

Glass-Technology International

THE LEADING MAGAZINE FOR THE INTERNATIONAL FLAT GLASS INDUSTRY

September/October • Year 33 • No. 5/2022

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CLEAN WATER

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LISEC'S AUTOMATED SOLUTIONS LAUDED BY **FELBERMAYER FENSTER UND TÜREN**

CUGHER: REDEFINING 'SPECIALIZED CONSULTATION' FOR TODAY'S GLASS INDUSTRY

BOVONE SET TO SHOWCASE ITS ROBOTIC SYSTEM AT GLASSBUILD AMERICA

ŞİŞECAM PRESENTS ITS DAZZLING NEW PRODUCT RANGE AT GLASSTEC

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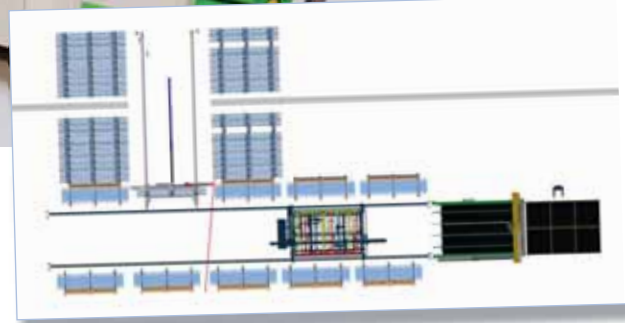


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FORVET: still innovating with drilling, milling and countersinking solutions

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FILTRAGLASS and DAKS-96: a win-win partnership

A recent system installation of DAKS-96 by FILTRAGLASS continues to build the latter company's 15-year experience in manufacturing water filtration systems for a vast array of sector types, from automotive to the space industry - including the transformation of fuel filters in general.



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INSULATING GLASS

LISEC's automated solutions lauded by FELBERMAYER FENSTER UND TÜREN

Thanks to the competence and expert technical support of LISEC, a recent project by FELBERMAYER FENSTER UND TÜREN has seen the extensive production of insulating glass in-house - fulfilled as always to the precise tradition of combining window and door construction with innovative technology.



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VISUAL INTELLIGENCE

ISRA SURFACE VISION shows its colours at Glasstec

In line with the current strategy to drive transformation through visual intelligence, ISRA SURFACE VISION recently exhibited its latest innovations at this world-leading event for the glass industry - showing how the company's highly-advanced inspection system can support glass processing digitalisation today.



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INTEGRATION

BOVONE set to showcase its robotic system at GlassBuild America

By GlassBuild America 2022 prepares to enter the industry in Las Vegas this October, BOVONE is already well-prepared to offer its single-point-to-go photo protection which the company proposes to share the benefits of its cutting-edge robotic system.



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INNOVATION

ŞIŞECAM presents its dazzling new product range at Glasstec

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SERVICE EXCELLENCE

SWISSPACER invests in finetuning its service offering

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ALLIED MARKET RESEARCH unpacks the rise of smart glass. The report highlights the growing demand for smart glass in various applications, from residential to commercial buildings.

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SMART GLASS

Five common misconceptions about SMART GLASS

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issue	exhibition/conference	date	venue	deadlines
2023				Editorial files: 30-01-2023 Deadline Adv files: 10-02-2023
2023	1	CHINA GLASS	Date to be announced SHANGHAI China	
		BAU	17-22 April MÜNCHEN Germany	Editorial files: 03-03-2023
		GLASSPRINT	25-26 April DÜSSELDORF Germany	Deadline Adv files: 13-03-2023
2023	2	GLASS TEXPO	11-12 May SAN ANTONIO (TX) USA	
		FIT SHOW	23-25 May BIRMINGHAM UK	Editorial files: 03-04-2023
		CONSTRUMAT	23-25 May BARCELONA Spain	Deadline Adv files: 11-04-2023
2023	3	GPD - GLASS PERFORMANCE	14-16 June TAMPERE Finland	Editorial files: 12-05-2023
		GLASSTECH MEXICO	19-21 July MEXICO CITY Mexico	Deadline Adv files: 19-05-2023
2023	4	VITRUM	5-8 September MILANO Italy	
		ALL VITRUM EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE GLASSTEC PREVIEW 		Editorial files: 14-07-2023
		GLASSPRO INDIA	14-16 September MUMBAI India	Deadline Adv files: 24-07-2023
2023	5	GLASSTECH ASIA	Date to be announced South East Asia	
		GLASSBUILD AMERICA	31 October 2 November ATLANTA (GA) USA	Editorial files: 15-09-2023
		REFRIGERA GLASS	7-9 November BOLOGNA Italy	Deadline Adv files: 22-09-2023
2023	6	EURASIA GLASS	Date to be announced ISTANBUL Turkey	
		GULF GLASS	4-7 December DUBAI UAE	Editorial files: 13-10-2023
		ZAK GLASS TECHNOLOGY	Date to be announced MUMBAI India	Deadline Adv files: 20-10-2023

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GUARDIAN GLASS

Operations in Russia sold

With a view to keeping readers apprised of the latest business updates regarding the two **GUARDIAN GLASS** plants in Russia and their approximately 600 employees we can now report that the company had been working with its local management team to find an exit strategy that maintained its commitment to employee safety without resulting in the Russian government taking over its plants and benefiting from them financially.

As of recently, Guardian has accomplished this responsibly and safely, having sold its business in Russia to Vladimir Alexandrovich Voronin, President of FSK Group, a private enterprise in the construction industry - an outcome both facilitated and supported by plant employees that complies with all applicable sanctions, laws and regulations.

WWW.GUARDIANGLASS.COM



NSG GROUP

New solar glass production line in Malaysia

To support the growing solar market, **NSG GROUP** recently announced its plan to invest in the additional production capacity of TCO (transparent conductive oxide) coated glass in Malaysia.

In the plan, a float line at the Johor Bahru factory of Malaysian Sheet Glass SDN BHD, a member of NSG Group, will install online coating capacity in the near future and will start shipping TCO glass for solar panel manufacture after the facility is in operation. It is anticipated that the supply from the converted line will commence during the fourth quarter of the fiscal year ending March 2024.

The investment is to support the expansion strategy of First Solar, Inc., a leading global manufacturer of thin-film solar panels that has a long-standing partnership with NSG Group. In addition to its existing facilities in Vietnam and Malaysia, First Solar is constructing a new manufacturing plant in India, which is expected to be commissioned in the second half of 2023.

In order to meet the growing global demand for solar pan-

els, especially those manufactured by strategic partner First Solar, NSG Group started operation of the second dedicated float line for solar glass in Vietnam in January 2020, and a new plant in Luckey, Ohio, USA has been operating since November 2020. The glass produced in these plants is exclusively supplied to First Solar.

NSG Group is promoting “Expansion of Value-added Business” as one of the measures listed in the medium-term management plan “Revival Plan 24 (RP24)”. The announcement to expand solar glass based on NSG Group proprietary online coating technology is part of this strategy.

The Group will continue its efforts to realize its Medium-Term Vision to be “A global glass supplier contributing to the world with high value-added glass products and services”.

WWW.NSG.COM



GRENZEBACH & SORG

From hot to cold: all from a single source

GSE is to support the activities of their partners **GRENZEBACH** and **SORG** as leading suppliers in the glass industry - particularly in the development of overall projects with complementary services for works planning, architectural and construction planning, planning of the complete media and power supply, as well as services for project management, construction supervision - commissioning up to technical assistance and production support. In doing so, they will ensure that customers have full access to the latest technological developments for sustainable and state-of-the-art glass production.



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MORLEY GLASS

New integral blind system for healthcare buildings

The UK's leading integral blind manufacturer **MORLEY GLASS** has launched a new system specifically-designed for hospitals, medical schools and other health and social care facilities.

ScreenView® balances the need for patient privacy and observation - allowing for easy switching between the two at different times of the day. Unlike any of the Venetian or pleated blinds available in the current Uni-Blinds range, ScreenView® has two layers of wide slats arranged in a ladder style, which move up and down to provide an open view for observation or complete closure.

The blind is perfect for door vision panels and other windows that separate a healthcare facility's communal or public areas from private spaces such as treatment facilities, consultation rooms, operating theatres and patient rooms. Unlike vision panel flaps and externally mounted blinds, ScreenView® blind requires no cleaning or maintenance, other than routine cleaning of the control device, and it is protected from the daily knocks and accidents that can easily damage blinds in busy public environments. Being permanently sealed within the glass unit, the ScreenView® blind is never exposed to dirt or germs, so it stays pristine over its lifespan. And, as an additional safeguard, the blind's control mechanism is protected with a Sanitized® antimicrobial coating to help with infection control.



Safety is optimized further when ScreenView® is coupled with certified fire rated glass in insulated glass units. One of the benefits of specifying integral blinds from Morley Glass is having the flexibility to choose from different types of glass to meet different performance goals, and that includes enhanced fire resistance through the company's partnership with Pyroguard.

This means ScreenView® blinds can be specified to provide passive fire protection, with assured performance of 30, 60 or 120 minutes, depending on the building requirements. It all adds up to a privacy and shading system that is hygienic, practical and fully compatible with designs in line with Approved Document B in England & Wales, as well as the equivalent regulations in Scotland and Northern Ireland.

Ian Short, Managing Director of Morley Glass, said, "ScreenView® gives specifiers and facilities managers a new option for controlling privacy and shading in healthcare environments that allows other important design objectives such as fire safety, hygiene, infection control and aesthetics to be met. We can provide specialist specification and design guidance to help achieve the right solution using ScreenView®, as well as the other integral blind solutions in our Uni-Blinds® portfolio."

As with every product in the Uni-Blinds range, ScreenView® is manufactured by Morley Glass in Leeds, UK, using the world-renowned ScreenLine® integral blind systems from Italian pioneer Pellini S.p.A.

WWW.MORLEYGLASS.CO.UK

VITRO

Investment potentially totalling USD 400M in Egypt

According to Egyptian authorities, Mexican glass manufacturer **VITRO** plans to expand to Egypt and invest USD 400M to build two factories, tipped to produce flat glass and glass containers and expected to export the majority of their output abroad. The factories could create as many as 1,500 jobs.

Prime Minister Mustafa Madbouli met with Advisor Muhammad Abdul Wahab, Executive Chairman of the General Authority for Investment and Free Zones to follow up on a number of projects currently under implementation. These include Vitro's proposal, under the free zone system, to build a 350 thousand-metre glass factory as well as another to manufacture containers over an area of 150 thousand metres.

WWW.VITRO.COM





PROMAT UK

Trio of new fire-rated door sets launched



Passive fire protection systems specialist **PROMAT UK** has developed two new steel-framed glazed door systems and a timber door set to provide specifiers with assured fire safety solutions in domestic, public and commercial buildings.

The new steel frame doors, Pyrosec Door and Pyrosec Slimlite, allow fire doors to be integrated into fire resistance screens and partitions with ease – maximizing light transmission and vision without compromising safety. Both are designed to integrate with the Promat Systemglas Ferro fire resistant glazing system, which provides architects and specifiers with a complete glazing solution backed by third party test evidence and Promat's 360-degree 'Wheel of Assurance'.

The Pyrosec Door provides strong aesthetic appeal with large vision panels. It is available in a single or double leaf configuration, with minimal stainless steel frame members and compatibility with a full complement of over panels and side screens that allow for clear butt joint glazing. For those applications where a slimmer frame is sought, Pyrosec Slimlite will meet the specifications. The glass area is maximized thanks to a super-slim 20 mm frame section, 25 mm stiles and 90 mm rails, making it one of the most slimline fire-rated doors available in the UK.

Promat timber fire doors are tested as a complete assembly to provide assured protection in the event of a fire.

The third new fire door from Promat, a timber door set, offers the same fire resistance as the two Pyrosec options for applications where a traditional timber solution is required. It integrates seamlessly with the Promat Systemglas Ligna glazing system, which is widely-used in all kinds of traditional and contemporary interiors.

The new fire rated door sets, along with the complete Systemglas range, can be fitted by Promat approved installers, which ensures the company can provide clients with complete traceability of the installed product. Key to the 'golden thread' approach being adopted by the construction industry more broadly, this means Promat can provide a post-installation certificate of conformity because it is in control of the whole supply process - from raw material sourcing, design and manufacture to installation.

Cath McLean, Segment Manager - Glass at Promat UK, said, "As the annual Fire Door Safety Week once again shines a light on why we can never become complacent about fire safety in new build and refurbishment projects, we are delighted to be able to be launching these three new door sets at this time.

"With no margin for error when it comes to the design and installation of passive fire protection products, it is important that specifiers and installers have access to the systems they can depend on. That's why we invest in creating fully tested complete systems which ensure risk is minimized at all points in the supply chain - ultimately providing peace of mind for clients and the end-users of buildings."

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PILKINGTON

Launch of durable, anti-corrosive glass

PILKINGTON UK recently launched Pilkington OptiShower™, a range of anticorrosive and durable glass by the NSG Group, to support designers specifying glass for use in high-moisture environments.

Pilkington OptiShower™ is a durable, clear glass, specifically designed to prevent surface corrosion when exposed to water, moisture and humid environments. The highly-transparent glass is easier to keep clean due to its special pyrolytic anti-corrosion coating, which acts as a barrier on the surface of the glass.

The glass has a wide range of residential and commercial applications, such as shower cubicles or back plates against cooking surfaces in kitchens.

Pilkington OptiShower™'s anti-corrosion properties also make it suitable for marine applications, such as aquariums, where it provides transparency while resisting the 'cloudiness' that can start to show over time when a glass surface begins to deteriorate in harsh, moist or humid conditions.

It's also practical for maritime vessels, to help them weather harsh environments and salt-water sprays. This includes parapets and external windows in yachts and cruise ships to reduce cleaning requirements whilst providing uninterrupted views for passengers.

The range has been extensively laboratory-tested at high temperatures and levels of humidity, where it demonstrated that it resists corrosion far better than untreated glass. It meets stringent EN 1096-2 standards, which certifies the products as able to withstand challenging outdoor weather conditions and abrasion.

The range is coated 'on-line', meaning the anti-corrosive coating is applied while the glass is still hot, rather than as a post-manufacture spray like many other products on the market with similar properties. This makes the product easier to process, as well as harder and more robust when in use.

Kirk Green, Regional Sales Manager at Pilkington United Kingdom Limited, part of the NSG Group, said, "Pilkington OptiShower™ has become a go-to glass for designers specifying in high-moisture areas where the glass needs to maintain its transparency, from ship-builders to shower cabinet makers.

"We're excited to launch this product in the UK to help new customers identify applications where the glass can deliver long-term durability - no matter the conditions."

WWW.PILKINGTON.COM

GLASTON

EUR 31M deal for multiple insulating glass lines'

In a recent development, **GLASTON** received a strategically significant order from a glass processor in Europe, valued at approximately EUR 31M, which will be booked in Glaston's received orders for Q3/2022.

This important deal includes multiple insulating glass lines in addition to multi arrissers and spacer frame production machines. The lines will be manufactured in Germany from 2023 to 2025.

"We're truly honoured to be a part of our customer's success story. For Glaston, this collaboration is an important strategic milestone, as it further strengthens the market's trust in our broader product offering," said the corporation's CEO Anders Dahlblom.

WWW.GLASTON.NET



MARYLAND GLASS & MIRROR

DFI coating standard on shower enclosures

MARYLAND GLASS & MIRROR, a Maryland-based glass fabricator, announced they will be offering DFI's Diamon-Fusion® protective coating as a standard feature on all their shower enclosures via the FuseCube™ Express glass coating machine. This new offering includes having Diamon-Fusion® consistently applied to both sides of their shower doors to differentiate themselves and develop a greater market share. Transparent and ultra-thin, Diamon-Fusion® chemically bonds to the glass filling in the microscopic peaks and valleys of the surface. The result is an invisible barrier that reduces cleaning times, prevents stains, and keeps the glass looking cleaner for longer. The Diamon-Fusion® coating is also UV-resistant (it won't break down in sunlight) and comes with a



lifetime warranty on residential surfaces and a 15-year warranty on commercial surfaces.

Matt Dalbke, Vice President at Maryland Glass & Mirror, said, "Maryland Glass will be applying Diamon-Fusion® protective coating to all the showers we produce. We strive to offer the highest quality shower doors and feel that incorporating Diamon-Fusion® to our complete line of shower doors is key to doing so."

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HEGLA

New management structure

Peter Heyer will be leaving the company on August 31, 2022 after 36 years at **HEGLA**, including 30 as head of after-sales services at the company's Maintenance and Service branch.

"After my long career as head and authorized signatory of HEGLA Maintenance and Service, I would like to say goodbye as I enter retirement and pass the baton on to my successor," said Peter Heyer. "Thank you to my team and HEGLA for their trust and active support. The support we received meant that we were able to develop such a strong Service division. I wish my successor Thomas Schwabe happiness and success in the position."

Thomas Schwabe: new Maintenance and Service branch head

The 42-year-old engineering graduate brings many years of experience in the fields of technology, marketing & sales and after-sales services with him, and was most recently head of After-Sales & Services in a mechanical engineering company.

"Together with his team, Peter Heyer has achieved great things and played a decisive role in shaping the successful direction of HEGLA Maintenance and Service," said Thomas Schwabe. "I am delighted to take over this highly appreciated area of HEGLA and support our customers with the performance and quality they are accustomed to."

"There is no question that Peter Heyer's well-deserved retirement leaves a big gap both on the business and personal levels," said HEGLA Group Managing Director Bernhard Hötger. "We would like to formally thank him for his energetic and long-standing commitment, and wish him all the best. At the same time, we are looking forward to working with our new colleague Thomas Schwabe, whose experience will help us continue to achieve our corporate and service goals."

