Glass-Technology International

THE LEADING MAGAZINE FOR THE INTERNATIONAL FLAT GLASS INDUSTRY

May/June • Year 30 • No. 3/2019

Glaston
STRATEGY REVIEW AND FINANCIAL TARGETS UPDATES

FOREL
QUALITY AND HIGH PERFORMANCE FOR VETRODOMUS WITH THE 'NO LIMITS' LINE

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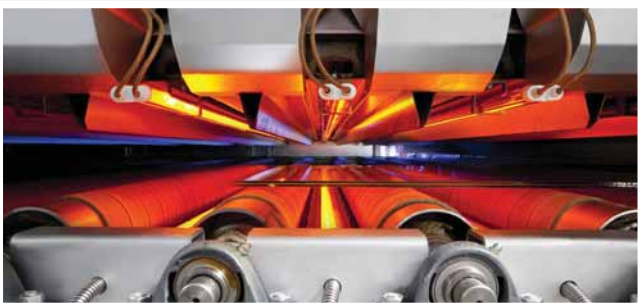
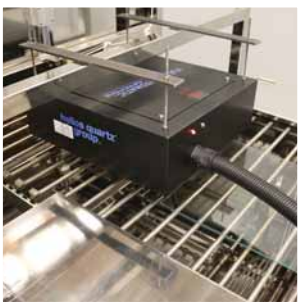

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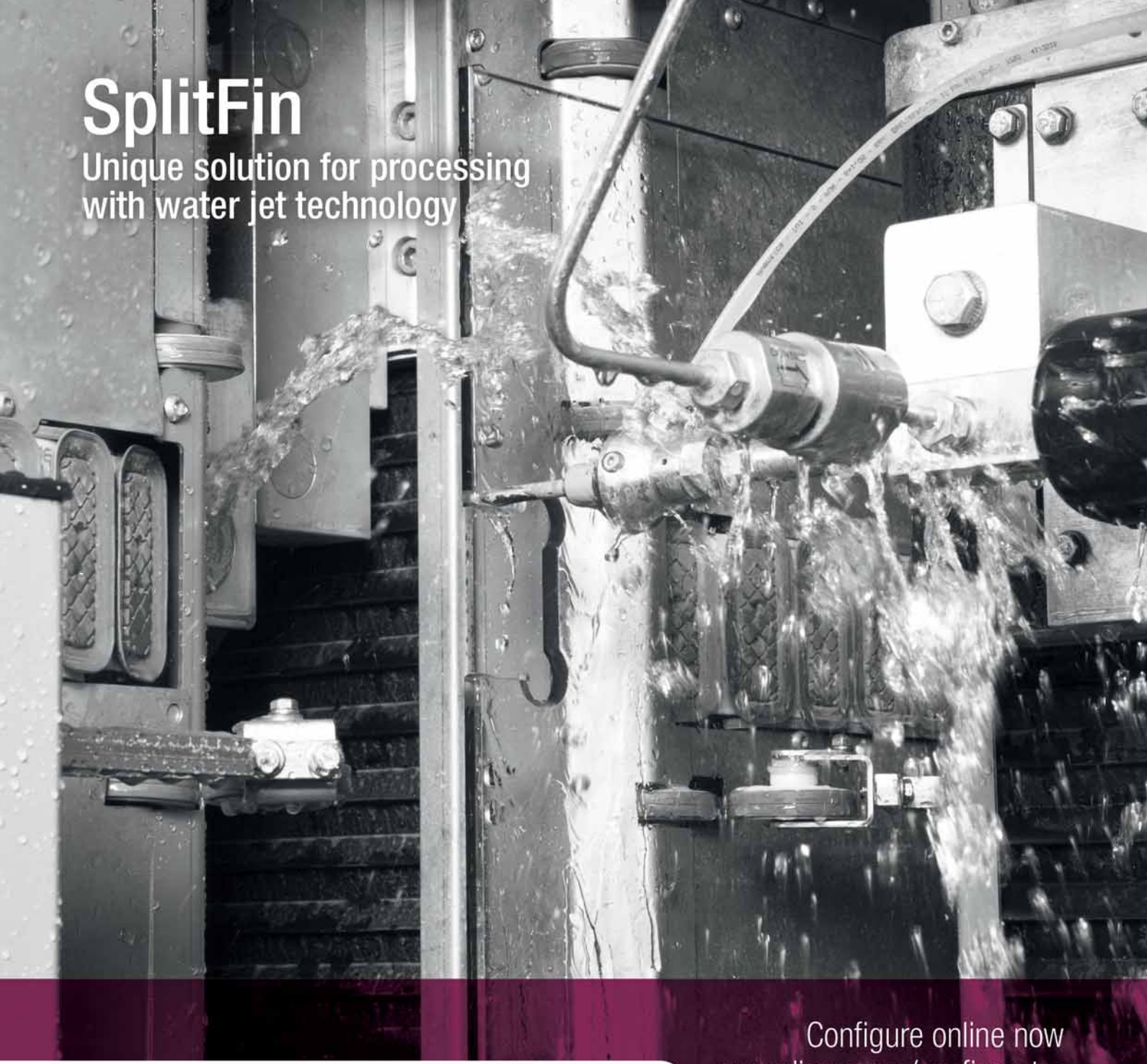

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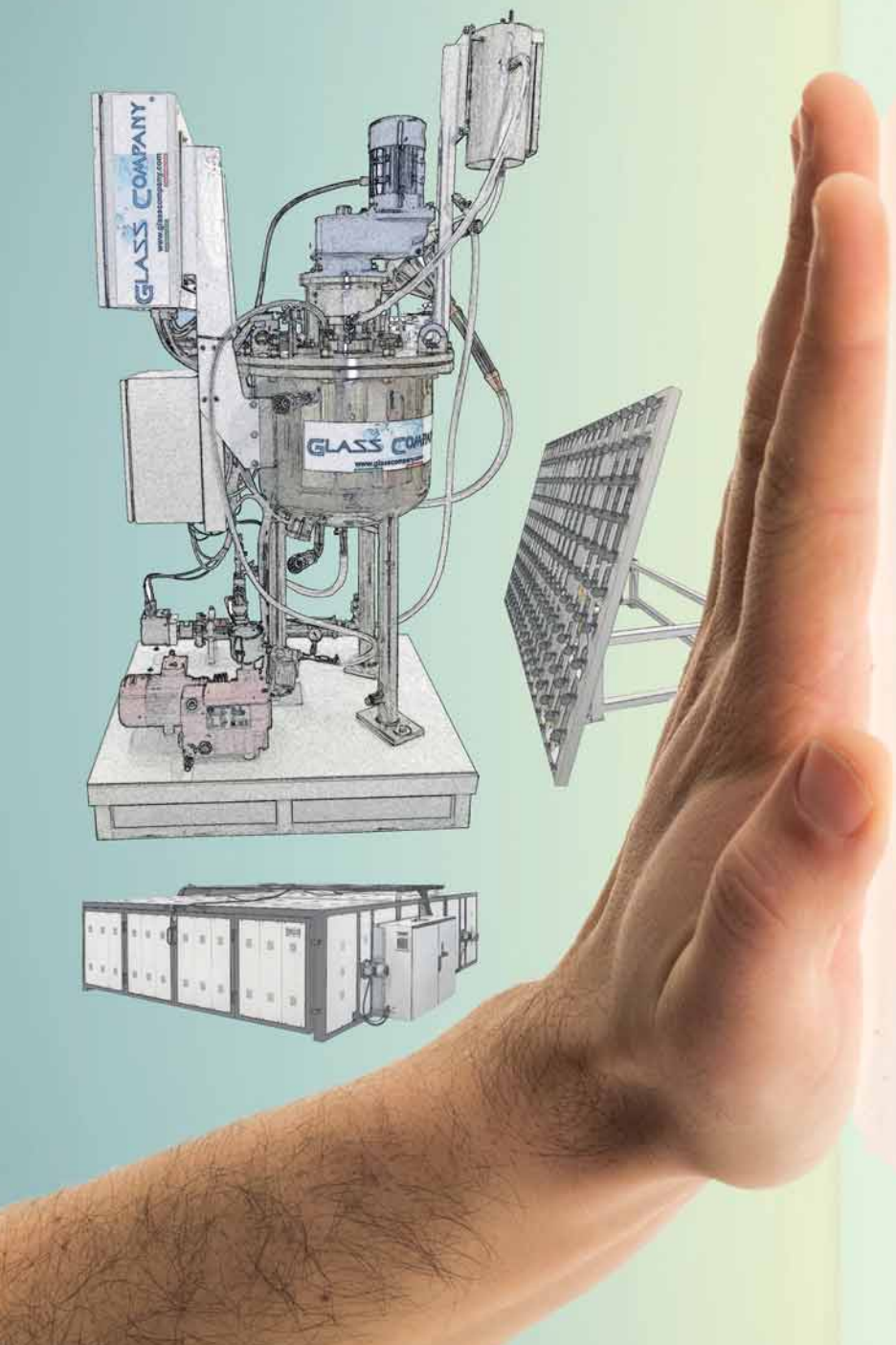

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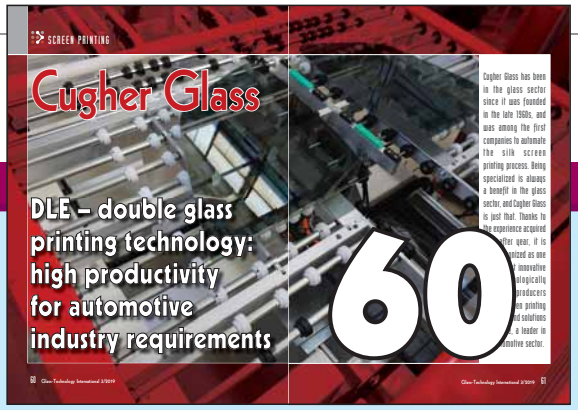

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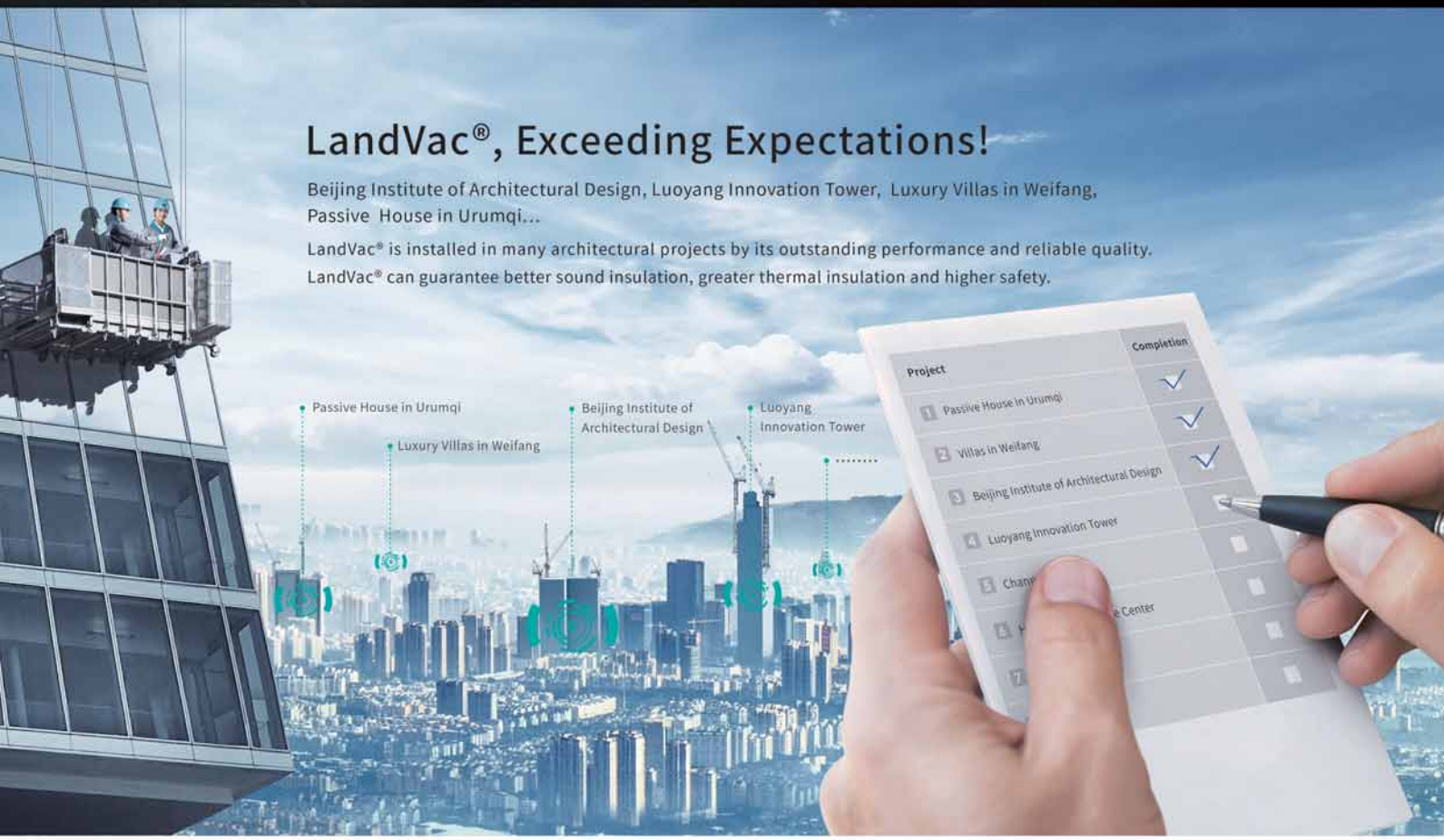

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Glass-Technology International

2019 FAIR CALENDAR

The magazine will be distributed at the following Trade Fairs

issue	exhibition/conference	date	venue	deadlines
2019 1	EURASIA GLASS	6-9 March	ISTANBUL Turkey	Editorial files: 25-01-2019
	MIR STEKLA	2-5 April	MOSCOW Russia	Deadline Adv files: 01-02-2019
2019	FLAT GLASS 2019 world directory			Editorial files: 01-03-2019 Deadline Adv files: 15-03-2019
2019 2	CONSTRUMAT	14-17 May	BARCELONA Spain	Editorial files: 05-04-2019
	CHINA GLASS	22-25 May	BEIJING China	Deadline Adv files: 16-04-2018
2019 3	GLASSTECH MEXICO	11-13 June	MEXICO CITY Mexico	Editorial files: 03-05-2019
	GPD - GLASS PERFORMANCE DAYS	26-28 June	TAMPERE Finland	Deadline Adv files: 10-05-2019
2019 4	GLASSBUILD AMERICA	17-19 September	ATLANTA (GA) USA	Editorial files: 19-07-2019
	GULF GLASS	24-26 September	DUBAI UAE	Deadline Adv files: 26-07-2019
2019 5	VITRUM	1-4 October	MILAN Italy	South Africa Glass 2019
	ALL VITRUM EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE VITRUM PREVIEW			
	GLASSPRO INDIA	10-12 October	MUMBAI India	
	SOUTH AFRICA GLASS	23-24 October	JOHANNESBURG Rep. of South Africa	Editorial files: 26-08-2019 Deadline Adv files: 06-09-2019
2019 6	GLASSTECH ASIA	12-14 November	JAKARTA Indonesia	Colombia Glass 2019
	COLOMBIA GLASS	20-21 November	BOGOTÀ Colombia	
	ZAK GLASS TECHNOLOGY	12-15 December	NEW DELHI India	Editorial files: 10-10-2019 Deadline Adv files: 18-10-2019

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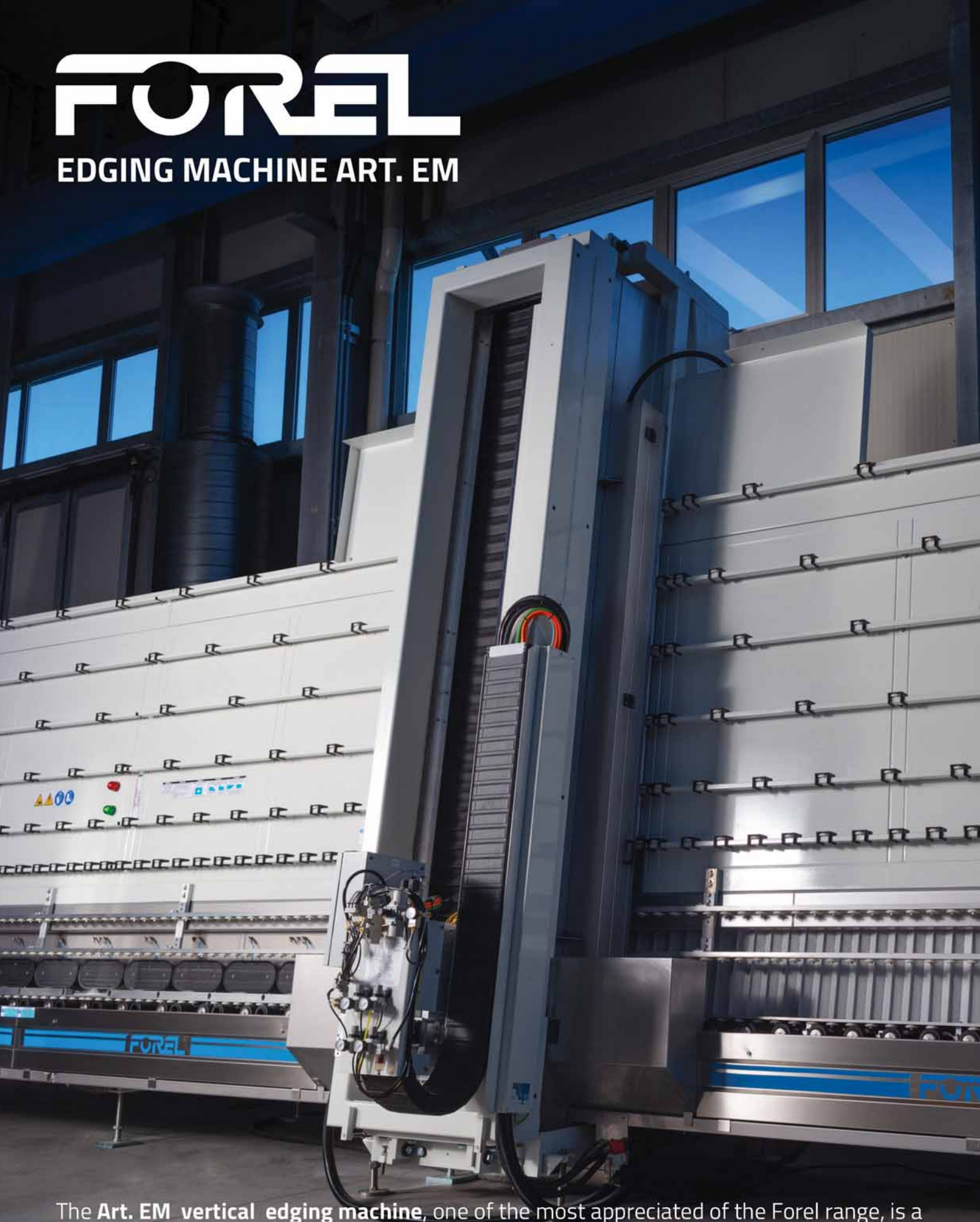

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CLAYTON GLASS

Second Neptun horizontal washer

Clayton Glass of Stanley, County Durham, UK, recently took delivery of its second **Neptun** horizontal washer supplied by *Flat Glass Solutions*. The new addition has been installed to complement the horizontal arrissing table in the toughening department, and was fitted and commissioned in less than two days.

When considering the options to replace the old washer, managing director Ryan Green asked his chief engineer Andrew Janson for his advice. "Buying another Neptun washer is fine with me, as there has not been one problem at all with the one in our North Shields factory, and it's not often I say that about washers," Andrew said.

Two weeks after the installation, Ryan said, "I haven't heard anything at all about the installation or its use afterwards, and

that is rare in itself, but it must mean that everything is working exactly as expected."

Asked about the new washer, a representative from Glass Solutions said, "Neptun is at the forefront of Industry 4.0 technology, including fully automatic robots that can pick up a piece of glass, seam all four sides, and place it on another conveyor, for a fully automatic handling and seaming solution."

WWW.NEPTUNGLASS.COM

NSG

Breaking ground on new float glass line in the US

NSG Group's new 500,000-square foot manufacturing facility, in Luckey, Ohio, is its first in the US since 1980. The new plant will produce transparent conductive oxide (TCO) coated glass to support its key customer, *First Solar*. The in facility is expected to be operational in the fourth quarter of the 2020 calendar year.

Todd Huffman, overall project manager of solar projects for NSG Group in North America, says the move was made to support the growing solar market.

"Global solar demand is expected see a double-digit growth every year over the next three years," he said. "...The decision to invest in the expanded production capacity is based on NSG Group's commitment to meet the needs of our key customer First Solar."

The Ohio plant will have a melting capacity of 600 tons per day and produce TCO coated glass using NSG's online coating technology. The production facility will also manufacture low-E and solar control glass for buildings and other markets employing transparent conductive films. The plant could create up to 150 new jobs in the area.

"The NSG Group's total investment will take place over the next three years and will include the upgrade and restart of a float line in Vietnam (Ho Chi Minh) and the construction of the new glass plant in Luckey, Ohio," continued Huffman. "The expanded production capacity for TCO glass will accelerate a shift in strategy to produce products that create more value for our customers."

The total cost of the solar expansion in Vietnam and the US is estimated to be USD 350 million.

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Cost-effective laser tool

BOLD Laser Automation, Inc. of Bedford, NH US, has announced that it has begun selling the *LGC3626 Laser Glass Cutting Platform*, a breakthrough in throughput and performance providing the US Glass Fabrication industry access to a cost-effective laser tool.

Todd Lizotte, CEO of BOLD Laser said, "The LGC3626 provides the US industry a chance to compete, by bringing laser technology within the grasp of fabricators who want to leverage laser technology for both thin and thick glass applications. By working with our laser vendors and with a focus on industry standards, we were able to offer the LGC3626 at a price point in line with industry CNC pricing."

Designated the LGC3626 Laser Glass Cutting System, the platform provides a work area of 3.6 metres by 2.6 metres, cutting tolerances of ≤0.125mm and cutting speeds in excess of 500 mm/sec with options upwards >750 mm/sec. The system can handle glass thicknesses of 0.5 mm to 8 mm, with single pass cutting of up to 4 mm.

A cost-effective solution for US domestic Glass Fabricators who are looking to add tools for new opportunities in custom architectural, automotive and domestic display glass using thin and thick glass materials.

The LGC3626 is a second generation tool based on working closely with its industry partners, glass suppliers and customer base.

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Tahvo Sutela, Lasifakta Oy

SPARKLIKE

On-site commissioning of IG gas analysis

Tahvo Sutela from *Lasifakta Oy* was commissioned to go on-site and control the level of implementation for, among other things, the insulating glass gas fill content. The chosen location was an international airport in Europe.

The quality control of IG gas fill levels was conducted using a **Sparklike** *Laser Portable™* device enabling non-destructive insulating gas analysis for triple and double glazed IGUs, even through coatings and laminated glasses.

Sparklike Laser Portable™ has the whole system integrated into a robust case, allowing easy mobility in factories and on building sites. By using Sparklike's patented and proprietary technology, device operators are able to deliver tested IG units to the end-user, test already installed units or perform long term testing to their production.

In this case, the contractor is an international construction company that operates in over 10 countries. This well-established company develops and builds apartments, business premises and entire areas. In addition, this contractor is also specialised in demanding infrastructure constructions and paving.

