TRANSPARENT GLASS SPACERS

The VisionMek system is designed for the production of Full Vision insulating glass, ideal for commercial refrigerators and high-transparency double glazing for interior design. The line includes the patented machine for processing transparent glass spacers and the patent-pending machine for the automated assembly of double glass, which integrates the PlasMek system, for the plasma treatment of the glass surface to improve adhesion, micro-dosing of ultra-transparent UV resin, automatic pressing and photopolymerization. The result is an aesthetically impeccable glass, without visual interruptions on the long edges, ideal for high-impact displays.

COATMEK: STAND-ALONE NANO COATING SPRAYING SYSTEM FOR FUNCTIONAL GLASS

Applicable on other machinery, Coatmek is the ideal system functional nanometric coating application through high-precision homogeneous spraying and adjustable in quantity - adapting to different glass formats and ensuring maximum operational flexibility. Here the spray, air and product parameters are all completely configurable for each type of treatment. In sum, GLASSMEK fully encapsulates Italian excellence for the glass of the future. Here Glass Company Srl provides all companies that work with glass with a flexible, modular and efficient technological ecosystem that's designed to increase the quality of finished products, reduce energy impact and digitize the entire production process. Indeed it is a concrete proposal for those who want to evolve with intelligent and high-performance solutions.



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Introducing BSOLUTION's SPEED EDGE 2.0.3 Compact Grinder Machine

INNOVATION AT ITS MOST COMPACT

Designed for small spaces and high performance, the new grinder machine now arrives in a sector where quality does not allow compromises and space optimization is increasingly central. The latest addition to BSolutions product range is its compact grinder machine. The result of a development process oriented towards continuous innovation, the machine was specifically designed to meet the needs of any who work in environments where space is limited - all the while wishing to maintain the highest standards of precision, reliability and productivity.

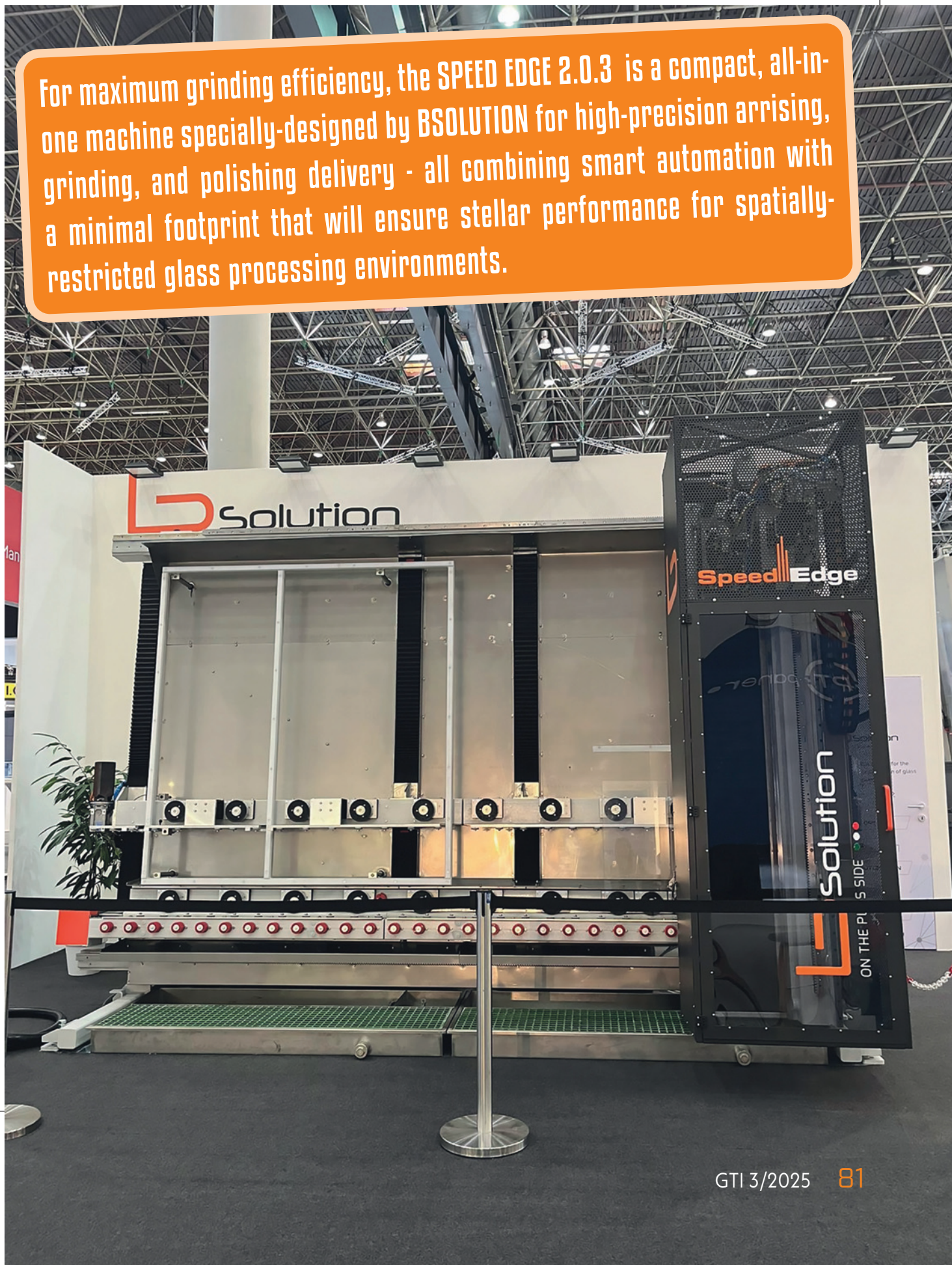
SMART DESIGN, EXCELLENT PERFORMANCE

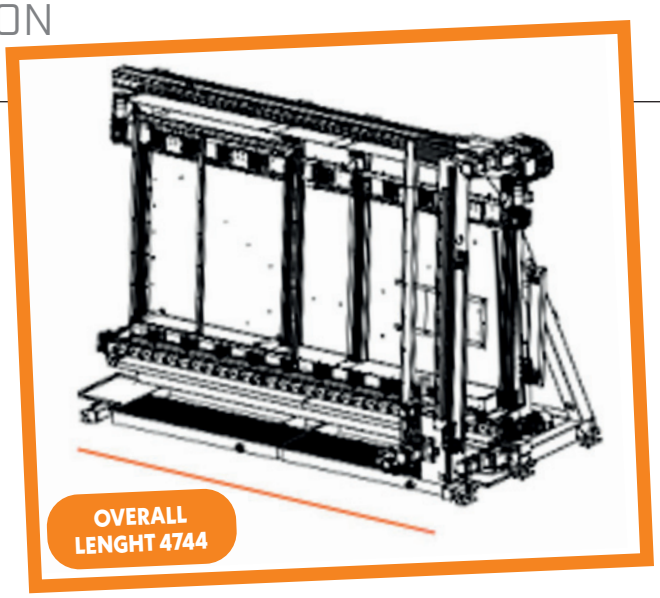
The compact grinder machine combines small size and ease of installation with advanced technology, ensuring high-quality arrising and grinding. Indeed every detail has been designed to offer the best in terms of ergonomics, energy efficiency and ease of use.

AN OPTIMUM CHOICE FOR SMALL GLASS PROCESSORS WHO ARE AFTER BIG RESULTS

Whether it's a small glass processor or a large production company that seeks to expand its operational capacity without upsetting the organization of the spaces, the compact grinder machine represents a superb solution. Versatile, robust and intuitive, it comes ready and poised to satisfy the requests of the most demanding glass processors. With this new proposal, the company confirms its commitment to innovation

For maximum grinding efficiency, the SPEED EDGE 2.0.3 is a compact, all-in-one machine specially-designed by BSOLUTION for high-precision arrising, grinding, and polishing delivery - all combining smart automation with a minimal footprint that will ensure stellar performance for spatially-restricted glass processing environments.