New Spare Parts Management & Maintenance and Service management positions

In May of this year, HEGLA Maintenance and Service and Spare Parts Management changed their location. Since then, they have been based in Beverungen's neighbouring town of Lauenförde. The new location provides both teams with new offices and additional space designed to create expanded room for continued success and growth.

In addition to new Branch Head Thomas Schwabe, the recent deputy head of HEGLA Maintenance and Service Christoph Benkel has been appointed division manager of Maintenance and Service. The 56-year-old has worked in various areas of HEGLA and HEGLA Maintenance and Service for 22 years and will be responsible for the operational business in future.

The connected Spare Parts Management division at HEGLA GmbH & Co. KG also has a new head after 39-year-old industrial manager Christian Potthast took over the division on 1 January 2022. He has since managed the team of eight responsible for the worldwide distribution and shipping of HEGLA spare parts. In order to meet the constantly growing demand for spare parts, the team is currently focused on the further optimisation and digitalisation of procedures and processes.

WWW.HEGLA.COM





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AU1B50

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- The traditional wall becomes simplified and refined.





SAINT-GOBAIN

Divestment of glass processing facilities in France

SAINTE-GOBAIN recently announced the closing of the sale of its Glassolutions Grand Ouest glass processing business to a group of private investors, led by former Saint-Gobain managers. This business, which operates in glass processing in the North-West region of France and glass installation in France, generated sales of around EUR 60M in 2021 and employs 420 people.

The operation is part of Saint-Gobain's continued business profile optimization strategy, consistent with the 'Grow & Impact' plan objectives. It enables Saint-Gobain in France to focus its investments on innovative solutions for sustainable construction with, for instance, the recent commercial launch of low carbon glass offer or the recycling of glass in a closed loop system.

WWW.SAINT-GOBAIN.COM

TVITEC

Largest tempered glass furnace for paddle tennis courts

It is estimated that this October Sistemas Sitec, in collaboration with its Satecris technical service, will put into operation at TVITEC the largest tempering furnace in the world, dedicated exclusively to glass tempering for the construction of paddle tennis courts.

This is to be a new **NorthGlass** tempering furnace for 13.000 x 3.300 mm glass sheets. With this furnace, TVITEC will have a production capacity of between 18 and 25 pieces of glass per hour.

The furnace, developed with the latest NorthGlass technology, meets the demands of planimetry, safety, precision, resistance and quality required by the most demanding paddle tennis courts installers. The tempering chamber is 13 metres long.

Fully-automated line

Its most outstanding achievement is that it's a completely automated line. From the cutting area, the processes of edging, drilling of the pieces and finally the tempering of the glass are integrated robotically. In addition, another factor that makes this installation unique is the speed of manufacturing. Not only will TVITEC's production capacity be multiplied but this way it can offer its products to more customers and fulfill orders within

much faster terms.

"There is nothing like it in Spain or in the whole world. Neither on a scale of speed, nor of precision, nor of automation of processes," underlined the director of Communication at TVITEC, Roberto Arias.

"The perspective for 2022 is to grow to the same extent as the last two years. Qualitatively, it is important to highlight how the firms specializing in paddle tennis, associated with major sports brands such as Adidas or Nike, are already betting on TVITEC quality and service", continues Daniel García Dos Santos, one of those responsible for coordinating the sale of track packs. Juan Lebrón, world number 1 in the WPT ranking, recently stated that "anyone who can't see the potential of paddle tennis must be blindfolded". TVITEC makes this great investment in the sector because it fully shares that impression," remarked Arias.

WWW.TVITECGLASS.COM





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AS UNIQUE AS OUR SOLUTIONS**

Customisation is the guiding element of every project: it lives in symbiosis with the values in which we have always believed, enhancing them. All of Lattuada solutions for glass and stone fit in perfectly into business realities, improving performance and increasing productivity.



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AYROX

Acquisition of Sharples Stress Engineers

One of the most respected operators in the optical stress measurement industry, **Sharples Stress Engineers**, will cease to exist as it's currently configured following the retirement of Ed Sharples, its owner.

The legacy and services of Sharples will be continued by **AYROX Srl** with the additional value of ISO 17025 accredited calibration and testing services for polarimeters.

Sharples has served clients from all over the world in the field of glass and plastics optical stress measurement, polarimeters, calibration standards manufacturing and calibration services for more than 60 years.

Ayrox is a well known player in the field of glass quality control. "We have been collaborating for a long time with Sharples, so it was a natural step for us to acquire the future of Sharples and to make it stronger with our ISO 17025 accredited calibration services," said Ayrox Chief Technology Officer Mikko Suomi. "The transition will be seamless for the existing and new clients," he added.

Hosted by the full company team during Glasstec 2022 in Dusseldorf, in Hall12, Stand C35, visitors were able to experience existing products as well as some of the new developments from Ayrox, such as the AEM-01 Automatic Edge Stress measurement instrument.

WWW.AYROX.COM

AGC GROUP

Wideye® to display LiDAR sensor mounted in B-pillar

As the automotive market relentlessly evolves towards autonomous vehicles, more and more sensors will be installed in vehicles. Integration is critically important: the sensors must be able to perform efficiently at all times, the system must be reliable and the overall look must be aesthetically pleasing – a triple challenge which Wideye, part of the **AGC GROUP**, and Sony Depthensing Solutions (SDS) jointly addressed by integrating a Time-of-Flight (ToF) camera, which is a type of scannerless LiDAR, in the B-pillar.

Wideye and SDS ultimately developed a prototype that combines SDS' sensor with Wideye glass. SDS contributed a ToF camera with specifications ideal for this location - delivering high resolution, a wide field of view and a short detection range. Wideye provided glass that was perfectly-optimized for the ToF camera. The glass is transparent to infrared rays and can be assembled aesthetically into the B-pillar, thanks to its glossy, black appearance.

One of the major benefits of Wideye glass over plastic solutions and other glass products on the market is its unique combination of excellent optical transmission and performance, robustness and reliability - all of which are necessary for this kind of exterior application.

The prototype will be on display at the AutoSens show, where the complete "Use Case" document describing this collaboration will be revealed. The document will be available as of September 17 from the newsroom link on the Wideye Vision website.

Through its collaboration with SDS, Wideye aims to leverage its automotive glass expertise and supply the industry with end-to-end integrated and validated solutions.

"Wideye's strategy is to develop expertise and competence through collaborative partnerships with key partners in order to deliver best-in-class solutions while sharing development capabilities and resources," said Wideye CEO Quentin Fraselle. "Our key goals are to develop integrated glass/sensor solutions, deliver optimum performance, reduce development time and lower costs."

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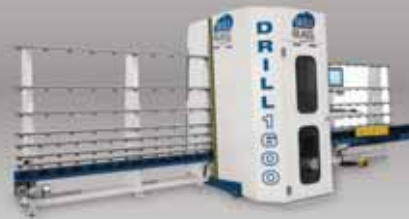
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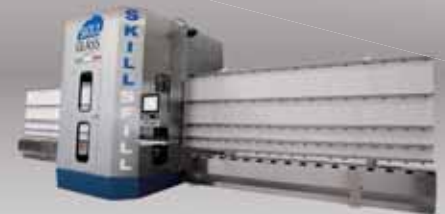
DRILL 101

CNC Drilling



DRILL 1600

Grinding and Polishing



SKILL SFILL

SWISSPACER

New warm-edge spacer bar

One of many innovative products shown at this year's Glasstec was the **SWISSPACER Ultimate Pro**, which combines outstanding energy efficiency with optimal processing. Because of its new material composition, the hollow profile is more elastic and easier to process - with the typical stability of the spacer bar frames. In terms of energy efficiency the Ultimate Pro is the same as the Swisspacer Ultimate, making it one of the best spacer bars in the world.

The demand for energy-efficient window and façade solutions is constantly rising. Among other elements, the spacer bar plays an important role in insulating glass units. Its thermal conductivity makes a big contribution to the energy efficiency of windows: if it has a poor or high heat transfer coefficient, a lot of heat is lost to the outside - even with an excellent frame and high-tech glass. Not only. Warm edge spacer bars minimize the formation of condensation at the glass edge and reduce the risk of mould development there.

The Swisspacer Ultimate has been one of the world's best spacer bars for years. The new Ultimate Pro supplements the existing portfolio. It focuses on optimal processing of the spacer bars and offers a maximum certainty about how they function in the insulating glass unit - all while retaining an excellent level of energy efficiency.

High elasticity for the best processing

"The optimized material makes the spacer bars particularly elastic," said Mario Kindler, Product Manager at Swisspacer as he explained the new development of the Swiss company. "The Ultimate Pro is therefore less susceptible to breaks or ultra-fine micro cracks that can occur when cutting or, for example, during the insertion of accessories. Ultimate Pro is also extremely robust during internal handling of the bars and the frame."

The Ultimate Pro can be processed especially efficiently while handling within the production process becomes safer: that means even better cycle times and minimized rejections in the production process. The optimized corner key and longitudinal connector additionally support the particular stability of the frame.

The enlarged film surface on the profile side ensures that the butyl application on the frame is of optimum quality. This provides a particularly reliable primary seal for the cavity

between the panes. Consequently, the risks of penetrating moisture or loss of gas are minimized. The improved perforation of the profile also increases quality assurance because the desiccant in the hollow profile can faster absorb any moisture that's present.

"The optimally coordinated design of geometry, perforation and film delivers an especially high degree of certainty about the functionality of the insulating glass units - in particular as regards the lifespan," Kindler said.

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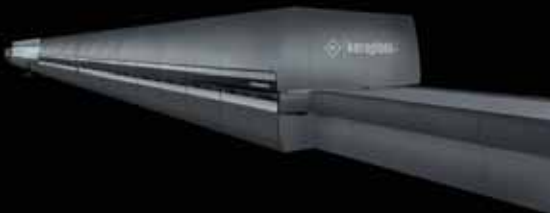
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keraglass

SEVASA

Enter Graduel-H - new cost-minded, gradual opacity glass!

For the first time the Graduel gradient goes from translucent to transparent, running parallel to the short side of the sheet (2250 mm or 2400 mm), with sheet better used during processing, exhibiting less waste and therefore better profitability.

This horizontal format also allows interior designers and glaziers to get wider pieces of up to 3.210 millimeters for installation in shower screens and dividers.

It has been highly sought-after for a long time in the market and in much demand from SEVASA, which led the company to focus R&D on the format.

The new Graduel-H glass offers the same quality and finish as Graduel®:

- Short transition, maintaining the unique quality of Graduel®.
- No fingerprints shown and less maintenance required.
- High resistance to scratches and stains in the treated translucent area.

GPD FINLAND 2023

Way To Grow!

GPD Finland, set to take place next year from June 14 to 15 in Tampere, Finland, visitors can grow their knowledge of the entire glass industry, or take a deep dive into a specific technological area. They can grow their network by making new contacts or even grow businesses or circles of fellow researchers - finding like-minded forerunners working toward the greater success of glass.

The carefully balanced conference, workshops and social events offer a rich palette of intriguing topics, opportunities to network with professionals at all levels in their careers and the chance to raise attendee awareness of the vast potential of the glass industry.

Venue - Nokia Arena

The new Nokia Arena, a unique multifunctional indoor event centre in the heart of Tampere, Finland, was home to the Men's World Ice Hockey Championship in 2022. The arena will offer a new event experience to all GPD delegates and speakers. With registration opening in November 2022, more event information will soon be released.

WWW.GPD.FI/



- High durability. Ideal for public spaces and high traffic areas.

The progressive opacity satin glass presents 4 solutions:

Graduel-H:

- Translucent to Transparent, along the short side of the sheet.

Graduel:

- From Translucent to Transparent, long side of the sheet.
- Translucent - Transparent - Translucent.
- Transparent - Translucent - Transparent.

The new Graduel-H glass (like the earlier three versions of Graduel) is ideal for use indoors: shower and bathroom screens, office enclosures, partitions and dividers, doors, etc., but also for exteriors: balconies, façades, canopies, etc.... It is a bright, elegant and versatile option.

It can also be customized: transparent/translucent area and location (depending on the model) to suit client's requirements.

WWW.SEVASA.COM



SMART WORKING



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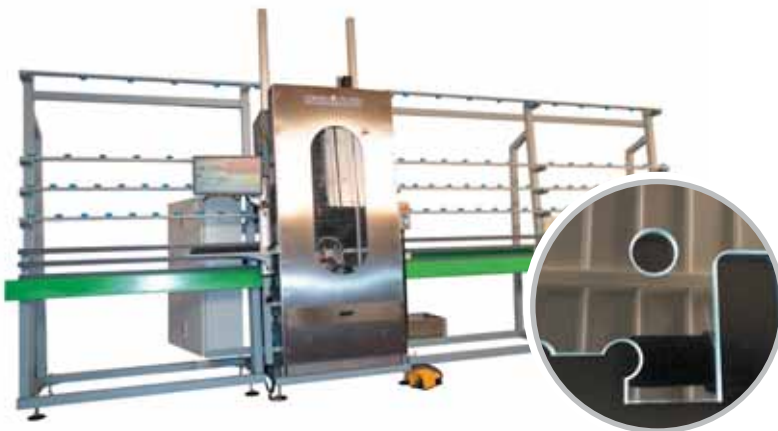
HTL

Horizontal flat glass washing machine



FV1000

Vertical milling and drilling machine



GEBI

Vacuum lifter



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- Ready for industry 4.0.

FORVET: still innovating with drilling, milling and countersinking solutions

When it comes to performance, innovation and technology, FORVET's equipment range of numerically-controlled solutions still wows the glass industry to this day - whether we're talking glass-working machinery or unique integrated solutions.





Dedicated to drilling, milling and counter-sinking operations on flat glass as well as irregular shapes, Forvet's Francesca range comes in several models. In two versions these are subdivided into three macro-types - with or without water-jet system integration, namely:

- Francesca FC 16M 1250 H.O
- Francesca FC 16M 1600/2000/2600/3000 with or without water jet
- Francesca FC 32M 3300 with or without water jet

FRANCESCA FC 16M 1250 H.O

Over 30 years have passed since the Francesca FC 8M 1000 prototype was first created as a

pioneering, numerically-controlled drilling machine. Today the model encapsulates Forvet's most advanced technology for drilling and milling operations. Not only. Compared to its original, the model can now boast 35 percent less footprint, 30 percent in weight-saving (thanks to its light alloys and compact, 3.6-ton structure), 30 percent in energy-saving and 25 percent of increased productivity.

Maximum drilling is at 70 mm in diameter, with larger diameters achievable using its milling feature. Cycle time is completely automatic - with no manual adjustments needed. Numerical control only requires hole di-

ameter and coordinates. The NC calculates both glass transport feed and spindles rotation automatically, as well as water quantity and tool wear & tear recovery.

With 8 positions each, the two rotating heads can install the Forvet Super Spindle - which is able to perform milling operations at a speed of up to 12.000 rpm and guarantees a higher milling speed and longer tool life cycle.

WATERJET SYSTEM INTEGRATION ADVANTAGES

Waterjet-integrated Francesca models combine the technology of diamond tool drilling with that of waterjet cutting - both of which are managed by a

single numerical control. As interacting production principles each implements the advantages of the other to expand production capabilities - all with mutual advantages that include, for example, the waterjet not needing to switch between two pressures when executing preliminary piercing through the glass thickness. This is because the phase doesn't require drill-bit use. Instead it starts the cutting movement with the pump working at a single pressure, then doubles its use without any maintenance intervention. In this version too, loading, positioning, processing and unloading operations are all completely automated.



FRANCESCA FC 32M 3300

The only CN machine that's able to load, process and unload two glass sheets at the same time without the need for manual adjustment. With this model it's possible to process a glass sheet of up to 3300 mm (maximum length) or two sheets reaching 1600 mm (maximum length) each. The machine is equipped with 32 tools installed on 4 rotating heads - all operating either simultaneously, independently or in sync with each other and thereby significantly reducing production cycle

time. Thanks to the extreme speed, coupled with a possibility to process two glasses in contempo, it eliminates the classic process deceleration that's typically exhibited by traditional machines.

AN ELEVATED POTENTIAL FOR CUSTOMIZATION

Prompted by specific customer needs, all Forvet solutions come configurable and customizable. Here, thanks to both its ingrained skills and advanced 3D-design software, the Forvet techni-

cal-commercial team is well kitted-out to closely guide the customer, step-by-step, through the entire equipment design process - offering a service and product that's

tailored to meet every requirement. Here just the number of machines installed globally serves as a clear testimony to current customer satisfaction around the world.



INTRODUCING BIESSE

Forvet was acquired by the Biesse Group in October 2021 - allowing the former to increase and thereby complete its range of glass machining centres. Indeed, it's thanks to the introduction of Forvet's proprietary technologies that the Group can now strengthen its offer to the high-end of the market by providing highly automated, customised machines and systems that are also unique. Thus, also, Forvet obtains in-depth commercial distribution thanks to Biesse's widespread global footprint in all markets. Biesse is a global leader in technology for processing wood, glass, stone, plastic and metal. It designs, manufactures and distributes machines, integrated systems and software for manufacturers of furniture, door/window frames and components for the construction, ship-building and aerospace industries. It invests an average of €14 million per year in R&D, boasting over 200 registered patents. The company operates through 12 industrial sites, 39 branches, and 300 agents and selected dealers, exporting 90% of its production. Its customers include some of the most prestigious names in Italian and international design. Founded in Pesaro in 1969 by Giancarlo Selci, Biesse S.p.A. has been listed in the STAR segment of the Italian Stock Exchange since June 2001 and is currently included in the FTSE IT Mid Cap index. It currently has 4,300 employees worldwide.