Measurement was performed to randomly selected units, including both double and triple glazed IGUs. When analysing customised double glazed IGUs, the gas fill levels did not always fulfil the industry requirements, since the average gas fill concentration varied between 1 and 82%. To that end, the contractor asked the glass and steel structure suppliers to observe the measurement and control of the units' insulating gas concentration. The measurement results showed clear repeatability when considering the gas concentration levels for the customised units.

The on-site insulating gas concentration analysis act as a prime example where the contractor has the possibility to verify that the level of implementation had happened according

to the original plan. For this example it meant that the measured units should have fulfilled the requested energy efficiency requirements.

In this particular commissioning case, the triple glazed IGUs were laminated with coatings on the 3rd and 5th glass surfaces.

Lasifakta was founded in 2012 by Tahvo Sutela. The company acts as an independent consulting company for the construction industry and it offers highly competitive and practical solutions such as consulting, training, calculations and problem solving as well as developmental support to their vastly growing domestic and international clientele.

With experience and knowledge gathered from decades of experience in the glass industry, Lasifakta has been working with a countless number of architects, planners and contractors.

Finnish company Sparklike is the developer and manufacturer of the world's first and only non-destructive insulating glass gas fill analysers. Non-destructivity along with different device options mean that the device operators are able to deliver tested IG units to the end-user, test already installed units or perform long term automated testing to their production. Also, depending on the device, the insulating glass gas fill analysis can be done for triple or double glazed IGUs, even through coatings and laminated glasses.

Their devices are used daily by world leading IG manufacturers, window and door manufacturers, testing laboratories, building quality inspectors and construction consultants. All Sparklike devices™ are based on their patented and proprietary technology.

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IOCCO

New market trend: switchable glass for the automotive sector

Sidelights and sunroofs to control the amount of light entering inside cars through glazing is the most recent trend offered by automotive market. The amount of light transmitted can be tuned continuously from dark to clear and vice versa at the simple touch of a button. This solution, which manages the level of solar radiance inside the car, while enabling passengers to have a view of the sky, is highly appreciated by today's auto market.

The glass used for such sidelights and sunroofs contains a special PVB (polyvinyl butyral) interlayer between two glass sheets laminated together, where a thin film of liquid crystals has been included. Light transmission is adjusted by applying an external voltage, resulting in the alignment of the suspended particles, allowing light to enter the vehicle. This system of managing transparency allows passengers to control the temperature inside the vehicle, keeping it comfortable, while reflecting invisible infrared rays.

These special automotive glass types require accurate handling at each and every step of industrial production phases. The experience gained by **IOCCO** as supplier of equipment and lines for automotive glass processing is the key to upgrade production plants according to current market demand.

PT ASAHIMAS FLAT GLASS

Mirror line at Cikampek plant

AGC Inc. announced that the *AGC Group*'s Indonesian unit, **PT Asahimas Flat Glass Tbk** (AMG), began operating a mirror line at its Cikampek plant in the first quarter of 2019 following the launch of its new float furnace and mass production on its new magnetron sputtering coater in the third quarter of 2018, marking another milestone in AGC's glass footprints in Asia. AMG was established as a joint venture in 1973 between Asahi Glass Co. Ltd. (Japanese glass manufacturer) and *PT Rodamas* (an Indonesian distributor of glass and related consumer goods).

With an integrated, state-of-the-art float glass furnace, magnetron coating line and mirror line, AMG offers a single source for a wide variety of specialty glass products and solutions catering to different market needs across the Asia-Pacific region.

The new magnetron coater with cutting-edge *AGC-Interpane Europe* technology is capable of delivering excellent products of solar control, high performance and spectrally selective glass in jumbo size up to 6 metres. A series of high-performance coatings, T-Sunlux and Stopray, targeted at residential and commercial segments for Asia-Pacific markets is launched progressively.

T-Sunlux, a temperable magnetron-coated glass, has a durable coating that is able to go through tempering without compromising on its appearance. The T-Sunlux coating presents good performance to block heat when there is excessive solar heat. With the ability to be used in both annealed and tempered versions, with a long shelf life, it provides glass processors with the flexibility to cater to project needs by just stocking one single product.

Stopray, high-performance magnetron-coated glass, gives excellent selectivity with a neutral appearance. It offers improved balance between visible light transmittance, solar control and enhanced U-values, thereby delivering maximum energy savings that meet or exceed energy code requirements. Always used in double or triple glazing, its performance is optimized and suits tropical and cold climates.

The new mirror line is a big step for AMG as it enhances its product line-up with the launch of *Mirox MNGE* (Mirox New Generation Ecological Mirrors), manufactured with patented AGC Europe technology and the same optimum levels of quality and service.

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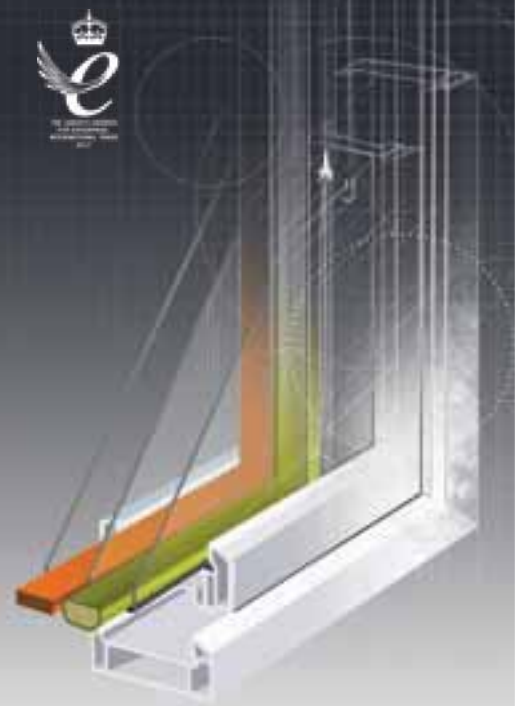

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Albrecht Luick (left), EVERLAM new CEO, and Marc Slock (right), EVERLAM Business Development and Technical Service Manager

EVERLAM

Changes in management team

EVERLAM has announced the appointment of Albrecht Luick as new CEO and of Marc Slock as Business Development and Technical Service Manager, a new position in the company

Albrecht Luick brings considerable expertise in the global chemical and automotive industries. With a BASc in chemical engineering from the University of Stuttgart, he built his career through successive managerial positions in international companies such as *PPG*, Accenture, *DuPont* and *Axalta*, in Germany, South Africa and Switzerland. An experienced leader, he has a track record in business strategic planning and development and in grooming high-performance, multi-cultural teams.

Marc Slock has spent the majority of his career in the PVB film business and has an in-depth knowledge of the laminated glass industry. Having held various senior positions in the PVB business at Monsanto, Solutia and Eastman, he is a recognised results oriented leader in the industry, with strong problem solving and customer focus skills. Marc holds a PhD in Chemistry from the University of Gent, Belgium, and is specialized in metal-organic and polymer chemistry.

Commenting on the new nominations, Aaron Parekh, Chairman of EVERLAM, said "I am delighted to have Albrecht and Marc on our team. Their backgrounds will definitely strengthen the company's capabilities and lead the company forward. Under Albrecht's leadership, and with Marc leading the business development and technical team, we expect the company to quickly build on its already strong position in the market."

"EVERLAM has achieved a great deal in the past 4 years," said Albrecht Luick, "and succeeded in positioning itself as a serious market contender. I intend to unlock even more of the company's potential and reinforce the start-up spirit that is necessary to take it to the next level of excellence."

"My objective", Marc Slock added, "is to leverage EVERLAM's technical expertise, which is a strength that all our customers acknowledge and appreciate, and make it an even stronger driver to grow the company's global business and expand it further."

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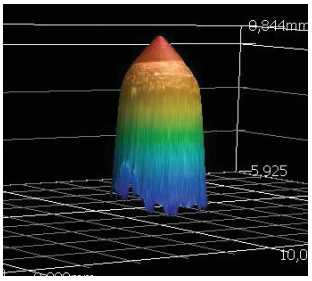

AYROX

Calibrated tools for fragmentation test

All major norms for tempered and heat strengthened glass require fragmentation testing with the use of a breaking tool. The point of the appliance has to have a radius of curvature of 0.2 ± 0.05 mm. This is the case for automotive glass (certified for ECE R43, ANSI Z26.1, etc.) as well as architectural glass (EN 12150-1, EN 1863-1, ANSI Z97.1 to name only a few).

Ayrox calibration laboratory, mainly known for the calibration of polarimeters, has decided to expand its range of services and has acquired a state-of-the-art instrument enabling the calibration of the tip of the breaking tools.

WWW.AYROX.COM

EDGETECH

Super Spacer celebrates 30th birthday

What were you doing in 1989? Indiana Jones was in the cinemas, Madonna was in the charts – and in the slightly less day-glo world of fenestration, *Super Spacer*® was released to market.

Super Spacer wasn't the first warm-edge spacer. They've been around for generations – as far back as 1865, in fact, American inventor Thomas D Stetson was patenting double-glazed windows that used wood or rope to separate glass panes.

But Super Spacer was the first 'foam' warm-edge spacer – and it was only with its launch that the warm-edge concept in general really took off. Rather than metal, Super Spacer was made with heat-insulating foam, over 950 times less conductive than aluminium, and significantly more productive for manufacturers.

Companies around the world use it to complete ambitious architectural projects. It's recently been used in Dubai's striking Museum of the Future, and in renovations to the Eiffel Tower – and, increasingly, to automate window production, and manufacture products that offer outstanding performance.

That's because Super Spacer units can be manufactured in under twenty seconds. Even using the most basic, entry-level manual application tools, some people make a unit with it in under 15 seconds. Upgrading to a fully-automated Super Spacer line the efficiency gains drastically increase. A nine-person line applying traditional rigid spacers can produce around 1,200 units every shift. A high-speed automated Super Spacer line, by contrast, can produce 23.5% more units and requires just 3 employees to operate. In total, that equals savings of approximately 180,000 UKP every year.

But that's just the beginning of the potential benefits of switching to Super Spacer. Competitor products don't just take longer to apply, they're a lot more labour-intensive too. The average rigid spacer has to be cut into bar length form, made into a frame, have PIB applied and be filled with desiccant beads before it can be used. With Super Spacer the between seven and nine processes that go into making an IGU the traditional way are cut to just three.

In an era of increasing skills shortages, Super Spacer is more relevant than ever, even three decades after its introduction. That's an astounding achievement. How many other products can you think of that are still helping their customers achieve optimal efficiency and performance 30 years after their launch?

That's why, at this year's *FIT Show*, **Edgetech UK Ltd.** celebrated Super Spacer's incredible career with a 30th birthday party.

WWW.SUPERSPACER.COM

NGA and IGMA

Joint guidelines on use of PIB Primary Sealant

The National Glass Association (**NGA**), together with the Insulating Glass Manufacturer's Alliance (**IGMA**), have announced the publication of a new jointly-produced resource for the glazing and glass products industry. The guidelines, developed by members representing both organizations, discuss the function of Polyisobutylene (PIB) Primary Sealant in insulating glass units (IGUs) with specific focus on the performance and aesthetic attributes of PIB. "This important joint industry Technical Bulletin provides details, photographs and guidelines that will be beneficial to building owners, architects, consultants, glazing contractors and IGU fabricators for understanding the difference, as well as establishing acceptable limits, for PIB squeeze out and PIB migration," explained Urmilla Sowell, NGA advocacy & technical director. The guidelines provide a thorough list of terminology applicable to the application of PIB and the use of sealant in IGUs; as well as, design considerations and illustrative definitions of specific situations (i.e. bubbles in the sealant) and their potential root causes. "PIB is one of the most commonly used primary sealants especially in commercial fabrications. This is the first of three documents that will be published on understanding PIB and a "go to" document for anyone who wants to understand how PIB should function, what is the difference between PIB squeeze out and migration and how it performs.," according to IGMA executive director Margaret Webb.

The PIB Primary Sealant guideline is the third resource produced by the two organizations. Previously-released bulletins include Guidelines for Use of Capillary Tubes and Unsupported Edge Conditions of IGUs.

WWW.IGMAONLINE.ORG/PUBLICATIONS/

WWW.TECHSTREET.COM/GANA/SEARCHES/23634919

ŞIŞECAM GROUP

Hosting of ICG in Italy

Members of Executive and Advisory Committees of the International Commission on Glass (**ICG**) from 33 countries convened at **Şişecam**'s Porto Nogaro flat glass production plant located in the north of Italy. Following a study visit to the production plant under the guidance of Professor Şener Oktik, Şişecam Group Chief Research and Technological Development Officer and Member of ICG's Executive Committee, and Beytullah Şahin, General Manager of Şişecam Flat Glass Italy SRL, "ICG 2030" strategies were discussed before noon during the meetings conducted at the plant. In the afternoon, the preparatory works for the ICG General Assembly to be held in Boston in June were completed.

Operating in the chemicals, flat glass and household glassware fields in Italy, Şişecam Group takes the lead in these business lines. The investments made in this country greatly contribute to the leading position of Şişecam Group in Europe for the chromic acid production and in the world for basic chromium sulphate production as a result of total investments amounting to EUR 120 million in Italy.

Today, Cromital S.p.A. is in a leading position in Italy, which is the largest leather processing centre in Europe, thanks to its liquid and powdered basic chromium sulphate production and sales. Holding an efficient position in the Italian household glassware market, Şişecam Group has made important investments in its logistics and distribution network besides the Paşabahçe Store in Milan. The Group reaches the US, European, Middle-Eastern and African markets via Italy.

The Group's flat glass production capacity in the country doubled up following the commissioning of Manfredonia in 2018 besides the Porto Nogaro plant with an annual production capacity of 220 thousand tonnes of flat glass and 5 million square metres of laminated glass. The Manfredonia flat glass production plant has an annual production capacity of 190 thousand tonnes besides a laminating line with an annual capacity of 4 million square metres, a coating line with an annual capacity of 4 million square metres and a satin line with an annual capacity of 1.5 million square metres.

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MAPPI

State-of-the-art tempering for Cardinal Glass and D3 Glass

Mappi is a leader in the market of tempering furnaces, leader in quality, innovation, lowest energy consumption and in highest production. It was almost taken for granted that a leader would meet another leader and that they would cooperate together to produce excellent quality glass.

Cardinal Glass Industries is a leader in the industry of residential glass for windows and doors, with more than 6,000 employees located at 37 manufacturing locations around the United States. Everyone at Cardinal has a clear vision: design and fabricate the most advanced residential glass products in the industry.

This means heavy investment in research and development. Two R&D centres in Minnesota and Wisconsin provide new advances in glazing fenestration and then useful products for regular homeowners.

Of course excellence and innovation needs the support of cutting edge technology, like what can be found in a Mappi tempering furnace; specifically in the new *ATS 4.0 2200 4200 Xtreme Profile Convection*, with double loading, double drain and integrated washing machine.

Mappi ATS 4.0, with his flexibility, constant quality, user friendly approach, is an excellent partner for a company like Cardinal that offers turnkey solutions to window manufacturers: whether it starts with insulating glass, coated, laminated, tempered or just plain float glass.

Joe Michaels, Plant Manager at Cardinal said, "For us is fundamental to meet partners like Mappi, with our same vision in terms of quality, reliability and innovation. We particularly appreciate the great operational flexibility of the machine and its truly reduced energy consumption."

In the case of **D3 Glass**, a Florida-based glass fabricator and tempering facility there are two that represent a point of contact with the Mappi growth path.

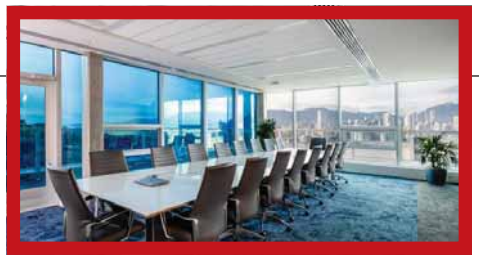
We hear what Bill Daubmann of D3 tells us: "In 2012 we purchased an ATS 1800x3000, the tool that allowed us to enter the high quality glass market with force. Today we have added a Mappi ATS 4.0 2500x5000, state of the art in the tempering of glass, which will be the protagonist of our new 60,000 sq.ft. manufacturing facility."

For D3 growth is My Shower Door, the brand that D3 has created for production and direct sales for heavy glass enclosures, including doors, hardware, and finishes. This was possible thanks to the possibility of producing high quality glass on its own, optimizing costs and time.

"We grow but our commitment remains the same. Today, as tomorrow, we believe in a better way, delivering custom glass solutions for people who refuse to compromise quality or price."

Mappi works side by side with its customers, becoming protagonists of their growth path, and this, the company say: "is the best reward for our daily commitment made of innovation, quality, constant attention to customer needs."

WWW.MAPPI.IT



Electrically charged View Smart windows in a new Vancouver office tower darken in reaction to sunlight or can be tinted with the use of a mobile app

VIEW

First 'smart window' office tower opens in Vancouver

British Columbia's first commercial office building – a triple-A class, 107,000 square foot tower by BlueSky Properties - has had **View** Smart windows installed on 10 floors of the 11 storey tower. Developed in Silicon Valley with backing from investors including Softbank and NZ SuperFund, the View Inc. smart exterior windows remove the need for blinds or screen while providing security since the glass can be also be darkened with an app, according to View customer success manager Linh Nguyen. The double-pane windows are programmed to automatically track the sun and change shading in response. While the windows reduce a building's energy use by an estimated 20% compared to conventional glazing, View is promoting the wellness aspects of the technology.

View's electrochromic windows use a single-line, low-voltage electrical current that allows a micro-thin layer of metal oxide to reflect or absorb light, tinting or untinting the windows. Cox said that 1,800 square feet of View windows draw the same power as a 60-watt light bulb, even when tinting. "It is like giant sunglasses," Nguyen said, who estimated 400 buildings in North America have had the View Smart glazing installed, with another 150 in progress. The windows can help qualify a building to up to 13 LEED (Leadership in Energy and Environmental Design) credits, according to View. BlueSky's office tower is among the first major commercial buildings equipped with the View glazing throughout. To date, View windows have been installed mostly on public buildings, including top-floor skylights at the Vancouver central public library, but it is also being used in a number of residential condo towers across North America.

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FUTURE MARKET INSIGHTS

Assessment of glass tempering system market up to 2027

Glass Tempering System Market: Global Industry Analysis (2012-2016) And Opportunity Assessment (2017-2027) is a new report of Future Market Insights that tracks the performance of the market for the projected period of 10 years i.e. between 2017 and 2027.

The global glass tempering system market is expected to witness significant growth during the forecast period, expanding at a CAGR of 3.7% during the projected period. Growth in the global glass tempering system market can be attributed to huge investments in R&D, increasing use of hybrid guide plates, solar control glazing for automotive and building glasses, growing use of lightweight glazing glass, and increasing usage of advanced nanotechnology in glass manufacturing.

According to this report, North America and APEJ are the key regions for glass tempering system market participants. In North America, the United States is investing in tempering activities, which is creating immense opportunities for glass tempering system manufacturers. Product development and establishment of long-term relationships with tempered glass OEMs is also a key to success in this market.

The global market for glass tempering system is expected to be valued at USD 94.5 million by 2017 end and is estimated to reach USD 135.6 million by the end of 2027.

Global glass tempering system market drivers include:

- shift towards renewable solar energy will accelerate the growth of the market;
- improving construction sector especially in Latin America is fuelling the growth of the global market;
- construction of energy efficient buildings and renovation of existing infrastructure is another key market driver.

On the basis of tempering technology, the global glass tempering system market is segmented into controlled heating and quenching equipment and chemical treatment. Controlled heating and quenching equipment is further segmented into standard configuration and advanced configuration. In terms of value, the controlled heating and quenching equipment segment is anticipated to be valued at 89.0 million USD by 2017 end, which is estimated to grow at a CAGR of 3.7% and reach a value of USD 127.8 million by the end of 2027.

The application segment consists of flat, bent and combined flat and bent segments. Flat segment is further segmented into continuous and oscillating segments. Oscillating type segment is expected to emerge as the most attractive segment by application over the forecast period. Combined flat and bent segment is anticipated to create incremental opportunity worth USD 4.2 million over the forecast period.

By end use the market is categorized into automotive windows, architectural, electronics, solar applications and others. Architectural segment is sub-segmented into windows and doors, mirror and partitions and furniture, while electronics segment is sub-segmented into smartphone and appliances. The solar applications segment is estimated to reach USD 1.6 million in 2027 from USD 1.3 million in 2017. The segment is estimated to grow at a CAGR of 2.4% during the forecast period.

Seven regions have been covered in this report and they are North America, Latin America, APEJ, Eastern Europe, Western Europe, Japan and MEA. China is expected to remain a strong market for glass tempering systems. Most of the APEJ, Eastern Europe, and Latin America buyers import glass tempering lines from China with standard configuration, due to investment constraints. North America is also projected to hold a significant share of the global glass tempering system market over the forecast period.

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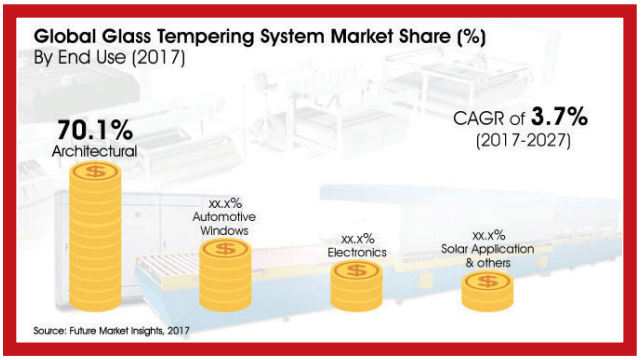

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GLASS FOR EUROPE

Maximising energy savings from glazing

Glass for Europe has released a fresh publication on the Energy Performance of Building Directive, Maximising energy savings from glazing.

The purpose of this brochure is to inform all stakeholders working on energy performance in buildings about the new EU legislative framework and how its robust implementation across European countries could help tap into the massive energy savings potential of advanced glazing.

According to several studies, the average energy performance of windows in the EU building stock is extraordinarily poor. The average thermal transmittance value of 3.4 Uw, is that of a mix of products from the late 1960s and 70s when incomparably better performance products are readily available in Europe.

While window retrofitting and performance have been overlooked for too many decades, Glass for Europe is keen on making sure that future national building codes become window and glazing-proof.

The revised Energy Performance of Buildings Directive (EPBD) must be implemented in all EU Member States in a little less than a year time. It is essential for a proper implementation that its provisions are well understood and that national stakeholders apprehend the specificities of windows so that revised national legislations can be designed in a such a way as to maximize both energy savings and the uptake of high-performance glazing. To that end, this new publication from Glass for Europe includes implementation recommendations.

"European countries cannot afford to miss the new EPBD implementation be it for energy savings, for the climate, for offering healthy and sustainable buildings to citizens or for the job creation opportunities it can generate," declared Bertrand Cazes, Secretary General of Glass for Europe, who continued, "All these promises are also those of high-performance glazing!"

GLASSFOREUROPE.COM

LANDGLASS

Launch of new intelligent glass tempering furnace

LandGlass has announced the launch of a new glass tempering furnace, developed based on its well-known and praised JetConvection technology. Backed by six major innovative technologies, it offers outstanding performance in both quality and capacity, fulfilling customers' demands for more diversified high quality flat and bent tempered glass used in architecture, furniture, automotive, home appliance and solar energy industries.

Unlike the traditional convection equipment, the new series employs the world's latest heating control technology to achieve precise control and even heating. In the meantime, by using flexible control over glass oscillation, the flatness of glass is greatly improved.

Furthermore, the new generation of glass tempering equipment can automatically adjust the heating temperature and convection strength during the process, meeting the demand for high quality tempered glass while reducing energy consumption.