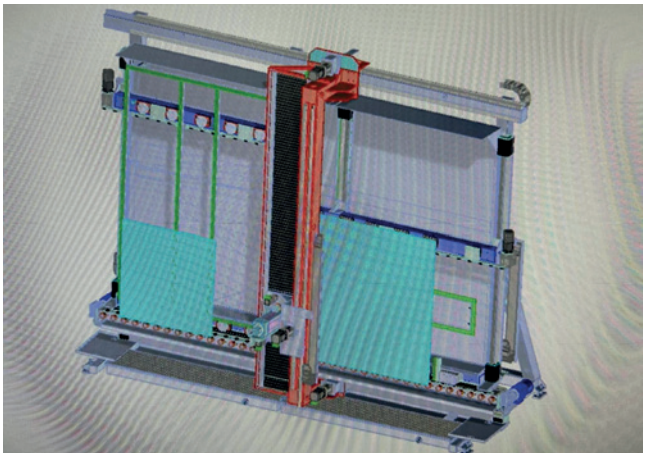


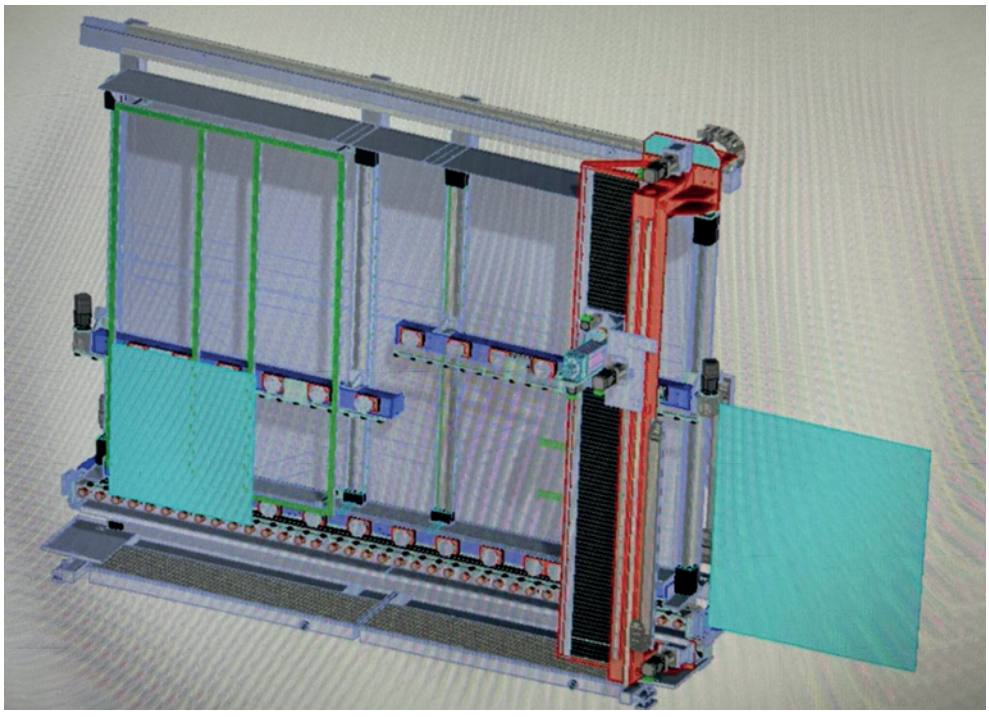


and proximity to real market needs - because every detail counts, especially when space is precious.

A SPECIFIC DESIGN FOR ARRISING, ROUGH GRINDING AND POLISHING

One of the distinguishing features of this machine is its compact and integrated system, which combines automatic loading and unloading within the same structure - optimizing the work cycle while minimizing operator intervention. With two independent sections, the transport system allows for loading of a second sheet while the previous sheet is being processed. The limit of this operation is that glass being processed has a maximum length of 1100mm,





which both optimizes cycle times and increases operational efficiency. Here the result is fluider management of the transition between one cycle and the next, with a significant reduction in downtime and an optimization of the overall production flow. By minimizing the need for manual intervention and separating the movement of the processed sheets, the system not only improves productivity. It also improves operational flexibility, which is a particularly important advantage in high-productivity or mixed-process contexts where both timing and precision are essential.

KEY STRENGTHS

- Three processing phases combined in a single machine
- Minimal footprint, ideal for compact production environments
- Integrated and automated loading/unloading system
- Independent transport for separate sheet handling
- Fast installation

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Still shaping skylines, NORTHGLASS brings more trailblazing solutions

With its groundbreaking advancements in curved, energy-saving and ultra-flat glass, NORTHGLASS is redefining façades as it sets global benchmarks in both aesthetic and structural performance. Combining precision engineering with artistic expression in glass, the company is transforming architecture through its avant-garde technologies.

Constructed by North-Glass, the glass cylinder of the Apple Store in Pudong, Shanghai, features 12 pieces of 12.8-metre curved glass, setting a benchmark for the flagship store curtain wall design. This ribless, self-supporting structure not only pushed the boundaries of glass processing at the time but also demonstrated the company's technical leadership in the global architectural glass industry. From

traditional building materials to intelligent manufacturing, NorthGlass is redefining contemporary architectural language through breakthroughs in both technology and aesthetics.

ATTENTIVE MANUFACTURING AT SCALE

In the intelligent workshop at the Tianjin Base of NorthGlass Processed Glass BU, the world-leading NorthGlass tempering furnace continues to operate efficiently. A single piece of nearly 20 m^2 ultra-clear coated glass is precisely formed in a 650°C high-temperature tempering furnace. Behind it lies the huge project for OPPO Headquarters in Shenzhen: 70,000 m^2 of super energy-saving curtain wall glass and nearly 10,000 pieces of super-large, special-shaped, and multi-curved glass - showcasing NorthGlass' cutting-edge processing technology.

ENGINEERING AESTHETICS IN MOTION

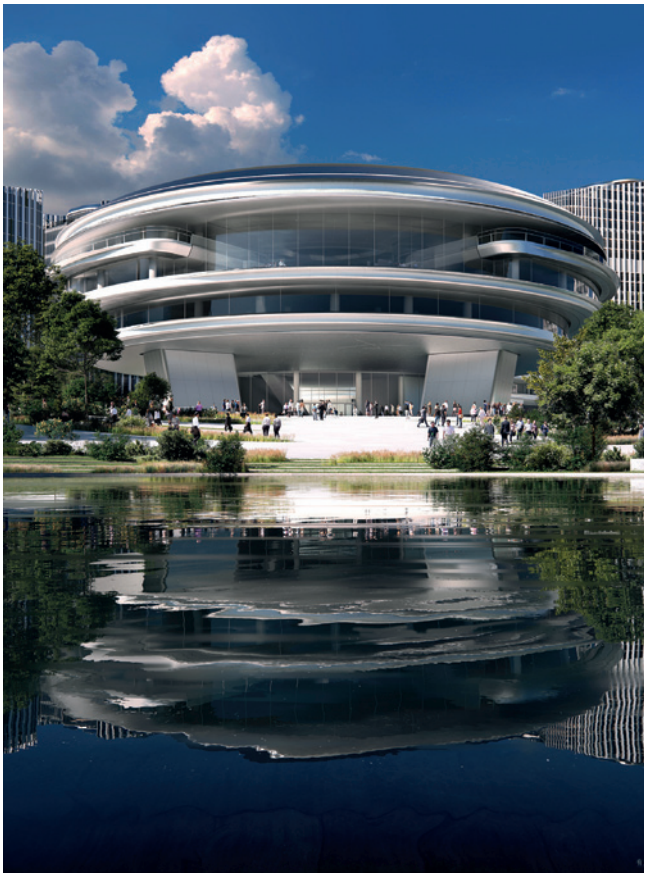
Previously, in the National Speed Skating Oval project, over 2,000 pieces of Tempered Half-tubes of varying sizes were perfectly matched with the steel structure using dynamic simulation technology. The resulting curtain wall system, formed by flowing curved glass, transforms structural logic into a rhythmic aesthetic - like a flying track across an icy surface.

PRECISION REDEFINED THROUGH INNOVATION

The Gapless Forced Convection System innovatively developed by NorthGlass has redefined the technical standards of flat tempered glass. With its new intelligent temperature control system, convection system and wind grille technology, the optical quality and flatness of the glass are greatly improved. Quality inspection data show that the flatness of North Glass tempered glass reaches 0.06/300mm, and its overall bow is smaller than 1‰. This technology not only enables the striking visual effect of the 330-metre glass curtain wall on Japan's tallest building, but also contributes to a curtain wall revolution at Hong Kong Two Taikoo Place - the large glass with a single plate area of 12 m^2 still maintains mirror imaging precision at 190 metres in height, reflecting the Victoria Harbour skyline as a dynamic, distortion-free picture on the building façade.

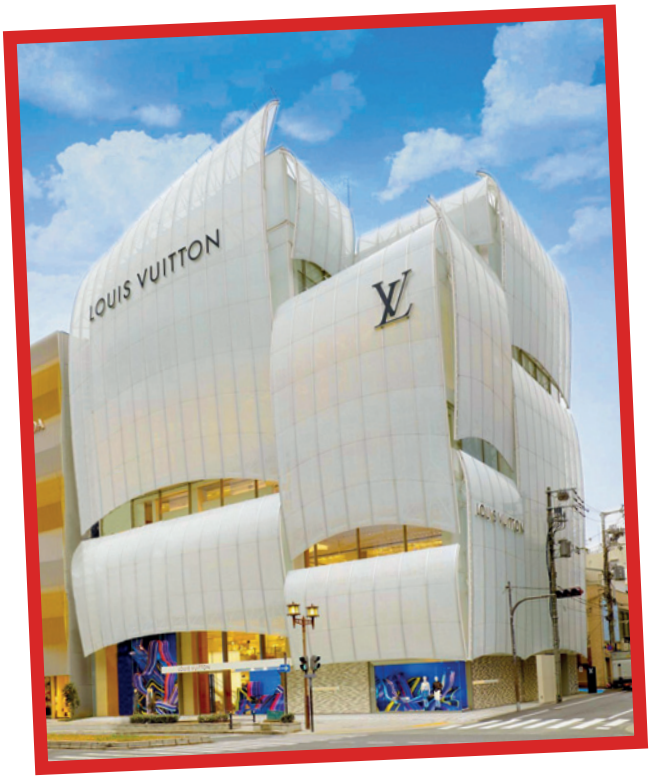
RESILIENCE AND SPIRIT IN MODERN FAÇADES

In the NorthGlass Safety Standard Laboratory, laminated glass is subjected to extreme testing. Even when impacted by steel balls, the



resulting spider-web cracks retain the overall structural integrity. This innovation, incorporating a new composite lamination process, enables architectural glass to withstand both super typhoons and explosive shockwaves. The company has developed a collaborative innovation system across the entire industry chain, integrating continuous vacuum magnetron sputtering coating lines and provincial and ministerial key laboratories, driving technology upgrades with an 8.5 percent R&D investment intensity, and continuously expanding the processing capabilities from low-iron with Low-E coated glass to special-shaped tempered glass.

From the corrugated curtain wall of Bloomberg's European headquarters in London to the super energy-saving glass of Azabudai Hills Mori JP Tower, the tallest building in Japan, from Apple Park to the New Performing Arts Venue in Brisbane, NorthGlass' intelligent production is bringing Chinese innovation to the world. At the Tianjin base of NorthGlass, the new generation of super-flat glass production line continues the innovative gene of the 'cradle of glass craftsmen'. Here NorthGlass always believes that when technology and art achieve perfect resonance in the glass medium, architecture will transcend functional carriers and sublimate into the spiritual totem of the city. Indeed the company firmly believes that when technology and art achieve perfect harmony through the medium of glass, architecture transcends its functional role and evolves into a spiritual totem of the city.