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- > For any kind of flat glass on the market
- > Working width from 1300 to 2600 mm

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FILTRAGLASS and DAKS-96: a win-win partnership

In consistently breaking new ground and exporting its systems to several different countries, Filtraglass has become an international market leader over the course of its long history. Today, the company's water filtration systems can be found in the Americas, Europe and Asia.

BRINGING ADDED VALUE

For DAKS-96, the decision to buy a Filtraglass purification machine was prompted

by various reasons. Above all, having a water treatment system in place would reduce water consumption considerably. Then the rate of production gets improved given that there's no need to stop the machine to change water - and pollution is diminished. The company places a high premium on using clean, good quality water in its handling machines which, in this way, last longer and with less frequent parts changes.

A recent system installation at DAKS-96 by FILTRAGLASS summons to mind the latter company's 15-year experience in manufacturing water filtration systems for a vast array of sector types, from automotive to the optics industry - including the transformation of flat glass in general.





Also, since the water is not changed, the consumption of coolant is reduced.

The specific option for a Filtraglass system underscores the preference at Daks-96 for an internationally-recognised brand that's backed by many years of experience. It was a choice for reliability and professionalism from the outset - both of which inspire a great deal of trust when making an investment decision. Here, as always with Filtraglass, the initial approach was to understand the needs at Daks-96 so as to offer customised advice on whichever system best-suited the company's characteristics. Another plus was a system that afforded Daks-96 a further possibility to advance one of its core values, which is to combat pollution.

SYSTEM ADVANTAGES

As for noteworthy, day-to-day differences experienced after purchasing the Filtraglass system, these included an obvious reduction in water bills and the quality of the final product also saw improvement. Since the first Filtraglass system was installed, the glass has displayed a transparent finish, leaving it completely clean and free of dust marks and debris. This reflects positively - both upon the quality of the product offered and on the image customers have of Filtraglass. Very importantly, too, productivity has improved given that there's no need to stop the



production line for maintenance work. As Filtraglass machines work constantly, Daks-96 can now offer still more - within the same time frame.

SHARED GOALS

The driving reason for re-purchasing a Filtraglass system was the company's previous experience, which had been roundly positive. Averse to taking any unnecessary risks it decided to stick with Filtraglass, given that the two companies already knew each other's way of working. Indeed Daks-96 was already very satisfied with its purchase of the first system which,

following machine installation, had seen a productivity increase and a reduction in costs. These were both important to Daks-96, as was the environmental factor - considering the key priority today among all companies to commit to sustainability, which signalled a joint pleasure of having mutually-aligned values in this regard.

CONTINUED CUSTOMER ACCOMPANIMENT

In sum, the relationship between the two companies has remained positive from the outset. First, prior to machine purchase, with the

advice of Filtraglass - then during installation, which also went very smoothly. Finally, with the technical and after-sales service. Here the Filtraglass team has remained always available to resolve any queries or problems as they rise. Besides, being contactable through various means, including WhatsApp, the company has kept communication channels open and practical. At Filtraglass that's had Luis and his team conscientiously monitoring the smooth running of the machine - ever at hand to offer help when necessary. Of course, such an excellent relationship and after-sales

service constitutes only a plus to everything else the company offers.

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OMV VISMARA rides the wave of Glasstec's mega success



Still fresh in the wake of Glasstec 2022, we take this occasion to publish our interview with Giacomo and Samuele Vismara at the stand of OMV VISMARA on the third day of the trade show.

GLASS-TECHNOLOGY INTERNATIONAL:

Giacomo, you're Production and Service Manager at OMV Vismara. To kick off, what can you tell us about the company?

GV: OMV Vismara was founded by Mauro Vismara and has been on the market for about 40 years. The company produces special processing machines - mainly drilling and milling to either large or small dimensions. The company also produces glass processing machinery, both with and without tool changers. Machines with the tool change are the most complicated and complex, though for our smaller customers we also have those which provide the manual tool change. The company doesn't have a standard machine, being designed to meet specific requirements - which is also why we're able to produce anything the customer requests.

GTI: Samuele, Tell us about your product range
SV: Our product range includes vertical drilling and milling machines. Initially this started with the production of simpler vertical drills only, though it developed over the years following ongoing requests to answer various customer needs - which got us developing

more complex machines. What differentiates us from our competitors is the production of horizontal drills - again beginning from the simplest ones and then developing over time with more complex machines that include, for instance, automatic loading and unloading as well as one

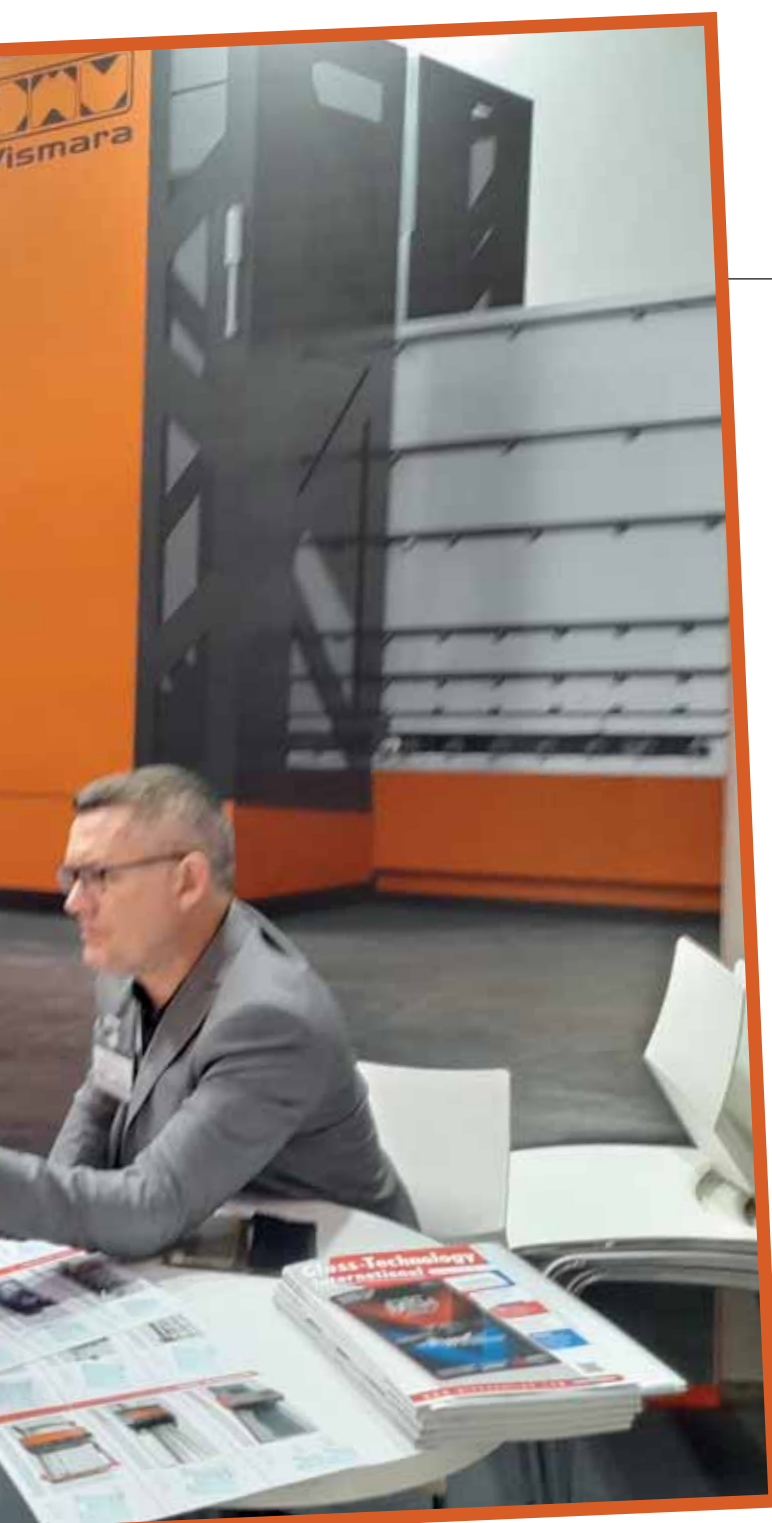
or more drilling stations and horizontal multi-unit stations.

GTI: Any comments on what you're presenting here at Glasstec?

SV: The novelty here at Glasstec is our drilling and milling line - complete also with a vertical grinding/arrissing ma-

chine. It's a full line offer for grinding, drilling and milling which comprises either two or three machines. Here the vertical masonry is followed by our drilling machine and then by the third milling machine. In itself, the line is very advantageous for customers as they can put the glass only once on a single machine to





have the finished product. This line is suitable for customers who make doors and shower doors though we could as easily be talking about any other glass processing that requires masonry, drilling and milling.

GTI: Where does OMV Vismara operate?

GV: The markets in which OMV Vismara operates are mostly Italian - 60 percent in fact. That's also thanks to our implementation of 4.0 incentives, which saw sales growing incrementally of late. Our footprint also extends to the rest of Europe, as well as South America. Currently we're pushing towards Eastern Europe and North America, so there we're hoping to be able to achieve the goals we've set for ourselves.

GTI: Finally, how's 2022 going so far and what are the prospects looking ahead?

SV: In this period we've seen a noteworthy increase in sales, especially in the Italian market. Again this was driven by 4.0 incentives, which recently guaranteed several orders for the Italian market. Indeed we're hoping the incentive will be further extended to increase sales always more while also affording us the added opportunity to develop new technologies by which to continue tailoring solutions that can best meet specific customer needs.

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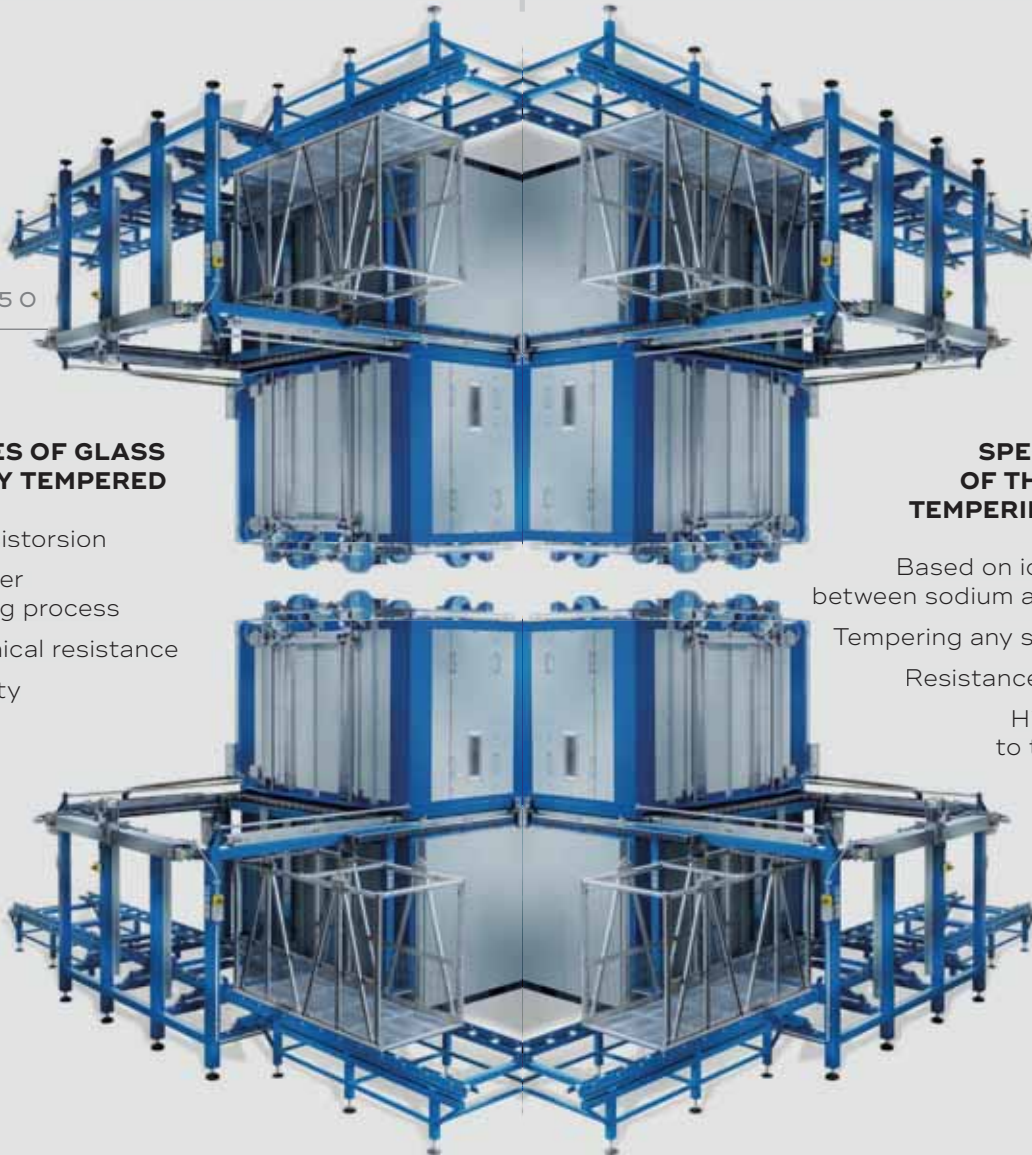
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LiSEC's automated solutions lauded by FELBERMAYER FENSTER UND TÜREN

Felbermayer Fenster und Türen was founded back in 1964 as a joinery. Then in 1993 Helmut Felbermayer took it over from his father. At the time only two employees worked

Thanks to the competence and industry-leading support of LiSEC, a recent project by FELBERMAYER FENSTER UND TÜREN now has the company producing insulating glass in-house - faithful as always to its proud tradition of combining window and door construction with innovative technology.





migrate from greenfield to insulating glass was originally planned for 2023-2024. However, thanks to an investment grant it was rescheduled and could be started at year-end 2020. Within a very short time, a new hall for insulating glass production had been built and intensive work had taken place on the layout planning: “Over a period of two months, plans were sent back and forth almost daily to identify the best possible solution - and I think we succeeded. Collaboration worked really well. It was a joint project that was also thoroughly enjoyable,” enthuses Felbermayer, visibly delighted with the project progress so far. “Top performance was delivered by everyone involved,” he continues. “The excavator

in the small company in Klosterneuburg. However, with the years Felbermayer gradually expanded to the 210 employees it has today - all working its the site in Unterwaltersdorf, Lower Austria, on the production of windows and doors, insulating glass manufacturing and powder coating. Here Felbermayer works jointly on installations with subcontractors.

to Salzburg and Vorarlberg with the supply of windows made of wood, wood-aluminium, plastic and plastic-aluminium. In 2021, Felbermayer generated sales totalling EUR 44.2 M - a handsome sum that’s projected to rise this year to EUR 50 M. Says Managing Director Helmut Felbermayer: “We’ve now devel-

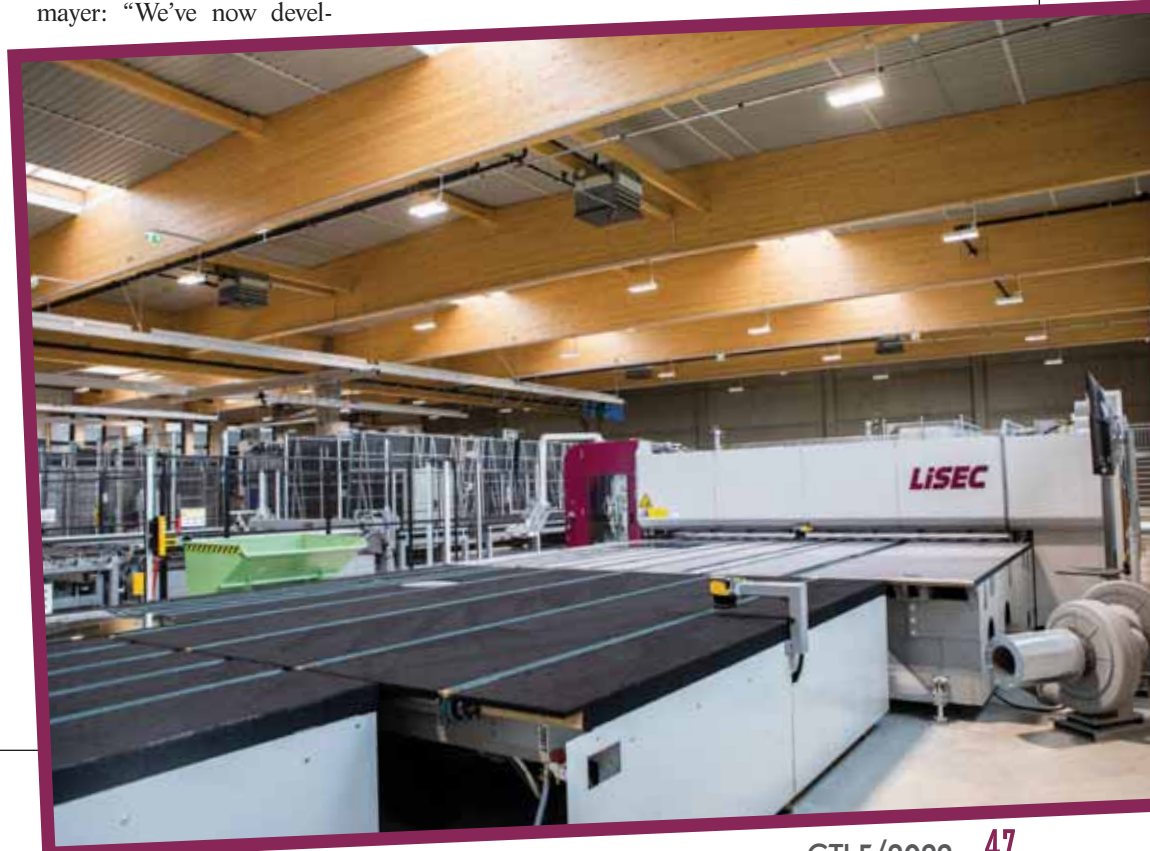
oped the window to render highly-automated finishing possible which, compared to the competition, marks our strength. Here we achieve elevated output with a very modest number of employees.”