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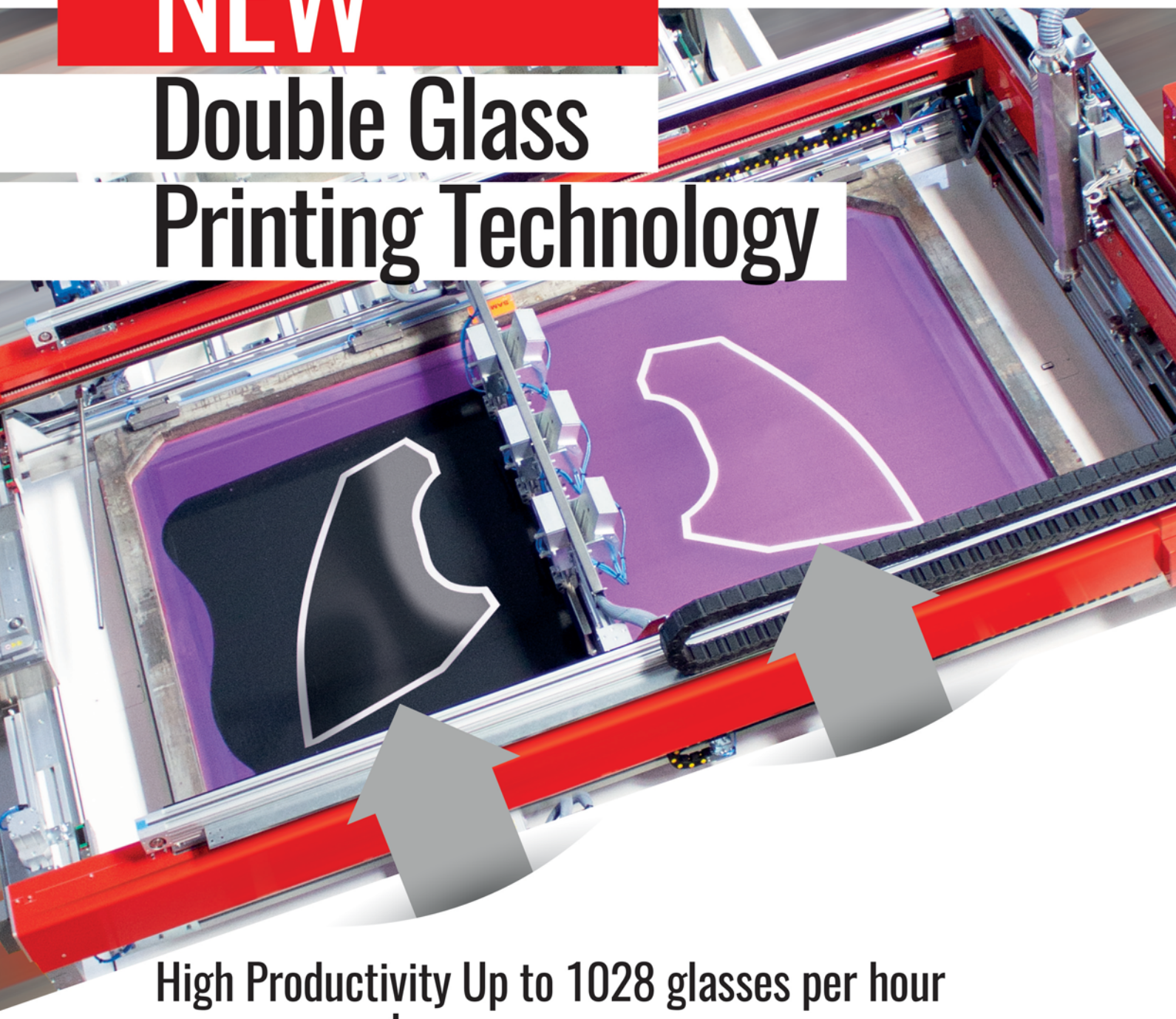

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STEWART ENGINEERS

Committed to Kyzylorda glass factory

Stewart Engineers, a co-investor in and equipment and technology provider, believes that the **Kyzylorda** float glass facility has the potential to be one of the best glass factories in the world. Stewart Engineers wants the project to be completed as quickly as possible, increasing employment in Kyzylorda and improving Kazakhstan's glass market.

During the implementation, the project has incurred many setbacks, despite this, Stewart Engineers achieved significant milestones for the project, such as:

- delivering the design on schedule;
- obtaining Kazakhstan State expertise approval of the design ahead of the construction schedule;
- supplying over USD 100 million of equipment on schedule; and
- supervising the installation of more than 1,500 tonnes of support steel.

Despite the delayed payments, Stewart Engineers delivered several thousand dollars' worth of ducting to the Kyzylorda work site as late as March 2019.

Even today, Stewart Engineers remains ahead of the construction schedule.

The process equipment cannot be installed until the buildings are complete. The following April 2019 picture shows current site conditions:

It should not be left unmentioned that over eight hundred 40-foot shipping containers worth of equipment supplied by Stewart Engineers sit at a partially completed site warehouse

Virtually all of the process equipment has been on site and ready for installation since December 2016.

According to the contract, construction is not in Stewart Engineers' scope of work. Stewart Engineers believes that the recent changes in the construction company and *Orda Glass'* ownership are positive for the future success of the project. However, Orda Glass has yet to fully address the losses and payment defaults suffered by Stewart Engineers and caused by the Baiterek corruption scandal. If all issues were resolved today so that work could commence immediately, Stewart Engineers realistically projects an August 2020 commissioning.

Stewart Engineers is ready, willing and able to return to the project once Orda Glass fulfils its contractual commitments.

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NORTHGLASS

Coated Glass Division reports new sales record

Shanghai Coated Glass Corporation, a subsidiary of **NorthGlass Group**, has officially changed its name to *Coated Glass Corporation* and has started fully managing the coating line in Luoyang. The company's business will expand to the markets in Central and West China, in a grand strategic adjustment.

According to statistics from 1 to 31 March 2019, the first month after the integration of Coated Glass Corporation, the production and sales volumes of coated glass in this single month created a new record, reaching 440,000m²; 230,000 m² compared to the production base in Shanghai, and 210,000m² from the Luoyang factory.

Since 2016, the production and sales volumes of what is now Coated Glass Corporation have increased year by year. In 2016, after the general manager Mr. Gaofeng took over the company for half a year, the production and sales volumes of coated glass reached 1,300,000m², with a year-on-year growth of nearly 20%; In 2017, the production and sales volumes reached 1 900,000m². In 2018, the production volume reached 2,200,000m², the sales volume reached 2,400,000m². The first coating line self-developed by NorthGlass in 2008 has been running smoothly for 11 years and keeps breaking its production record, thanks to the solid quality of NorthGlass' equipment.

In recent years, although faced with tougher and tougher competition and the influence of fluctuations in prices of raw materials as well as the stricter environmental policies, but NorthGlass Coated Glass Corporation kept its solid presence in the market in East China through strict management, innovative management mechanism and continuous improvement in the production capability. In particular the workers in the workshop spared no efforts to accurately control the equipment's state and expertly debug the coating system. The next strategic step for the company is to explore the markets in Central and West China, aiming to build brand reputation and maintain its market share in Central and West China.

Mr. Gaofeng said that taking over the Luoyang coating line is a challenge, but what's more is an impetus. In future, the company will not only continue to do an excellent job in the market in East China, but also better serve the markets in Central, West and North China. The company will promote both glass products and equipment manufactured by NorthGlass.

Coated Glass Corporation has great support from both the equipment manufactured by NorthGlass and dedicated staff, and it's sure to achieve new records in the future.

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Glaston

STRATEGY REVIEW AND FINANCIAL TARGETS UPDATES

The announcement of Glaston's acquisition of Bystronic glass shows how this company is continuing along its route to become a leading player in heat treatment technologies and insulating glass as well as in cutting and grinding technologies. This article takes us through the steps that Glaston will now be making to ensure this goal is reached.

Bystronic glass & Glaston teams in Russia celebrating day one at MirStekla

Glaston has reviewed its strategy and updated its financial targets for the strategy period 2018–2021 as a result of its acquisition of Bystronic glass.

The foundation of the strategy remains unchanged; Glaston will continue to seek growth in their core business and to profit in the services field through digitalization. The strengths of Bystronic glass and Glaston as well as leveraging the know-how Bystronic glass adds will allow Glaston to build a strong machinery and services offering as well as the ability to capture new growth opportunities. Implementing a joint operating model will support the company in reaching its strategic goals and in realizing the full potential of combining Glaston and Bystronic glass.

Glaston's overall strategic goal remains unchanged: their ambition is to be the industry's innovative technology leader, realizing its customers' highest ambitions in glass.

Glaston's purpose is to build a better tomorrow

Bystronic glass colleagues visiting Tampere factory

Päivi Lindqvist & Arto Metsänen celebrating day one

through safer, smarter and more energy-efficient glass solutions. The demand for environmentally sustainable and energy-efficient solutions, tightening safety standards as well as growing visual and functional quality requirements of glass, increasingly affect the way customers operate as well as impact the specifications they require from their glass processing technology partners.

Glaston's strategy is divided into four key themes:

Strategic aim: to become a global market leader in the company's core business

Glaston will focus on growth in its core business with the aim of becoming the leading player in Heat Treatment technologies and Insulating glass as well as in Cut and Grind technologies for the Automotive market.

With a versatile product portfolio, Glaston is in a strong position to respond to the demand for innova-

tive solutions. The company will seek growth in its core business, and work to develop an integrated glass processing line offering and drive the automation of equipment for the benefit of its customers.

Key goals:

- Profitably grow core machine sales, develop an integrated line offering as well as increase digitalization and level of automation in products leading up to fully automated lines.

NEW GROWTH OPPORTUNITIES

Strategic aim: to capitalize on new market potential

Combining the strengths of Bystronic glass and Glaston provides the company unique opportunities to develop the market and further strengthen positioning in the mid-market segment of its core products; in technologies for the automotive market and in emerging glass processing technologies.

Growth is sought through the development of our product portfolio and the development of an integrated line offering to better suit the glass processing mid-market segment customers' needs, especially in the Architectural market in Asia. The company will further seek to leverage the strong position of Bystronic glass in the Automotive market, further develop offerings in the mid-market segment and aim to capture cross-selling opportunities. The company will continue to seek opportunities for emerging glass processing technologies within energy efficient, smarter and safer glass.

Key goals

- Develop mid-market offering in the Architectural market.
- Leverage the strong position of Bystronic glass in the Automotive market and capture cross-selling synergies.
- Continue to look for new opportunities and technologies to support growth in the Emerging Technologies product area.

SERVICES

Strategic aim: to win in services through digitalization

Glaston believes that combining the Services businesses of Glaston and Bystronic glass will drive growth. The company will seek to leverage untapped potential from existing unique life-cycle services, its combined large installed base and extensive global service network.

Today, most of the service work is performed in-house by the customers. The company sees strong untapped potential in combining its extensive installed bases with innovations within digitalization and automation for the benefit of the customer and believes that the combined services offering of Glaston and Bystronic glass have the potential to lead to appealing benefits for the customers and provide a base for further development of proactive and predictive maintenance and optimized services, with the aim of covering the key parts of the whole processing chain in the future.

The combined service offering enables the company to expand its scope with the ambition to optimize the performance of its customers' installed base throughout the life-cycle, using data analytics and artificial intelligence to support customers' business decisions. The goal is to have the most

Glaston in China celebrating day one

competitive ecosystem in the market, benefiting the company's customers and improving their uptime and operational efficiency. The company believes this differentiates itself from the competition and puts it in a strong position to fulfil the most demanding needs of its customers.

Key goals

- Grow the Services business supported by digitalization.

JOINT OPERATING MODEL

The company's strategic goals are supported by a joint operating model which will assist in realizing the full synergy potential of combining Glaston and Bystronic glass. The aim is to develop a cohesive and effective operating model for sales, service and operations, capture synergy potential and continuously improve the company's performance. The first phase of building the joint operating model targets cost synergies, cross-selling, strengthening Glaston and Bystronic joint presence in Asia and further developing integrated line offerings for relevant end markets.

Key goals

- Develop cohesive and effective operating model for sales, service and operations. Realize full synergy potential.

UPDATED FINANCIAL TARGETS

- Annual growth of net sales exceeding market growth* (CAGR)
- Comparable operating margin (EBITA)** above 8 per cent at the end of the strategy period. EBITA excludes amortizations of purchase price allocations.
- Comparable return on capital employed (ROCE)** of more than 14 per cent at the end of the period

Glaston's (without Bystronic glass) restated comparable EBITA margin for 2018 was 5.6 per cent and comparable return on capital employed 9.6 per cent. Bystronic glass is similar to Glaston in net sales and EBITA margin. The Bystronic glass acquisition, and related financing increases Glaston's equity and debt for a total of about 80 million EUR and the transaction will result in a significant amount of goodwill created. Therefore, the return on capital employed (ROCE) development will be impacted by increasing capital employed during the strategy period immediately following the transaction.

Glaston plans to publish Glaston's and Bystronic glass' unaudited combined financial information for 2018 and the first quarter of 2019 at the latest in connection with the planned rights issue, which is expected to begin during the second quarter of 2019.

*Flat glass market growth over the cycle.

**Calculation of key ratios:
Comparable EBITA excluding amortizations of purchase price allocations: Result before amortization of purchase price allocations +/- items affecting comparability
Comparable return on capital employed, per cent (Comparable ROCE): (Profit/loss before taxes + amortization of purchase price allocations +/- items affecting comparability + financial expenses x 100)/ (Equity + interest-bearing liabilities, average of 1 January and end of the reporting period).

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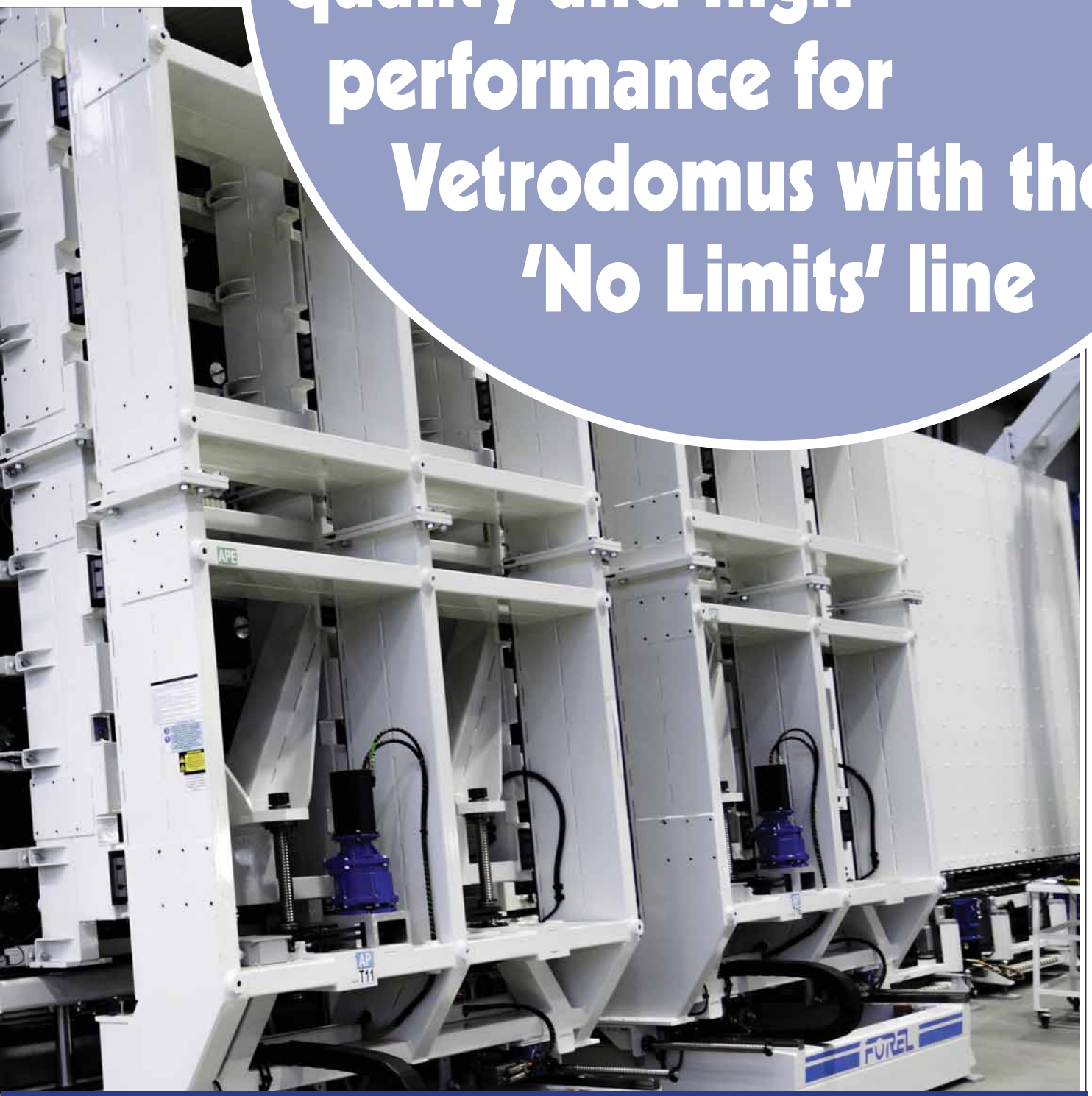
quality and high performance for Vetrodomus with the 'No Limits' line



The need to increase productivity while ensuring the quality of finished products are two main requirements for today's glass processors. In this article, we take a look at how Vetrodomus has achieved these requirements with a Forel 'No Limits' line.

"Everything is based on the quality that a glass company can offer. Superior quality allows you to connect with higher-level customers and access higher-level orders. How do you achieve quality? On the one hand, you rely on the skills and know-how of your company and employees; on the other hand, you capitalize on the tools you decide to use."

These are the words of Roberto Pastore, owner of Vetrodomus (Brescia - Italy). His company, founded over 50 years ago, is now one of the leading European companies in the large pane processing sector. With over 70 employees and a production area of 13,000 m², the company is specialised in the production of glazing for facade applications and shipbuilding. Vetrodomus was among one of the first companies to believe in Forel's 'No Limits' IGU line project, which led to the development of insulating glass lines capable of processing extra-jumbo sized glass sheets.

"We needed to increase our productivity," says Pastore, "by adding a new insulating glass line to the two existing lines. Our top priority was for high performance (the ability to handle heavy weights and support significant thicknesses and offsets) to correspond to a good level of labour productivity. We were familiar with Forel because we had already purchased a vertical edge processing line (grinding, milling and drilling, washing machine) and part of an insulating glass line, so we decided to work with them to explore a system that could go beyond the standard formats. Having made the decision

Roberto Pastore, Vetrodomus owner

Maurizio Capello, Production Manager Vetrodomus

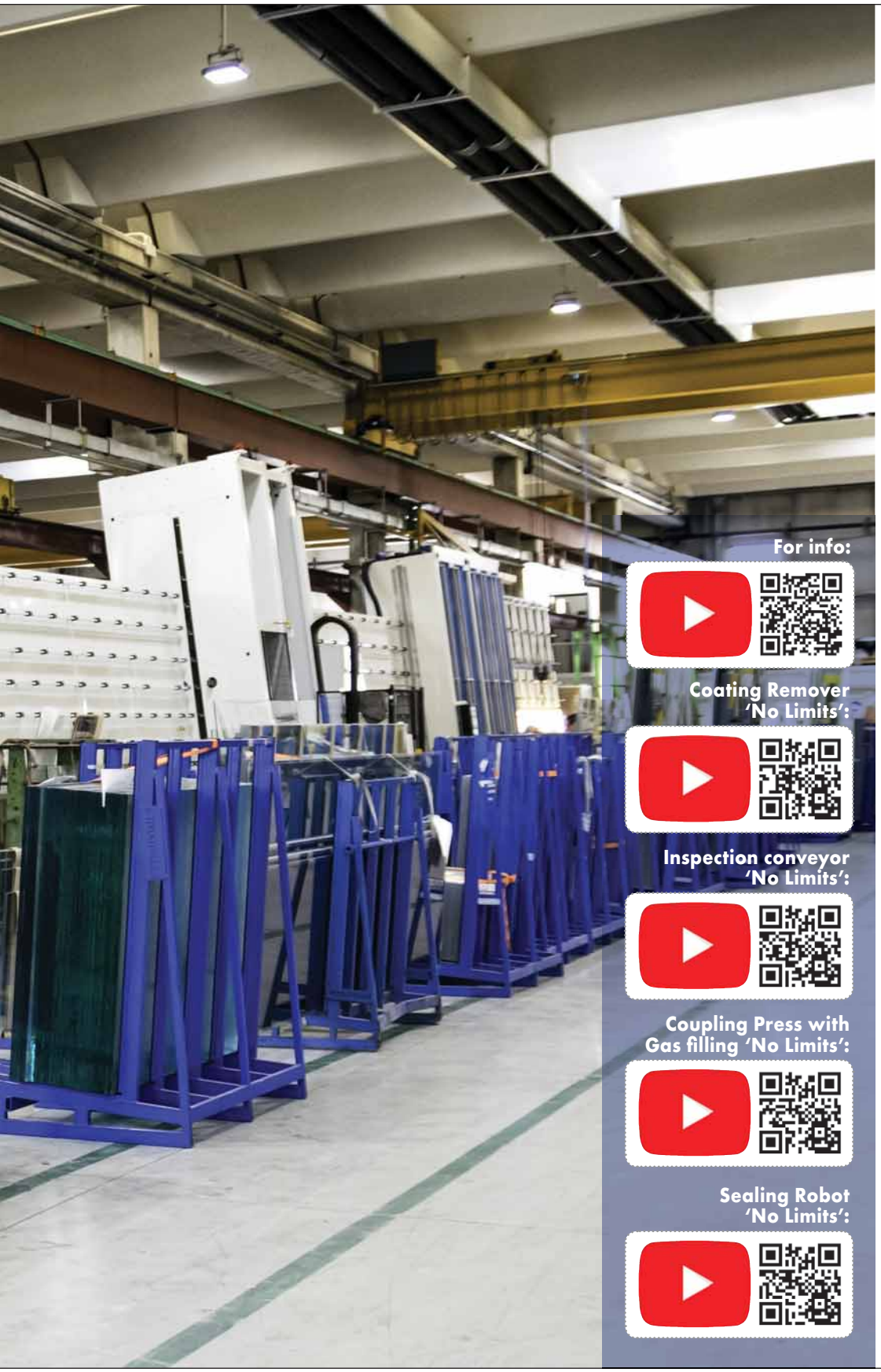
to invest, we opted to do so by opening ourselves up to new possibilities. This led us to the 'No Limits' line. We considered this choice carefully and in the end it proved to be a winner. It has superior performance characteristics and has given us access to substantial orders."

Maurizio Capello, Production Manager at Vetrodomus, played an important role in selecting and assessing the line: "We are very scrupulous in the evaluation of the machines that are proposed to us," explains Capello. "We were looking for a flexible solution that could assemble units for the international facade market. Our customers, mainly Groups that operate internationally, are very demanding in terms of accuracy and quality of finished products. As for Forel, we have always appreciated the robustness stemming from the monoblock structure that distinguishes their products. And the fact that they are made in Italy is synonymous with quality. Having made these preliminary considerations, we then compared the performance and functionality of the 'No Limits' line with the other lines on the market. We conducted a detailed analysis, which demonstrated that the Forel brand had made significant progress from a technological point of view. We decided to put our trust in the No Limits line and we made the right choice."

We end our meeting with Vetrodomus with a final question for Roberto Pastore: In a competitive and increasingly technologically advanced context like the current glass market, what strategies must a company implement to excel?