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Brussels heritage preserved with FINEO vacuum glass by AGC

Blending Art Nouveau elegance with cutting-edge energy performance, FINEO by AGC shows how window renovation in historic buildings can be redefined. Delivering ultra-thin, triple-glazing performance, this innovation maintains original aesthetics whilst dramatically improving insulation - a breakthrough that's showcased now in a remarkable villa restoration in Brussels.

ORIGINAL GEORGIAN BAR WINDOWS REVITALIZED FOR ENERGY EFFICIENCY

Despite its elegant splendour, any building constructed at the beginning of the 20th century inevita-

bly involves the problem of insulation that's noncompliant with the thermal requirements of today's buildings. Such requirements are inseparable from what's necessitated in terms of comfort, energy consumption and maintenance costs. The same predicament was encountered by a family in Brussels who, in 2021, acquired an Art Nouveau villa with the intention of renovating it in a manner that would both respect their personal preferences and adhere to contemporary energy regulations and standards. A pivotal element of the renovation and insulation involved the replacement of the original wooden Georgian bar windows with approximately thirty windows with 86 vacuum-insulated glass units from the Belgian glass expert FINEO by AGC.

FINEO VACUUM-FORMED GLASS: A SUPERB FIT IN RESTRICTED WOODEN FRAME SPACES

Brussels is renowned for its abundance of Art Nouveau architecture, boasting a thousand or so buildings in this style. The city is home to several UNESCO World Heritage sites, while other private residences are discreetly tucked away from the tourist trail. In contrast to the opulent and renowned edifices, the renovation initiative in the commune of Uccle, situated to the south of Brussels, employs a limited array of architectural elements from the Art Nou-

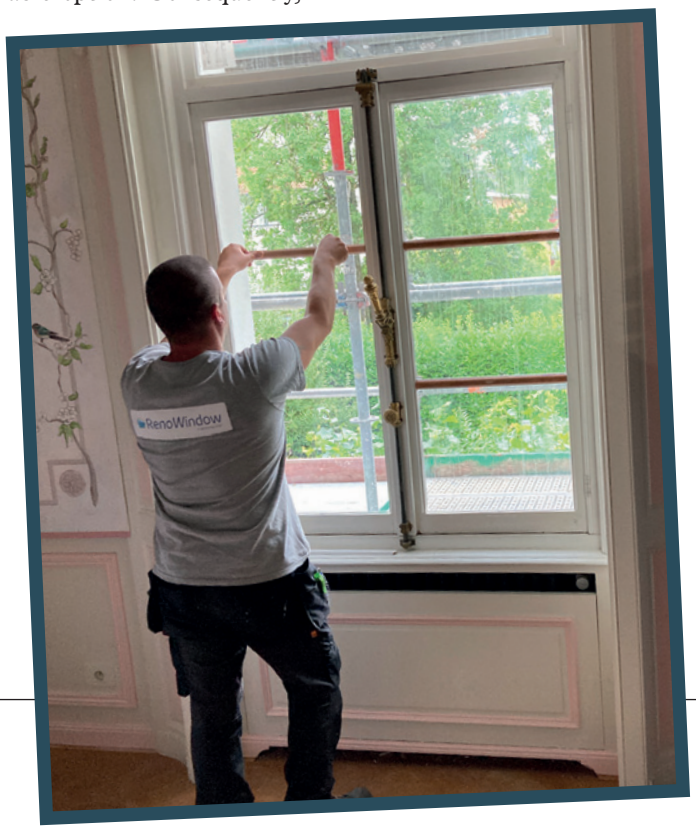
veau style. These include the arched windows, the floral embellishments and the decorative accents on the openings and facades. The roundness of the 'Bull's eye' windows and the openwork motifs of the balustrades around the terraces and balconies are more closely related to other stylistic periods. The charming hipped roof is covered with natural slate, a building material often used in the Brussels region due to its proximity to Ardennes slate quarries.

PRESERVING AESTHETIC INTEGRITY WHILE ENHANCING ENERGY PERFORMANCE

The Art Nouveau heritage villa is notable for its Georgian bar windows, which blend in with the building's discreet sobriety. The ground floor is distinguished by double-sash arched windows, each comprising eight glazing bars, a horizontal transom, and a double arch. These elements infuse the facade with visual dynamism, with the exception of the dressed stonework that defines the corners. This aesthetic is replicated in the sculpted overhangs and frames that adorn the rectangular mullion windows on the first floor. The building's distinctive historic character and unique aesthetic are further accentuated by the presence of original espagnolette locks and handles.

A SEAMLESS FIT FOR HISTORIC FRAMES

In addition, given the excellent condition of the wooden frames, the owners were seeking an energy-efficient replacement for the existing single glazing that met the highest insulation standards and values. Due to the narrow width of the frames, traditional double glazing was not a viable option. Consequently, the decision was made to utilise FINEO vacuum insulated glazing, a solution that offered a natural progression in addressing the specific requirements of the project. "FINEO's innovative structure offers this unprecedented potential. The secret lies in two glass panes separated by a super-thin vacuum of just 0.1mm," explains Stefan Lips, Sales Manager Europe for FINEO by AGC. "This minimal gap acts as a highly effective thermal insulator, as it almost completely eliminates heat transfer by conduction and convection, in contrast to traditional thicker and heavier double or triple glazing, which uses gases such as argon or krypton in the glazing space," continues Lips. "Such innovation enables FINEO to deliver



thermal insulation equivalent to triple glazing, while maintaining unparalleled thinness ranging from 6.7 millimetres to 11.7 millimetres. In the villa in Uccle, the Ug value was reduced from 5.8 to 0.7 W/(m²K)."

WINDOW RENOVATION BY SIMPLY REPLACING THE GLASS

This innovative glass manufacturing process was even more revolutionary than Art Nouveau, enabling Belgium to make its mark on the architectural landscape. By 1880, Belgium had become the world's leading supplier of glass. In 1902, the Belgian engineer Emile Fourcault developed the first mechanical glass production system. This vertical glass-drawing system gradually replaced the traditional mouth-blowing method, which had been used to make window glass until then. This development firmly established Belgium as a pivotal player in the global glass industry, shaping its future and cementing its lasting legacy. "With our vacuum insulating glass, which we produce exclusively in Belgium, in Lodelinsart, we have added a new and innovative chapter to the historic heritage of glass in our country," Lips continues. "Unlike traditional insulating glass units, the space between the panes is not filled with inert gas, but with a vacuum. Each FINEO pane is custom-made to ensure optimal performance, allowing for the creation of a wide variety of shapes, including the arched and circular designs showcased here for 'Bull's eye' windows." RenoWindow, which is in charge of the renovation work and one of FINEO's-approved installers in Belgium, recognised the market opportunities in the renovation sector very early on. Since its establishment in 2019, the RenoWindow team has built a reputation for excellence in the refurbishment of windows, a significant proportion of which have incorporated FINEO vacuum insulation glass. Here the Managing Director recognises significant benefits in this approach, particularly in the context of restoring old windows: "In Uccle, we exclusively worked on existing frames. This approach ensured minimal disruption to the family's daily life and was more

ABOUT AGC GLASS EUROPE

A European leader in flat glass, AGC Glass Europe produces, processes and markets flat glass for the construction industry (external glazing and interior decoration), the automotive industry (OEM and replacement glass) and other industrial sectors (transport, solar power and high-tech). It is the European branch of AGC, a world leader in flat glass. It has over 100 sites throughout Europe and employs around 13,000 employees.

cost-effective than replacing heritage windows, which would have necessitated bespoke manufacturing and extensive manual labour. In instances where the wooden frames do not require renovation or repainting, a day's work on site is sufficient."

SMART RENOVATION, MINIMAL DISRUPTION, MAXIMUM IMPACT

The first phase of the Uccle project involved the removal of the existing single glazing and its accompanying mullion bars. This was followed by the precise milling of the wooden sash by approximately 2 to 3 millimetres to allow for the straightforward fitting of the slightly thicker FINEO glazing. The final step in the process entailed the reattachment of new sash bars to provide a secure and complete finish. When renovating windows in listed buildings of cultural and historical importance, FINEO's Heritage range of glazing can be combined with Fourcault glass to create the look of restoration glass. This allows the historic character of the facade to be preserved. "Facing the strict requirements for protecting historic monuments, FINEO glass can be produced in smaller sizes for insertion into existing glazing bars that require preservation," states Clément Lemoine, Head of Product Management for FINEO by AGC, who immediately goes on to emphasise that "the approach nonetheless comes with a certain degree of heat loss. Consequently, uniform glazing remains the optimal choice from energy and economic perspectives since it allows for the integration of new glazing bars."

QUALITY AND DURABILITY, AN INSEPARABLE DUO

FINEO vacuum insulating glass units are made entirely from organic materials, making them suitable for recycling at the end of their useful life. This eliminates the need for tedious and costly dismantling, ensuring a straightforward and cost-effective process. "The lifespan of our FINEO glass is impressive," says Clément Lemoine. "According to tests carried out by an independent laboratory, FINEO retains its high energy and sound insulation values for at least 60 years. This exceptional performance is backed by a 20-year product guarantee, providing customers with peace of mind and assurance of quality." FINEO by AGC is a company that is synonymous with quality. This is underlined by the fact that it was the first and only manufacturer to obtain CE marking for its vacuum insulation glass in 2024. This is why the company is taking a new step forward by introducing its innovative technology to the market. The recognition of this quality label will help to democratise FINEO vacuum glazing among building contractors - ensuring a high level of quality, reliability and safety for its product range.