HARNESSING INNOVATION

The production project to

TWO COMPANIES

A duo of identifying names comprise this remarkable outfit: namely Felbermayer Fenster & Türen Erzeugungs GmbH. Of these, the latter first produces the windows before selling them to Felbermayer Vertriebs GmbH which, in turn, takes care of installation. The company is primarily active in the contract market - covered from Vienna and Graz



arrived at the end of February-beginning of March 2021. In August, the hall was ready on schedule and installation of the machinery began. This continued in stages at full throttle, right up to the start of production. We had an outstanding team from LiSEC.” Felbermayer goes on to report that everything on the project worked - from machines to software, with no mistakes made: “We would do everything exactly the same again. Throughout my entire career, during which we have bought numerous machines and planned plants, I’ve never experienced such perfect implementation within such a tight time frame.” Here Felbermayer is the only contract window company that manufactures the insulating glass itself, which has Felbermayer confident to add that “thanks to the full automation, output and the actual costs, we enjoy massive advantages over the competition.”

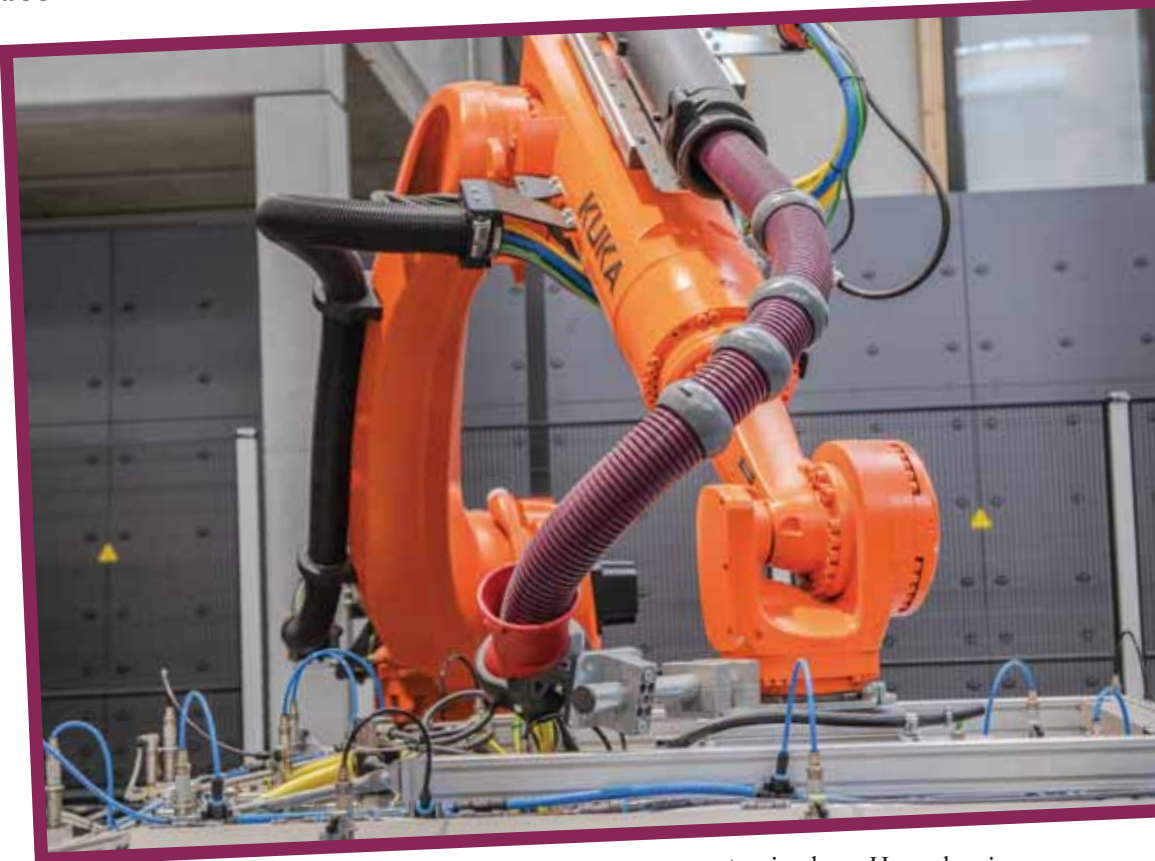
ALL SOLUTIONS FROM A SINGLE SOURCE

LiSEC’s solutions satisfy the expectations of Felbermayer, who’s always known the brand: “I’ve always had an eye on insulating glass production given that, at heart, we’re genuine machine freaks. That’s had us attending trade fairs for years, where we’ve consistently seen both LiSEC machines and those offered by competitors. What’s always been clear to us is that LiSEC

tops the list when it comes to machinery construction.” The software, too, is impressive. “Machines are one thing, but the software behind them makes a big difference too. This installation went without a hitch. We had nothing to worry about. Our LiSEC software contact worked together with my colleague Gerhard Czervenka to compile all the basic data and update the master data till the whole thing was up and running.” Felbermayer goes on to highlight the advantages of obtaining solutions from a single source: “With the project being highly complex in nature, it was hugely beneficial to work with LiSEC - because everything came from a single source. LiSEC is a machine manufacturer that can supply all the elements you need: machinery,

software and services - the lot. Thanks to its all-in-one solutions, all coordination takes place internally and you don’t really notice (or you only rarely do) the coordination and planning measures that are taking place in the background. Another huge advantage with LiSEC is that they make it all look so easy.” Felbermayer was also impressed with the elec-

tronic plans. Here planning had to be accurate down to the last centimetre, with all connections in the ground and laid before the concrete slab was cast. Felbermayer emphasises that, although other suppliers also offer good stand-alone machines, for him LiSEC truly shines when it comes to high-quality, fully-automatic machinery coupled with high-output processes.



ABOUT LiSEC

Headquartered in Seitenstetten/Amstetten, LiSEC is a globally-active group that has provided individual and comprehensive solutions in both flat glass processing and finishing for 60 years. Its service portfolio comprises machines, automation solutions and services. In 2021, the group, with circa 1.100 employees and over 20 sites, achieved an export ratio of more than 90 percent and generated sales of more than EUR 200 M. LiSEC develops and fabricates glass-cutting and sorting systems, single components and complete production lines for insulating glass and laminated glass fabrication, as well as glass edge processing machines and tempering machinery. With reliable technology and intelligent automation solutions, it sets both quality and engineering standards and significantly contributes to the success of its customers.

LiSEC MACHINES FLEET AT FELBERMAYER

But Felbermayer wasn't only impressed by the range of machines and software: "Machinery construction is evidently very carefully thought-out and I get the sense the development phase takes longer than that of the competition. Clearly it's apparent in the workmanship and components that everything is very coherent. Indeed the LiSEC design department does an excellent job."

As for the LiSEC machinery fleet at Felbermayer, it includes the following machines: PKL/SBL, ESL-RS, two VSL-A stations, KSR, GSL, VHW-F, ARL, TPA-A, AGP-A, VFL-1F as well as automatic tempering bed loading and unloading. The glass is loaded by the PKL/SBL glass gantry loading system. With its rotating double suction frame, the

system is able to stack large format sheets automatically and precisely. In addition to cutting flat glass using the LiSEC ESL-RS cutting table, Felbermayer has two LiSEC VSL-A cutting systems with Dynamic Load Balancing for cutting laminated glass. This is an intelligent form of dynamic utilisation control that can achieve a high output. The edges are sealed with the LiSEC KSR processing machine. Once the quality has been checked by the GSL quality scanner, the sheets are sorted into the ASM sorting magazine by the SHL glass transport shuttle. The system is able to pick up glass lites sheets vertically and horizontally, buffer and transfer the sheets, and transport them between the processing stations. The VHW-F is characterised by features including its flexible expandability, the contactless

spindle guide and the self-cleaning gap filter system in the washing zone area. The sheets are washed and dried in an energy-efficient manner and with optimum polishing quality. With the desiccant filling machine ARL-45F, spacer frames made from all common materials can be filled with desiccant, both as rectangular frames and as shapes. Filling at the back of the frame guarantees a stable process, even with delicate plastic materials. The optional measurement of the desiccant quantity can ensure that there is sufficient desiccant in the frame compared to other systems. The LiSEC TPA - a fully automatic system for applying thermoplastic spacers - enables maximum flexibility by seamlessly changing between the different dimensions of the glass. The stepless width adjustment allows switching between different spacer widths without the requirement for a waiting time. The high-end gas filling press AGP-A is suitable for a wide range of applications due to the individual configuration options and impresses with the highest precision and quality. The LiSEC VFL-1F is a system for sealing insulating glass units with two-component sealants. The perfected build-up of this system guarantees a high degree of process reliability and top corner quality - even for units of high weight.

MARKET CHANGES

The economy has changed dramatically since 2020. "We're currently experiencing an economic situation we've never seen before. Indeed the damage isn't even fully tangible yet," says Felbermayer, concluding that, "the coming years will be difficult for every company." He nonetheless expresses delight at having accelerated the insulating glass production project: "Insulating glass and the financial savings it delivers benefit us because it affords a huge advantage over the competition, thanks to production automation. Bringing this forward was the right decision. It will be a great help to us over the long term - especially given the challenges of the coming years."

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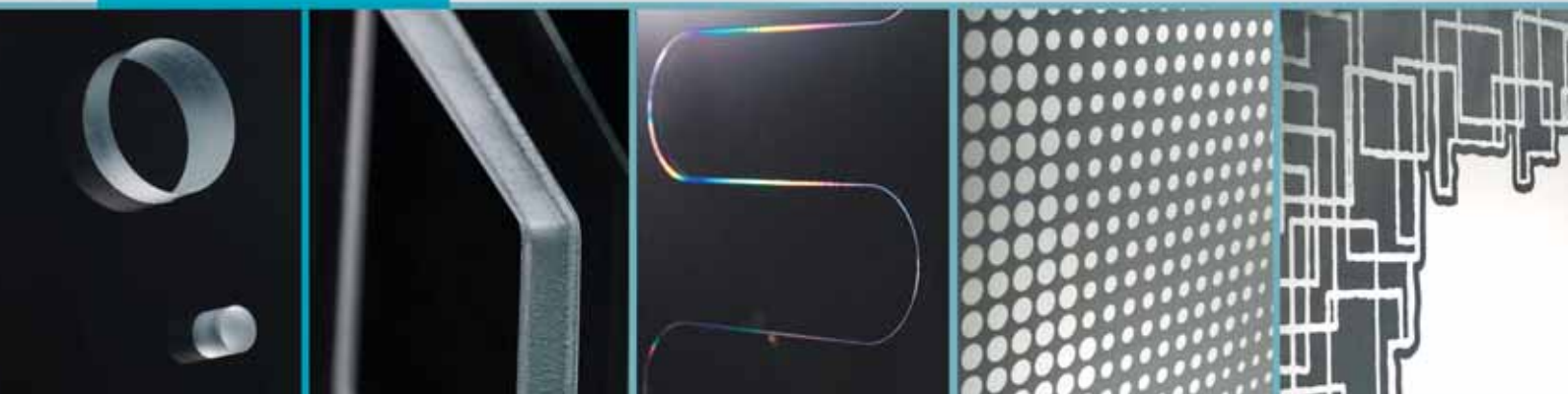
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ISRA SURFACE VISION

shows its colours at Glasstec

In line with its current strategy to drive transformation through visual intelligence, ISRA SURFACE VISION recently exhibited its latest innovations at this world-leading event for the glass industry - showing how the company's highly-performant inspection system can support glass processing digitalization today.

As Isra Vision's Bertrand Mercier recently noted: "Float glass is enormously important as a base material for countless glass products." The company's Business Unit Manager for Glass then stressed how "the demand for ever higher quality is steadily increasing in such sectors as architecture and electronics - as well as for displays, solar and the automotive industry." Mercier attributed the result of this trend to heightened demand on the one hand - and, on the other, to continuously

increasing quality requirements.

ATTENTION TO QUALITY

By that reasoning, even the first process step plays a decisive role in determining the attainable quality of the final product and here Isra's innovative inspection systems help to achieve a truly high yield whilst simultaneously reducing the company's carbon footprint. As such, its outstanding performance allows for notable optimization between energy consumption and delivered

product quality for value-added applications. Already on the glass ribbon, for example, used filters will assist in enabling a quality grading for final applications (an automotive windshield, for instance).

Quality issues often also occur after lamination or coating, as well as during cutting and grinding. To ensure that only flawless material reaches downstream production, Isra's P2 (PowerPlate) product family helps to detect problems in glass processes already early on - thereby permanently increasing pro-





duction yield. The same applies to, say, the architectural glass sector - which confirms that coatings comply with a given standard. Here P2 systems communicate seamlessly with other aspects along the production chain, like PLCs - all to optimise cutting, sorting and further glass processing/handling whilst providing inspection data to third-party production databases.

Troubleshooting defects in photovoltaic

Company showcasing at Glasstec also included solutions for the ever-demanding solar glass production, given that virtually invisible material defects in the glass for photovoltaic modules can compromise their stability.

The solar market has started to fluctuate across the world; manufacturing costs and solutions that cushion the drop in prices for solar modules are gaining in importance.

EPROMI LIVE PRODUCTION

One way to reduce in-house costs is to expand automation and production insights. EPROMI live is a production management intelligence solution that enables comprehensive monitoring of ongoing processes on the hot and cold end of the float process. EPROMI delivers critical information on three main aspects, namely system health, quality status and process conditions. Indeed this new data platform intelligently combines such data as defect rate, production line speed, illumination, CPU

utilisation and customer-specific parameters - all while presenting the results in clear ^ECOCKPITS that cover multiple sites. These different dashboards provide real-time information to managers on production fundamentals. Not only. Abnormal line parameters can be instantly reported - including proposed actions to remedy the issue reported. This affords users maximum transparency on the current state of their processes -and on the inspection systems themselves- so that possible maintenance windows, too, can be identified and swiftly planned. The benefit of this increased proactive control results in additional hours of effective production.

The EPROMI live production analytics tool monitors the data from Isra Vision's inspection system, allowing

real-time status monitoring- accessed from anywhere without having to install client software. The analysis tool continuously checks the system status and acts as an early warning system to detect upcoming problems.

A Glasstec success story

Whether it was float glass, solar glass, glass processing or production analytics, Isra's presence at Glasstec 2022 offered visitors a deep-dive into the latest technological advancements for innovative new solutions - including ever more comprehensive and reliable quality inspection along the entire production chain.

ISRA Surface Vision

**ISRA
VISION**

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ABOUT ISRA VISION GmbH

With more than 1.200 employees across 25 locations worldwide, Isra Vision is a leading provider of industrial image processing technologies. As part of the Machine Vision division of the Atlas Copco Group, a world-leading provider of sustainable productivity applications, the company offers innovative, intelligent industrial solutions that range from surface inspection to software-controlled robotics systems for smart factory automation. Isra Vision has been driven by passion, commitment, and diversity for over 35 years.

CUGHER: redefining 'specialized consultation' for today's glass industry

With its highly-technological machinery that's capable of printing big and small formats alike -in any shape- CUGHER is now recognized globally for its consolidated experience in screen printing on flat glass.

Alongside CUGHER's printing machines are its dryers, handling systems and vision systems for quality control - each industry 4.0 compliant and perfectly integrated to form automatic, synchronized lines. In design and production of both stand-alone and turkey plants, the company is directly responsible for the Automotive, Building & Interior Design, Home Appliance and Solar sectors.

Yet besides its highly-specialized know-how and the development of those innovative performing technologies which allow for the expansion of its wide



THE CUGHER METHOD

Identification of specifications

Exchange of knowledge

Development of layout

Examination and changes

Final solution

product range, what differentiates Cugher's customer consultancy approach from that of other companies?

WALKING IN LOCKSTEP WITH THE CUSTOMER

From the initial phase of any project the technical-commercial team collaborates closely with the customer - identifying the correct specifications while sharing both the best knowledge and the most useful information to determine the right approach to a problem. Since no 'default solution' exists, every project needs to leverage years-

of machinery then adapted according to the customer's production standards.