"In order to become suppliers of certain customers, you need to invest on different levels and work towards continuous improvement. To be a true leader requires efficient and effective management of the company's business processes and on-going cultivation of staff know-how through suitable


FUREL



For info:

Coating Remover 'No Limits':

Inspection conveyor 'No Limits':

Coupling Press with Gas filling 'No Limits':

Sealing Robot 'No Limits':

training. Vetrodomus, in addition to the certification of its Quality Management System, has always worked in this direction by implementing its own quality controls on products and processes. Likewise, the company is diligent in adhering to customer protocols, which are increasingly specific and demanding. Obviously, all this is complemented by the machinery. By investing on both fronts, Vetrodomus has increased its productivity and raised the bar on its objectives, enabling the company to approach a very high-level clientele now."

THE 'NO LIMITS' LINE

The Forel 'No Limits' insulating glass line by Vetrodomus is composed of a coating remover to remove low-emission coatings (Art. CRP), a washing machine (Art. VW), an inspection and frame application conveyor (Art. LCFP), a coupling flat press with gas filling (Art. APG) and a sealing robot (art. SRHP). The line can process jumbo units (6000 x H=3300mm), with a capacity per linear meter of up to 350kg for single panes and 550kg for assembled panes, with thicknesses up to 40mm for single panes and 100mm for the IG units. It can assemble units with up to three chambers and is able to handle offsets up to 250mm on the horizontal side and 1,000mm on the vertical side thanks

to the dynamic support of the coupled panes. Each machine within the line is equipped with devices developed specifically to handle large dimensions, substantial weights and any non-planarity throughout every phase.

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Turomas TFS, advanced planimetry system

The surface of Turomas cutting tables, like that of other manufacturers, historically has been made of wood. And since wood is a living material that changes when it is cold, hot, and above all, humid, the deformation that it suffers when it absorbs moisture is detrimental to achieving the best possible cutting of glass.

TABLE REDESIGNING

The concern and incessant search for the cutting of glass with exceptional quality motivated the redesigning of tables: the wood was completely removed from the support area of the glass and replaced by

In its constant search for top quality in its products and for the glass that its machinery processes, Turomas presents our readers with its most representative features.

aluminium. This measure gives greater stability to the structure. A phenolic covering is applied on the aluminium surface. The cutting bridge rectifies this covering along the way to get rid of any unevenness. It achieves a complete flatness tolerance with a perfect parallel between the table and the cutting tool. This way, stability and precision are guaranteed, something which is essential with thinner glass.

The phenolic component is also highly resistant to water, humidity, high levels of steam, many chemicals and is not highly vulnerable to damage caused by impacts and bending.

IMPECCABLE CUTTING

The combination of aluminium material and phenolic panel has two more advantages. On the one hand, simplicity when it comes to replacing one carpet with another. On the other hand, the im-mediacy of the air outlet towards the surface of the table, since the porosity of the wood is what causes the loss of air flow.

The advanced TFS planimetry system, together with the patented 4-Tool cutting tool, has led to impeccable cutting from 2 to 25 millimetres, as well as machinery that is durable over time and resistant to external conditions. “No other manufacturer in the market has implemented a process like this,” says Álvaro Tomas, Vice President of Turomas.

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RCN AND RIVA

WHEN CHEMICAL TEMPERING EXPERTISE REACHES OUT TO MAJOR GLOBAL GLASSMAKERS

We recently went to speak at some of the top people at RCN, who not only discussed how chemical tempering is continuing to gain market share, but also how its machines are now reaching out to important global glassmakers looking for ways to reduce glass thicknesses.

Roberta Cometti, RCN: How to have glass that is strong but with reduced thickness and deforming? Chemical tempering, of course, a process that is no longer used

Gianfranco Rivaroli

Roberta Cometti

Alessandro Rivaroli

only for special glass types or standard sizes, but now also customized.

Gianfranco Rivaroli, RIVA: Thanks to the collaboration between RCN and RIVA, we are moving forward in the development of chemical tempering, to have furnaces of 'important' sizes, used for architectural, automotive and naval glass – so large glass sizes. And the fact that chemically tempered large glass sizes have now been approved by RINA – a body that controls the standards for glass used in nautical applications – is an important step forward.

This means that we are continuing to propose our plants in diverse sectors and companies – from important global groups to small companies, because our plants can temper both small sizes and large glass sheets.

Roberta Cometti, RCN: Let's say that we are working on creating and increasing the 'idea' of chemical tempering in sectors in which up to now it has not been taken into consideration for diverse reasons.

As we all know, chemical tempering is not a new process, but its use has never been, until now, so widespread. This was due to the fact that the benefits of chemical tempering were not so well-known compared to thermal tem-

THE EVOLUTION OF TEMPERED GLASS

Chemical tempering is moving forward, gaining more and more appreciation and demand, thus extending its application to several industries: aeronautic, aerospace, naval, military, automotive, electronic, optical and in all those projects demanding special curves and reduced glass thicknesses.

Chemical tempering, especially important for the curved glass, is the par excellence and definitive answer to the compromise between thicknesses and shapes, achieving perfect flatness, mainly for glass thicknesses lower than 2mm., allowing chemical tempered glass to be perfectly coupled and laminated accordingly.

The process

Chemically tempered glass is a glass which has been strengthened by an ion exchange process, occurring at a temperature of about 450°C.

After pre-heating, the glass is immersed in a fused potassium salt bath thus starting the chemical process. During this time, the glass is exposed to an ion exchange between sodium (Na+), contained into the molecular structure of the glass, and potassium (K+), the chemical element the salt is made of.

This process takes place thanks to the difference of the electro-chemical potentials of the ions themselves.

How does it work?

The process provokes a space reduction between the glass particles that are compressed by the bigger size of the potassium ions. It results in a complex system of stress and tension on the glass surface, increasing the mechanical stress resistance three times more than thermally tempered glass, thus granting an excellent quality standard.

What are the advantages?

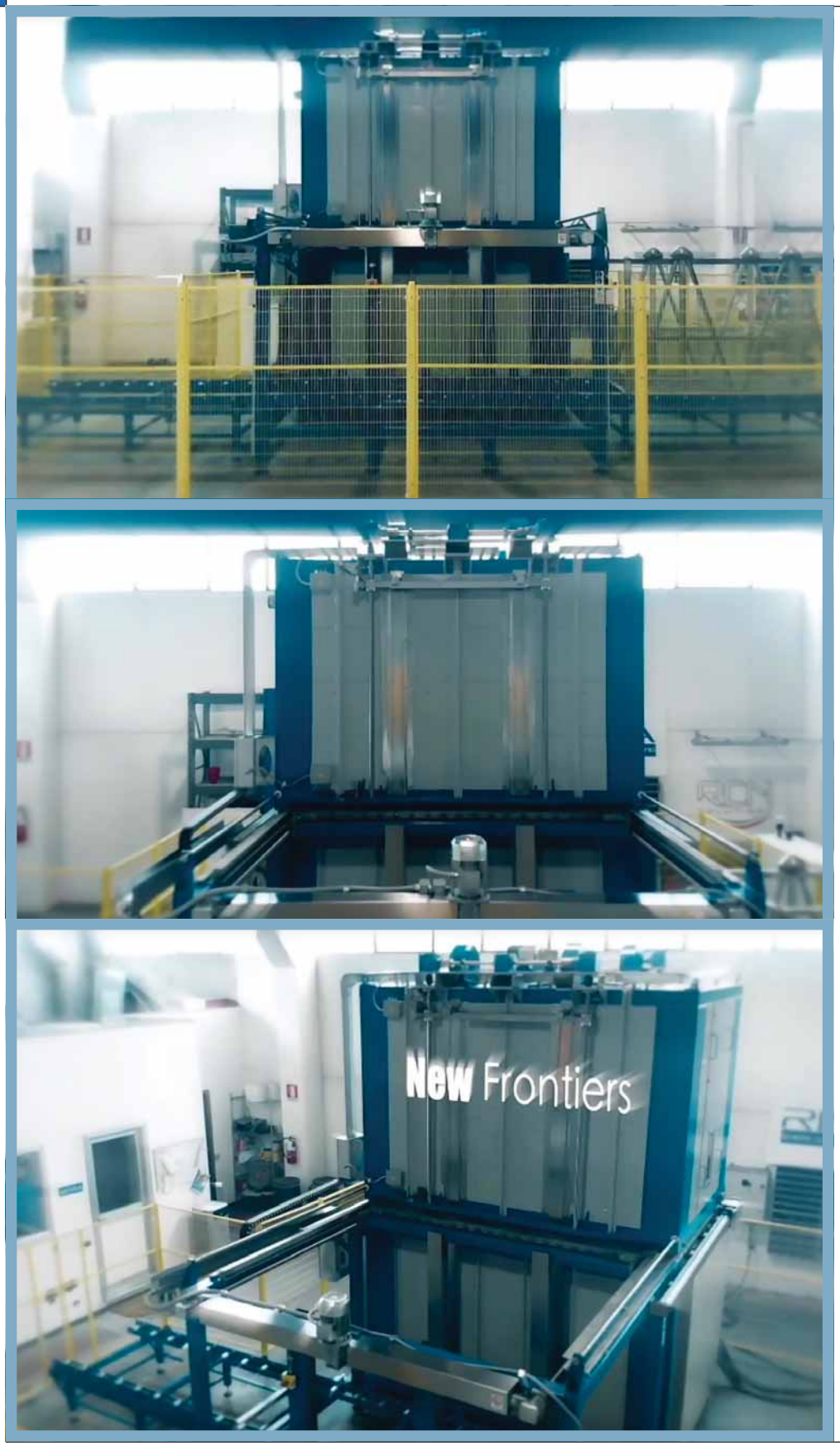
Chemically tempered glass has no visual surface imperfections in comparison to thermally tempered glass. Thus, curved glass can also be chemically tempered.

Thin glass can be tempered without the risk of breakage or distortion.

In addition, the results of chemical tempering create perfect coupling in the case of later lamination with EVA or PVB, with results free from visual defects, with a great difference from the most recurrent defects of thermal tempering.

Scope

- Tempering of glass thickness lower than 2.5mm;
- Complex glass curves and big sizes that cannot be thermally tempered;
- For all applications demanding resistance to high stress and impact (boats; aeronautic, military, aerospace industry, etc.)
- In all applications where, in addition to the mechanical properties of the process, high quality glass is also required: transparency and flat surface (no distortion caused by the contact of the glass with the rolls).



pering in sectors such as construction, for example.

Gianfranco Rivaroli, RIVA: Another aspect that we need to make clear regards costs. Chemical tempering is not, as is often considered, more expensive, on the contrary. It all depends on how many glass sheets you are tempering with the plant. A chemical tempering plant usually consumes about 15 per cent of the energy installed. The limits of a chemical plant are those regarding time and, therefore, production yield.

Glass-Technology International (GTI): What about large-sized glass sheets – do they take a longer time to be tempered? And what about glass thickness?
Gianfranco Rivaroli, RIVA: Tempering time depends only on the size of the plant installed, and it is the same for the glass case of a watch to a large, 3-metre glass pane for a luxury yacht.

Alessandro Rivaroli RIVA: It all depends on the chemical reaction time … We are speaking about the time needed for the ions to penetrate the glass. There are, however, special glass types, such as those used for smartphones and touch devices, that can be tempered chemically in about 3 - 4 hours, compared to the 16 hours for chemical tempering of float glass.
Over the past ten years or even a lot more, we have

gone from glass processors not even knowing what chemical tempering was to now receiving continuous requests and contacts for information about our plants.

Gianfranco Rivaroli: Just think of the glass sector and the many different types of glass that we now have, all with their own specifics and safety regulations, and so on. The changes in the approach and requests for information regarding chemical tempering came about more or less with the introduction of laminated glass, where chemical tempering can actually help reduce the thickness of the glass used while ensuring the same mechanical resistance as glass thermally tempered.
Glass tempered thermally is usually not so flat, with consequent optical distortions over large surfaces. On the other hand, chemically tempered glass is a lot flatter as tempering is carried out at a lower temperature during which glass does not deform. This means that today's architects are requesting chemically tempered glass more and more.

COLLABORATION WITH AGC, BELGIUM

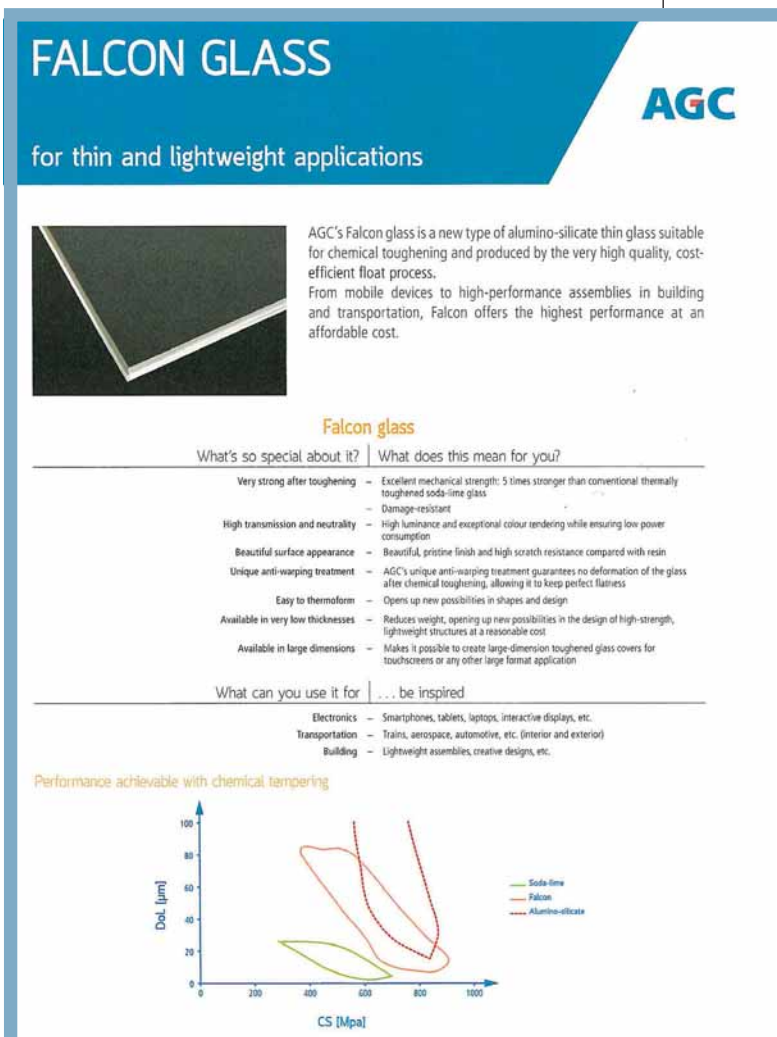
Roberta Cometti: This is why, other than our standard machines, we are now more flexible – offering customization as far as sizes are concerned. Of course, our goal is to be able to cater for large glass sizes, but right now we are offering 'tailor-made' construction – which is what we have done for AGC in Belgium.

GTI: What were the main requests of AGC?
Gianfranco Rivaroli: Their main request was that of a 2 x 1.2-metre furnace, which they are using in the development of their special Falcon glass, similar to the special glass types on the market for use in devices such as phones and tablets. These glass types can be tempered in four hours.

GTI: Tell us about the timing regarding the supply of this furnace.
Gianfranco Rivaroli: The first contact was in May 2018, and we delivered the furnace in November 2018, followed by installation and commissioning. And the plant was put into operation at the beginning of this year.

Gianfranco Rivaroli: We have also supplied a smaller-sized plant for Schott Germany.

Roberta Cometti: These two important steps – a smaller company like ours working alongside the biggest international top brands – have been made possible thanks to Rivaroli, of course, but also due to our way of working and contacting these top players. Here at RCN, we are able to supply



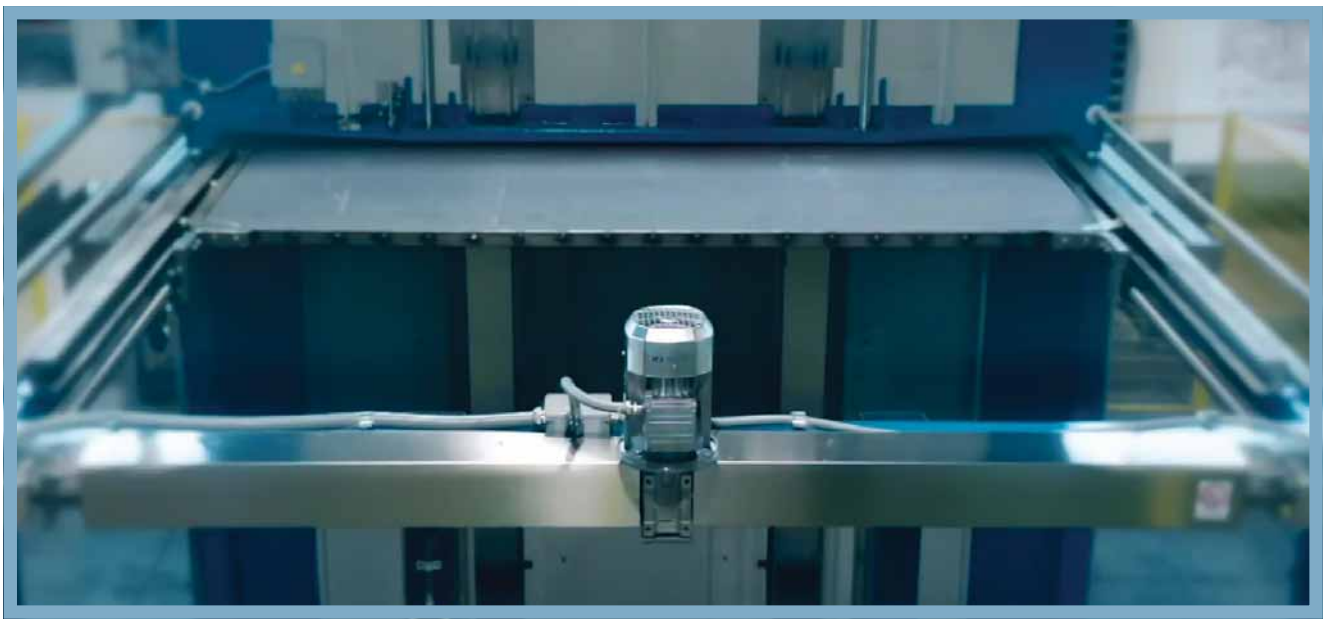
a 'complete package', already presented at glasstec last year, starting from the bending furnace, chemical tempering and lamination. These same machines can also be purchased individually, but for those who want to have complete in-house production, we are there to supply the complete line. And we are now receiving a great number of request for these 'complete packages'.

Alessandro Rivaroli: A lot of our clients who 'worked' mainly with normal glass types, are now starting to process glass for smartphones and devices where the use of chemical tempering gives the best results.

Gianfranco Rivaroli: This type of glass is now not only used for smartphones and tablets, but also in other applications where having a touchscreen is possible, such as in kitchen appliances, and even coffee machines in offices and work environments, just to name a few.

Roberta Cometti: Another sector that we are seeing growth from is that of safety glass and its increased requests for safety levels. This means that alternative solutions need to be found for glass used in balustrades and balconies for example.

Gianfranco Rivaroli: This is possible when using chemi-



cal tempering as it gives the glass twice more mechanical resistance compared to thermally tempered glass.

GTI: Does this mean that chemical tempering will take the place of thermal tempering?

Gianfranco Rivaroli: Not for all sectors because of the time required to temper the glass – about 16 hours for window glass, for example. So for normal residential home windows there will be no real need for chemical tempering. On the other hand, chemical tempering is, and will be, used more and more for architects in large curtain wall glazed areas, thanks to its guarantee of high aesthetic quality glass – especially with regards to flatness.

Roberta Cometti: I think what will happen is that chemical tempering will run side by side with thermal tempering according to the use that the glass will have once tempered. Another important advantage of chemical tempering is that the glass can be processed after tempering: cut, drilled, edged without problems, unlike thermal tempered glass.

Gianfranco Rivaroli: This is made possible because thermally tempered glass has internal stress tension

IMPORTANT DEVELOPMENT AND CONFIRMATION

After an important period of company restructuring and collaboration in 2017, leading to the new "RIVA BY RCN" chemical tempering line, designed and built thanks to the collaboration with Senior Expert Gianfranco Rivaroli, R.C.N. Solutions' position on the market is now stronger, more innovative, highly professional and with greater visibility.

Adjusting and adapting machine to the needs for Industry 4.0, RCN provides Italian and European clients with improved technologies aimed not only at responding to the needs for investments, but also to provide improved handling and organization of more suitable production.

The offer of a complete range of machines for production cycles, such as bending furnaces, chemical tempering furnaces, laminating furnaces, all with sizes of up to 6 metres, allowing to work in sequence or independently, enabling RCN to stand out from the crowd in the glass industry market compared to other solutions.

The development and production of REVA BF that RCN has been producing for some years now, is no less important. In fact, this laminating interlayer was subject of considerable investments during 2018, aimed at increasing production rates in response to the demands of today's market, looking for product quality and precision.

Last but not least, and a key characteristic of the company's philosophy, is the commitment to customization, which means attention to the design of machinery built according to customer needs, always respecting the technological and quality choices of RCN. Therefore total 'Made in RCN' that is allowing the company to move up to the top of the glass industry.

POWERLAM and LAMMY SYSTEM laminating furnaces

POWERLAM is RCN's laminating machine without bags, developed and built in 2008. POWERLAM is the production and logistic solution for significant lamination quantities. POWERLAM has been studied to meet the most important production needs in very short working times, where volumes need: fast handling, precise performance, little operator intervention, promptness of finished products.

This range of special machines works alongside the more traditional tempering furnaces with bags in different sizes for each and every production need. RCN has also given this product line a series of special features, such as the easy closure of the bags, an important characteristics to reduce times, and to ensure vacuum sealing.

ECO SPECIAL bending furnaces

The important comeback in the request for bending furnaces has enabled RCN to start-up and up-grade its production of bending furnaces, now with the possibility of customization and an increase in the number of independent heating zones, a fundamental feature to enable to carry out more complex bending, thanks to independent controls and temperature zones.

'RIVA by RCN' chemical tempering furnaces

The winning choice in this period in which the market is requesting tempered glass with perfect flatness, without optical distortion, with the possibility of processing after tempering, highly resistant to impacts. Doubly winning if we also add the possibility of customizing the machines and the technical expertise of an expert with many years of experience in the construction of chemical tempering furnaces – Gianfranco Rivaroli – who has, in fact, more than 40 years of top level professional activity.

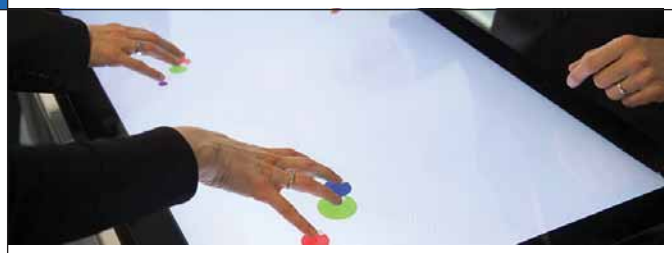
REVA BF lamination interlayer

This project started up more than six years ago with the (limited) introduction of an EVA interlayer combining adhesion quality, transparency, ease of use, characteristics that are no so guaranteed in today's range of EVA products.

Indeed, this balance of very sensitive and difficult to calibrate quality has been reached only after years of experience and collaboration with important chemical companies.

REVA BF, which has been validated by international certification institutions, has undergone constant development, along with the commitment to maintain high quality based on the targeted choice of raw materials, supplied by one of the most prestigious international chemical companies and capillary and professional production controls.