ABOUT FINEO

FINEO is the new generation of insulating glass. This vacuum glazing, with its optimum thinness, provides excellent thermal and acoustic comfort - meeting the expectations of joinery professionals concerned about sustainability and energy efficiency. Under the aegis of AGC Glass Europe, FINEO is produced in Belgium - benefiting from a revolutionary production method in comparison with typical building glazings. In terms of both thermal and acoustic insulation, its remarkable thinness in no way detracts from its technical prowess.

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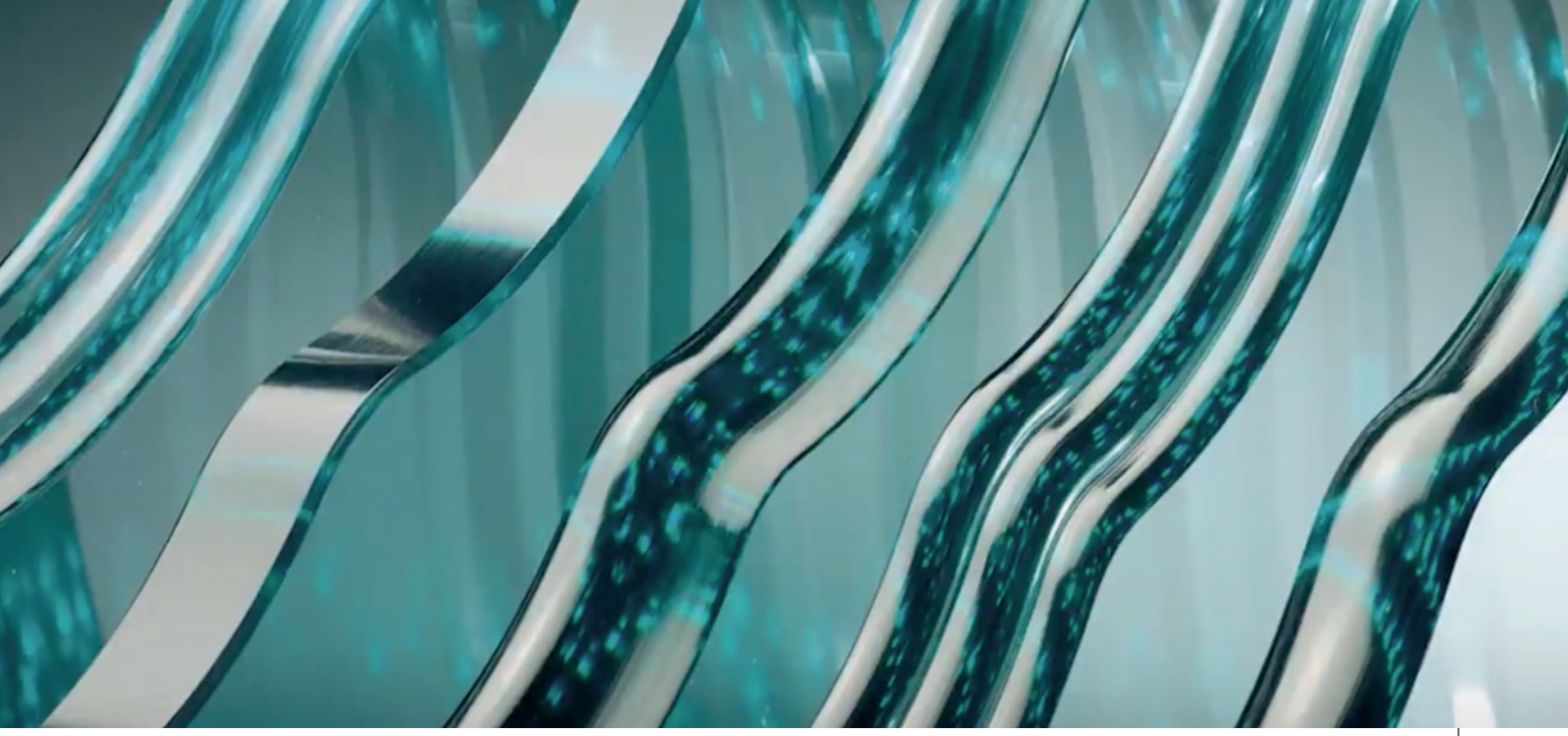
COLLECTIVE INTELLIGENCE: a bridge from Academia to Industry

Eager to have word from the Academy on its approach to the industry's future, GTI Senior Editor Nick Fouché recently interviewed MARIA ANTONIA BARUCCO, Associate Professor at Iuav, Venice, on the sustainable, adaptable and innovative uses of glass today, together with ELTI CATTARUZZA, Vice Rector for Student Affairs at Ca' Foscari, Venice, who emphasized the transformative role of recycling today.

GLASS TECHNOLOGY INTERNATIONAL: PROF. BARUCCO, WHAT EXACTLY IS ENSURING THAT GLASS REMAINS A MATERIAL OF PRIMARY IMPORTANCE FOR OUR FUTURE?

MAB: For one thing I'd say environmental sustainability most certainly: glass is ideally 100 percent recyclable and can be reused without any loss in quality. Very few materials offer such potential. Although full circularity across supply chains is not yet a reality, numerous studies, pilot projects and cases of excellence point to a growing interest in increasingly widespread applications. I observe this trend in my work studying glass supply chains - which has engaged me for about a decade. So circularity is one area where great progress will be made in the coming years: regardless of the sector in which glass gets used - the processing chains will see strong development in this direction.



We must also consider the adaptability and versatility of glass, which can be used across numerous sectors - from construction (windows, façades, insulation) to packaging (containers for food and beverages), from technology (screens for electronic devices, optical fibers) to art, design and beyond. Its ability to adapt to diverse applications and integrate with emerging technologies makes it indispensable for many innovative uses.

Glass possesses unique properties, such as transparency and heat resistance. Here it's vital to remember that these characteristics, which we now take for granted, are the result of thousands of years of experimentation, trial and craftsmanship. Today, we must continue along this path of research, equipped with tools, skills and objectives (such as the question of sustainability with which we opened this interview) that enable us to make further advancements. Innovation in the field of glass has never stopped. It is within this context of continuous evolution that we can envision revolutionary future developments - perhaps even replacing synthetic polymer-based materials with new silica-based or recycled glass materials.

In the near term, I'm convinced we'll see the spread of applications involving ultra-resistant glass and 'smart glass' - materials capable of adjusting transparency and thermal insulation on demand, potentially guided by environmental sensors. Glass already plays a key role in applications that support the energy efficiency of buildings and this will also remain so in the future. There is tremendous work ahead of us on this score, particularly when it comes to improving the energy performance of existing building stock.

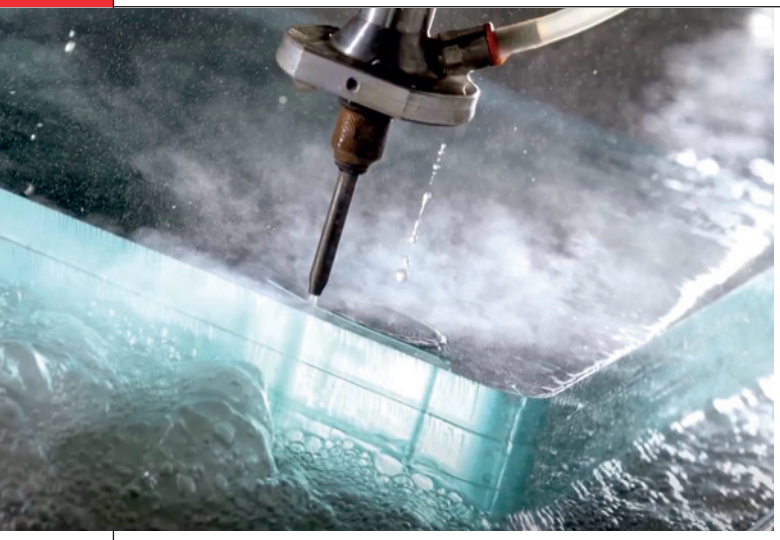
In any case, it is essential to understand that the glass industry exemplifies how tradition and innovation can coexist and mutually reinforce each other - leading to solutions that address not only today's societal needs but those of the future as well.

GTI: How can the synergy between academic research and industrial innovation foster the development of new solutions in glass?

MAB: Collaboration between academia and industry is essential for innovation in glass. That synergy stems from a shared vision coupled with aligned goals and it requires a joint commitment to promoting research and education that can keep pace with rapid, future-oriented technological developments in the field of glass.

In these complex and uncertain times, it's crucial to remember that neither industry nor academia can meet the challenges ahead without strengthening their connection with future generations. We're not just referring to future consumers or users of glass; the focus must be firmly placed on today's students - tomorrow's talents in research, industry and design. Bridging specializations and generations is key to understanding current limitations and setting shared goals for advancement.

In the classroom, I observe a strong sense of purpose, courage and dedication among my students, especially toward environmental, economic and social sustainability - values that define the new generations. There's still considerable work to be done to build common goals between academia and industry - goals rooted in shared values. But this is not an impossible task - indeed, it is precisely what the EU Green Deal has taught us.



Equally important is reinforcing the bond between local communities and the young students and researchers who come from those areas. The glass sector in Italy is a cornerstone of the Made in Italy brand and employs a significant workforce, yet its potential often remains unknown to future designers. Frequently, those who aspire to study or work in the field of glass look abroad. At the same time, there's growing interest from international institutions in collaborating with Venice on education and research related to glass.

Glass has every potential to become a highly attractive field for talent: it's heritage, it's innovation, it's artisan tradition and it's a material with expanding expressive and technical possibilities.