OPEN COMMUNICATION CHANNELS

Continuous dialogue produces various versions of project layout until the identification of a solution can satisfy such requirements as space optimization and productivity while interfacing with components of other lines. Here

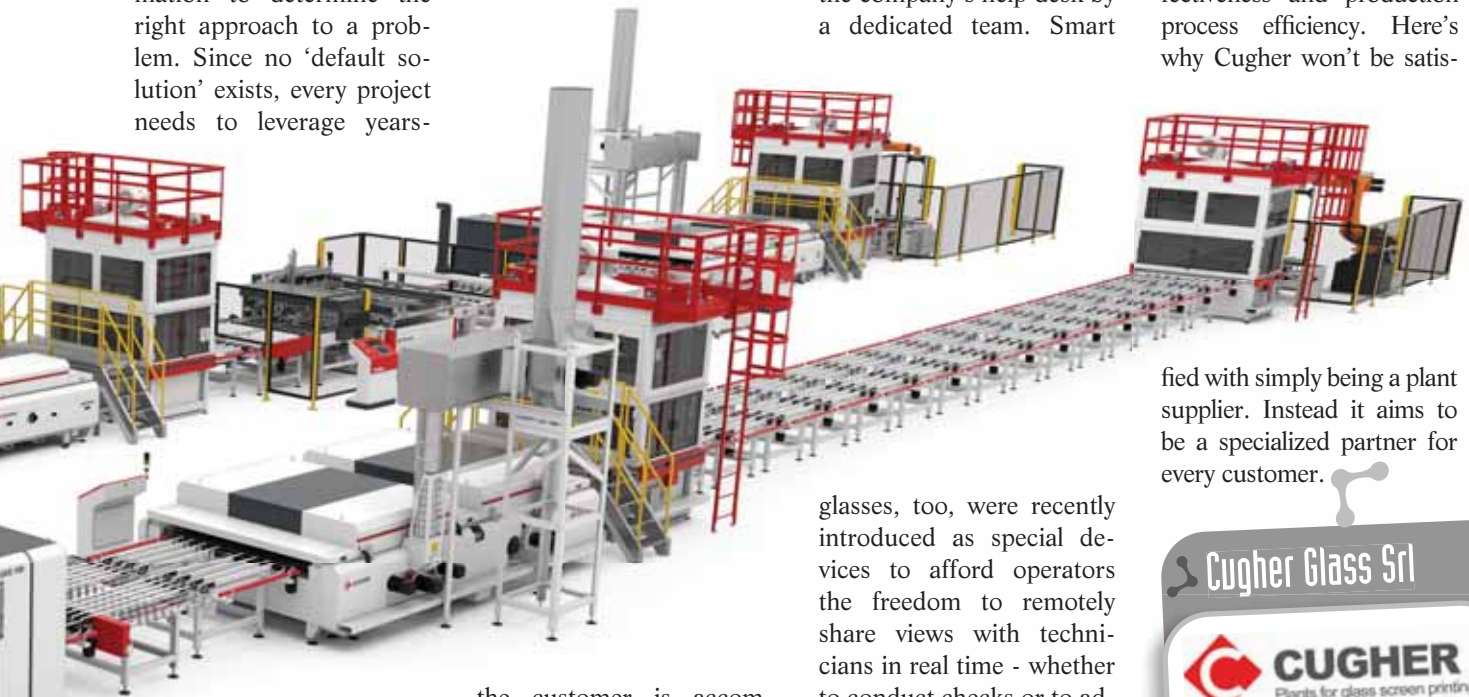
LEVERAGING TECHNOLOGIES TO IMPROVE SERVICE

This keeps Cugher's customer-oriented approach in the driver's seat for ongoing innovation and change - always aiming to offer an optimum service that's fully in line with the times. An example here is the ticketing system, introduced some years ago, by which customer assistance is quickly coordinated from the company's help desk by a dedicated team. Smart

est plant configurator that was recently presented at Glasstec, can hardly go unmentioned. Here, thanks to augmented reality, clients can view their ideal line by an experience of full immersion.

A STRONG TEAM

Relying upon a team of experts means attaining new solutions to reach concrete results - all while developing fresh know-how, coupled with both the requisite effectiveness and production process efficiency. Here's why Cugher won't be satis-



long experience and technical ability to configure an ideal solution. Just so, the customization of every product can only come as a direct consequence of this method - with plant ma-

chinery then adapted according to the customer's production standards. This extends further to guarantee constant after-sales support - all to secure trust and ensure that the customer remains satisfied.

glasses, too, were recently introduced as special devices to afford operators the freedom to remotely share views with technicians in real time - whether to conduct checks or to address machinery problems. Not only. A research centre for construction solutions, Architectural Lab, was created to offer specific products that can be customized to meet every need. Lastly, EVA, Cugher's lat-

fied with simply being a plant supplier. Instead it aims to be a specialized partner for every customer.

Cugher Glass Srl



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BOVONE set to showcase its robotic system at GlassBuild America



As GlassBuild America 2022 prepares to wow the industry in Las Vegas this October, BOVONE is already well-primed to offer its zinger know-how on glass production while the company prepares to share the benefits of its cutting-edge robotic system.



With automating edging-processes 'wired' to enhance productivity to guarantee competitive success, Bovone's robotic automation of glass manufacturing now takes production to the next level. Not only. It significantly boosts the competitiveness of productivity while sustaining it over the long-term - all thanks to a technological reliability that's coupled with competence and service efficiency.

INNOVATION DEVELOPMENTS

As the same robotic integration allows for a considerable increase in productivity, there's also significant cost reduction - plus greater operator safety when handling

large slabs. But there's more. Right from within, the BRS system integrates a robotized station, two straight-line edging machines, a vertical washing machine and two or three anthropomorphically-articulated multi-axis robots which have different ranges in terms of load and application capacity. It's precisely in the field of applied industrial robotics

that Bovone has remained Kuka's Official System Partner for many years now. Indeed, use of robotic elements produced by a company so established in the market immediately increases safety and reliability levels - also in terms of after-sales assistance. Here, treating just safety and productivity, Bovone has created grippers of reduced weight,

with dimensions that ensure lower impact upon robot load capacity. This enhances performance in terms of speed (25 percent less), with energy saved as well - especially during the processing of heavy slabs.

QUALIFIED SUCCESS

BRS adheres perfectly to Industry 4.0 pro-





ocols. Its islands work personnel-free and can be fully-integrated for both traceability and self-regulation in terms of production parameters.

In sum, BRS can increase automation levels in production by minimising operator-machine interaction. It optimises production and reduces both cost and downtime while standardising grinding quality. Besides, Bovone's fully-automatic edging machines will

increase flexibility thanks to their quick switch from one batch to another, which lowers the risk both to labour and to any manual, glass-handling materials. This they achieve by reducing operator-machine interaction, which lowers the possibility of operator injury and damage.

ANTICIPATING GLASSBUILD AMERICA

Bovone's anthropomorph-

ically-articulated robots can be supplied stand-alone while being applied either to existing edgers or as customised robotic islands based on specific needs. During GlassBuild America, the technical sales team of Bovone North America -the company's US subsidiary- will be delighted to explain the many advantages of BRS to any visitor to booth 5208 at the Las Vegas convention centre.

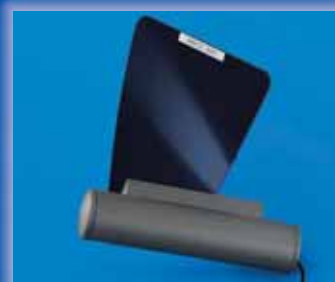
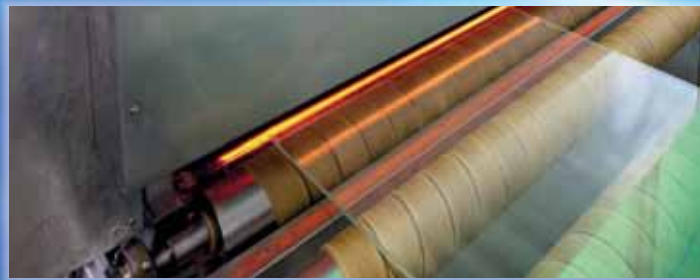
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ŞİŞECAM presents its dazzling new product range at Glasstec

In exhibiting an array of innovative products at Glasstec in Düsseldorf last month, ŞİŞECAM was afforded its chance to showcase the company's current R&D focus on energy efficiency - all the while informing visitors of its high-performance solutions, which provide both effective thermal insulation and solar control.

A global player operating in key areas of glass, Şişecam presented Glasstec visitors with its wide range of innovative products at its exclusively-designed booth - attracting great interest from trade fair attendees. Not only. A stunning installation was exhibited at

its booth in commemoration of the United Nations International Year of Glass, of which the company is an important sponsor.

ŞİŞECAM WORKS ITS MAGIC

Composed with glassware, glass packaging and flat glass, the special Şişecam





installation conveyed the company's strong and extensive relationship with glass by way of an abstraction of nature.

Visitors were invited into an imaginary underwater environment where they could experience the contribution of glass to a sustainable and healthier world. Here the magical effect of brilliant green oceanic plants, multi-coloured fish, floating jellyfish and sea urchins were all captivatingly conveyed via Şişecam products - all serving as a clear reminder

of how critical sustainability is to ensuring a healthier world and a key topic of discussion at Şişecam throughout the year after 2022 was declared International Year of Glass by the United Nations.

MAXIMIZING ENERGY SAVINGS

Demonstrating its expertise in both product development and R&D, Şişecam also presented its high-tech products. Visitors to the shade show were informed about its new, advanced technology as well as its value-added

products that provide energy savings, safety, security and noise control.

Here the company exhibited its 'Şişecam Temperable Solar Control Low-E Glass Neutral 63/29' triple silver product - which has a very high selectivity value. Offering solutions to prestigious projects, Neutral 63/29 provides energy savings with maximum solar control and a U value of 1.0 W/m²K - all without compromising natural daylight.

'Şişecam Temperable Solar Control Low-E Glass Neutral 70/40' has the

same colour and performance with its standard equivalent 'Şişecam Solar Control Low-E Glass Neutral 70/40', which provides high light transmission and low reflection. Indeed Neutral 70/40 is preferred for residences, villas, and retail stores, where natural appearance is desired.

Another exhibited product was the 'Şişecam Temperable Solar Control Low-E Glass Neutral 50/25'. It has the same colour and performance with its standard equivalent, namely 'Şişecam Solar Control Low-E Glass

Neutral 50/25', which provides effective solar control and excellent thermal insulation with U value of 1.0 W/m²K. Neutral 50/25 offers solutions for projects where a neutral effect on façade, low reflectance indoor and outdoor are required. 'Şişecam Temperable Solar Control Low-E Glass Neutral 43/28' is designed for warm climates and skylights where daylight control and efficient solar protection are both required.

'Şişecam Temperable Solar Control Low-E Glass Neutral 40/22' was one of the most outstanding products at the Şişecam booth, with its excellent thermal insulation, maxi-



mum solar control and neutral façade effect. Neutral 40/22 offers solutions for warm climates and

skylights with its U value of 1.0 W/m²K and provides controlled daylight. 'Şişecam Temperable So-

lar Control Low-E Glass Green 40/28', coloured by coating on the clear glass, is preferred in warm climates and skylights where daylight control and more efficient solar control are both required. The neutral effect continues when looking through -inside to outside- and creates a green colour effect on the façade.

ABOUT ŞİŞECAM

Şişecam was founded in 1935 to establish Turkey's glass industry in line with the vision of Mustafa Kemal Atatürk, the founder of the Turkish Republic. Today, Şişecam is a strong global player in the fields of both glass and chemicals. Şişecam is a global company that operates in the core areas of glass production, including flat glass, glassware, glass packaging and glass fibre. The company currently ranks among the world's top glassware manufacturers as well as the top producers of glass packaging and flat glass. It is one of the three largest soda ash producers in the world and a world leader in chromium chemicals.

Şişecam also plays a lead role in the flat glass, glassware, glass packaging, chemicals, automotive, glass fibre, mining, energy and recycling business lines. The company operates production facilities in Germany, Italy, Bulgaria, Romania, Slovakia, Hungary, Bosnia-Herzegovina, Russian Federation, Georgia, Ukraine, Egypt, India, and the USA - all in addition to Turkey.

Şişecam is taking major steps towards its goal of becoming one of the world's top three manufacturers in its main fields of activity. Driven forward by its highly competent human resources and smart technologies, The company is continuously transforming its digital infrastructure and corporate culture, always taking into account the needs of the future. With 86 years of experience and 24.000 employees, it conducts production activities in 14 countries on four continents and operates a sales network in more than 150 countries worldwide.

Şişecam is moving forward along its growth journey, in line with its Global Excellence strategy and powered by an inclusive approach that supports the development of its entire ecosystem. It takes responsibility for protecting the planet, empowering society and transforming life with its CareforNext strategy, which is compliant with, and centered around, the United Nations Sustainable Development Goals. Here Şişecam uses all its experience and competencies to promote sustainable development in every aspect.

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#ChooseRightGlass

SWISSPACER invests in finetuning its service offering



Conducted over the past year, a comprehensive client survey has served as the basis for Swisspacer's recent boost in customer excellence. The days when the value chain stopped at pure product delivery are now long gone. Customers increasingly expect manufacturers to support them through the production processes - both with technical know-how and further, added measures. These include, for example, activities to do with knowledge transfer, personal and customised support, as well as assistance with market preparation and marketing. Here Swisspacer evaluated where any problems lay by holding detailed customer interviews - which have since had the company expanding its service portfolio on the basis of those results.

HIGH QUALITY - ALSO IN SERVICE

"Our products have been proving their quality for years," says Martina Pankoke, Marketing Director Europe at Swisspacer. "Indeed it's hardly for nothing that our spacer bars are among the best

With services that include tailored consultations on efficient, warm-edge spacer bar processing, SWISSPACER has considerably expanded its support range in recent years. This includes personalised customer accompaniment with machine settings, as well as training courses and marketing activities.

on the market. That's why we seek to further expand this pioneering role in our services too. Speaking to our customers got us better understanding how we can best support them by optimising both their products and their production processes - given that our aspiration remains that of flanking them across the entire value chain."

To this end, Swisspacer hired more technical personnel and expanded its range of services. "The measures we've implemented include, for example, customised consultations for optimal processing of the spacer bars," says Matthias Bach,

Technical Director at Swisspacer. "This concerns either machine settings or tool choice - like cutting blades, for instance. It helps us optimise procedures in insulating glass unit production while making them more efficient too."

LEARNING FROM EXPERIENCE

Among those who took part in the customer survey was Ralf Maus, head of Application Technology at Glas Fandel in Bitburg. It left him impressed by the implications. "The demand for spacer bars is undisputed. That said, we encountered constant

processing problems. In the past, this often left us feeling alone and unsupported." And considering that production interruptions are often associated with lost sales, the issue is especially problematic.

For Maus, it represented a strong motivation to participate in the customer survey. "I was really pleased that Swisspacer was after a one-on-one discussion to scout for the problem types we were contending with. As a customer that makes one feel better understood than in usual group surveys." Maus was also happy with the speed with which Swisspacer reacted. "The

prompt advice and support, in production for example - which was necessary due to the DIN EN 1279 standard update - helped us enormously. To me that's what really good cooperation looks like."

Here Maus was especially pleased to find a Swisspacer employee on hand to keep an eye on the potential for optimisation on the production line.

SUPPORT WITH VISUALISATION AND MARKET CULTIVATION

"In the surveys, we frequently heard how very important the topics of vis-





Swisspacer employee Nils Sperfeld is on hand to keep an eye on the optimization potential of customers' production lines.
Courtesy: Swisspacer

ualisation, knowledge transfer and market processing are to our customers," says Matthias Bach. "That motivated us to further expand the video section. The videos make, for example, processing methods easy to understand while minimising the risk of misinterpretation. We're even able to explain topics like changing from cold flexible aluminium spacer bars to Swisspacer warm edge spacer bars as well as the necessary changes in processing really well in a visual way."

Swisspacer's Marketing Director for Europe, Martina Pankoke, was especially pleased to learn that customers appreciate the market preparation measures. "We know that every single window maker or architect won't fully understand the potential of the warm edge. Yet even if that were the case, the aim would need to be that of convincing their

customers. Here's where we wish to provide support with reliable, solid information." Training courses and seminars for different players as well as studies, analyses and theme setting all jointly help to highlight problems on the market while increasing demand for innovative product solutions: "Both our customers and theirs benefit from this - right away."



An equally positive topic is that of sustainability, which is slowly gaining traction. Here, too, Swisspacer is expanding its portfolio beyond existing data sources like EPDs. Says Pankoke: "At this year's Glasstec we sought to focus 'all around' on this consideration - from energy-saving and improved living comfort to product quality, simplified processing and optimum frame stability."

"Here we walk in lockstep with our customers and are always ready to adapt our range of services flexibly to their requirements. Already we have an extensive after sales service for insulating glass unit manufacturers and window makers: from pure technical services to our online

tool Caluwin, EPDs, training courses and extensive documentation, as well as video instructions focusing on processing." Says Pankoke: "It's through these that, as manufacturer of premium spacer bars, we want to continuously adapt and further expand the programme."

ABOUT SWISSPACER

Swisspacer operates globally and is a leader in the innovation of 'warm edge' spacer bars, which is why the company's products impress with their excellent functional and aesthetic properties. Its product portfolio is supplemented with the Swisspacer Air component, which enables the equalisation of pressure inside the insulating glass unit. Founded in 1998, the company belongs to the Saint-Gobain Group.

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MAPPI and mindset: Putting the customer first

GLASS- TECHNOLOGY INTERNATIONAL:

Giulio, can you describe your approach to furnace design?

GdC: Listening is definitely the basis of all our work. You can't design a furnace if you lack daily experience of the glass factory from inside - if you haven't fully understood its needs. Whenever recruiting a new staff member, the first thing I

look at isn't the curriculum but the passion and desire to understand, to learn, to innovate.

GTI: How does one become a Mappi designer?

GdC: Your knowledge of the mechanical and electrical parts must be perfect - which also extends to the production process and all its variables. You have to experience the environment of the glass factory, go

several times around the world with the teams that take care of assembly and participate in customer training. Only in this way, and always factoring in a training period ranging from four to five years, can s/he qualify as a Mappi designer.

GTI: Does it really take so long?

GdC: Sure it does. And that's one of the reasons why a Mappi solution is

always so simple, solid, reliable, free of bugs and without any nasty surprises for the customer. This isn't a world of improvisation.