Production has also increased thanks to an extension of the extruders range carried out in 2018.



and breaks up into very small pieces when cut or drilled. On the other hand, chemically tempered glass, which only has surface stress tension, can withstand these types of impacts and is flexible, which means that it can also be curved.
In the architectural glass sector, the advantage with chemical tempering is that when the glass panes are assembled together they match perfectly, while with thermal tempering, and the consequent 'waviness' of the glass sheets, this matching is not so perfect. And this means that lamination of these types of glass sheets becomes more complicated.

Roberta Cometti: It also become more expensive because you need to increase the interlayer thickness, as well as using more pressure and more power.

GTI: The architectural glass market is now starting to look into the using of vacuum for IG units; is chemical tempering possible for these thinner but large-dimensioned glass sheets?

Gianfranco Rivaroli: Yes, of course. And, considering other types of glass, we have already supplied a couple of plants for the production of armoured glass for the automotive industry, which is now requesting to reduce the mass of the glass used in these special vehicles.

Alessandro Rivaroli: Chemical tempering used for armoured vehicles has now reached the level of thermal tempering, because the industry is combining these two types of tempered glass.

Roberta Cometti: There are in fact, requests for alternative solutions concerning higher resistance and smaller thicknesses.

Gianfranco Rivaroli: The use of these two different kinds of tempered glass seems to be the trend at present for a number of sectors, where chemical tempered glass is used for the external sheet due to its higher resistance to impact, and thermal tempering for the internal sheet, where during impact the glass breaks up into small pieces.

TECHNICAL ASPECTS OF THE PLANT

GTI: How often do the salts used for chemical tempering need to be replaced?

Gianfranco Rivaroli: In chemical tempering, the exchange takes place between ions of potassium nitrate and sodium contained in the glass. The bigger ions of potassium enter the glass, which releases sodium and compresses the glass surface. When the salts reach a concentration of sodium higher than 2 per cent, they can either be replaced or regenerated by removing 'old' salts and adding new salts. The levels of the salts obviously need to be constantly monitored.
One of the first companies in Italy to use a plant of this kind,replaced completely after 10 years of work.
The need to regenerate the salts or replace them can be seen in the quality of the glass produced – by placing some small samples of glass inside the furnace and keeping a regular record of the parameters of the tempered glass. The other possibility is that of carrying out tests on the tempered glass.

GTI: Is there the possibility of tempering only one part or side of the glass sheet?

Gianfranco Rivaroli: Since the glass sheet is inserted into the salt solution vertically, it's quite difficult to do this, but it is possible. In fact, a few years ago, I developed a smaller special furnace for a university in the area of Tuscany, where they needed to temper only one of the surfaces of the glass to transmit electronic waves. More recently, a company in Modena developed their own furnaces and bought the salts from us to be used to temper the new types of vitreous-surface tiles.
So you can see that there are endless applications for the use of chemical tempering.

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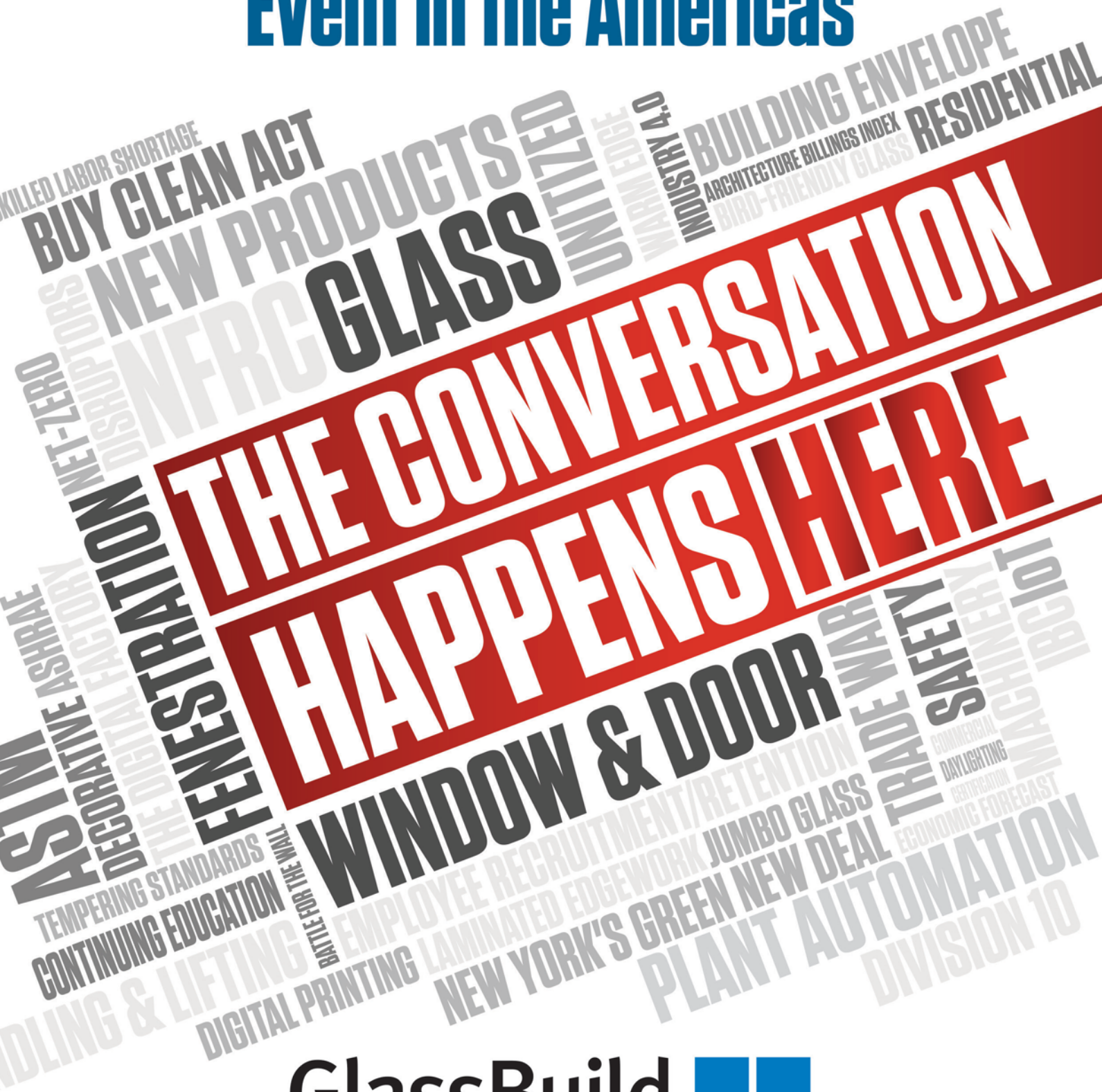

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LiSEC

WORKING WITH CRYSTAL SAFETY GLASS WITH RELIABILITY, INNOVATION AND AUTOMATION

In the fast-growing and changing Malaysian glass market, Crystal Safety Glass made an important decision of choosing product quality over quantity. To obtain this, the company decided to invest in machinery and automation from LiSEC.

CRISIS AND OPPORTUNITY ALWAYS COME HAND IN HAND

The Chinese word for 'crisis' is composed of two characters respectively meaning 'danger' and 'chance, good timing'. Crystal Safety Glass faced such a situation 21 years ago.

Crystal Safety Glass is located in Kuala Lumpur, Malaysia, and is managed by Tan Seng Huat, who opened it as glassware

trading company in 1992. During the Asian Financial Crisis in 1997 one of his customers who owed him money asked to offset his debt with two containers of glass. Tan knew about the possibilities of glass as a construction material. Seeing the opportunity, Tan changed his business from trading glassware to trading glass. In 1998 he borrowed money from friends, moved into a rented 3,000-square-foot shop lot and hired three people for his new glass operation.

CONTINUOUS UPTREND; CONTINUOUS PRODUCT QUALITY

Since its foundation the company has been on a continuous uptrend. Tan now employs 300 people and the plant's size has grown to 300,000 square feet, with another factory of 400,000 square feet which opened at the end of 2018. The main sales market is domestic around Malaysia, but a lot of products are exported to Singapore, Thailand, Cambodia, Vietnam and Indonesia.

Crystal Safety Glass is still a family business run by Frank and his sister Yi Shin, who both joined the company in 2000. Their father had been preparing his children for business since they were young. Both of them put a lot of efforts in bringing the company to the next level. They found that product quality is vital as consumers' expectations have increased over the years. They decided to move from selling large quantities of glass at cheap price and invested in quality, productivity and a safe working environment. The solution to reach this level was offered by LiSEC in 2013.

SOLVING PROBLEMS STEP BY STEP

The investment budget has always been a major factor in making business decisions at Crystal Safety Glass, that is why the management decided to solve problems step by step. In 2014 they bought a LiSEC automatic cutting line and PKL crane system.

Before that employees at Crystal Safety Glass were carrying out these processes manually. After the installation, cutting and loading operations became simple and fast. The total glass breakage during unloading was reduced to nearly zero. At the same time, the working environment was also improved. Before the LiSEC loading system was installed, there were four to five physical injuries every quarter, now there are nearly none.

"Simple operation controlled by software ensure that there are no errors in glass selection and cutting dimension. The software optimisation ensures the precision of our output. The high reliability of LiSEC machines sostituire con:
has made our overall operations smooth and efficient."

Thanks to the highly automated loading system, Crystal Safety Glass was able to cut down the manpower per operation from ten to three people, which helps the company in terms of investment return in the long run. Besides that, workforce was transformed from low skilled to higher skilled workers.

FAST-CHANGING MARKET

"The glass industry is changing very fast in Malaysia. The market has become very demanding: on-time delivery, quality, reliability and cost competitiveness are the constant values. With LiSEC technologies we ensure our customers' satisfaction at all time. We are still looking for innovative ways to improve our processes and efficiency by using automation and machinery. With that we can cut down dependence on labour workforce and minimize human error during operations. Cooperation with LiSEC has provided us with the breakthrough solution to realize our glass processing business value."

LiSEC Group
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Fax: 0043-7477-40580
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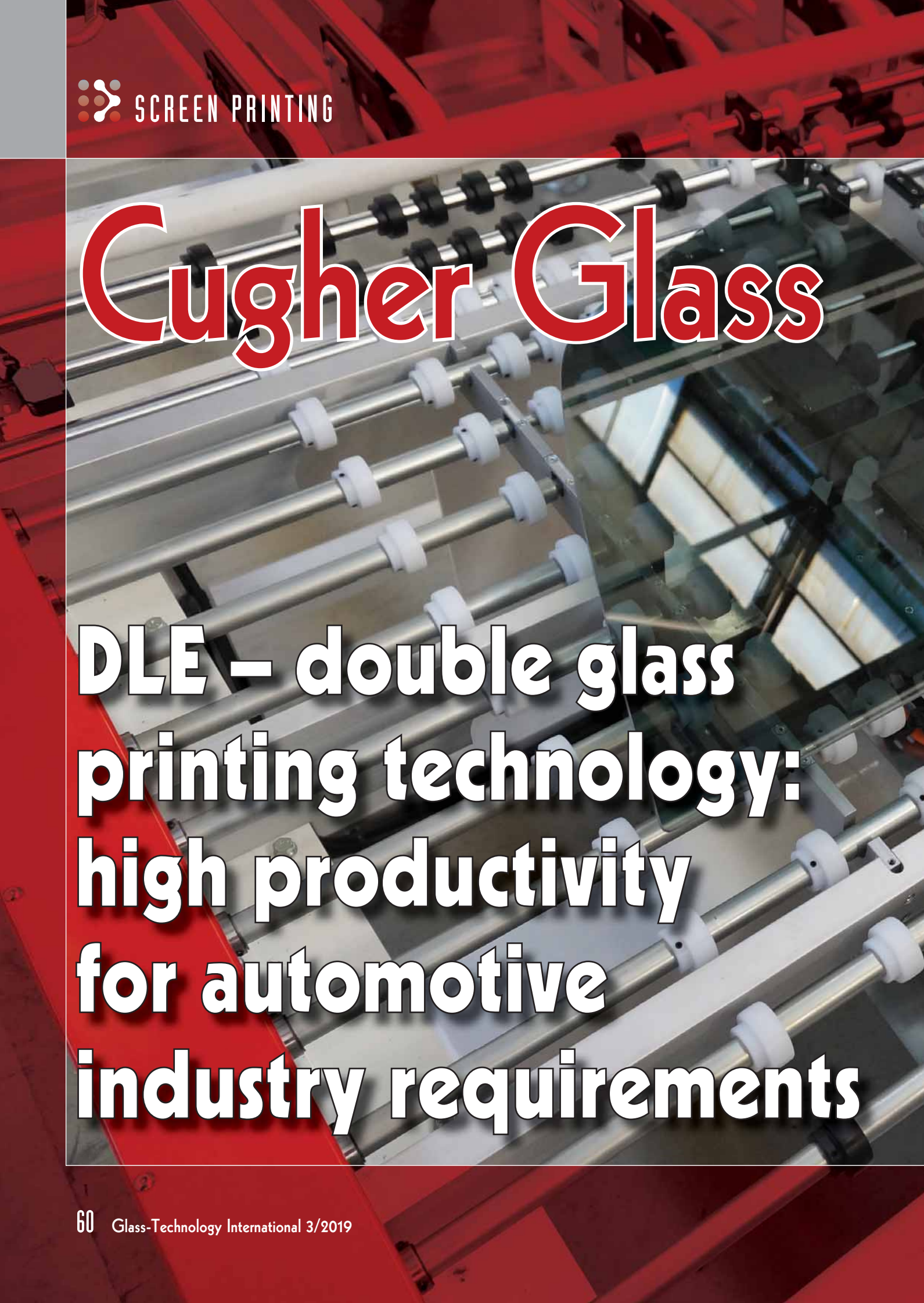
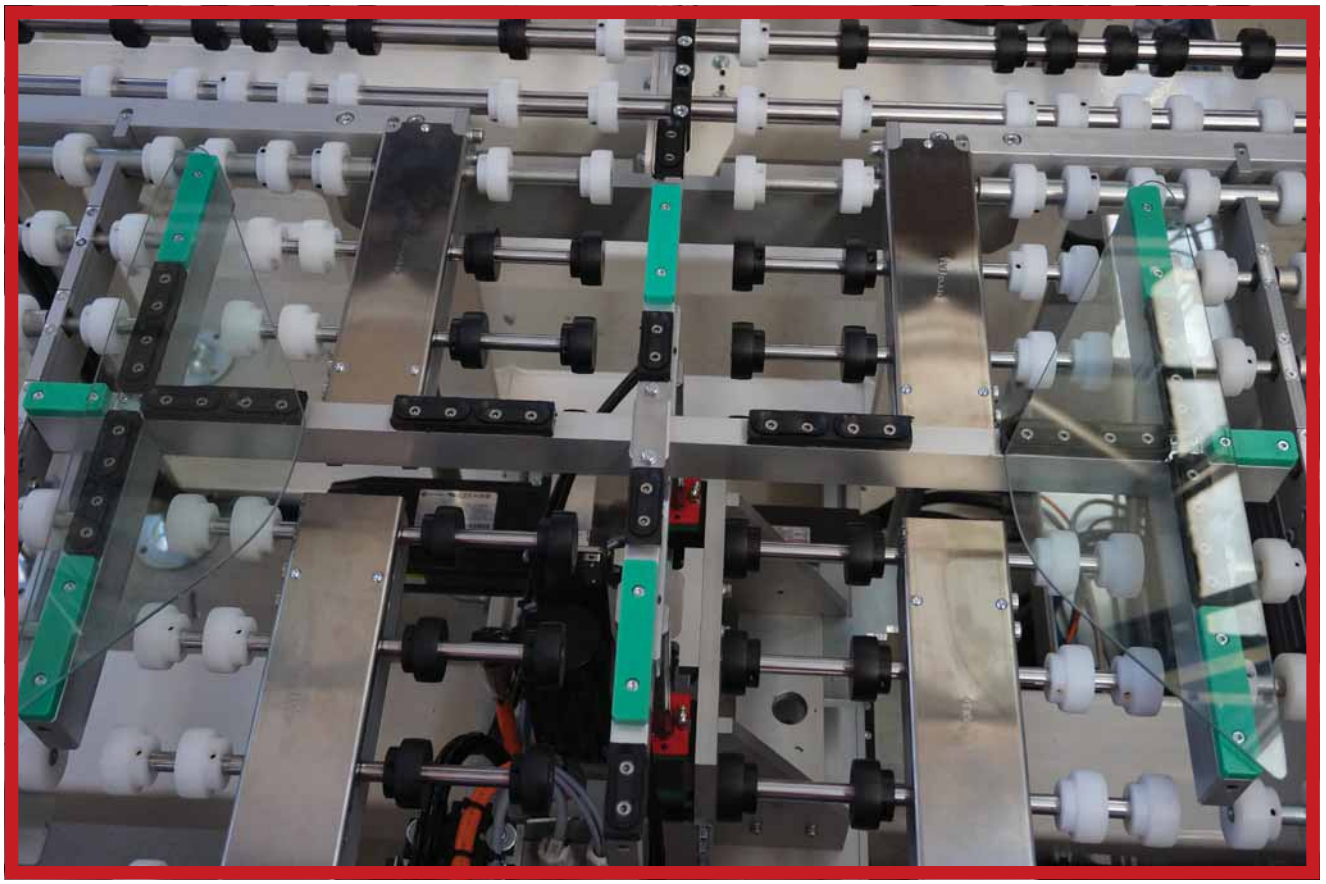


Cugher Glass

DLE – double glass printing technology: high productivity for automotive industry requirements

Cugher Glass has been in the glass sector since it was founded in the late 1960s, and was among the first companies to automate the silk screen printing process. Being specialized is always a benefit in the glass sector, and Cugher Glass is just that. Thanks to the experience acquired year after year, it is now recognized as one of the most innovative and technologically advanced producers of silk screen printing machines and solutions worldwide, a leader in the automotive sector.



In this article, Cugher Glass describes the G series special edition DLE, designed to handle both single- and double glass sheets, with productivity of double glass processing reaching up to 1,028 glass sheets per hour.

G SERIES: DOUBLE GLASS PRINTING TECHNOLOGY

The G series special edition DLE (Double Lite Edition) for double glass printing was conceived with the aim to have maximum flexibility in a single printing line. One single big glass sheet (backlite, windshield or sunroof) or two small glass sheets (sidelites or vents) can be printed on one printing machine, resulting in considerable savings in terms of industrial space and cost optimization, as well as faster ROI.

The machine consists of an entry/squaring conveyor, a printing body and an exit synchronized conveyor. The correct alignment of the two glasses before they are moved to the centring device is performed by the pre-centring conveyor.

The DLE is available for different glass sizes, from vents size up to windshields.

TRANSPORT SYSTEM TO MATCH HIGH FLEXIBILITY

To match the high flexibility of this machine with the high precision requested by the industrial process, the transport system has also been specially engineered. If two glasses are being processed, they will be collected by two walking beams while they are still in the centring device of the inlet conveyor; in this way, the glasses can be transported with great accuracy, without requiring further glass registration before printing.

AN OUTSTANDING CENTRING SYSTEM

The outstanding centring system mounted on all the G series printing machines has 18 axes that enable to perfectly centre all types of glass, even those with extreme shapes. This automation allows very fast setup of the machine, even with two glass sheets. The position of the pins is then stored in a recipe system and, in this way, the operator simply has to recall the recipe and the pins will position themselves automatically. Easy to use and ergonomic, it is equipped with dimensional auto-learning functions controlled by the operator panel.

When one single glass sheet is being processed, the two synchronized holders act as one big single holder (aka spider), transferring the centred glass from the centring system to the printing table.

THE G SERIES PRINTING MACHINES

For industrial contests that require high levels of auto-

mation, large production volumes, quick set up and format changeover, and extreme print precision, Cugher offers the G Series printing machines.
Glass transportation is performed by a shuttle with two independent cross shaped holders; centring is performed out of the printing table.
The system consists of one cross shaped holder with a vacuum cups system. The glass is collected by the walking beam while it is still in the centring device of the inlet conveyor; in this way the glass can be transported with great accuracy. No further glass registrations are necessary before the printing process. This solution enables to reach the maximum speed of the printing process for small- and medium dimensioned glass.

THE COMPANY AND ITS PRODUCT RANGE

The company is specialized in the production of turnkey silk screen printing lines, with a wide range of optional and complementary equipment and solutions that can meet the most challenging production needs, including process automation and control, IR and UV dryers, handling and storage equipment. Automatic vision and quality control systems for glass and printing, with the highest level of technology, are also part of Cugher production.
Cugher silk screen printing machines are able to print on symmetrical, asymmetrical, single-, double- and coupled glass sheets, with standard dimensions up to 2,500x4,000 millimetres and thickness varying from 1.4 up to 10 millimetres. Machine performance is outstanding, while productivity and precision levels are very high.

Cugher Glass Srl

CUGHER
Plants for glass screen printing

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At this year's event – with a new name, new format and extended duration, Intermac opened its doors to provide its customers with a complete experience, designed on the basis of their individual needs. Glass-Technology International was there to speak to some of the key people of the company about the new products on show, but also about how the company is continuing to expand, develop and grow.

Intermac

AN EXCLUSIVE EVENT DEDICATED TO GLASS MACHINERY SPECIALISTS

YOU + TECH GLASS

You + Tech Glass was this year's open house hosted by Intermac, showing the technology of tomorrow, today. The event, which took place from 10 to 13 and from 15 to 17 April, was dedicated to specialists who work in the glass machining sector.
With a completely new format and an extended duration compared to the traditional Inside Intermac event, You + Tec Glass provided invited customers and press with a complete experience, designed on the basis of their individual needs.

THE TOUR

During the event, we had the chance to see first-hand the most recent developments in terms of machinery, with Matteo Traini.

AQUA, THE INTEGRATED GLASS WASHING SOLUTION

The AQUA washing solution was presented for the first time on the market at the event, integrated with the Vertmax, with a series of technical peculiarities that guarantee extreme cleanliness from all the impurities accumulated during processing on the glass sheets.
Matteo Traini: One of our most recent developments is that of vertical washing machines, which is a strongly connected market

sector to our other vertical machines, and following our aim to supply our clients with a complete package of machinery, not only regarding production but also processing. Another important aspect is that these new machines are focussed on energy saving with regards to electricity and the use of water.

And supplying Vertax with the vertical washing machines enables us to provide certification of the line as far as safety aspects are concerned. Aqua will have a complete range of machines, in modular format, enabling clients to set up the washing machine in response to their real production needs and available space.

Our production of vertical washing machines was made possible thanks to the collaboration with A lessandro Carriero, owner of a company that makes these washing machines, and with 20 years of experience in this type of production. This company will soon become part of the Group.

ANTICIPATING THE FACTORY OF TOMORROW

Ultimate flexibility, optimisation of the production process without the use of the operator and elevated productivity: the Master Loader, a flexible robotic cell, was designed and created to offer these advantages. With investments that are attainable by any

company, it is capable of revolutionising industrial production, guaranteeing competitiveness and time-to-market production, optimising the loading and unloading time for machining centres and water jet machines. The Master Loader is now even more complete and guarantees the automation of the entire process, even offering the option of serving two technological solutions of the same type. The Master Loader robotic cell is installed on the Master One, the new 3-axle work centre specifically designed for the processing of glass and sintered materials, capable of carrying out all of the machining operations necessary within a marble workshop without compromising performance.

Matteo Traini: Master Loader is our move to make glass handing and transport automatic, reducing human intervention in these operations, thus reducing danger for operators. The arm of the robot is equipped with suction cups that can be positioned directly from the machine as per the shape of the glass sheet to be managed. This means that the glass can be positioned and processed, followed by the removal of the waste automatically.