I am committed to ensuring that academia and industry will soon respond concretely to these needs. This requires international policies and strategies to enable such synergistic growth. Yet it's no less important to recognize and reaffirm that the glass sector today offers a broad landscape of opportunities for technicians, artists, artisans, scientists - and, above all, passionate designers. Without these people, it will be impossible to develop new innovations and solutions in the sector.

GTI: How can cullet be transformed from waste into a valuable resource for glass production?

MAB: Glass is a material we have known how to recycle since ancient times. Research into historical Venetian glass production reveals multiple ways in which glass waste was repurposed - even in the manufacture of luxury items. This was possible because the production chains were relatively simple and, most importantly, governed by a limited number of Master glassmakers. That said, there were still complexities, particularly concerning the supply of raw materials, which varied over time depending on trade routes and foreign relations.

Today, we know that glass is infinitely recyclable and chemically inert. However, this very property often leads to an underestimation of its potential to inspire revolutionary supply chains -such as the model developed by rehub, a spin-off of the Iuav University of Venice- and to a diminished appreciation of the importance of continuous incremental innovation. These innovations are vital for improving the efficiency of recovery and recycling processes, especially in the case of flat glass.

On the other hand, the need to conserve energy is a strong incentive for glass cullet recycling: in the melting process, cullet reduces the need for virgin raw materials and lowers the energy required (since it melts at lower temperatures).

Let me briefly emphasize that to initiate new research and development pathways and to engage talent in these efforts, scientific data is essential. Yet equally inspiring are the applications of glass waste in design and art. These applications draw attention to important values and encourage creative thinking, reminding us just how deeply embedded glass is in our culture.

In addition to the now highly efficient hollow glass recycling chain, we are seeing a growing number of enterprises transforming cullet into insulating glass - an innovation that valorizes waste while contributing significantly to the energy efficiency of the construction sector. Furthermore, research is actively exploring ways to integrate cullet into new composites and hybrid materials that can be applied across diverse sectors, from construction to automotive, offering enhanced properties such as improved strength and thermal insulation.

There is no shortage of areas ripe for innovation and the need for it -especially in the recycling field- is clear. This is why widespread education and awareness-raising are essential, particularly given that today's glass supply chains are far more extensive and complex than those I

previously described in reference to historic Venetian glassmaking. True innovation in the recycling of both pre- and post-consumer cullet can only be achieved through a precise and comprehensive understanding of these supply chains.

To innovate in cullet recycling means to connect previously isolated and independent chains. The glass processing and recycling sector -complex and multifaceted- must be approached as an integrated system.

New technologies will play a crucial role in deepening our understanding of production dynamics and in developing digital solutions that will make research and development processes more effective and better aligned with sustainable values, thus allowing us to address and overcome current challenges.

GTI: Prof. Cattaruzza, how do universities make glass-related knowledge applicable to everyday life?

EC: Whether we're speaking Italy or internationally, universities are already contributing significantly to the real-world application of glass knowledge through advanced materials research, the development of new technologies, technology transfer and specialized training. In the technical-scientific field, glass is studied not only as a material for construction or design, but as a multifunctional system with potential applications in electronics, optics, bioengineering and energy.

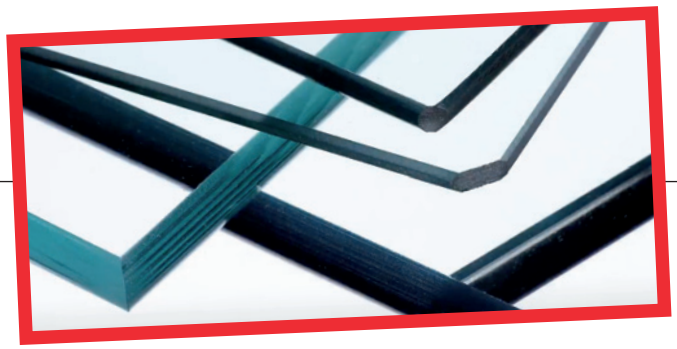
From a materials research perspective, universities analyze the amorphous structure of glass at the atomic level using tools such as Raman spectroscopy, X-ray diffraction and transmission electron microscopy (TEM). Understanding the network-forming dynamics among components like SiO_2, B_2O_3, Na_2O and CaO allows researchers to tailor the physico-chemical properties of glass - such as density, thermal expansion coefficient, corrosion resistance, transparency and ionic conductivity. This is essential for developing innovative glasses for advanced applications.

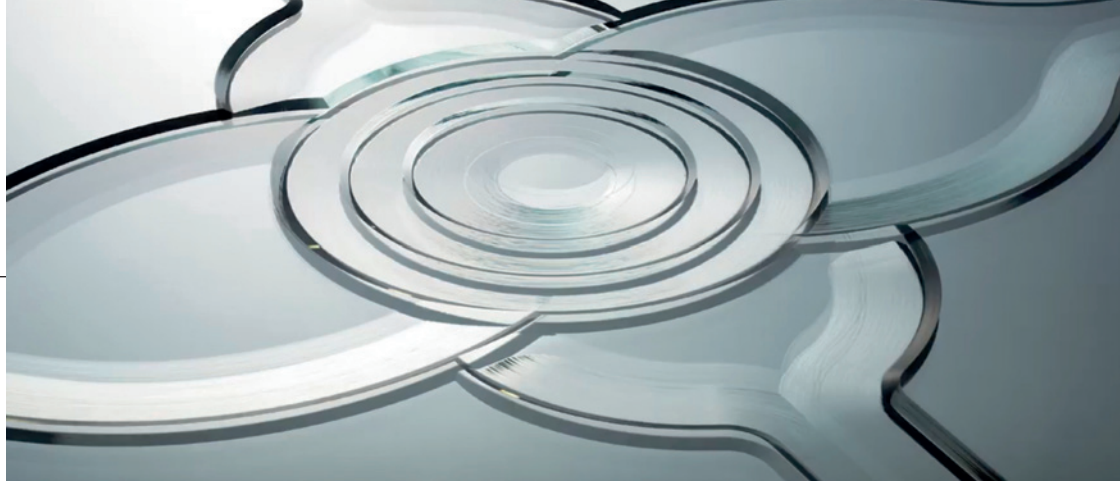
In the electronic and optical fields, many university laboratories are developing photonic glasses and rare-earth-doped optical fibers (e.g., erbium, ytterbium), which are used in telecommunications and medical lasers. Precise control of the melting and cooling processes enables optimization of transmission losses or the amplification of specific wavelengths. Some glasses are also functionalized to become electrochromic (smart glass), suitable for dynamic solar shading in buildings or for use in liquid crystal displays.

Biomedical applications represent another key technical area. Many academic institutions are working on bioactive glasses, such as phospho silicates, capable of interacting with biological tissues. These materials are used in bone regeneration or as bioactive coatings for prosthetics. Italian researchers have contributed to the design of porous bioactive glasses capable of releasing therapeutic ions (Ca^{2+}, Ag^{+}, Cu^{2+}) to promote osseointegration or reduce inflammation.

In the energy sector, university research focuses on photovoltaic glass and high-transparency, low-emissivity cover glasses for solar panels. Techniques such as sol-gel processing, chemical vapour deposition (CVD) and physical vapour deposition (PVD) are being studied to produce coatings ranging from a few nanometers to several microns thick. These coatings may be nanostructured and/or doped with photoluminescent elements (even as atomic-scale clusters) to enhance energy efficiency. Some universities collaborate with companies to develop prototypes of building-integrated photovoltaic (BIPV) glass, which incorporates solar cells directly into the building envelope -such as roofs or façades- thereby replacing or integrating traditional construction materials to discreetly and functionally generate solar energy as part of the architectural design.

Technology transfer typically takes place through university spin-offs and joint projects with industry. Examples include public-private consortia promoted by the Italian Ministry of University and Research (MUR) or the European Commission (Horizon Europe), where university research groups collaborate with companies





to develop industrial products based on academic research. Experimental theses and industrial PhDs also contribute to applied innovation. Finally, technical education offered in degree programmes in materials engineering, industrial chemistry and applied physics equips students with specific skills in glass melting, tempering, forming and surface treatment processes. These skills are directly applicable in manufacturing, especially in the Italian glass sector, which is renowned for its excellence in both the artistic domain (think of Murano) and industrial applications (packaging, construction, automotive).

Personally, I am convinced that university students themselves can play an important role in making glass-related knowledge practical in everyday life by engaging in hands-on and creative projects. During courses and lab sessions, we instructors can offer them opportunities to work on real-world challenges - for example, studying insulating glass for building energy efficiency or developing smart containers for food packaging. These activities help transform theoretical knowledge into practical solutions. Furthermore, by participating in competitions, hackathons, or company internships, students can design new glass objects that combine design with sustainability. Academic research itself is another important channel: experimental theses and group projects can help improve industrial processes, reduce the environmental impact of glass, or explore its applications in fields like medicine and electronics.

Lastly, students can also play an active role in science communication thanks to their ability to convey concepts in more accessible ways to their peers - through videos and digital media platforms.

GTI: Where do you see the main benefits of knowledge transfer from the academy to the glass industry?

EC: The transfer of knowledge from academia to the glass industry is one of the most strategic processes for driving technological innovation, improving production efficiency and enhancing the sector's environmental sustainability. This exchange generates tangible benefits across multiple areas, such as the development of new materials, the improvement of industrial processes, the reduction of environmental impact and increased global economic competitiveness.

One of the primary benefits lies in the development of advanced glass materials—engineered with specific chemical and physical properties for high-performance applications. Universities contribute essential expertise in solid-state physics, materials chemistry and computational modeling, enabling the industry to move beyond standard soda-lime glass production toward the creation of functionalized glasses: anti-reflective, self-cleaning, thermally insulating, UV-shielding, or even conductive. For example, thanks to academic research on nanostructured coatings via sol-gel or sputtering techniques, today we are able to produce low-emissivity (low-E) glass, which significantly reduces thermal loss in buildings.