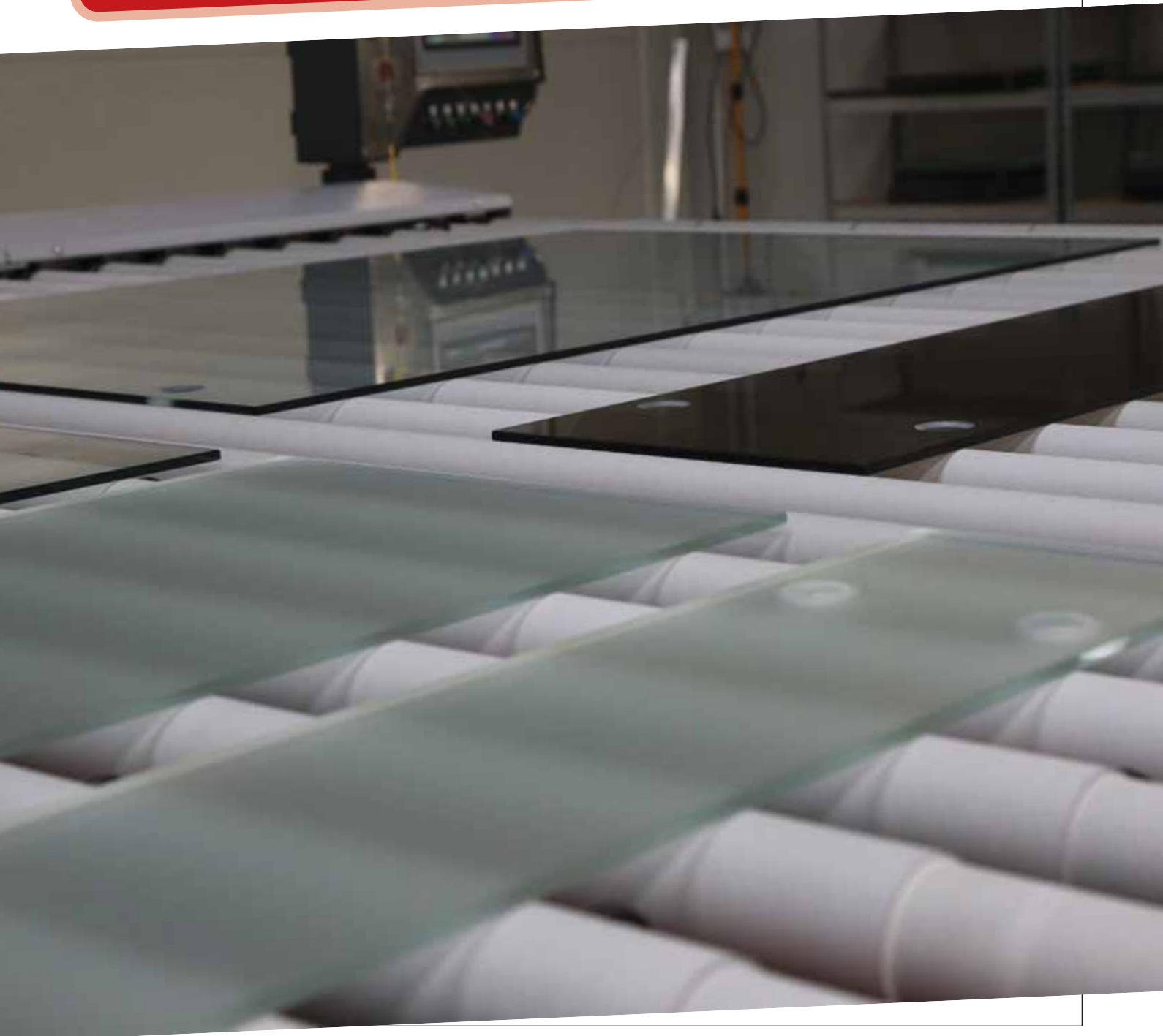
GTI: How would you describe the design sector as a whole?

GdC: As a sector it's complex. There are many skills to coordinate, and even more variables to consider. Some dedicate themselves to mechanical design, others to the electrical part, others to electronics or dedicated software. Still others can interact perfectly with existing structures. If we can manage all these in the best possible way then that's thanks to the training I mentioned earlier. Here we all speak the same language. And everyone shares just one goal: to improve the life of the glassmaker.

GTI: As we're aware, the glassware system has many elements of variability, which include great areas for improvement. Firstly, we know for instance that between 30 and 50 different glass types are created an-



Tempering furnaces summon to mind production, technical characteristics, reliability and costs. To know more about what lies behind the results, years of work and experience, specific skills and constant attention to customer needs, GTI recently spoke to MAPPI's freshly-appointed head of design Giulio dalla Costa, who's been with the company for 22 years.





nually - each of which requires specific treatment and hardening. Secondly, every day you touch, firsthand, what it means to manage an energy-intensive supply chain, as well as 'what' and 'how many' benefits can be gained from optimizing consumption. A third consideration: the glass factory has five to ten percent waste owing to breakages and defects in the quenching phase. How do you juggle all these challenges at Mappi?

GdC: As to the first, we respond with customer training. That's a pathway which, over five days, enables customers to personally understand how to write a 'recipe' - that is, how to programme their furnace to temper that glass type

in the right way. It's not enough -as many do- to simply hand the customer a package of ready-made recipes only to then abandon him to his own devices. Instead it's far better to train him and render him independent - all the while giving him maximum support. Even after ten or fifteen years a Mappi customer knows s/he can call on the company to find answers and solutions to potential needs, whatever they may be. To respond to your second point, Mappi takes a series of precautions in the choice of materials, mechanical design and software - all of which minimize energy consumption. For years, a saving of at least 30 percent has distinguished our furnaces from those of the com-

petition. Here we've calculated that, according to current energy prices spread over the furnace lifespan, this represents savings of more than half the purchase cost. Finally, and as regards your third consideration, we estimate that those who use a new generation Mappi furnace will have a waste percentage of 0.5 percent during the tempering phase - which tallies as ten times below the normality. Now, when speaking about constant tempering quality, this is what we're referring to: quality which translates

into savings in energy, raw materials, time and labour costs. You hardly need me to tell you that these are truly significant considerations.

GTI: Looking back at your 22 years at Mappi, what most comes to mind?

GdC: It's a job that absorbs you 110 percent. It has to be your passion. Here I consider myself very lucky and indeed my greatest satisfaction is to see that what I do actually helps people from all over the world to live and work better.

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ALLIED MARKET RESEARCH unpacks the rise of smart glass



As they propel market growth throughout the world, smart glass and window products are used more within both transportation and architecture. Here's why we at ALLIED MARKET RESEARCH have noted how the rise in demand for smart glass in premium projects is accompanying an increase in opportunities for key industry players.

Koyel Ghosh
Allied Market Research

In recent years the new era of hybrid and electric vehicles has seen a fall in the price of electrochromic materials while raising the demand for smart glass products in several industry verticals - including the transportation and commercial sectors. This already has Allied Market Research projecting a whopping CAGR for the global smart glass and smart window market from 2020 to 2030.

CUSTOMIZATION PRIORITIZED BY LEADING MANUFACTURERS

Today top manufacturers across the world are coming out with commercial and residential smart glass solutions that are combined with added features and technologies. This has

consumers acquiring top-end smart glass solutions that are sturdier and more resilient. Laminated smart glass pieces tend to mitigate damage and avoid harm to people - even in the event of breakage. Indeed to ensure high commercial safety, such smart

glass solutions offer a safe screen by promoting the ability to hold out against unstable forces - thereby further stimulating the adoption rate. Here, high-end energy efficiency and significantly lower maintenance expenses emerge as major factors for smart glass and windows - encouraging their adoption within the architectural segment. Strict energy conservation legislation enforced by several government bodies has also driven their adoption. Besides, favourable government policies and growing support for green buildings have made smart glass the preferred choice within a plethora of industries. For example, smart glass is utilized by Indian Railways in the first-class

bogies of superfast trains - a development that indicates a growing preference across the Asia-Pacific region.

CADILLAC CELESTIQ

Noteworthy here is the recent announcement by General Motors that the company will invest over USD 81M in its technical centre in Michigan to make the campus to design CELESTIQ, Cadillac's future flagship sedan - signifying a new-fangled, renaissance era for the brand. Both the transfer and distribution of an all-inclusive flagship by Cadillac are anticipated to be deployed by 2023 as the vehicle's official debut is imminent. As affirmed by the





president of General Motors, every model will be exclusively-crafted by a proficient team of specialists at the technical centre. Indeed, announcement of the investment highlights the company's commitment towards this excellent Cadillac which boasts such exceptional technology, engineering, and design.

The full-glass roof of CELESTIQ will be among the first to promote a SPD and four-quadrant glass. With smart glass aboard, passengers will have their occupancy space diminished while enjoying roof transparency. Together with the driver, the front-seat passenger will relish a pillar-to-pillar asymmetrical display with a dynamic sense of privacy to help

alleviate any potential driver distraction. At the same time, the rear-seat passengers will have bespoke viewing screens for their entertainment. Console screens between seats, on the other hand, will cancel out any modified comfort settings to reduce distraction during entertainment.

Designed by REFR, the Smart light control film is a key smart glass module. This allows occupants to control the dyeing of plastic or glass products promptly and accurately - either at the mere touch of a button or with the help of mechanical settings. Today products utilizing this smart glass technology are being extensively used in an array of cars, yachts, airplanes and

trains, even if its usage for residential and commercial purposes has witnessed a sharp incline.

COVID-19

Finally it's worth a mention that the pandemic led to a stalling of production within the electronics sector. That, in turn, gave way to huge manufacturing interruptions glob-

ally. Not only. There were disruptions in the exports of Chinese parts, which negatively impacted the global smart glass and smart window market. However, as the economy started recovering, so too did the demand for new and inventive products - even to a considerable extent. Now business organizations are looking forward to investing in innovative, next generation products - utilizing novel technologies to heighten the anticipated customer demand.

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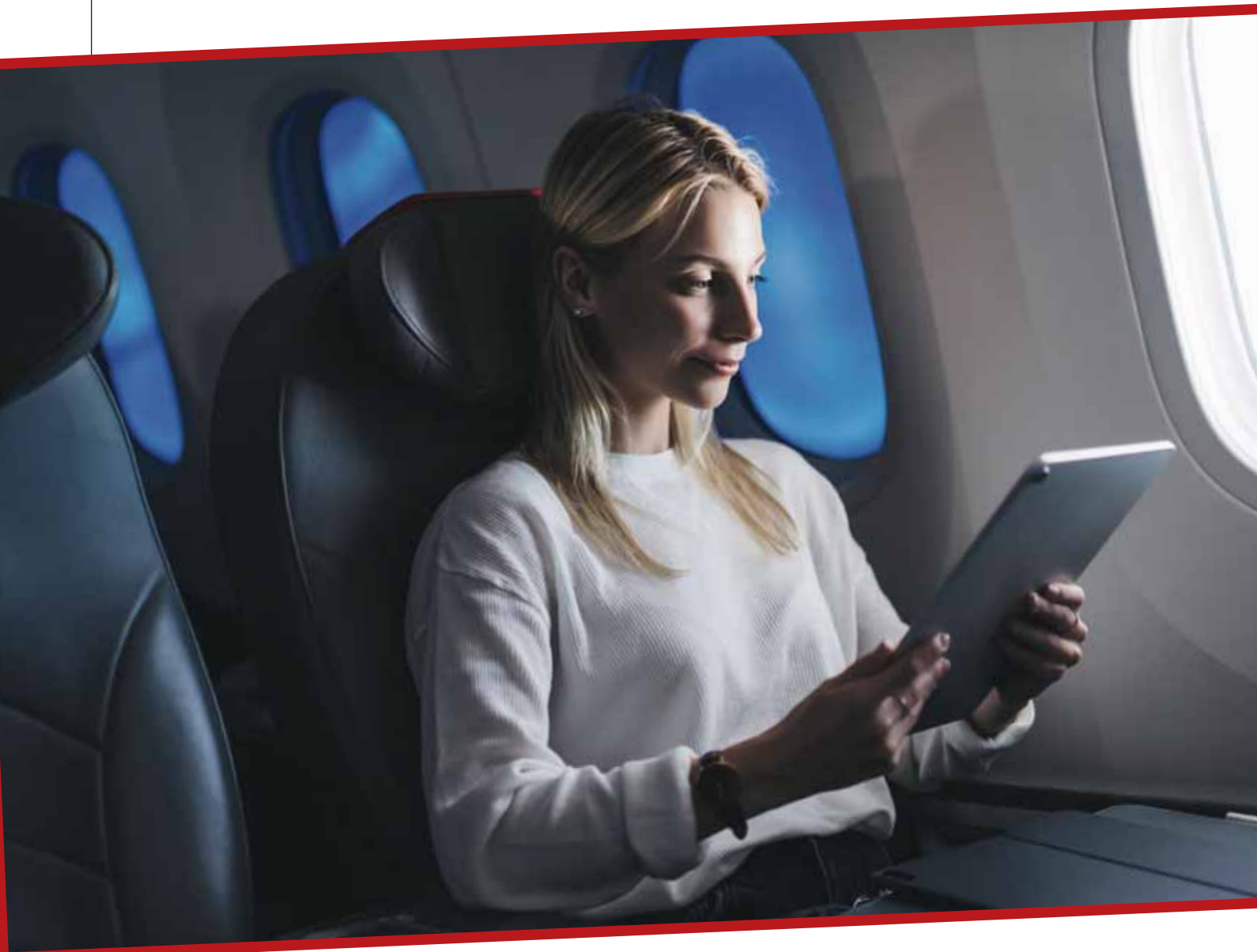


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Five common misconceptions about **SMART GLASS**

Considering using SMART GLASS in construction, retail, transportation or consumer devices? Doubtless you'll have read about this dynamic glazing technology. However, having heard many misconceptions in our experience of manufacturing smart glass display cases, here are some clarifications on the most important ones.

Manoj Phatak
 ArtRatio and Founder
 & CEO
 Smart Glass World

MISCONCEPTION 1: SMART GLASS IS A PRODUCT

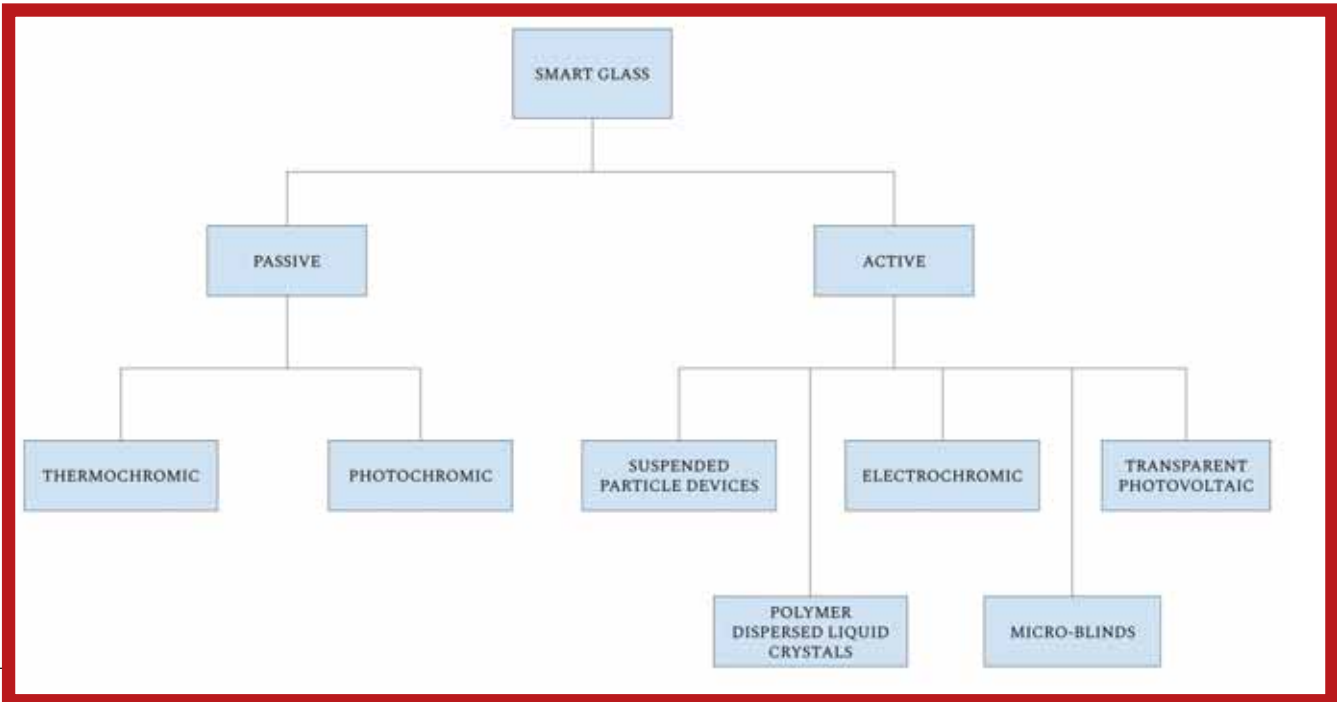
Smart glass is not one single product but rather a family of technologies. We can think of this family as segmented into two major groups, namely 'passive' and 'active'. Passive smart glass reacts to an environmental stimulus such as light or temperature, with examples such as thermochromic glass (triggered by heat) and photochromic glass (triggered by shorter-wavelength UV light). Ac-

tive smart glass, on the other hand, is driven electrically, and can be triggered by sensors or by a building management system (BMS), with examples that include SPD (suspended particle devices), PDLC (polymer-dispersed liquid crystals), electrochromic glass, microblinds glass, and even TPV (transparent photovoltaic) glass. You could even go as far as to include smart mirrors, augmented-reality spectacles (think Google Glass or Apple Glass) and heads-up displays (HUDs) found in aviation and high-end automobiles. The diagram below shows a loose taxonomy, though it doesn't pretend to be complete.