This type of development is part of the new business sector of Intermac – the Systems Unit – made up of a group of highly skilled people with regards to glass processing and how to use production flows inside the company, enabling us to become a consultant for our clients too. This means understanding their production needs and understanding which actions to be taken to optimize their production.

CUTTING DEVELOPMENTS

Genius

Genius Line J-A 46 with automated cycle up to 88.12 and Genius Comby Plus J-H49 with automatic delivery of the cut pieces to the end of the line were presented at the event. Combining highly advanced cutting technologies for monolithic and laminated glass, Genius Comby J-H49 is the perfect solution for the needs of the most automated factories, a solution aimed to achieve rapid performances and high productive standards. Comby J-H49 offers the possibility to carry out multiple tasks at the same time while guaranteeing the complete automation of the cutting process and limiting the risks for the operator.

The range of solutions on display was completed by the most evolved Genius cutting tables, Waterjet technology installed on the Primus, the Master Series machining centres, and Vertmax, a range of vertical machining centres.

Matteo Traini: We are presenting two important developments with regards to laminated and monolithic cutting. The first line on show is a combined line – able to process both monolithic and laminated glass (LMH). The machine can process all volumes of laminated glass up to thicknesses of 8+8 mm, with guaranteed constant productivity. The only activities of operators regards the unloading of the glass sheets.

We are undergoing important growth in the glass cutting sector, also thanks to the acquisition of Movetro, leading us to be able to supply a complete range of machinery for our clients. And having Movetro solutions as part of our product range means that we can maximize the layout of machines, saving space – a fundamental aspect for glass processors.

These layouts are, however, based on standard solutions that guarantee the highest levels of reliability.

GREATER VALUE FROM MACHINES

In order to make factories increasingly efficient, Intermac is continuing its innovative journey with SOPHIA, an IoT service platform that enables to be continuously in contact with its machines, wherever they are, expanding the platform's functions in favour of predictiveness. This will significantly improve the level of personalised interaction with the customer on the basis of the machine, enabling a notable reduction in the time required for assistance, thanks to a special proactive service hotline, with response guaranteeing in a maximum of one hour with regards to machine downtime.

Thanks to SOPHIA, the process of factory digitalisation is further made a reality. The new platform provides, in real time and through intuitive dashboards, information and data from machines distributed around the world. This data enables to monitor production, analyse how the machines are functioning, identify malfunctions, assist clients in maintenance operations, order replacement parts in less time, and conduct preventative maintenance.

DIAMUT – TOOLING DIVISION

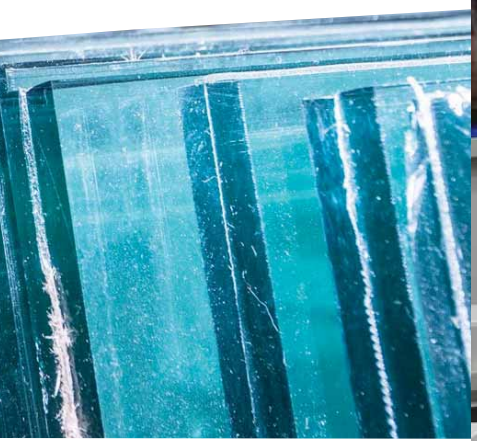
Maximum technological interaction was perceived in the area dedicated to Diamut solutions within the Intermac Tech Center during the event, with the spotlight on the Start-up Tool Kit: a case containing a special supply of Diamut tools and accessories which is supplied along with Intermac machines, useful for the operator during the installation of Intermac Master machines (3- and 5 axes) and Vertmax. Last

but not least, the case also includes a booklet with parameters concerning tool use.

During our visit, Alberto Bisio, Diamut, spoke to us about the synergies between Intermac and Diamut, and showed us the most recent new products and developments.

Alberto Bisio: Diamut is the tools and accessories division of the Biesse Group, for glass, natural and synthetic stone, and ceramic material. All the tools are sintered with diamond. The glass division has two distinctive sectors: the part dedicated to Intermac, and the other for external machinery suppliers. This means that we can supply our tools to glassworks on a 360° basis.

The practical demonstration of the full synergy between tools and machines is obtained thanks to the strong collaboration with Intermac. In fact, all our products are tested here in Intermac before being shipped to clients.



Grinding wheels

Swave grinding wheels, entirely developed by Diamut, a combination of high levels of glass removal with continuous grinding and top level finishing, taking the place of two wheels. This also means the elimination of a spindle and less power consumption.
With a new design, high speed of use, superior durability and excellent finishing of the edges, the Diamut cup wheels have been redesigned to meet the working standards for all types of machines. They are the ideal solution for all companies with a high production capacity.

MANAGEMENT ASPECTS

Franco Angelotti – Sales and Marketing Manager of the Glass and Stone Division; Gianluigi Casadio – Director of the Glass and Stone Division.

Intermac has undergone four years of double-digit growth, which means growth in terms of volumes, product range, as well as in personnel of course.
The year 2018 was especially positive for us, with about 15 per cent growth in turnover, and 18 per cent in profit. This makes us one of the most profitable companies of our sector, enabling us to always have the available finances to carry out investments. We have also intensified our R&D activities, leading to the new products on show at this year's event, but there are others that will be released in the second part of this year, and the beginning of 2020.
Working to reach Industry 4.0 does not always and only mean the products that we provide our customers with, but also our activities and processes here in the company. And this is an ongoing process for the entire Biesse Group – not only glass and stone, involving personnel and their skills too.
Digitalization is pushing more and more towards 3D components also in prototype phases, and simulation is also becoming an important part of our work. Another important aspect is that of automation and the introduction of robots in production.
In this moment our job is that of not only being a partner for our clients, but also a consultant to know exactly what they want, of course, but also to provide them with the right type of process to obtain the results that they want, supplying training, software and machines, with SOPHIA and its dedicated developed business area.

Intermac - Biesse Spa

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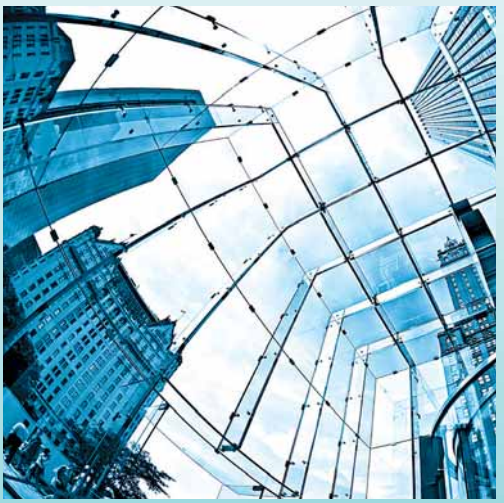

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GCV Glass

Picasso and dryer

Glass today is much more than a transparent means to see inside or out of a room or building. We all know about the high-tech applications that are increasing continuously, but what about decoration? This article gives us an idea of how we can decorate glass surfaces while respecting the environment – in terms of product used and machinery, ensuring high-speed and long-lasting treatment.

GROWTH AND DEVELOPMENT FOR HIGHER PRODUCTION AND VERSATILITY

Alvaro Crespo
GCV Glass

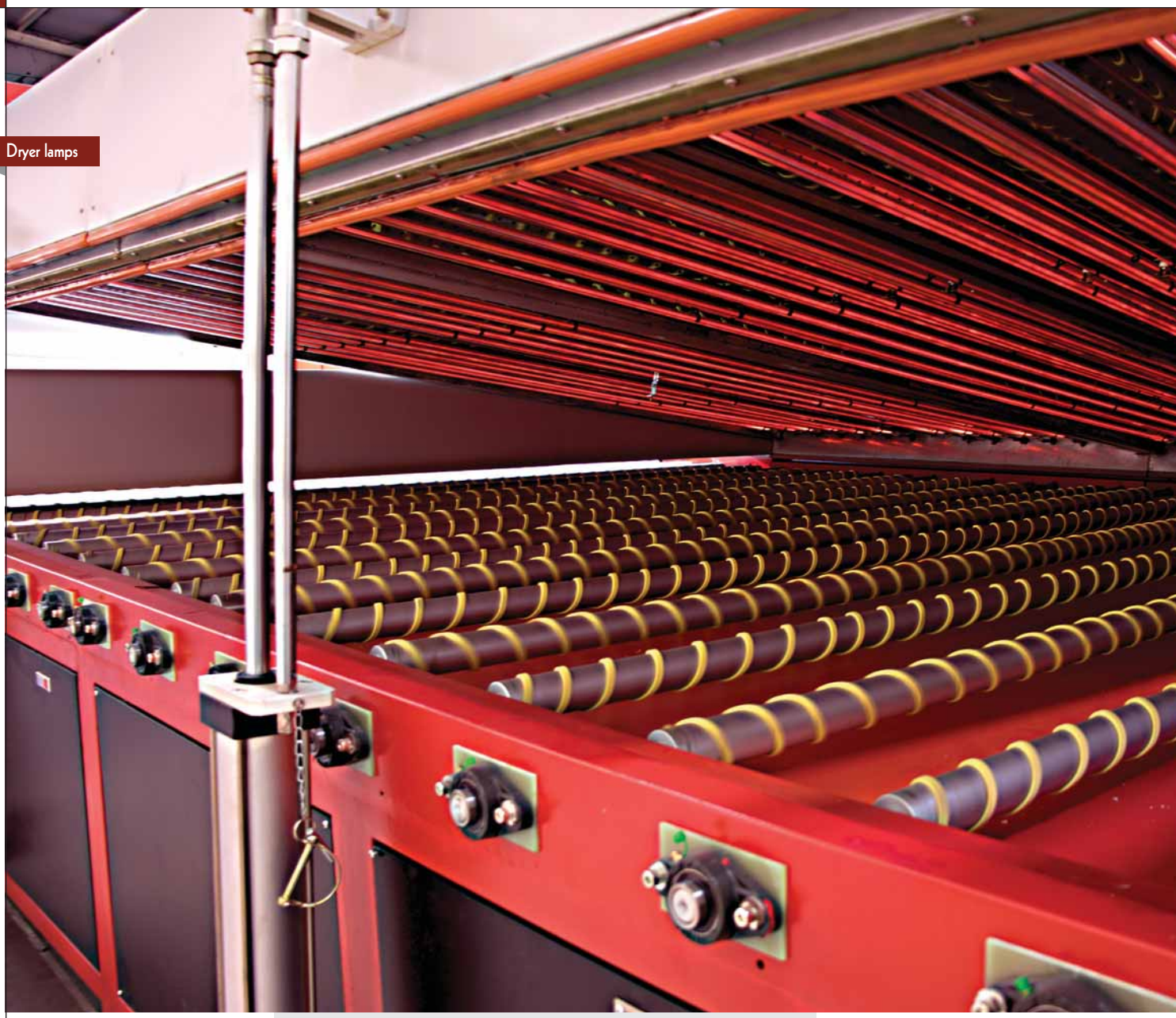
The Crespo family has been linked to the glass business for three generations, and what began in a small workshop soon developed into a manufacturing plant. In one of the many exhibitions visited since those days, the company discovered a decorative resin with great endurance in all kinds of environments and conditions, guaranteed for 10 years. The next step was the development of the Wizard Illustrator, which continued to grow, reaching its maximum splendour today. Thus, we realized really beautiful jobs that are increasing demand in South America and Middle East. Over the years and thanks to tests with some of the existing glass paints, hand by hand with Creative Resins Europe, the com-

Frida with dryer

pany started making the best acrylic resins for glass painting. These paints, which support damp and saline environments, are resistant to UV radiation, etc., and are guaranteed for 10 years, and all work carried out in the early 2000s is still looking fantastic even now.

THE PICASSO LINE

Due to rising market demand for glass paint and the development of EVA lamination, GCV Glass Machinery was created. This engineering company, focused on developing glass machinery applications, and working together with Creative Resins Europe, designed an automatic application machine for glass paint - the Picasso machine - which was originally conceived for small glass manufacturers who did not want large curtain or roller coating lines. Many of our customers, due to the increased volume of market they reached thanks to our



Dryer lamps

equipment, asked us for higher production with the same versatility.

AUTOMATIC APPLICATIONS: THE FRIDA SYSTEM

A new project for a new Jumbo size machine (3.3 meters width) was started to compete against roller coaters in production rate, while maintaining fast colour change (in 3 minutes) without any waste of paint. Frida, the biggest, fastest and most efficient spray machine in the world, was introduced with huge success at glasstec and Veteco 2018 exhibitions, two of the biggest shows in the glass world. The possibilities for these machines are the following: Picasso, dryer and cooler in 1.8 and 2.6 meters width and Frida with its drying tunnel of 3.3 and 2.5 meters width. The short length of the Frida (1.1 meters) allows to replace an existing roller coater and adapt this new machine to give extra adaptability and economy to painting lines. Thanks to its application system, the cost per square meter is 47 per cent less with Frida compared to a roller coater and just 1 litre needed to start painting.

The Frida system was developed thanks to the close relationship GCV has with its customers, and contains everything that the company has learned from

them. Fully configurable and customizable, adding drying and cooling modules adaptable to the required production and factory size. At GCV Glass Machinery, we've specialized in the application of all types of spray products on sheet glass, and the all-new Frida machine is the culmination of months of work and research. With the latest technology, this is a state-of-the-art machine in speed of application, quality and precision.

NEW PICASSO V2

At the moment, we are producing the new Picasso V2 able to apply our Creative Resins paints and ceramic enamels, easy cleaning products for shower doors and a new hydrophilic self-cleaning treatment for facades. All these products are able to be applied with the new Picasso V2. One machine, one supplier, zero problems. Apart from that, the new Picasso V2 is even smaller (less than 7 meter long complete line), modular design totally adaptable to customers' requirements (just coating or adding drying, cooling, brushing, etc.), more speed (up to 200 square metres per hour), easier to mantain and more affordable thanks to our engineering team.
Picasso means a target for evolution and full equipment with respect to other spraying machines in the market. Colours can be completely changed in 1.5 minutes, even for cold process paints or ceramic inks.

Advantages over other spraying machines in the market

Purging circuit:
Continuous cleaning: The operator can clean the spray gun automatically at any time, even with paint ready to be used, avoiding

INSTALLATIONS:

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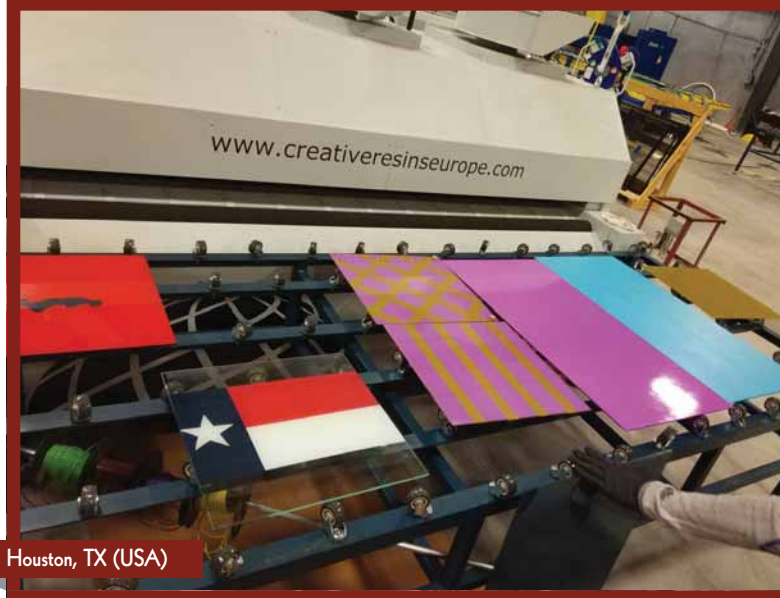

Houston, TX (USA)

Surfers Paradise (Australia)

INSTALLATIONS:

First complete line in Spain, Grupo Ialvi

Novograma (Spain)

Correlli Glass, Monterrey (Mexico)

common problems such as jammed needle, dirt and dry remaining product, or paint leakage.

Continuous product recirculation:
No sedimentation problems, no product hardening in the tank, no jammed pipes, while paint surplus can be recovered in perfect condition after job is finished. The resins can be kept in the machine for more than 8 hours without jamming pipes.

Auto cleaning system and quick colour change:
Picasso adapts better to variable paint quantities and tank kinds as different tin sizes can be used (0.5Lt; 1Lt; 2.5Lt; 5Lt; 10Lt…) and they can be refilled at any time while the machine is just painting. It does not have to be stopped to add more paint or change hermetic tanks.

Easy maintenance gun:
A high-level model of the Japanese brand ANEST IWATA is installed on the machine head cart. It can be dismantled in 10 seconds for easy and safe maintenance and cleaning.

Automatic glass detection:
Glass is detected by sensors to measure both length and width automatically. The Ultrasonic sensors are protected by anti-dust air chambers to keep them clean. Moreover, unlike laser sensors, they do not have to be cleaned periodically.

Extraction system:
This powerful air extraction system enables to filter paint dust particles and absorb volatile solvents, resulting in clean air for the facilities. More affordable spare filters, even the active carbon ones, and faster to clean and replace without disassemble anything.

Can be operated from the outside:
It can be adjusted even while working, optimizing time and avoiding stops which additionally mean opening the painting chamber and releasing solvents as well as letting the dust come in.

Remote access port online:
The Technical Support department can connect the Picasso machine via worldwide 3G routers for software update, maintenance or troubleshooting.

Short, medium and large series:
Picasso production is flexible and profitable from 2 square metres up, while it can reach 200 square metres per hour. It also uses 47 per cent less paint than a roller coater and 55 per cent less than manual painting.

NEW IS-PRO 180

In the same way, the new

IS-PRO 180 was created with an exclusive application system of self-cleaning products that can be equipped with its own curing and drying system in the same compact machine. This new machine, with our range of hydrophobic products, guaranteed for 3, 5 or 10 years, provides the best performance, the lowest cost per square meter and record-breaking application speed. This hydrophobic application machine is totally adaptable to the needs of ultra-fast and efficient applications. Specially designed at the beginning to be used with Invisible Shield® and Invisible Shield PRO 15® of Unelko Corporation with curing and drying, all in one. By the way, it is totally adaptable to diverse needs: Ultra-fast and efficient application (more than 120 square metres per litre of product). Production of up to 2,000 square metres per day of glass up to 1,800 millimetres wide, and with treatment guaranteed up to 10 years.

CREATIVE RESINS

GCV are official distributors for Creative Resins Europe products. Our commitment to the highest quality enables us to work side by side with our partners from Creative Resins, with the best acrylic resins of the market. This is demonstrated by more than 20 years' experience and 10 years' warranty in outdoor installation, even with wet conditions, saline environment, etc. GCV offers the most complete solution to produce pigments for our GlassPaint resins, adapting to technical requirements and customer needs. By following the steps of our formulation software ColourGlass by Creative Resins, customers are able to produce any colour of the different colour charts (RAL, Pantone, Dulux, Eurotrend, BS…) with around 15,000 formulation files. ColourGlass software is available online, anywhere and daily updated with new formulation files. From the most affordable system, such as the Manual mixing shelves with pigment jars, from the Manual carrousel dispenser to the most complete and professional system, such as the Automatic carrousel dispenser. Creative Resins supports us ers in easy and fast production, using just the required quantity of any colour pigment at any time to reduce stock to the lowest amount.

IS-PRO 180

GCV -Grupo Crespo Vidrio

GCV glassmachinery

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ECOL
Forel
Guangdong Northglass & Juisun Technology Industrial
Hegla
IOCCO Group
Italcarrelli
Keraglass
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

HANDLING ROBOTS
Bavelloni
Bottero
CMS
ECOL
Hegla
IOCCO Group
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

HANDLING EQUIPMENT FOR FLOAT GLASS
Bovone Elett.
Bottero
Bystronic glass Group
ECOL
Hegla
IOCCO Group
Italcarrelli
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

TROLLEYS AND CLASSIFIERS
CMS
Forel
Hegla
Lisec Group
MOVETRO - Mistrello
Schiavo
Tecno Glass
Torgauer Maschinenbau
Turomas

TRANSPORTATION SYSTEMS/ TRUCKS
Giardina Finishing + HS Glassprinting
Hegla
Italcarrelli
Lisec Group
Schiavo

VACUUM LIFTING EQUIPMENT
Bottero
Bystronic glass Group
CMS
ECOL
Fenzi
Forel
Hegla
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

CRANE SUCTION CUPS FOR LARGE SHEETS
Bottero
Bystronic glass Group
Fenzi
Hegla
Lisec Group
Schiavo
Turomas

TRANSPORTATION TONGS
Bottero
Fenzi
IOCCO Group
Schiavo
Turomas

SUCTION CUPS
ADI
Bottero
Bystronic glass Group
CMS
Fenzi
Hegla
Schiavo
Turomas

CONVEYOR BELTS
Ashton Industrial Sales
Bystronic glass Group
Cugher Glass
ECOL
Schiavo
Turomas

PACKAGING MATERIALS AND SYSTEMS
ECOL
Hegla
Schiavo

ACCESSORIES
Bottero
CMS
Fenzi
Hegla
Helios Quartz
Mole Moreschi
Schiavo
Turomas

Straight-edge and shape cutting

COMPLETE STRAIGHT-EDGE LINES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Euromec
Forvet
Hegla
Lisec Group
Schiavo
Schiatti Angelo
Shanghai North Glass Technology

COMPLETE SHAPE CUTTING LINES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Guangdong Northglass & Juisun Technology Industrial
Hegla
Lisec Group
Schiavo
Shanghai North Glass Technology
Turomas

AUTOMATIC CUTTING MACHINES FOR AUTOMOTIVE GLASS
Bando Kiko
Bottero
Bystronic glass Group
CMS
Glaston
IOCCO Group
Lisec Group
Schiavo

LOADING AND TILTING MACHINES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
ECOL
Euromec
Forel
Glass Company
Hegla
Intermac - Biesse
IOCCO Group
Lisec Group
Schiavo
Tenon (Beijing) Equipment
Turomas

CUTTING TABLES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Euromec
Fenzi
Forel
Hegla
IOCCO Group
Lisec Group
Macotec
Schiavo
Tekno Kilns
Tenon (Beijing) Equipment
TK
Triulzi
Turomas

CUTTING OPTIMIZERS
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Deltamax Automazione
Euromec
Forel
Hegla
IOCCO Group
Lisec Group
Optima
Schiavo
Turomas

CUTTING PATH OPTIMIZERS
Bando Kiko
Bottero
Bystronic glass Group
CMS
Euromec
IOCCO Group
Lisec Group
Optima
Schiavo

CAD SYSTEMS
Bavelloni
CMS
Lisec Group
Prodim
Schiavo

ARMOURED AND LAMINATED GLASS CUTTING MACHINES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Hegla
Lisec Group
Schiavo
Turomas

ROUND OR SHAPE CUTTING MACHINES
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Fenzi
Hegla
Lisec Group
Schiavo
Turomas

CUTTING ACCESSORIES
ADI
Ayrox
Bando Kiko
Bottero
Fenzi
IOCCO Group
Schiavo
Softeco
Turomas
Tyrolit Vincent

SAW MACHINES
RCN Solutions
Schiavo
Tecno Glass

AUTOMATIC SAWS FOR CUTTING LAMINATED AND BULLET-PROOF GLASS
CMS
Schiavo

BREAKING SYSTEMS
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Euromec
Hegla
IOCCO Group
Lisec Group
Schiavo
Turomas

CUTTING MACHINES WITH BREAKING AND EDGE DELETING DEVICES
Bando Kiko
Bottero
Bystronic glass Group
CMS
Euromec
Guangdong Northglass & Juisun Technology Industrial
Hegla
IOCCO Group
Lisec Group
Schiavo
Turomas