Another key benefit concerns the optimization of manufacturing processes. Through collaborations with university laboratories, the industry can incorporate advanced thermo-fluid dynamic simulation technologies to improve furnace design, molten glass quality and, once again, energy efficiency. Academic support also facilitates the implementation of real-time monitoring techniques (such as in-line spectroscopy) and automated process control systems, reducing waste and downtime.

On the environmental sustainability front, technology transfer directly supports the advancement of a circular economy. Universities conduct research and experiments on the integration of cullet in melting processes, the use of secondary raw materials and CO_2 emissions reduction - whether by modifying batch compositions or adopting electric furnaces powered by renewable energy sources. These innovations are then scaled up for industrial use, helping companies achieve their sustainability and corporate responsibility goals.

The benefit to product innovation should not be underestimated either: academic research centers can propose novel glass applications, such as sensor-equipped smart building glass, bioactive glass for medical use, or photovoltaic-integrated glass capable of generating energy. This enables the industry to diversify its offerings, enter new markets and strengthen its competitive positioning.

Finally, knowledge transfer plays a crucial role in developing highly specialized professionals. Academic programmes-ranging from undergraduate degrees to master's and industrial PhD courses-supply the industry with up-to-date expertise, essential for tackling the sector's ever evolving challenges.

GTI: How can glass be leveraged to meet current demand in the areas of business, science and art?

EC: Glass is an ancient material that proves to be extraordinarily modern. Today, it emerges as a versatile resource capable of effectively addressing emerging needs across all three of the mentioned domains, thanks to its unique properties -transparency, durability, workability and recyclability- which make it a strategic material, constantly subject to innovation and reinterpretation.

In the business sector, I currently observe that glass plays a central role, primarily in response to two dominant trends: sustainability and the so-called "user experience." In commercial architecture, for instance, low-emissivity, selective, or photovoltaic glazing enables the construction of energy-efficient, sustainable buildings, in line with the environmental standards demanded by investors and regulations. Glass is also employed to enhance aesthetics and the perception of openness and transparency - key elements in the design of retail spaces, offices and hospitality environments. Furthermore, with the growth of the experience economy, glass becomes a vital technological enabler for interactive solutions: smart façades, touch-sensitive walls, transparent displays for digital signage and visual communication.

In the scientific field, as already highlighted, glass is an indispensable ally in laboratories, technology and advanced research. Its chemical stability makes it ideal for laboratory equipment (flasks, test tubes, precision glassware), while its optical transparency is crucial in physics, photonics and materials science. As mentioned, optical glass and doped fibers form the backbone of telecommunications and sensor technologies; in the biomedical field, bio-glasses -bioactive glasses capable of interacting with biological tissues- are used for bone regeneration or as coatings for orthopedic implants. Additionally, in microelectronics and analytical chemistry, glass is utilized in microchips for lab-on-a-chip devices, contributing to the development of miniaturized and portable diagnostic tools.

I firmly believe that art and science are colours of the same rainbow. Glass continues to evolve as a contemporary expressive medium even in the art world, blending artisanal tradition with technological innovation. Today's artistic demands increasingly aim toward sustainability, multisensory experiences and interaction with space and the public. Glass is perfectly suited to these challenges: it refracts light, changes with its environment and can be shaped, engraved, fused and coloured. Artists and designers are leveraging digital technologies (such as laser cutting, 3D printing on glass, or augmented reality) to create hybrid works, often straddling the lines between art, design and installation. In this context, institutions like the Murano Glass Museum or artist residencies in historic glassworks become hubs of experimentation between art and science.

In summary, glass responds to contemporary needs in a multidimensional way: it enables innovation through sustainability and digital transformation, pushes the boundaries of scientific knowledge and opens new visual and material languages. It is a material that, despite its transparency, is far from invisible in the transformation of our world - indeed, it proves to be truly 'antifragile'.

Demand for contemporary interior design has Pilkington MirroView™ thriving

As modern technology continues to evolve it is playing a growing role in shaping interior design trends. Innovations like the interactive Pilkington MirroView™ mirror are becoming more common in public spaces such as hotels, shopping malls and airports - as well as in private homes where smart home solutions begin to be an expanding trend.

A pioneering glazing product from NSG Group, Pilkington **MirroView™** allows for concealment of digital displays and video screens behind a highly-reflective mirror coating. Ideal for any room where there is low ambient light, such as bathrooms, kitchens and living rooms, its concealing effect means that the fact there is a screen can be hidden and softened with the aesthetics of a mirror. Pilkington **MirroView™** 50/50 offers the same qualities as the original product, yet it is designed for use in applications with high ambient light such as retail stores. Its innovative technology changes the way digital displays and video screens are viewed. Pilkington **MirroView™** looks like a normal mirror when the screen is 'off', but when the screen is 'on', the image shows through the mirror for a clear view of the screen beneath. In addition to being suitable for standard mirror applications, both products are compatible with all touch screen technologies including projected capacitive touch - making them ideal for smart mirrors. Thanks to its pyrolytic coating, Pilkington **MirroView™** is a very durable product and can be easily handled, transported and processed - toughening and laminating included. Due to the durability of the pyrolytic coating, it does not degrade over time, which gives the product a virtually unlimited shelf-life. The latest trends in interior design and furnishing focus on minimalism, space and modernity. The latter entails looking for innovative solutions that combine interesting design with practical qualities that improve our quality of life.

HOME THEATRE AND HOME COMMAND CENTRE

Televisions controlled by voice, motion or touch panels are no longer a surprise. The real innovation, however, is hiding a large-size television screen of over 60 inches behind a sheet of glass that turns into a mirror when the equipment is switched off. Thanks to smart mirror solutions, we can hide the


© SPECTRA TV

dark, large and dominant surface of the television in the room - retaining all its functions and at the same time increasing the aesthetic value of the interior. The smooth surface of the mirror optically enlarges and brightens the room. Thanks to Pilkington **MirroView™**, the room gains additional functionality without losing its attractiveness and elegance. Another feature of Pilkington **MirroView™** is that the digital screen hidden beneath its surface can be controlled with touch screen technologies. This opens a wide range of applications in both private and commercial spaces. The digital screen hidden behind the bathroom mirror allows us to access information quickly while drying our hair, brushing our teeth or shaving. In this way, we can read emails, chat with loved ones via instant messaging, check the latest news from the stock market or, while applying our make-up, find inspiration in a tutorial displayed on the mirror. Hidden in the wall home command centre is also practical for use in the kitchen if a touch-screen-controlled digital device is installed behind the glass wall above the kitchen worktop. The result can be a handy, online cookbook that can be accessed quickly and conveniently. Such an interactive wall is a real command and entertainment centre, as we can also use it for online shopping or prepare a meal together with a culinary youtuber. The favourite series displayed on a screen hidden behind the wall will add variety to a boring salad cutting.

VIRTUAL STYLIST

Pilkington glass can have a significant impact on the attractiveness of retail stores and shopping malls. The latest technology has also crept into a store's fitting rooms. For those who do not like the gymnastics of a cramped cubicle or have too little time to change their hairstyle several times, virtual fitting rooms are the ideal solution. Thanks to a digital screen concealed behind the Pilkington **MirroView™** mirror and a camera with 3D sensors, the figure reflected in the mirror is 'fitted' to the clothes available in the virtual store effortlessly and in a very short time. This allows quick purchasing decisions and reduces the time spent on painstakingly selecting styles.

ADVERTISING MEDIA

The field of outdoor advertising and information presentation is increasingly dominated by digital media content, which is communicated via visually appealing displays. Digital advertising and information systems such as electronic posters or information terminals not only make our surroundings more colourful, but also offer information and interaction in real time. Interactive kiosks - modern, mobile touch-screen advertising panels that are used at events, trade fairs, as well as in showrooms, information points, hotel lobbies, etc. - are becoming increasingly popular among commercial customers. It is an interesting proposal for presenting advertising content that attracts with its form and allows the content presented to be changed on the fly. The right glass is a prerequisite for the optimal display and presentation of digital content. Pilkington **MirroView™** is a mirror that is not electrically conductive and can therefore be combined with touch technologies for digital signage. In hotels, museums and exhibitions, in retail stores and shopping malls, but also in home interiors, various installations with mirrors offer extraordinary design possibilities. In today's tech-enabled world, creating decorative, practical, and multi-functional spaces is a must. Pilkington **MirroView™** digital display mirror is designed to transform interiors according to their use.