MISCONCEPTION 2: SMART GLASS IS JUST FOR BUILDINGS

We can find smart glass in automotive, aviation and marine vessels as well as consumer displays, healthcare, luxury retail - even in museum display cases (example shown below, where the smart glass reduces light exposure damage on fragile artworks). Among the coolest examples of smart glass we've seen is the BMW i Vision Circular concept car, launched in 2021, which integrates smart glass into the front kidney grilles, to recreate the classic BMW design front entirely as a digital icon, rather than with physical

metal. Yet another example is the transparent OLED (organic light-emitting diode) display panel by the South Korean giant LG, which uses Gauzy's SPD technology in replacement windows for public transportation. The display panel enables high contrast ratios, making the OLED adaptable to bright environments and shifting light conditions. The sheer variety of smart glass technologies opens up numerous other opportunities to control light 'on-demand', such as neonatal incubators, wine coolers and drone-based transport of human organs - where light needs to be controlled on sensitive materials.





MISCONCEPTION 3: SMART GLASS IS JUST PLEXIGLASS

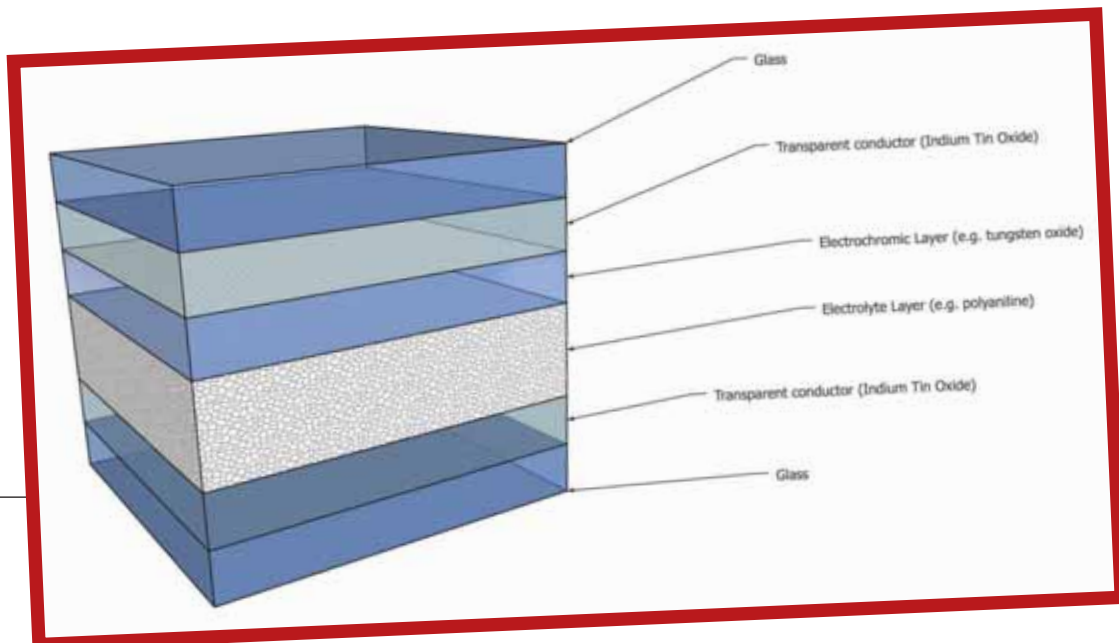
Introduced in 1933 by Rohm & Haas as the trademark Plexiglass, this acrylic, more correctly named poly(methyl methacrylate), or PMMA, is a transparent thermoplastic normally manufactured in sheets. It is static in behaviour and consists of one single material. Smart glass materials, on the other hand, are complex composites, made up of multiple layers of plastic, conductive material, coatings and/or switchable film, which is what provides the dynamic light-filtering capability. The exact composition depends upon which smart glass family member you are referring to, of course.

As one example, suspended particle devices technology (SPD-Smart-Glass® from Research Frontiers Inc) uses indium tin oxide (ITO) as the transparent conductive layer, and is sandwiched between PET, EVA and/or PVB transparent laminating layers. Electrochromic smart glass, however, is quite different in

structure - comprising layers of materials such as tungsten oxide, polyaniline, ITO and a glass substrate. Electrochromic smart glass resembles a battery with ions being transported between electrolyte and electrochromic layers. The diagram below shows one possible configuration. Do note, however, that each manufacturer will have their own stack design.

MISCONCEPTION 4: SMART GLASS CAN ONLY BE SWITCHED ON OR OFF MANUALLY

Several smart glass technologies can be dimmed to any level between completely opaque or translucent or transparent by dimmer modules that also allow control and digital connectivity. Assuming we're talking





about active smart glass, the driving signal can be an analogue DC voltage or current or an AC voltage, or alternatively digital commands from building automation technologies such as Konnex. The possible activation triggers are diverse:

- By sensor (e.g. temperature, light or proximity) integrated into buildings, vehicles or consumer devices;
- By building-automation systems (e.g. Konnex), configured by occupants or automatically;
- By web-based data feeds (e.g. monitoring social media chatter to predict terrorist threats, and making smart glass building facades transparent to enable visibility and aid evacuation);
- By voice control systems (think Alexa, Google Home or Apple's Siri).

The ways to drive smart glass and the resulting benefits are extremely varied and depend on materials, technologies and application area.

MISCONCEPTION 5: SMART GLASS IS PROHIBITIVELY EXPENSIVE

The industry needs to think of smart glass just as we think of solar panels - a capital investment, with subsequent operational benefits and cost savings - leading to a quantifiable payback period.

The typical payback period for the solar panel industry is six to ten years. This is the time that it takes for the investment to 'pay itself off'.

Thus, when talking about smart glass we must look at the Total Cost of Ownership (TCO) rather than just the cost of build or installation. The TCO figure also includes the operational costs (and cost savings) which occur as a direct result in this investment.

Here quantifiable benefits of smart glass systems include:

- Reduced air-conditioning costs in the building or vehicle - thanks to filtering of infrared solar radiation (i.e. heat);
- Reduced colour-fading

and deterioration of fashion textiles, artworks and other light-sensitive materials - with the consequent protection of their market value;

- Increased productivity, comfort and retention of employees and customers, thanks to user-configurable levels of glare;
- Switchable privacy screens to protect sensitive data in banks, healthcare facilities and retail point-of-sale areas - with cost savings due to reduced security breaches, improved customer satisfaction and reduced reputation costs.

These are sometimes difficult to quantify, but it should be made known that there is indeed a number, though we may not know it at the start of the project.

CONCLUSIONS

There are many misconceptions about smart glass technologies - which is understandable, since their adoption is still relatively low.

That said, the technologies aren't necessarily new, and

they've been applied successfully in many vertical sectors - from construction to transportation to health-care.

We do still receive questions from clients who've unknowingly developed an incomplete understanding of what smart glass is, so I hope this article goes some way to turning that ship around.

When one considers the urgent push to environmental sustainability and reduced carbon emissions, one might argue that our world literally depends upon the rapid adoption of smart glass technologies in order to accelerate this development.

SMART GLASS WORLD

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HANDLING ROBOTS

Ashton Industrial Sales
Bavelloni
Bottero
CMS
ECOL
Hegla
IOCCO Group
Lisec Group
Neptun
Schiavo
Torgauer Maschinenbau
Tuomas

HANDLING EQUIPMENT FOR FLOAT GLASS

Bovone Elett.
Bottero
Di Gregorio
ECOL
Glaston Group
Hegla
IOCCO Group
Italcarrelli
Lisec Group
Schiavo
Torgauer Maschinenbau
Tuomas

TROLLEYS AND CLASSIFIERS

CMS
Di Gregorio
Forel
Hegla
Lisec Group
Macotec
MOVETRO
Schiavo
Si.Ste
Tecno Glass
Torgauer Maschinenbau
Tuomas

TRANSPORTATION SYSTEMS/ TRUCKS

Hegla
Italcarrelli
Lisec Group
Schiavo

VACUUM LIFTING EQUIPMENT

Bottero
CMS
Di Gregorio
ECOL
Fenzi
Forel
Glaston Group
Hegla
Lisec Group
Schiavo
Si.Ste
Torgauer Maschinenbau
Tuomas

CRANE SUCTION CUPS FOR LARGE SHEETS

Bottero
Di Gregorio
Fenzi
Glaston Group
Hegla
Lisec Group
Schiavo
Tuomas

TRANSPORTATION TONGS

Bottero
Fenzi
IOCCO Group
Schiavo
Tuomas

SUCTION CUPS

ADI - Surface Group
Bottero
CMS
Fenzi
Glaston Group
Hegla
Schiavo
Si.Ste
Tuomas

CONVEYOR BELTS

Ashton Industrial Sales
Cugher Glass
Di Gregorio
ECOL
Glaston Group
Schiavo
Tuomas

PACKAGING MATERIALS AND SYSTEMS

ECOL
Hegla
Schiavo
Vismara

ACCESSORIES

BOST
Bottero
CMS
Fenzi
Hegla
Helios Quartz
Mole Moreschi
Schiavo
Tuomas

Straight-edge and shape cutting

COMPLETE STRAIGHT-EDGE LINES

Bando Kiko
Bavelloni
Bottero

CMS
Euromec
Forvet
Glaston Group
Hegla
Lisec Group
Neptun
Schiavo
Schiatti Angelo
Teknik Elmas
Tesir Makine
North Glass Technology

COMPLETE SHAPE CUTTING LINES

Bando Kiko
Bavelloni
Bottero
CMS
Glaston Group
Hegla
Lisec Group
Macotec
Schiavo
North Glass Technology
Teknik Elmas
Tesir Makine
Tuomas

AUTOMATIC CUTTING MACHINES FOR AUTOMOTIVE GLASS

Bando Kiko
Bottero
CMS
Glaston Group
IOCCO Group
Lisec Group
Macotec
Schiavo

LOADING AND TILTING MACHINES

Bando Kiko
Bavelloni
Bottero
CMS
ECOL
Euromec
Forel
Glass Company
Glaston Group
Hegla
Intermac - Biesse
IOCCO Group
Lisec Group
Macotec
Neptun
Schiavo
Tuomas

CUTTING TABLES

Bando Kiko
Bavelloni
Bottero

CMS
Euromec
Fenzi
Forel
Glaston Group
Hegla
IOCCO Group
Lisec Group
Macotec
Schiavo
Tekno Kilns
Triulzi
Tuomas

CUTTING OPTIMIZERS

Bando Kiko
Bavelloni
Bottero
CMS
Deltamax Automazione
Euromec
Forel
Glaston Group
Hegla
IOCCO Group
Lisec Group
Macotec
Optima
Schiavo
Tuomas

CUTTING PATH OPTIMIZERS

Bando Kiko
Bottero
CMS
Euromec
Glaston Group
IOCCO Group
Lisec Group
Macotec
Optima
Schiavo

CAD SYSTEMS

Bavelloni
CMS
Lisec Group
Prodim
Schiavo

ARMoured AND LAMINATED GLASS CUTTING MACHINES

Bando Kiko
Bavelloni
Bottero
CMS
Glaston Group
Hegla
Lisec Group
Macotec
Schiavo
Tuomas

ROUND OR SHAPE CUTTING MACHINES

Bando Kiko

Bavelloni
Bottero
 CMS
 Fenzi
Glaston Group
Hegla
Lisec Group
 Macotec
Schiavo
 Tuomas

CUTTING ACCESSORIES

ADI - Surface Group
 Ayrox
Bando Kiko
Bottero
 Fenzi
 Lanzetta
 IOCCO Group
 Macotec
Schiavo
 Softeco
Talamoni
 Teknik Elmas
 Tesir Makine
 Tuomas

Vincent - Surface Group

SAW MACHINES

Di Gregorio
Schiavo
 Tecno Glass

AUTOMATIC SAWS FOR CUTTING LAMINATED AND BULLET-PROOF GLASS

CMS
Schiavo

BREAKING SYSTEMS

Bando Kiko
 Bavelloni
Bottero
 CMS
 Euromec
Glaston Group
Hegla
 IOCCO Group
Lisec Group
 Macotec
Schiavo
 Teknik Elmas
 Tesir Makine
 Tuomas

CUTTING MACHINES WITH BREAKING AND EDGE DELETING DEVICES

Bando Kiko
Bottero
 CMS
 Euromec
Glaston Group
Hegla

IOCCO Group
Lisec Group
 Macotec
Schiavo
 Teknik Elmas
 Tesir Makine
 Tuomas

GLASS CUTTING FLUIDS

Schiavo
 Tuomas

ACCESSORIES

Schiavo
Schiatti Angelo
Talamoni
 Teknik Elmas
 Tesir Makine
 Tuomas

Edging and bevelling

COMPLETE EDGING LINES

Adelio Lattuada
 Ashton Industrial Sales
 B Solution
Bando Kiko
 Bavelloni
Bottero
 CMS
Forel
Forvet
 Hiseng Glass Machinery
 IOCCO Group
 Neptun
Schiavo
Schiatti Angelo
SKG - Skill Glass
 Teknik Elmas
 Tesir Makine

COMPLETE BEVELLING LINES

Adelio Lattuada
Bando Kiko
Bottero
 CMS
 Hiseng Glass Machinery
 IOCCO Group
Schiavo
 Teknik Elmas
 Tesir Makine

COMPLETE AUTOMOTIVE GLASS EDGING AND BEVELLING LINES

Adelio Lattuada
Bando Kiko
 Bavelloni
Bottero
Glaston Group

Hiseng Glass Machinery
Intermac - Biesse
 IOCCO Group
SKG - Skill Glass
 Teknik Elmas
 Tesir Makine

DOUBLE-EDGE GRINDING MACHINES

Ashton Industrial Sales
 B Solution
Bando Kiko
 Bavelloni
Bottero
 CMS
Forvet
 Hiseng Glass Machinery
Intermac - Biesse
 IOCCO Group
Schiatti Angelo
 Teknik Elmas
 Tesir Makine

VERTICAL-EDGE GRINDING MACHINES

Adelio Lattuada
 B Solution
Bando Kiko
 Bavelloni
Bottero
 Di Gregorio
Forel
Glass Company
Glaston Group
 Hiseng Glass Machinery
 Neptun
Schiavo
Schiatti Angelo
 SGM - Special Glass Machinery
North Glass Technology
SKG - Skill Glass
 Tesir Makine

GRINDING SPINDLES

Schiavo
 Tecno Glass
 Teknik Elmas

BEVELLING MACHINES FOR ROUND AND SHAPED GLASS

Adelio Lattuada
Bando Kiko
 Bavelloni
 CMS
 Hiseng Glass Machinery
Intermac - Biesse
Schiavo
 Teknik Elmas
 Tesir Makine

STRAIGHT-EDGE BEVELLING MACHINES

Adelio Lattuada

Bando Kiko
 Bavelloni
 Bovone Elett.
 CMS
Glass Company
 Hiseng Glass Machinery
Schiavo
Schiatti Angelo
 Teknik Elmas
 Tesir Makine

BEVEL POLISHING MACHINES

Adelio Lattuada
Bando Kiko
 Bavelloni
 Bovone Elett.
 CMS
 Hiseng Glass Machinery
Intermac - Biesse
 Teknik Elmas
 Tesir Makine

STRAIGHT-EDGE ENGRAVING MACHINES

Bavelloni
Bottero
 CMS
Intermac - Biesse
SKG - Skill Glass
 Teknik Elmas

SHAPED GLASS ENGRAVING MACHINES

Bavelloni
Bottero
 CMS
Intermac - Biesse
 Teknik Elmas
 Tesir Makine

CORNER GRINDING MACHINES

Adelio Lattuada
 Ashton Industrial Sales
 B Solution
 Bavelloni
 CMS
Intermac - Biesse
 SGM - Special Glass Machinery
SKG - Skill Glass
 Teknik Elmas
 Tesir Makine

SHAPED GLASS GRINDING MACHINES

Adelio Lattuada
 Ashton Industrial Sales
Bando Kiko
 Bavelloni
Bottero
 CMS
Forel
Glass Company
 Hiseng Glass Machinery

Intermac - Biesse

Teknik Elmas
Tesir Makine

BELT GRINDING MACHINES

Adelio Lattuada

Ashton Industrial Sales
Fenzi
Hiseng Glass Machinery
IOCCO Group
Si.Ste

LATHES - VERTICAL AND HORIZONTAL

CMS
Fenzi
Teknik Elmas
Tesir Makine

EMBOSSING MACHINES

CMS
Fenzi

PORTABLE MACHINES

Fenzi
Helios Quartz
Si.Ste
Tecno Glass

DIAMOND TOOLS

Adelio Lattuada
ADI - Surface Group
Ashton Industrial Sales
Bando Kiko
Bovone Diamond Tools
Bottero
Diamut - Biesse
Fenzi
Glaston Group
Lanzetta
Marrose Abrasives
Mole Moreschi
Neptun
Schiavo
Talamoni
Teknik Elmas
Vincent - Surface Group

DIAMOND BELTS

Mole Moreschi

SEAMING LINES

Ashton Industrial Sales

MANUAL LINES

Ashton Industrial Sales

POLISHING WHEELS

Adelio Lattuada
ADI - Surface Group
Bando Kiko
Bovone Diamond Tools
Diamut - Biesse
Dogo
Fenzi
Glaston Group

Italmole
Marrose Abrasives
Mole Moreschi
RBM Italia - Surface Group
Schiavo
Si.Ste
Teknik Elmas
Vincent - Surface Group

POLISHING AGENTS AND OXIDES

ADI - Surface Group
Bovone Diamond Tools
Fenzi
Schiavo
Teknik Elmas
Vincent - Surface Group