GLASS CUTTING FLUIDS
Diamant - AR Nunziata
Schiavo
Turomas

ACCESSORIES
Schiavo
Schiatti Angelo
Turomas

Edging and bevelling

COMPLETE EDGING LINES
Adelio Lattuada
Ashton Industrial Sales
B Solution Licensee of BF Project
Ban**do Ki**ko
Bavelloni
Bottero
CMS
Forel
Forvet
Hiseng Glass Machinery
IOCCO Group
Schiavo
Schiatti Angelo
SKG - Skill Glass

COMPLETE BEVELLING LINES
Adelio Lattuada
Bando Kiko
Bottero
CMS
Hiseng Glass Machinery
IOCCO Group
Schiavo

COMPLETE AUTOMOTIVE GLASS EDGING AND BEVELLING LINES
Adelio Lattuada
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
Hiseng Glass Machinery
Intermac - Biesse
IOCCO Group
SKG - Skill Glass

DOUBLE-EDGE GRINDING MACHINES
Ashton Industrial Sales
B Solution Licensee of BF Project
Bando Kiko
Bavelloni
Bottero
CMS
Forvet
Hiseng Glass Machinery
Intermac - Biesse
IOCCO Group
Schiatti Angelo

VERTICAL-EDGE GRINDING MACHINES
Adelio Lattuada
B Solution Licensee of BF Project
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
Forel
Glass Company
Hiseng Glass Machinery
Schiavo
Schiatti Angelo
Shanghai North Glass Technology
SKG - Skill Glass

GRINDING SPINDLES
Schiavo
Tecno Glass

BEVELLING MACHINES FOR ROUND AND SHAPED GLASS
Adelio Lattuada
Bando Kiko
Bavelloni
CMS
Hiseng Glass Machinery
Intermac - Biesse
RCN Solutions
Schiavo
Bando Kiko
Bavelloni
Bovone Elett.
CMS
Glass Company
Hiseng Glass Machinery
RCN Solutions
Schiavo
Schiatti Angelo

STRAIGHT-EDGE BEVELLING MACHINES
Adelio Lattuada

BEVEL POLISHING MACHINES
Adelio Lattuada
Bando Kiko
Bavelloni
Bovone Elett.
CMS
Hiseng Glass Machinery
Intermac - Biesse
RCN Solutions

STRAIGHT-EDGE ENGRAVING MACHINES
Bavelloni
Bottero
CMS
Intermac - Biesse
SKG - Skill Glass

SHAPED GLASS ENGRAVING MACHINES
Bavelloni
Bottero
CMS
Intermac - Biesse

CORNER GRINDING MACHINES
Adelio Lattuada
Ashton Industrial Sales
B Solution Licensee of BF Project
Bavelloni
CMS
Intermac - Biesse
SKG - Skill Glass

SHAPED GLASS GRINDING MACHINES
Adelio Lattuada
Ashton Industrial Sales
Bando Kiko
Bavelloni
Bottero
CMS
Forel
Glass Company
Guangdong Northglass & Juisun Technology Industrial
Hiseng Glass Machinery
Intermac - Biesse

BELT GRINDING MACHINES
Adelio Lattuada
Ashton Industrial Sales
Fenzi
Hiseng Glass Machinery
IOCCO Group
Tenon (Beijing) Equipment

LATHES - VERTICAL AND HORIZONTAL
CMS
Fenzi

EMBOSSING MACHINES
CMS
Fenzi

PORTABLE MACHINES
Fenzi
Helios Quartz
Tecno Glass

DIAMOND TOOLS
Adelio Lattuada
ADI
Ashton Industrial Sales
Bando Kiko
Bovone Diamond Tools
Bottero
Diamant - AR Nunziata
Diamut - Biesse
Fenzi
Glaston
Mole Moreschi
RCN Solutions
Schiavo
Tyrolit Vincent

DIAMOND BELTS
Mole Moreschi

SEAMING LINES
Ashton Industrial Sales

MANUAL LINES
Ashton Industrial Sales

POLISHING WHEELS
Adelio Lattuada
ADI
Bando Kiko
Bovone Diamond Tools
Diamant - AR Nunziata
Diamut - Biesse
Fenzi
Glaston
Mole Moreschi
RBM Italia
RCN Solutions
Schiavo
Tyrolit Vincent

POLISHING AGENTS AND OXIDES
ADI
Bovone Diamond Tools
Diamant - AR Nunziata
Fenzi
RCN Solutions
Schiavo
Tyrolit Vincent

POLISHING BELTS
Diamant - AR Nunziata
Fenzi
Schiavo

COOLANTS
Adelio Lattuada
Bovone Diamond Tools
Fenzi
Schiavo

GLASS GRINDING AND BEVELLING COOLANTS
Schiavo

SEPARATORS FOR GLASS-SOLIDS
Ashton Industrial Sales
Schiavo

ACCESSORIES
ADI
CMS
Fenzi
Forza G / G. Tech
Helios Quartz
IOCCO Group
Mole Moreschi
RCN Solutions
Schiavo
Schiatti Angelo
Tyrolit Vincent

Washing

HORIZONTAL WASHING MACHINES
Ashton Industrial Sales
Bando Kiko
Bavelloni
Bovone Elett.
Bystronic glass Group
ECOL
Forel
Glass Company
Hiseng Glass Machinery
IOCCO Group
Lisec Group
Neptun
Schiavo
Triulzi

VERTICAL WASHING MACHINES
Adelio Lattuada

Ashton Industrial Sales
Bavelloni
Best Makina
Bystronic glass Group
ECOL
Forel
Glass Company
Hiseng Glass Machinery
IOCCO Group
Lisec Group
Neptun
Schiavo
Shanghai North Glass Technology
S.T. Group
Tenon (Beijing) Equipment
Triulzi

WASHING MACHINES FOR AUTOMOTIVE GLASS

Bando Kiko
Bystronic glass Group
ECOL
IOCCO Group
Triulzi

WASHING PURIFICATION SYSTEMS

Bystronic glass Group
Forel
Forza G / G. Tech
Glass Company
IOCCO Group
Schiavo
Tenon (Beijing) Equipment

LIQUID WASHING CONCENTRATES

Diamant - AR Nunziata
Schiavo

SEPARATORS FOR GLASS-SOLIDS

Vitrosep
Filtraglass

ACCESSORIES

Helios Quartz
Idrotecnica
Schiavo
S.T. Group

Mirror production

COMPLETE PLANTS & CONVEYORS FOR MIRROR PRODUCTION

Bovone Elett.
IOCCO Group
Triulzi

PAINTING EQUIPMENT

Fenzi
Giardina Finishing + HS Glassprinting
IOCCO Group
Triulzi

DRYING OVENS

Bovone Elett.
CMS
Giardina Finishing + HS Glassprinting

AUTOMOTIVE MIRROR BENDING FURNACES

Bovone Elett.

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
Bystronic glass Group
Forel
Glass Company
Neptun
Schiavo
S.T. Group
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

AUTOMATIC SEALING LINES

Bavelloni
Bystronic glass Group
Forel
Lisec Group
S.T. Group

AUTOMATIC SPACER BENDING MACHINES

Bavelloni
Best Makina
Bystronic glass Group
Fenzi
Forel
IOCCO Group
Lisec Group
Lombarda Macchine
Schiavo
S.T. Group
Tenon (Beijing) Equipment
Thermoseal Group

DESICCANT SALT FILLING MACHINES

Ashton Industrial Sales
Bavelloni
Best Makina
Bystronic glass Group
Di Gregorio
Fenzi
Forel
Lisec Group
Lombarda Macchine
Neptun
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

SPACER CUTTING SAWS

Ashton Industrial Sales
Bavelloni
Best Makina
Fenzi
Forel
Lisec Group
Neptun
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group

BUTYL EXTRUDERS

Bavelloni
Best Makina
Bystronic glass Group
Forel
Lisec Group
Neptun
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

HOT-MELT EXTRUDERS

Bavelloni
Best Makina
Fenzi
Forel
Lisec Group
Neptun
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

POLYURETHANE EXTRUDERS

Bavelloni
Best Makina
Bystronic glass Group
Fenzi
Forel
Lisec Group
Schiavo
S.T. Group
Tecno Glass

POLYURETHANE ENCAPSULATION

Bystronic glass Group
Lisec Group
Schiavo

SILICONE EXTRUDERS

Best Makina
Bystronic glass Group
Fenzi
Forel
Lisec Group
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Triulzi

POLYSULPHIDE SEALANT EXTRUDERS

Best Makina
Bystronic glass Group
Fenzi
Forel
Lisec Group
Schiavo
Tecno Glass
Tenon (Beijing) Equipment
Triulzi

GAS FILLING EQUIPMENT

Bystronic glass Group
Fenzi
Forel
Lisec Group
Neptun
Schiavo
Sparklike
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group

DESICCANT SALTS

Ashton Industrial Sales

Fenzi
Neptun
Schiavo
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
Thermoseal Group

POLYSULPHIDE SEALANTS
Fenzi

HOT MELT
Ashton Industrial Sales
Fenzi
Thermoseal Group

OTHER SEALANTS
Fenzi

PANTOGRAPHS
Fratelli Pezza

ACCESSORIES
Ashton Industrial Sales
Deltamax Automazione
Diamant - AR Nunziata
Forel
Forza G / G. Tech
Helios Quartz
Schiavo
Sparklike
S.T. Group
Tenon (Beijing) Equipment
Triulzi

Tempering

TEMPERING FURNACES (ARCHITECTURAL GLASS)
CNUD-EFCO
Glaston
Glass Company
Glasstech Inc.
Hornos Industriales Pujol
Keraglass
Landglass Technology
Lema
Lisec Group
Mappi International
Mazzaroppi Engineering
Schiavo
Shanghai North Glass Technology
Tekno Kilns
TK

TEMPERING FURNACES (AUTOMOTIVE GLASS)
Glaston
Glass Company
Glasstech Inc.
Keraglass
Landglass Technology
Mappi International
Mazzaroppi Engineering
SGLASS
Shanghai North Glass Technology

CHEMICALS TEMPERING EQUIPMENT
Glass Company

ACCESSORIES
CNUD-EFCO
Deltamax Automazione
Fenzi
Glaston
Glass Company
Helios Quartz
Hornos Industriales Pujol
Keraglass
Landglass Technology
Mappi International
Mazzaroppi Engineering
RCN Solutions
SGLASS
Tekno Kilns
TK
Torgauer Maschinenbau

Bending

BENDING FURNACES (ARCHITECTURAL GLASS)
Glaston
Glass Company
Glasstech Inc.
Hornos Industriales Pujol
Keraglass
Mappi International
Mazzaroppi Engineering
RCN Solutions
SGLASS
Tekno Kilns
TK

BENDING FURNACES (AUTOMOTIVE GLASS)
CNUD-EFCO
Glaston
Glass Company
Glasstech Inc.
Keraglass
Mappi International
Mazzaroppi Engineering

ACCESSORIES
Ayrox
Deltamax Automazione
Glaston
Glass Company
Glasstech Inc.
Hornos Industriales Pujol
Keraglass
Mappi International
RCN Solutions
Softeco
Tekno Kilns
TK

Laminated glass production

COMPLETE PLANTS
Bovone Elett.
Bottero
Bystronic glass Group
Forel
Glaston
Glass Company
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Mazzaroppi Engineering
Triulzi

LAMINATED WINDSCREEN BENDING FURNACES
ECOL
Glaston
Glass Company
Glasstech Inc.
Keraglass
Mappi International

AUTOCLAVES
Bystronic glass Group
Glaston
Glass Company
Hornos Industriales Pujol
Lisec Group
Triulzi

CLIMATIC CABINS
Bystronic glass Group
Forel
IOCCO Group
Lisec Group
Triulzi

INFRARED OVENS
Bystronic glass Group
ECOL
Forel
Glass Company
Hornos Industriales Pujol
IOCCO Group
Lisec Group
SGLASS
Triulzi

PRESSES/BENDING MACHINES
Forel
IOCCO Group
Lisec Group
Triulzi

RESIN LAMINATING MATERIALS AND EQUIPMENT
IOCCO Group
Torgauer Maschinenbau

PVB
Everlam
Kuraray - Trosifol

PVB - SHAPING AND CUTTING EQUIPMENT
Ayrox
Bystronic glass Group
ECOL
Forel
IOCCO Group
Lisec Group
Softeco

PVB - WIRING TECHNOLOGY FOR HEATABLE LAMINATES
Ayrox
ECOL
Softeco

ACCESSORIES
Ayrox
Bottero
Deltamax Automazione
Glaston
Helios Quartz
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Optris
Softeco
Triulzi

Drilling

AUTOMATIC DRILLING LINES

B Solution Licensee of BF Project
Bando Kiko
Bavelloni
Bystronic glass Group
Forvet
Guangdong Northglass & Juisun Technology Industrial
Intermac - Biesse
IOCCO Group
Schiatti Angelo
SKG - Skill Glass

MULTI-SPINDLE DRILLING MACHINES

B Solution Licensee of BF Project
Bando Kiko
Bavelloni
Bystronic glass Group
CMS
Forvet
Glass Company
Intermac - Biesse
IOCCO Group
Schiavo
Schiatti Angelo
SKG - Skill Glass

DRILLING MACHINES WITH OPPOSITE DRILLING HEADS

B Solution Licensee of BF Project
Bando Kiko
Bavelloni
Bottero
Bystronic glass Group
CMS
Fenzi
Forvet
Hiseng Glass Machinery
Intermac - Biesse
IOCCO Group
Schiavo
Schiatti Angelo
SKG - Skill Glass

COLUMN DRILLING MACHINES

B Solution Licensee of BF Project
Bottero
Fenzi
Schiavo

PORTABLE DRILLING MACHINES

CMS
Fenzi
Schiavo

DRILLING AND MILLING MACHINES

Bavelloni
Bottero
CMS
Forvet
IOCCO Group
Schiavo
SGLASS
ADI
Bovone Diamond Tools
Diamut - Biesse
Glaston
Schiavo
SKG - Skill Glass
Tyrolit Vincent

DIAMOND DRILLS

ADI
Bovone Diamond Tools
Diamant - AR Nunziata
Diamut
Fenzi
Glaston
Mole Moreschi
Schiavo
Tyrolit Vincent

ACCESSORIES

CMS
Fenzi
Schiavo

Other equipment and plants

TURNKEY PLANTS / ENGINEERING - FOR BUILDING GLASS

Bando Kiko
Bottero
Bystronic glass Group
Cugher Glass
Intermac - Biesse
IOCCO Group
Keraglass
Lisec Group
Torgauer Maschinenbau

TURNKEY PLANTS / ENGINEERING - FOR AUTOMOTIVE GLASS

Bando Kiko
Bottero
Bystronic glass Group
Cugher Glass
Easy Automation
Intermac - Biesse
IOCCO Group

KEY PLANTS / ENGINEERING - FOR DISPLAY GLASS

Bando Kiko
Cugher Glass
Torgauer Maschinenbau

WORKING CENTRES - CNC CONTROLLED

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

FLOAT PLANTS/LINES (EQUIPMENT & ACCESSORIES)

Bovone Elett.
IOCCO Group
Optris

CONSULTING SERVICES

Horn

CULLET HANDLING SYSTEMS

ECOL

COMPLETE BATCH PLANTS

Zippe

VACUUM COATING EQUIPMENT AND PLANTS

Glass Company
Shanghai North Glass Technology

ENAMELLING EQUIPMENT AND PLANTS

Giardina Finishing + HS Glassprinting
Glass Company
Rollmac division of GeMaTa

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

Giardina Finishing + HS Glassprinting
Horn

SANDBLASTING SYSTEMS, EQUIPMENT AND PLANTS - OPTIMIZERS

Fenzi
Fratelli Pezza
Glass Company
Schiavo
SKG - Skill Glass

DIGITAL INKJET PRINTERS

Glass Company

SCREEN PRINTING EQUIPMENT AND PLANTS

Ayrox
COMSS
Cugher Glass
Deltamax Automazione
ECOL
Giardina Finishing + HS Glassprinting
Glass Company
Guangdong Northglass & Juisun Technology Industrial
Keraglass
Rollmac division of GeMaTa
Shanghai North Glass Technology
Softeco

SCREEN PRINTING FRAMES

COMSS

SCREEN PRINTING DRYING SYSTEMS

COMSS
Cugher Glass
Glass Company
Guangdong Northglass & Juisun Technology Industrial
Rollmac division of GeMaTa

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

CERAMIC FIBER PANELS

RCN Solutions

CERMAMIC INKS
Glass Company

CHAMBER ELECTRIC KILNS
Glass Company
Keraglass
RCN Solutions
Tekno Kilns
TK

DECORATING ENAMELS AND COLOURS - PRECIOUS METALS
RCN Solutions

DETACHING MATERIALS AND EQUIPMENT
RCN Solutions

ACCESSORIES
Deltamax Automazione
Helios Quartz
RCN Solutions

Miscellaneous

AUTOMATION
Ashton Industrial Sales
IOCCO Group
Horn
Optris
Torgauer Maschinenbau
Zippe

AUTOMOTIVE GLASS APPROVAL SERVICES
Ayrox
Softeco

AUTOMOTIVE GLASS QUALITY CONTROL
Ayrox
Bando Kiko
Bystronic glass Group
Cugher Glass
Deltamax Automazione
Easy Automation
Glaston
IOCCO Group
Optris
Softeco

CE MARKING - QUALITY CONTROL EQUIPMENT FOR GLASS IN BUILDING
Ayrox
Softeco

COLOURS & ENAMELS - OTHER APPLICATIONS
Ayro

DEIONIZING AND WATER SOFTENING EQUIPMENT
Fenzi
Forel
Glass Company
Idrotecnica
Lisec Group
Triulzi

ELECTRIC FOILERS FOR COPPER RIBBONS
RCN Solutions

FLAT GLASS QUALITY CONTROL DEVICES
Ayrox
Deltamax Automazione
Forel
IOCCO Group
Softeco

FURNACES
Glass Company

GLASS COATING AND TINTING
Giardina Finishing + HS Glassprinting
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

HINGES FOR GLASS DOORS

INFRARED TUBES
Helios Quartz
Deltamax Automazione

KILNS
Glass Company
Horn
Keraglass
Lisec Group
RCN Solutions
Tekno Kilns
TK

METAL ACCESSORIES
Fenzi

METALLIC SECTIONS
Fenzi

NUMERICAL CONTROL SYSTEM (CNC) FOR ALL GLASS PROCESSING MACHINES
Glass Company
IOCCO Group
Prodim

OPTICAL DISTORTION ANALYSERS FOR AUTOMOTIVE GLASS
IOCCO Group
Keraglass

OPTICAL INFRARED THERMOMETERS
Optris

POWDER OR LIQUID APPLICATION SYSTEMS FOR PROTECTING FLOAT GLASS
Cugher Glass
Giardina Finishing + HS Glassprinting
Glass Company

PUMPING AND APPLICATION SYSTEMS (AUTOMOTIVE GLASS)
IOCCO Group

PURIFIERS FOR REFLUENT WATER
Forza G / G. Tech

PUTTIES AND SEALANTS
Fenzi

QUARTZ EQUIPMENT
Helios Quartz

SHAPE CHECKING DEVICES
Easy Automation
IOCCO Group

glassOnline click here

SIC HEATERS
Helios Quartz

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SATINAL

selecting raw materials without compromise; providing top quality products

The guarantee of careful quality checks during the entire production process, from raw materials supply to sale to customers results in top quality products. And this is the company philosophy of Satinal, based in northern Italy. This same philosophy also applies to the company's new EVA-based interlayer (Ethylene Vinyl Acetate) – STRATO™ – which is produced in Italy, guaranteeing optimal results, widely satisfying the global market.

ITALY AS A SYNONYM OF ATTENTION TO DETAIL

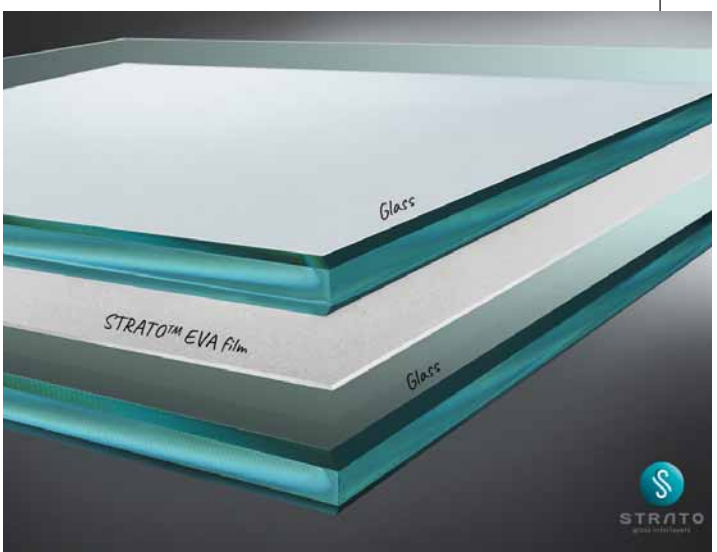
Italy has always been at the forefront in developing the

In this article we take a look at the most recent project of one of Italy's 'family-owned and run' companies, which involves the production of interlayers – made entirely in-house in Italy. The resulting product - STRATO™ – is an EVA-based interlayer (Ethylene Vinyl Acetate), which can be used both for architecture and for interior design.

best technologies and, as the first manufacturer of EVA-based interlayers in Italy, Satinal's mission is to provide a 100 per cent Italian product which meets these highest standards, with continuous attention to detail in mind.
For Satinal, customer assistance and attention to clients begin even before selling a product. Compatibility tests are provided to understand how new materials react in contact with STRATO™ film and glass. Clients interested in testing new products can contact the company to verify the adhesion result of the materials.

STRATO™ – A NEW EVA-BASED INTERLAYER

STRATO™ is a new EVA-based interlayer (Ethylene Vinyl Acetate), a polymer used for a wide range of applications in different industrial sectors. The knowledge of this EVA-based interlayer is essential to understand all its possible applications and the advantages it offers. Being a crosslinked material (thermoset), STRATO™ can be applied on security glasses for architecture and for interior design without incurring in the delamination process.



The application of STRATO™ requires specific temperatures and processing times. For this reason, quality controls carried out by the company enable to achieve the perfect adhesion of the material on the glass plate.
Thanks to its network of agents, Satinal offers top level assistance through customized services, with staff available to meet the needs and requirements of clients.
Satinal's after-sales follow up with clients involves asking them to send samples of products during and after production, to verify the final result.

Versatility

STRATO™ is a very versatile product, present in many products used in everyday life, ranging from the footwear sector – where it is used as cushioning material, to being inserted into electric cables as insulation. It is, in fact, a material with numerous advantages thanks to its characteristics.
STRATO™ is a crosslinked material (thermoset) which can be applied on glass for architecture and interiors without incurring in the delamination process.

- Safety – EVA-based interlayer is used for the lamination of the glass, making it a security glass according to European (UNI EN ISO) and American (ANSI) standards.
- Resistance to high moisture – Not being sensitive to water and moisture, it does not require other protection (such as sealants) even in external glass units.
- Resistance to high temperatures – STRATO™ interlayer, if correctly processed, becomes highly crosslinked: this means that its performances does not change even when it is subject to high temperatures.