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NSG GROUP

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Building West Wing, 5-27
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www.nsg.com

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Teknik Elmas
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Bando Kiko
Bottero
CMS
Glaston Group
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Schiavo

LOADING AND TILTING MACHINES
Bando Kiko
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Biesse Group
Bottero
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ECOL
Forel
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GPM Automation
Hegla
IOCCO Group

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ARMOURED AND LAMINATED GLASS CUTTING MACHINES

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Bavelloni
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Hegla
Lisec Group
Schiavo
Turomas

ROUND OR SHAPE CUTTING MACHINES

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Bottero
CMS
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Glaston Group
Hegla
Lisec Group
Schiavo
Turomas

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Bottero
Fenzi
IOCCO Group
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Talamoni
Teknik Elmas
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SAW MACHINES

Schiavo

AUTOMATIC SAWS FOR CUTTING LAMINATED AND BULLET-PROOF GLASS

CMS
Schiavo

BREAKING SYSTEMS

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Bavelloni
Bottero
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IOCCO Group
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Schiavo
Teknik Elmas
Tesir Makine
Turomas

CUTTING MACHINES WITH BREAKING AND EDGE DELETING DEVICES

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GLASS CUTTING FLUIDS

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Schiatti Angelo
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Talamoni
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Turomas

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Bando Kiko
Bavelloni
Biesse Group
Bottero
CMS
Forel
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Lovati
Neptun
Schiavo
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Schraml
SKG - Skill Glass

CROSSBELT ARRISERS

Best Makina

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Bando Kiko
Biesse Group
Bottero
CMS
IOCCO Group
Lovati
Schiavo
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COMPLETE AUTOMOTIVE GLASS EDGING AND BEVELLING LINES

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Bando Kiko
Bavelloni
Biesse Group
Bottero
Glaston Group
IOCCO Group
Schraml
SKG - Skill Glass
Teknik Elmas
Tesir Makine

DOUBLE-EDGE GRINDING MACHINES

B Solution
Bando Kiko
Bavelloni
Biesse Group
Bottero
CMS
IOCCO Group
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Teknik Elmas
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VERTICAL-EDGE GRINDING MACHINES

Adelio Lattuada
B Solution
Bando Kiko
Bavelloni
Bottero
Forel
Glass Company
Glaston Group
Neptun
Schiavo
Schiatti Angelo
SGM - Special Glass Machinery
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Schraml
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Tesir Makine

GRINDING SPINDLES

Schiavo
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Tesir Makine

BEVELLING MACHINES FOR ROUND AND SHAPED GLASS

Adelio Lattuada
Bando Kiko
Bavelloni
Biesse Group
CMS
Lovati
Schiavo
Teknik Elmas
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STRAIGHT-EDGE BEVELLING MACHINES

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Bando Kiko
Bavelloni
Bovone
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Glass Company

Schiavo
Schiatti Angelo
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Tesir Makine

BEVEL POLISHING MACHINES

Adelio Lattuada
Bando Kiko
Bavelloni
Biesse Group
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CMS
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Bavelloni
Biesse Group
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Bavelloni
Biesse Group
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CMS
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Glass Company
Lovati
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BELT GRINDING MACHINES

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Bando Kiko
Bavelloni
Best Makina
Bovone
ECOL
Emar
Forel
Glass Company
Glaston Group
GPM Automation
IOCCO Group
Lisec Group
Neptun
Schiavo
SGM - Special Glass Machinery
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Triulzi

VERTICAL WASHING MACHINES

Adelio Lattuada
Bavelloni
Best Makina
Emar
ECOL
Forel
Glass Company
Glaston Group
GPM Automation
IOCCO Group
Lisec Group
Neptun
Schiavo
SGM - Special Glass Machinery
North Glass Technology
Stefiglass
Tecglass
Teknik Elmas
Tesir Makine
Triulzi

WASHING MACHINES FOR AUTOMOTIVE GLASS

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ECOL
Glaston Group
IOCCO Group
Tecglass
Tesir Makine
Triulzi

WASHING PURIFICATION SYSTEMS

Best Makina
Dieffe Macchine
Emar
Forel
Glass Company
Glaston Group
Immmes
IOCCO Group
Schiavo

LIQUID WASHING CONCENTRATES

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Idrotecnica
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AUTOMATIC SEALING LINES

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Easy Automation
Emar
Forel
Glaston Group
Lisec Group
Marval
Teknik Elmas
Tesir Makine

AUTOMATIC SPACER BENDING MACHINES

Bavelloni
Best Makina
Emar
Fenzi
Forel
Glaston Group
IOCCO Group
Lisec Group
Marval
Schiavo
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Bavelloni
Best Makina
Emar
Fenzi
Forel
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Marval
Neptun
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Triulzi

SPACER CUTTING SAWS

Bavelloni
Best Makina
Emar
Fenzi
Forel
Lisec Group
Marval
Neptun
Schiavo
Tesir Makine
Thermoseal Group

BUTYL EXTRUDERS

Bavelloni
Best Makina
Emar
Forel
Glaston Group
Lisec Group
Marval
Neptun
Schiavo
Thermoseal Group
Triulzi

HOT-MELT EXTRUDERS

Bavelloni
Best Makina
Easy Automation
Emar
Fenzi
Forel
Lisec Group
Marval
Neptun
Schiavo
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Triulzi

POLYURETHANE EXTRUDERS

Bavelloni
Best Makina
Easy Automation
Emar
Fenzi
Forel
Glaston Group
Lisec Group
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Emar
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SILICONE EXTRUDERS

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Fenzi
Forel
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Lisec Group
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Schiavo
Triulzi

POLYSULPHIDE SEALANT EXTRUDERS

Best Makina
Emar
Fenzi
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Glaston Group
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Marval
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OTHER SEALANTS

Fenzi

PANTOGRAPHS

Fratelli Pezza

ACCESSORIES

Deltamax Automazione
Forel
Helios Quartz
Schiavo
Si.Ste Trading
Sparklike
Tesir Makine
Triulzi

Tempering

TEMPERING FURNACES (ARCHITECTURAL GLASS)

Glass Company
Glasstech Inc.
Glaston Group
Hornos Industriales Pujol
Jinglass
Keraglass
Landglass Technology
Lisec Group
Luoyang Fuchong Machinery
Mappi International
Marposs
North Glass Technology
Schiavo
Tecnosens
TK
Tekno Kilns/Pujol
Texpack

TEMPERING FURNACES (AUTOMOTIVE GLASS)

Glass Company
Glasstech Inc.
Glaston Group
Jinglass
Keraglass
Landglass Technology
Luoyang Fuchong Machinery

Mappi International
Marposs
Mazzaroppi Engineering
North Glass Technology
Satinal
Taifin
Tecnosens
Texpack

CHEMICAL TEMPERING EQUIPMENT

Glass Company
R.C.N. Solutions
TK

ROBOT FOR CLEANING SILICA ROLLERS

Eurotech Way

ACCESSORIES

Deltamax Automazione
Fenzi
Glass Company
Glaston Group
Helios Quartz
Hornos Industriales Pujol
Keraglass
Landglass Technology
Mappi International
Mazzaroppi Engineering
R.C.N. Solutions
Satinal
Taifin
Tekno Kilns/Pujol
Torgauer Maschinenbau

Bending

BENDING FURNACES (ARCHITECTURAL GLASS)

Hornos Industriales Pujol
Jinglass
Keraglass
Luoyang Fuchong Machinery
Mappi International
Marposs
Mazzaroppi Engineering
R.C.N. Solutions
Tecnosens
Tekno Kilns/Pujol
TK
Texpack

BENDING FURNACES (AUTOMOTIVE GLASS)

Glass Company
Glasstech Inc.
Glaston Group
Jinglass
Keraglass
Luoyang Fuchong Machinery
Mappi International
Marposs
Mazzaroppi Engineering
R.C.N. Solutions
TK
Taifin
Tecnosens
Texpack

ACCESSORIES

Ayrox
Deltamax Automazione
Glass Company
Glasstech Inc.
Glaston Group
Hornos Industriales Pujol
Keraglass
Mappi International
Satinal
Softeco
Tekno Kilns/Pujol
TK

Laminated glass production

COMPLETE PLANTS

Best Makina
Bovone
Bottero
Forel
Glass Company
Glaston Group
GPM Automation
Hornos Industriales Pujol
IOCCO Group
Italmatic
Lisec Group
Mazzaroppi Engineering
R.C.N. Solutions
Texpack
TK
Triulzi

LAMINATED WINDSCREEN BENDING FURNACES

ECOL
Glass Company
Glasstech Inc.
Glaston Group
Keraglass
Mappi International
Marposs
Taifin
Texpack

AUTOCLAVES

Glass Company
Glaston Group
GPM Automation
Hornos Industriales Pujol
Italmatic
Lisec Group
Triulzi

CLIMATIC CABINS

Forel
Glaston Group
GPM Automation
IOCCO Group
Lisec Group
Triulzi

INFRARED OVENS

ECOL
Forel
Glass Company
Glaston Group
GPM Automation
Hornos Industriales Pujol
IOCCO Group
Lisec Group
TK
Triulzi

MANGLES

GPM Automation

PRESSES/BENDING MACHINES

Forel
IOCCO Group
Lisec Group
Triulzi

RESIN LAMINATING MATERIALS AND EQUIPMENT

IOCCO Group
Satinal
Teknik Elmas
Torgauer Maschinenbau

EVA (ETHYLENE VINYL ACETATE)

Satinal
Si.Ste Trading
Tecnosens

PVB

Everlam
Kuraray - Trosifol
Marposs
Si.Ste Trading
Tecnosens

PVB - SHAPING AND CUTTING EQUIPMENT

Ayrox
ECOL
Forel
Glaston Group
GPM Automation
IOCCO Group
Lisec Group
Softeco

PVB - WIRING TECHNOLOGY FOR HEATABLE LAMINATES

Ayrox
Easy Automation
ECOL
Softeco

ACCESSORIES

Ayrox
Bottero
Deltamax Automazione
Eurotech Way
Glaston Group
Helios Quartz
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Satinal
Si.Ste Trading
Softeco
Taifin
Triulzi

Drilling

AUTOMATIC DRILLING LINES

B Solution
Bando Kiko
Bavelloni
Biesse Group
Glaston Group
IOCCO Group
Neptun
Schiatti Angelo
Schraml
SKG - Skill Glass
Teknik Elmas
Tesir Makine
Vismara

MULTI-SPINDLE DRILLING MACHINES

B Solution
Bando Kiko
Bavelloni
Biesse Group
CMS
Glass Company
Glaston Group
IOCCO Group
Neptun
Schiavo
Schiatti Angelo
Schraml
SKG - Skill Glass
Teknik Elmas
Tesir Makine
Vismara

DRILLING MACHINES WITH OPPOSITE DRILLING HEADS

B Solution
Bando Kiko
Bavelloni
Bottero
CMS
Fenzi
Glaston Group
IOCCO Group
Lovati
Neptun