POLISHING BELTS

Di Gregorio
Fenzi
Schiavo
Si.Ste

COOLANTS

Adelio Lattuada
Bovone Diamond Tools
Fenzi
Schiavo

GLASS GRINDING AND BEVELLING COOLANTS

Schiavo
Teknik Elmas

SEPARATORS FOR GLASS-SOLIDS

Ashton Industrial Sales
Dieffe Macchine
Filtraglass
Immmes
Schiavo
Vitrosep

ACCESSORIES

ADI - Surface Group
CMS
Fenzi
Helios Quartz
IOCCO Group
Lanzetta
Mole Moreschi
Schiavo
Schiatti Angelo
Teknik Elmas
Vincent - Surface Group

Washing

HORIZONTAL WASHING MACHINES

Ashton Industrial Sales

Bando Kiko

Bavelloni
Bovone Elett.
Di Gregorio
ECOL
Forel
Glass Company
Glaston Group
Hiseng Glass Machinery
IOCCO Group
Lisec Group
Neptun
Schiavo
SGM - Special Glass Machinery
Si.Ste
Triulzi

VERTICAL WASHING MACHINES

Adelio Lattuada
Ashton Industrial Sales
Bavelloni
Best Makina
Di Gregorio
ECOL
Forel
Glass Company
Glaston Group
Hiseng Glass Machinery
IOCCO Group
Lisec Group
Neptun
Schiavo
SGM - Special Glass Machinery
North Glass Technology
Si.Ste

S.T. Group
Stefiglass
Teknik Elmas
Tesir Makine
Triulzi

WASHING MACHINES FOR AUTOMOTIVE GLASS

Bando Kiko
ECOL
Glaston Group
IOCCO Group
Tesir Makine
Triulzi

WASHING PURIFICATION SYSTEMS

Dieffe Macchine
Forel
Glass Company
Glaston Group
Immmes
IOCCO Group
Schiavo

LIQUID WASHING CONCENTRATES

Schiavo

ACCESSORIES

Helios Quartz
Idrotecnica
Neptun
Schiavo
S.T. Group

Mirror production

COMPLETE PLANTS & CONVEYORS FOR MIRROR PRODUCTION

Bovone Elett.
IOCCO Group
Triulzi

PAINTING EQUIPMENT

Fenzi
IOCCO Group
Triulzi

DRYING OVENS

Bovone Elett.
CMS

AUTOMOTIVE MIRROR BENDING FURNACES

Bovone Elett.
Tecnosens

MANUAL SILVER- SPRAYING EQUIPMENT

Fenzi
Glass Company

PAINTS AND CHEMICAL PRODUCTS

Fenzi

ACCESSORIES

Fenzi
Helios Quartz

Insulating glass

COMPLETE INSULATING GLASS LINES

Ashton Industrial Sales
Bavelloni
Best Makina
Di Gregorio
Forel
Glass Company
Glaston Group
Marval
Neptun
Schiavo
SGM - Special Glass Machinery
S.T. Group

Thermoseal Group
Triulzi

AUTOMATIC SEALING LINES

Bavelloni
Easy Automation
Forel
Glaston Group
Lisec Group
Marval
S.T. Group
Teknik Elmas
Tesir Makine

AUTOMATIC SPACER BENDING MACHINES

Bavelloni
Best Makina
Fenzi
Forel
Glaston Group
IOCCO Group
Lisec Group
Marval
Schiavo
S.T. Group
Thermoseal Group

DESICCANT SALT FILLING MACHINES

Ashton Industrial Sales
Bavelloni
Best Makina
Di Gregorio
Fenzi
Forel
Glaston Group
Lisec Group
Marval
Neptun
Schiavo
Stefani
S.T. Group
Tecno Glass
Thermoseal Group
Triulzi

SPACER CUTTING SAWS

Ashton Industrial Sales
Bavelloni
Best Makina
Di Gregorio
Fenzi
Forel
Lisec Group
Marval
Neptun
Schiavo
S.T. Group
Tecno Glass
Tesir Makine
Thermoseal Group

BUTYL EXTRUDERS

Bavelloni

Best Makina
Di Gregorio
Forel
Glaston Group
Lisec Group
Marval
Neptun
Schiavo
Si.Ste
Stefani
S.T. Group
Tecno Glass
Thermoseal Group
Triulzi

HOT-MELT EXTRUDERS

Bavelloni
Best Makina
Di Gregorio
Easy Automation
Fenzi
Forel
Lisec Group
Marval
Neptun
Schiavo
Si.Ste
Stefani
S.T. Group
Tecno Glass
Thermoseal Group
Triulzi

POLYURETHANE EXTRUDERS

Bavelloni
Best Makina
Easy Automation
Fenzi
Forel
Glaston Group
Lisec Group
Marval
Schiavo
S.T. Group
Tecno Glass

POLYURETHANE ENCAPSULATION

Glaston Group
Lisec Group
Marval
Schiavo

SILICONE EXTRUDERS

Best Makina
Di Gregorio
Fenzi
Forel
Glaston Group
Lisec Group
Marval
Schiavo
S.T. Group
Tecno Glass
Triulzi

POLYSULPHIDE SEALANT EXTRUDERS

Best Makina
Fenzi
Forel
Glaston Group
Lisec Group
Marval
Schiavo
Stefani
Tecno Glass
Triulzi

GAS FILLING EQUIPMENT

Di Gregorio
Fenzi
Forel
Glaston Group
Lisec Group
Marval
Neptun
Schiavo
Si.Ste
Sparklike
Stefani
S.T. Group
Tecno Glass
Thermoseal Group

DESICCANT SALTS

Ashton Industrial Sales
Di Gregorio
Fenzi
Neptun
Schiavo
Stefani
S.T. Group
Tecno Glass
Thermoseal Group

SPACERS/PROFILES

Ashton Industrial Sales
Edgetech Europe
Fenzi
Schiavo
S.T. Group
Tecno Glass
Thermoseal Group

GEORGIAN BARS

Ashton Industrial Sales
Hegla
Tecno Glass
Thermoseal Group

BUTYL

Ashton Industrial Sales
Fenzi
Stefani
Thermoseal Group

POLYSULPHIDE SEALANTS

Fenzi
Stefani

HOT MELT

Ashton Industrial Sales
Fenzi
Stefani
Thermoseal Group

OTHER SEALANTS

Fenzi
Stefani

PANTOGRAPHES

Fratelli Pezza

ACCESSORIES

Ashton Industrial Sales
Deltamax Automazione
Forel
Helios Quartz
Schiavo
Sparklike
Stefani
S.T. Group
Tesir Makine
Triulzi

Tempering

TEMPERING FURNACES (ARCHITECTURAL GLASS)

Glass Company
Glasstech Inc.
Glaston Group
Hornos Industriales Pujol
Jinglass
Keraglass
Landglass Technology
Lema
Lisec Group
Mappi International
Schiavo
North Glass Technology
Tecnosens
Tekno Kilns
Texpack

TEMPERING FURNACES (AUTOMOTIVE GLASS)

Glass Company
Glasstech Inc.
Glaston Group
Jinglass
Keraglass
Landglass Technology
Mappi International
Mazzaroppi Engineering
Satinal Spa
SGLASS
North Glass Technology
Taifin
Tecnosens
Texpack

CHEMICAL TEMPERING EQUIPMENT

Glass Company
R.C.N. Solutions

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 Spa

SGLASS

Taifin

Tekno Kilns

Torgauer Maschinenbau

Bending

BENDING FURNACES (ARCHITECTURAL GLASS)

Hornos Industriales Pujol

Jinglass

Keraglass

Mappi International

Mazzaroppi Engineering

R.C.N. Solutions

SGLASS

Tecnosens

Tekno Kilns

Texpack

BENDING FURNACES (AUTOMOTIVE GLASS)

Glass Company

Glasstech Inc.

Glaston Group

Jinglass

Keraglass

Mappi International

Mazzaroppi Engineering

R.C.N. Solutions

Satinal Spa

Si.Ste

Taifin

Tecnosens

Texpack

ACCESSORIES

Ayrox

Deltamax Automazione

Glass Company

Glasstech Inc.

Glaston Group

Hornos Industriales Pujol

Keraglass

Mappi International

Satinal Spa

Softeco

Tekno Kilns

Laminated glass production

COMPLETE PLANTS

Bovone Elett.

Bottero

Forel

Glass Company

Glaston Group

Hornos Industriales Pujol

IOCCO Group

Italmatic

Lisec Group

Mazzaroppi Engineering

R.C.N. Solutions

Satinal Spa

Si.Ste

Texpack

Triulzi

LAMINATED WINDSCREEN BENDING FURNACES

ECOL

Glass Company

Glasstech Inc.

Glaston Group

Keraglass

Mappi International

Taifin

Texpack

AUTOClaves

Bürkle

Glass Company

Glaston Group

Hornos Industriales Pujol

Italmatic

Lisec Group

Triulzi

AUTOClave-FREE LAMINATED GLASS PRODUCTION

Bürkle

CLIMATIC CABINS

Forel

Glaston Group

IOCCO Group

Lisec Group

Triulzi

INFRARED OVENS

ECOL

Forel

Glass Company

Glaston Group

Hornos Industriales Pujol

IOCCO Group

Lisec Group

Satinal Spa

SGLASS

Triulzi

PRESSES/BENDING MACHINES

Forel

IOCCO Group

Lisec Group

Triulzi

RESIN LAMINATING MATERIALS AND EQUIPMENT

IOCCO Group

Satinal Spa

Teknik Elmas

Torgauer Maschinenbau

EVA (ETHYLENE VINYL ACETATE)

Satinal Spa

PVB

Everlam

Kuraray - Trosifol

Tecnosens

PVB - SHAPING AND CUTTING EQUIPMENT

Ayrox

ECOL

Forel

Glaston Group

IOCCO Group

Lisec Group

Softeco

PVB - WIRING TECHNOLOGY FOR HEATABLE LAMINATES

Ayrox

Easy Automation

ECOL

Softeco

EVA (ETHYLENE VINYL ACETATE)

Tecnosens

ACCESSORIES

Ayrox

Bottero

Deltamax Automazione

Eurotech Way

Glaston Group

Helios Quartz

Hornos Industriales Pujol

IOCCO Group

Lisec Group

Satinal Spa

Softeco

Taifin

Triulzi

Drilling

AUTOMATIC DRILLING LINES

B Solution

Bando Kiko

Bavelloni

Forvet

Glaston Group

Intermac - Biesse

IOCCO Group

Neptun

Schiatti Angelo

SKG - Skill Glass

Teknik Elmas

Tesir Makine

Vismara

MULTI-SPINDLE DRILLING MACHINES

B Solution

Bando Kiko

Bavelloni

CMS

Forvet

Glass Company

Glaston Group

Intermac - Biesse

IOCCO Group

Neptun

Schiavo

Schiatti Angelo

SKG - Skill Glass

Teknik Elmas

Tesir Makine

Vismara

DRILLING MACHINES WITH OPPOSITE DRILLING HEADS

B Solution

Bando Kiko

Bavelloni

Bottero

CMS

Di Gregorio

Fenzi

Forvet

Glaston Group

Hiseng Glass Machinery

Intermac - Biesse

IOCCO Group

Neptun

Schiavo

Schiatti Angelo

SKG - Skill Glass

Teknik Elmas

Tesir Makine

Vismara

COLUMN DRILLING MACHINES

B Solution
Bottero
 Di Gregorio
 Fenzi
 Neptun
Schiavo
 Si.Ste
 Tesir Makine
 Vismara

PORTABLE DRILLING MACHINES

CMS
 Fenzi
Schiavo
 Si.Ste
 Teknik Elmas
 Tesir Makine

DRILLING AND MILLING MACHINES

Bavelloni
Bottero
 CMS
Forvet
 IOCCO Group
 Neptun
Schiavo
 SGLASS
 Teknik Elmas
 Tesir Makine
 Vismara

DIAMOND DRILLS

ADI - Surface Group

Bovone Diamond Tools
 Diamut - Biesse
 Fenzi
Glaston Group
 Lanzetta
 Mole Moereschi
 Neptun
Schiavo
 Si.Ste
 Teknik Elmas
 Tesir Makine
Vincent - Surface Group

ACCESSORIES

CMS
 Fenzi
 Neptun
Schiavo
 Si.Ste
 Teknik Elmas

Other equipment and plants

TURNKEY PLANTS / ENGINEERING - FOR BUILDING GLASS

Bando Kiko
Bottero

Cugher Glass Glaston Group

Horn
Intermac - Biesse
 IOCCO Group
Keraglass
Lisec Group
 Torgauer Maschinenbau

TURNKEY PLANTS / ENGINEERING - FOR AUTOMOTIVE GLASS

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

KEY PLANTS / ENGINEERING - FOR DISPLAY GLASS

Bando Kiko
Cugher Glass
 Torgauer Maschinenbau

EDGES ROLLER COATING MACHINE

Eurotech Way

WORK CENTRES - CNC CONTROLLED

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

FLOAT PLANTS/LINES (EQUIPMENT & ACCESSORIES)

Bovone Elett.
 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

Bürkle
 Giardina Group Glass Division

SPRAYING TECHNOLOGY

Bürkle
 Giardina Group Glass Division

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

Bürkle
 Giardina Group Glass Division

SANDBLASTING SYSTEMS, EQUIPMENT AND PLANTS - OPTIMIZERS

Di Gregorio
 Fenzi
 Fratelli Pezza
Glass Company
Schiavo
SKG - Skill Glass

DIGITAL INKJET PRINTERS

Glass Company
 System Ceramics
 TecnoFerrari

SCREEN PRINTING EQUIPMENT AND PLANTS

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

SCREEN PRINTING FRAMES

COMSS

SCREEN PRINTING DRYING SYSTEMS

COMSS
Cugher Glass
Glass Company
Rollmac division of GeMaTa

EDGES ROLLER COATING MACHINE

Giardina Group Glass Division

ACIDING GLASS EQUIPMENT AND PLANTS

Lisec Group
Rollmac division of GeMaTa

LASER DECORATING MACHINES

Ashton Industrial Sales
Glass Company

LASER MARKING

Ashton Industrial Sales

Artistic glass production

CERMAMIC INKS

Glass Company

CHAMBER ELECTRIC KILNS

Glass Company
Keraglass
 Tekno Kilns

ACCESSORIES

Deltamax Automazione
Helios Quartz

CUTTERS

Si.Ste

CUTTING WHEELS

Si.Ste

MANUAL GRINDING MACHINES

Di Gregorio

UV ADHESIVES

Si.Ste

Miscellaneous

ADHESIVES FOR GLASS BONDING

Si.Ste

AUTOMATION

Ashton Industrial Sales
 Easy Automation
 Horn
 IOCCO Group
 Tecnosens
 Torgauer Maschinenbau
 Zippe

AUTOMOTIVE GLASS APPROVAL SERVICES

Ayrox
Softeco
Tecnosens
Teknik Elmas

AUTOMOTIVE GLASS QUALITY CONTROL

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

CE MARKING - QUALITY CONTROL EQUIPMENT FOR GLASS IN BUILDING

Ayrox
Softeco

COATING OF GLASS SHEETS - SYSTEMS & MATERIALS - HOT / COLD END

Bürkle

COLOURS & ENAMELS - OTHER APPLICATIONS

Ayrox

CUTTERS

Tesir Makine

CUTTING WHEELS

Teknik Elmas
Tesir Makine

DEIONIZING AND WATER SOFTENING EQUIPMENT

Fenzi
Forel
Glass Company
Idrotecnica
Lisec Group
Triulzi

DEIONIZING AND WATER SOFTENING EQUIPMENT

Immmes

DIAMOND ROUTER EQUIPMENT - PORTABLE

Teknik Elmas
Tesir Makine

FLAT GLASS QUALITY CONTROL DEVICES

Ayrox
Deltamax Automazione
Forel

IOCCO Group
Softeco
Tecnosens

FURNACES

Glass Company
Horn
Texpack

FURNACES / HYDROGEN GENERATORS (WATER ELECTROLYSERS)

Nel Hydrogen

GLASS COATING AND TINTING

Bürkle
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

HINGES FOR GLASS DOORS

Si.Ste

INSPECTION INSTRUMENTS & INTENSIMETERS

Tecnosens

INFRARED TUBES

Helios Quartz
Deltamax Automazione

KILNS

Glass Company
Keraglass
Lisec Group
Tekno Kilns
Fenzi

METAL ACCESSORIES

Si.Ste
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

POWDER OR LIQUID APPLICATION SYSTEMS FOR PROTECTING FLOAT GLASS

BOST
Cugher Glass
Glass Company

PUMPING AND APPLICATION SYSTEMS (AUTOMOTIVE GLASS)

IOCCO Group

PURIFIERS FOR REFLUENT WATER

Dieffe Macchine
Immes

PUTTIES AND SEALANTS

Fenzi

QUARTZ EQUIPMENT

Helios Quartz

SHAPE CHECKING DEVICES

Easy Automation
IOCCO Group

RAW MATERIALS

BOST

SHOWER ENCLOSURES

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
Lisec Group

SURFACE STRESS MEASUREMENT INSTRUMENT

Ayrox
Glass Company
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WINDSCREEN STRESS MEASUREMENT INSTRUMENT

Tecnosens

WINDSCREEN AND BACKLITES

Tecnosens

TESTING FOR SOLDERINGS

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Easy Automation
Softeco

TESTING DEVICES OF BACKLITES ELECTRICAL HEATING

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Easy Automation
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THERMAL IMAGING SYSTEMS

Glass Company
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Optris

TIN FLOAT BATH FURNACES

Horn
IOCCO Group

TIN FLOAT BATH SIDE DETECTION DEVICES

Tecnosens

TRADE ASSOCIATIONS

Teknik Elmas
Tesir Makine

UV LAMPS

Helios Quartz

UV PORTABLE MACHINES

Helios Quartz




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1989

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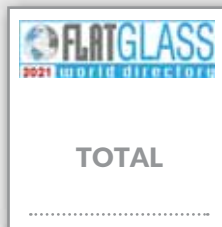
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