Schiavo
Schiatti Angelo
Schraml
SKG - Skill Glass
Teknik Elmas
Tesir Makine
Vismara

COLUMN DRILLING MACHINES

B Solution
Bottero
Fenzi
Neptun
Schiavo
Tesir Makine
Vismara

PORTABLE DRILLING MACHINES

CMS
Fenzi
Schiavo
Si.Ste Trading
Teknik Elmas
Tesir Makine

DRILLING AND MILLING MACHINES

Bavelloni
Bottero
Biesse Group
CMS
IOCCO Group
Lovati
Neptun
Schiavo
Teknik Elmas
Tesir Makine
Vismara

DIAMOND DRILLS

ADI - Surface Group
Bovone
Diamut - Biesse
Fenzi
Glaston Group
Mole Moreschi
Neptun
Schiavo
Si.Ste Trading
Teknik Elmas
Tesir Makine
Vetrolux

ACCESSORIES

CMS
Fenzi
Neptun
Schiavo
Si.Ste Trading
Teknik Elmas

Other equipment and plants

TURNKEY PLANTS / ENGINEERING - FOR BUILDING GLASS

Bando Kiko
Biesse Group
Bottero
Cugher Glass
Glaston Group
Horn
IOCCO Group
Keraglass
Lisec Group
Marposs
Torgauer Maschinenbau

TURNKEY PLANTS / ENGINEERING - FOR AUTOMOTIVE GLASS

Bando Kiko
Biesse Group
Bottero
Cugher Glass
Easy Automation
Horn
Glaston Group
IOCCO Group
Marposs

KEY PLANTS / ENGINEERING - FOR DISPLAY GLASS

Bando Kiko
Cugher Glass
Marposs
Torgauer Maschinenbau

EDGES ROLLER COATING MACHINE

Eurotech Way

WORK CENTRES - CNC CONTROLLED

Bando Kiko
Bavelloni
Biesse Group
Bottero
Glass Company
Glasstech Inc.
Glaston Group
Hegla
Neptun
Schraml
SKG - Skill Glass

FLOAT PLANTS/ LINES (EQUIPMENT & ACCESSORIES)

Bovone
Horn
IOCCO Group

CULLET HANDLING SYSTEMS

ECOL

COMPLETE BATCH PLANTS

Zippe

VACUUM COATING EQUIPMENT AND PLANTS

Giardina Group Glass Division
Glass Company
North Glass Technology

ENAMELLING EQUIPMENT AND PLANTS

Giardina Group Glass Division
Glass Company
Rollmac division of GeMaTa

DRYERS AND ENAMELING FURNACES

Giardina Group Glass Division
Tecglass

SPRAYING TECHNOLOGY

Giardina Group Glass Division

HOT- AND COLD-END COATING SYSTEMS AND MATERIALS (CVD, ROLLERS, CURTAIN COATERS)

Giardina Group Glass Division

SANDBLASTING SYSTEMS, EQUIPMENT AND PLANTS - OPTIMIZERS

Fenzi
Fratelli Pezza
Glass Company
Schiavo
Schraml
SKG - Skill Glass

DIGITAL INKJET PRINTERS

Glass Company
System Ceramics
Tecglass
TecnoFerrari

SCREEN PRINTING EQUIPMENT AND PLANTS

Ayrox
COMSS
Cugher Glass
Deltamax Automazione
ECOL
Eurotech Way
Glass Company
Keraglass
North Glass Technology
Rollmac division of GeMaTa
Softeco
Studio 1 Automazioni
TecnoFerrari

SCREEN PRINTING FRAMES

COMSS

SCREEN PRINTING DRYING SYSTEMS

COMSS
Cugher Glass
Glass Company
Rollmac division of GeMaTa
Studio 1 Automazioni

EDGES ROLLER COATING MACHINE

Giardina Group Glass Division

ACIDING GLASS EQUIPMENT AND PLANTS

Lisec Group
Rollmac division of GeMaTa

LASER DECORATING MACHINES

Glass Company

Artistic glass production

CERMAMIC INKS

Glass Company
Tecglass

CHAMBER ELECTRIC KILNS

Glass Company
Keraglass
Tekno Kilns/Pujol

ACCESSORIES

Deltamax Automazione
Helios Quartz
TK

Miscellaneous

ADHESIVES FOR GLASS BONDING

Si.Ste Trading

AUTOMATION

Easy Automation
Horn
IOCCO Group
Marposs
Studio 1 Automazioni
Tecnosens
Torgauer Maschinenbau
Zippe

AUTOMOTIVE GLASS APPROVAL SERVICES

Ayrox

Marposs
Softeco
Tecnosens
Teknik Elmas

AUTOMOTIVE GLASS QUALITY CONTROL

Ayrox
Bando Kiko
Cugher Glass
Deltamax Automazione
Glaston Group
IOCCO Group
Marposs
Softeco
Tecnosens

CE MARKING - QUALITY CONTROL EQUIPMENT FOR GLASS IN BUILDING

Ayrox
Softeco

COLOURS & ENAMELS - OTHER APPLICATIONS

Ayrox

CUTTERS

Si.Ste Trading

CUTTERS WHEELS

Si.Ste Trading

DEIONIZING AND WATER SOFTENING EQUIPMENT

Fenzi
Forel
Glass Company
Idrotecnica
Lisec Group
Triulzi

DEIONIZING AND WATER SOFTENING EQUIPMENT

Immmes

DIAMOND ROUTER EQUIPMET - PORTABLE

Teknik Elmas
Tesir Makine

DISTRIBUTORS

Si.Ste Trading

FLAT GLASS QUALITY CONTROL DEVICES

Ayrox
Deltamax Automazione
Forel
IOCCO Group
Marposs
Softeco
Tecnosens

FURNACES

Glass Company
Horn
Texpack

FURNACES / HYDROGEN GENERATORS (WATER ELECTROLYSERS)

Nel Hydrogen

GLASS COATING AND TINTING

Glass Company
Rollmac division of GeMaTa

GLASS TREATMENT FILMS

Glass Company

HEATING EQUIPMENT - STANDARD (GAS FIRING, BURNERS, AIR GAS MIXERS, SAFETY DEVICES, ELECTRICAL RESISTORS)

Horn
Keraglass
Texpack

INSPECTION INSTRUMENTS & INTENSIMETERS

Marposs
Tecnosens

INFRARED TUBES

Helios Quartz
Deltamax Automazione

KILNS

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Keraglass
Lisec Group
Tekno Kilns/Pujol
TK
Fenzi

METAL ACCESSORIES

Si.Ste Trading
Teknik Elmas
Tesir Makine

METALLIC SECTIONS

Fenzi
Tesir Makine

NUMERICAL CONTROL SYSTEM (CNC) FOR ALL GLASS PROCESSING MACHINES

Glass Company
IOCCO Group
Prodim

OPTICAL DISTORTION ANALYSERS FOR AUTOMOTIVE GLASS

IOCCO Group
Keraglass
Tecnosens

OPTICAL INFRARED THERMOMETERS

Optris GMBH

POWDER OR LIQUID APPLICATION SYSTEMS FOR PROTECTING FLOAT GLASS

Cugher Glass
Glass Company

PUMPING AND APPLICATION SYSTEMS (AUTOMOTIVE GLASS)

IOCCO Group

PURIFIERS FOR REFLUENT WATER

Dieffe Macchine
Immmes

PUTTIES AND SEALANTS

Fenzi

QUARTZ EQUIPMENT

Helios Quartz

SHAPE CHECKING DEVICES

Easy Automation
IOCCO Group

SHOWER ENCLOSURES

Si.Ste Trading
Vismara

SIC HEATERS

Helios Quartz

SOFTWARE SYSTEMS FOR PRODUCTION CONTROL

A+W Software
CMS
Cugher Glass
Deltamax Automazione
Edgetech Europe
Forel
Lisec Group
Optima
Prodim

SOLDERING EQUIPMENT FOR ELECTRICAL CONNECTORS FOR WINDSCREENS AND BACKLITES

Ayrox
Easy Automation
Softeco

SORTING SYSTEMS

Glaston Group
GPM Automation
Lisec Group
Studio 1 Automazioni

SURFACE STRESS MEASUREMENT INSTRUMENT

Ayrox
Glass Company
Tecnosens

WINDSCREEN STRESS MEASUREMENT INSTRUMENT

Tecnosens

WINDSCREEN AND BACKLITES

Marposs
Tecnosens

TESTING FOR SOLDERINGS

Ayrox
Easy Automation
Softeco

TESTING DEVICES OF BACKLITES ELECTRICAL HEATING

Ayrox
Easy Automation
Softeco

THERMAL IMAGING SYSTEMS

Glass Company
Easy Automation
Optris GMBH

TIN FLOAT BATH FURNACES

Horn
IOCCO Group

TIN FLOAT BATH SIDE DETECTION DEVICES

Tecnosens

UV ADHESIVES

Si.Ste Trading

UV LAMPS

Helios Quartz

UV PORTABLE MACHINES

Helios Quartz

WATER REPELLENT SPRAY COATING MACHINES

Best Makina

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1989

Glass-Technology International

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Annual Guides

1990

Glass Industry Directory 2024

The **GLASS INDUSTRY DIRECTORY** is a unique international annual guide which gives a complete overview of international glassworks and suppliers involved in hollowware and special glass manufacturing. About 300 pages of complete company profiles: addresses, management, sister companies, plants, number of employees, turnover, banks, year of company foundation, capital, trademarks, areas of activity, innovations, product-by-product and country-by-country breakdowns. The **GLASS INDUSTRY DIRECTORY** is the annual reference point for the international glass manufacturing industry comprising bottles and containers, domestic glassware, tubing, vials and ampoules, lighting glassware, technical and industrial glassware, scientific, laboratory and medical glassware and much more.

2013

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