Colours and finishes

STRATO™ interlayer is available in a range of basic colours, with which is possible to create lighting effects and combinations with different materials:

- EXTRA CHIARO: transparent and brilliant
- LEGGERO: light frosted
- SATINATO: matt effect, soft and delicate
- LATTE: semi-transparent, giving glimpses of the shape of objects
- BIANCO: purity and simplicity
- NERO: extreme coverage
- FRESCO: solar control

Applications

STRATO™ can be used in the realization of elements, positioned both indoors and outdoors, as well as for decorative elements while maintaining its main feature as an element of safety: offices, shops, restaurants can thus achieve an aesthetic, creative and special effect but always safe. Colours and materials inserted between STRATO™ and glass can, indeed, create endless variations, games of designs and particular visual effects.
Textiles, chain-link fences, organic dried materials, marble: all these elements can be used for decorations with glass and EVA-based interlayer. To verify the compatibility of a new material, test can be carried out directly by Satinal at its premises.
Many designers have used EVA-based interlayers to give a creative aspect to simple interior design elements, thanks to the insertion of multiple materials or lighting effects which can be obtained from the illumination of the final product.
Regarding architecture, especially for the production of railings, stairs and bus shelters, the use of STRATO™ for glass stratification is a synonym of safety. In fact, in the case of broken glass, STRATO™ avoids the dispersion of dangerous sharp shards.
The crosslinked structure of STRATO™ enables the internal molecules to activate three-dimensional links, ensuring added protection for all the archi-

tectural elements subject to extreme conditions, such as high temperatures, moisture and different atmospheric agents.
The EVA-based interlayer, positioned between two glass plates, offers complete protection from UV rays – more than 99 per cent – avoiding the discoloration of internal furniture.

S-LAB: RESEARCH AND EDUCATION

Satinal's Research & Development Lab is focussed on the control of all production phases of STRATO™ and its technical characteristics. The company's engineers and professional technicians perform tests in order to obtain a product which can be matched and compatible with different materials and which can guarantee to architects and glassmakers the maximum output on projects and final realization.

Not only technical exams, but also education

The S-LAB area also hosts scheduled courses and launches aimed at freelance professionals and companies wanting to stay informed on the possible processings of this product – in continuous evolution – and on the news of this sector.
Satinal also works with University Research Centres regarding the study and engineering of mate-

rials. This allows to complement the expertise of the company staff with the know-how of experts and scientists of the sector, add further improvements to STRATO™.

STRATO™ by Satinal Spa

STRATO
glass interlayers

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Inside the Elbe Philharmonic Hall around the concert rooms so-called tuning forks made of GRFP accept three spherically bent sheets each.
Photo/Copyright: Cordelia Ewerth

glass technology live: TRANSPARENT VISIONS

The glass technology live show during Glasstec 2018 provided new impulses: a cluster comprising four universities and renowned exhibitors presenting innovative and visionary solutions covering four selected focal themes, with a combination of scientific theory and hands-on practice.

Dipl.-Ing. (FH) Claudia Siegele - freelance architect and specialised journalist Matthias Fischer - specialised journalist and textbook author

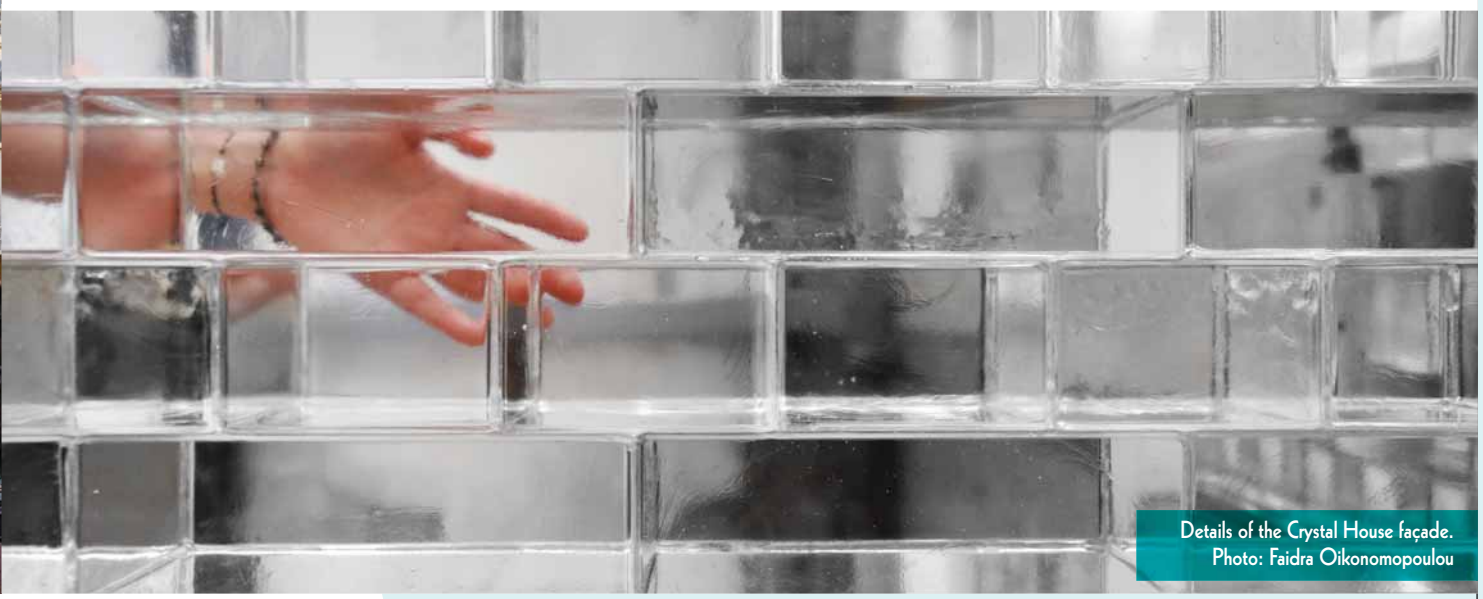
Façade of the Crystal House in Amsterdam.
Photo: Daria Scagliola & Stijn Brakkee

The glass technology live show at Glasstec 2018 addressed the four focal themes Interactive Façades/Display Glass, Energy and Performance, Structural Glass (thick glass/thin glass) and New Technologies. In cooperation with four Technical Universities (Darmstadt, Delft, Dresden and Dortmund) and selected businesses Messe Düsseldorf showcased forward-looking technologies. Furthermore, the Glasstec conference also provided information on the latest developments while also picking up on current research projects from the special show. The essential and typical characteristic of glass is its transparency – a property that laid the foundation for the appeal of this material millennia ago and that has not ceased to fascinate with its versatile applications until this very day. From the early period through antiquity to the Middle Ages glass manufacturing has been constantly refined and specialised. By the introduction of industrial-scale production glass became an affordable mass-produced product on the one hand, and machine-based glass technology also opened up hitherto unknown possibilities for glass finishing, on the other. Last but not least, digitalisation brought completely new fields of application such as interactive façades and energetic functions.

GLASS TECHNOLOGY LIVE UNDER NEW GUIDANCE AND WITH A NEW CONCEPT

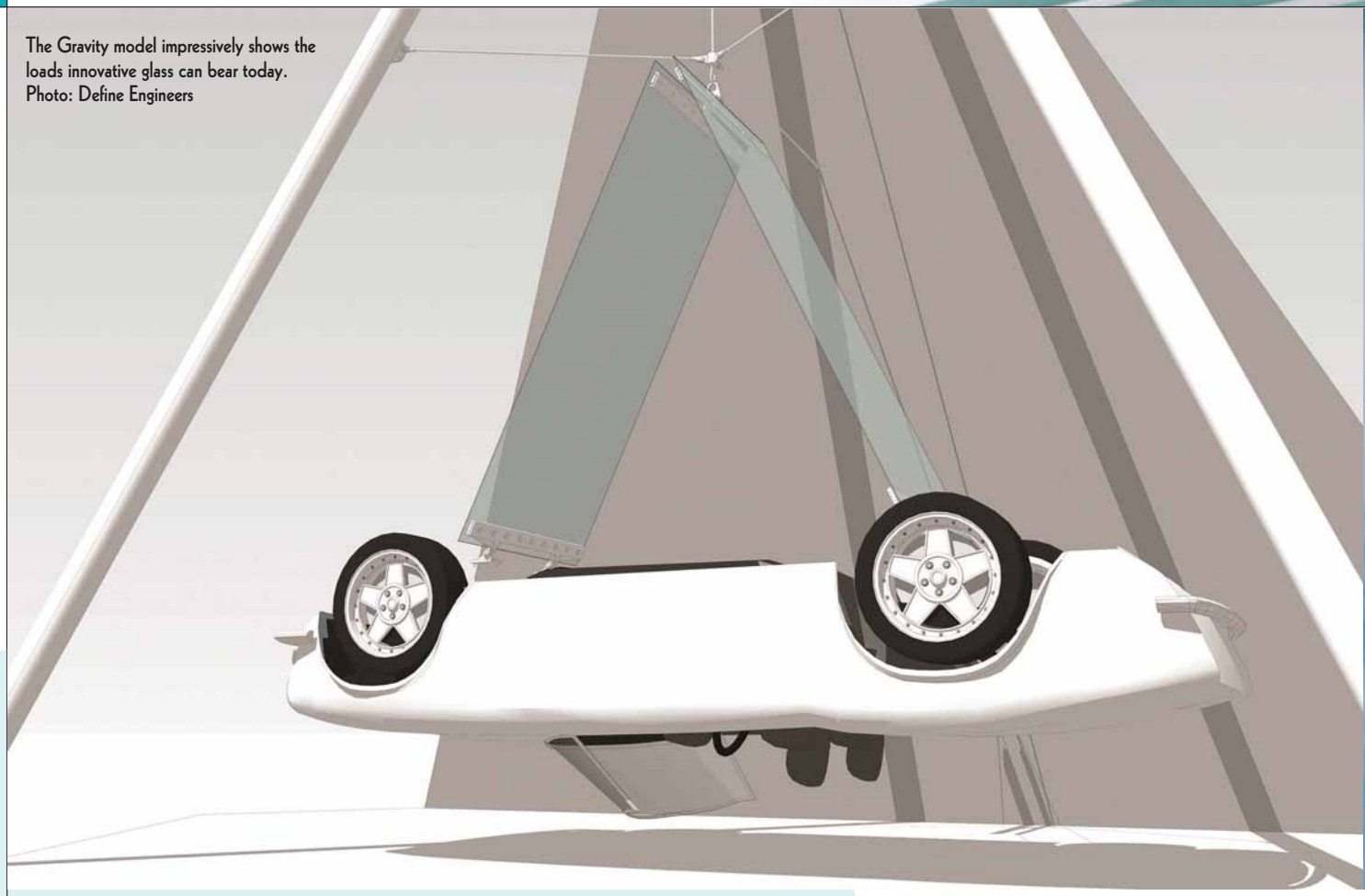
glass technology live fused both the said advances made in glass technology and the undreamt-of possibilities of this tradition-rich material. The special show has been part and parcel of the trade fair for 20 years

Rendering of the glass bridge on the TU Delft Campus.
Illustration: TU Delft, Frank Auperlé



Details of the Crystal House façade.
Photo: Faidra Oikonomopoulou

now and has long since been considered a key impulse generator for the international glass industry. Originally initiated by Professor Stefan Behling, Senior Executive Partner at Foster + Partners, and the Institute of Building Construction at the Stuttgart University and designed, organised and characterised by him and his team for over two decades, glass technology live in 2018 celebrated its 25th anniversary completely re-vamped: a cluster of four universities instead of one worked out the conception for the special show. Each one of the four universities addressed its own focal theme and presented ground-breaking exhibits from the area of technology, manufacturing and glass applications. The cross-industry spectrum of themes covered ranged from automotive through consumer products to construction and interior design. While TU Darmstadt outlined visions in structural glass engineering and used new technologies to make their realisation graspable, TU Delft introduced the matching new glass types and glass construction typologies. In contrast to this, Dortmund University covered interactive façades and the energetic functions of glass. Last but not least, Dresden University worked out the potential that gluing holds as a joining technique for glass construction. Almost three quarters of the exhibits on display at the special show were first 'releases', university research projects, experimental concepts or award-winning works from student competitions. Themed 'Meet the Expert' sessions and the newly conceived Glasstec conference gave glass technology live visitors an additional opportunity to make personal contacts, attend



The Gravity model impressively shows the loads innovative glass can bear today.
Photo: Define Engineers

interesting lectures and take part in topical expert discussions.

INNOVATIONS FROM UNIVERSITIES AND PIONEERING EXHIBITORS

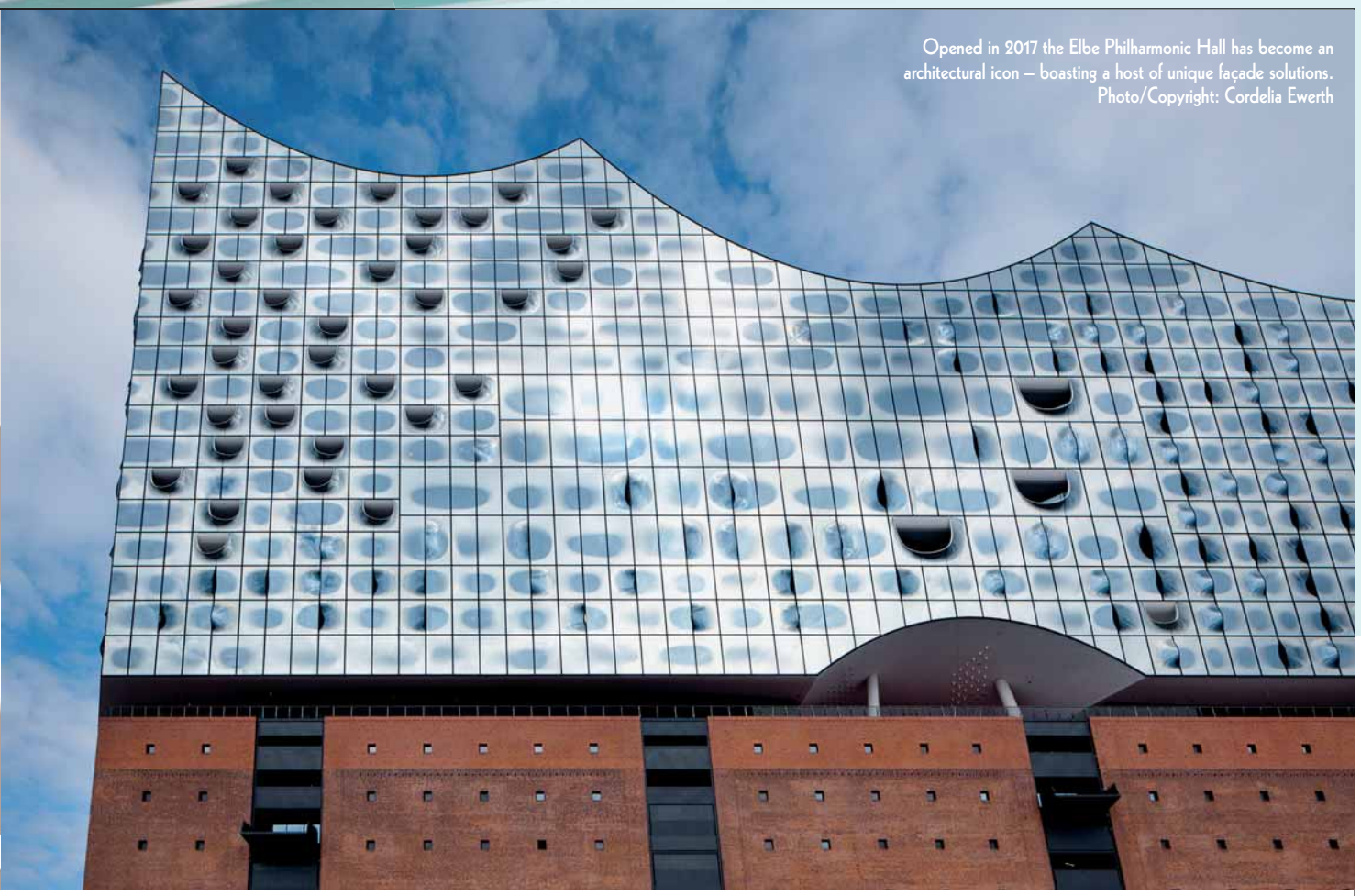
The area occupied by glass technology live was divided up into four segments dedicated to the aforementioned focal themes of the four universities. The common denominator of all exhibitors was that they showcased completely new ways of using glass as a material.

Seen GmbH, for example, deals with reflecting shapes. Micro shapes with a metallic reflection in glass reflect light and colours in all directions. The individual elements are highly customisable. The choice of surface ranges from highly and semi-reflective metals to multi-coloured iridescent colour coatings. The shapes available are squares, rectangles or circles sized between two and twenty millimetres. Up to five different types can be fixed at any chosen distance on the transparent substrate that is introduced as a two-sided insert into laminated sheet glass or laminated toughened glass. Uniform lines and grid structures are feasible as well as partial areas, graduated shades and logotypes. Elements coated on one side produce an intriguing effect. The different thermal expansion coefficients of the various surfaces produce a slight curvature in the individual shapes during the lamination process so that a three-dimensional effect is produced.

ELBE PHILHARMONIC HALL – GLASS RE-STAGED

Opened in 2017 the Elbe Philharmonic Hall in Hamburg has set new standards in many ways. Its unique features are the bent, multiple coated and printed multi-purpose insulating glass sheets that produce special light effects on the building skin.

Josef Gartner GmbH, a company of the Permasteelisa-Group, clad the buildings with custom-made glass panes over a total area of 16,000 square metres. Never before had multi-functional insulating glass units been produced with a curvature along just one glass edge. To this end the glass panes were first printed, then coated and finally bent precisely according to specifications at a temperature between 500 and 600°C. About 500 of the approximately 2,200



Opened in 2017 the Elbe Philharmonic Hall has become an architectural icon – boasting a host of unique façade solutions. Photo/Copyright: Cordelia Ewerth

glass elements inserted are spherically bent. Another 1,700 units were inserted flat but all elements are made of low-iron oxide glass to ensure particularly clear views. Both element sizes were produced with an outside curvature and with an inside curvature offset by 350 millimetres towards the inside. Oval pivot windows allow the rooms to be naturally ventilated. Each pane of the façade features a chrome dot screen print and a second coloured dot screen print. The small reflecting chrome dots vary, thereby making each window element a one-off. In the area of the two concert rooms six inside terraces were built. 5 metres high and 6.45 metres wide so-called tuning forks made of glass fibre reinforced plastic accept three spherically bent panes each and open the façade to the loggia located behind it like an inside balcony. In the flat wing of the building these tuning fork elements are 5 metres wide and 3.33 metres high and accept two spherically bent laminated security glass panes printed with dot screens. The latter were on show as sample elements from the Elbe Philarmonic Hall alongside other Gartner exhibits at glass technology live.

The exhibit provided by Define Engineers, Carpenter/Lowings and seele was about gravitation in the broadest sense of the word. It demonstrated technological progress in glass processing, adhesive development, high-precision technology and manufacturing. A car turned upside down was suspended from just two thin glass panes between a steel tripod. The laminated panes measured 1 x 2.20 metres and consist of two 2-millimetre, partially pre-stressed glass sheets provided by Glaston that were laminated with SentryGlas by sedak. The primary connection with the glass was realised with Dow's transparent TSSA silicone structural adhesive. Another superlative was the world's biggest bent glass sheet with a curve length of 8,000 millimetres and a height of 3,200 millimetres in thermally pre-stressed glass presented by Northglass. A specially developed furnace technology allows heating and cooling the glass on transport rollers all the way. With this process the best optical quality of the bent glass can be ensured.

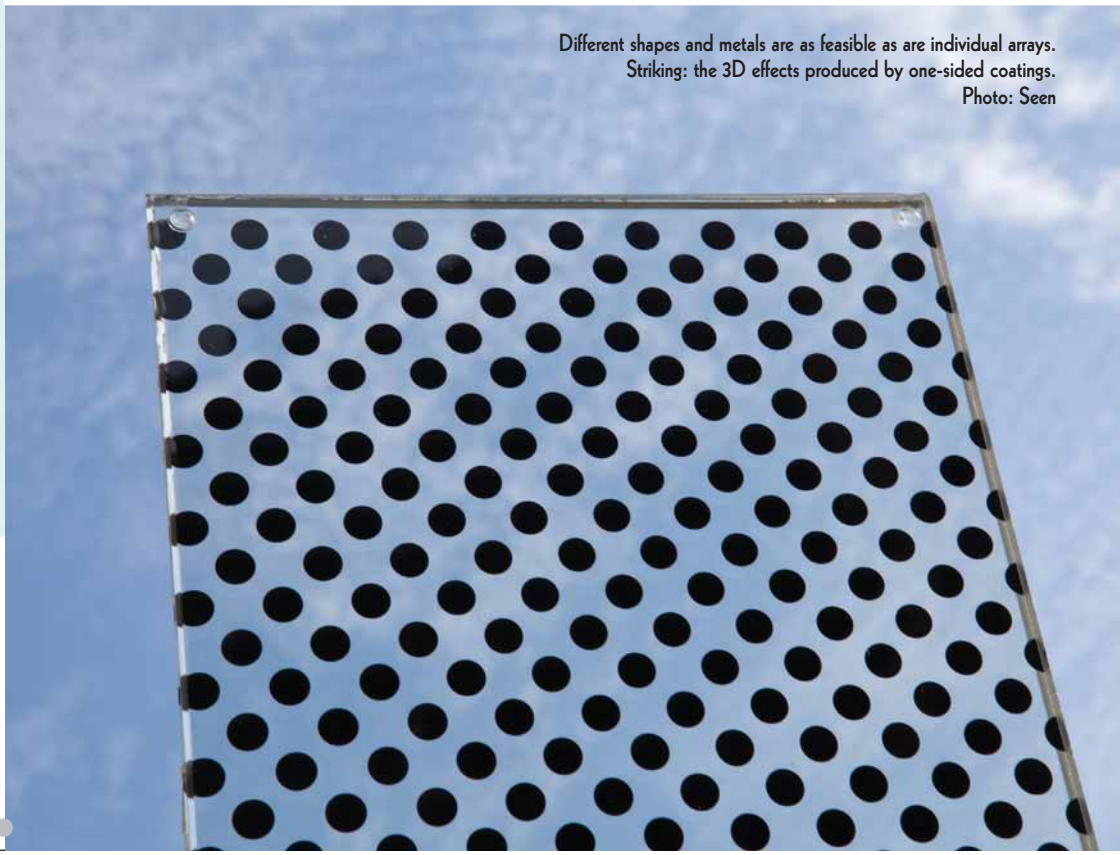
NIEMEYER SPHERE

In the listed brick buildings of the Kirow-Werke in Leip-

zig one of the last designs by architect Oscar Niemeyer (1907-2012) is currently taking shape. The project is based on a spherical design that embraces the existing building while also forming a contrast with it. The sphere consisting of white exposed concrete with two large, curved window 'cut-outs' hosts two storeys. The window cut-outs are geodesic domes with a triangular division. The matching partner for realising this project was found in Merck and their Liquid Crystal Window-Technology (LCW) for self-shading double-glazed units. One prerequisite for the project was the development of a neutral grey shade that attains a very high degree of transparency in its initial state. This can be switched gradually either automatically or at the touch of a button to a very dark grey so that the energy transmittance can be reduced substantially if need be. At glass technology live Merck presented a true-to-scale model of part of the building. This demonstrator was made up of 50 different triangular sheets measuring approximately 1.4 x 1.4 metres and supported by a steel structure.

Interactive façades, display and thin glass, forward-looking glass technologies for generating energy as well as developments and possibilities in structural glass engineering: all of this was on show at glass technology live at Glasstec 2018.

Metallic reflections for façade and interior.
Photo: Seen



Different shapes and metals are as feasible as are individual arrays. Striking: the 3D effects produced by one-sided coatings.
Photo: Seen

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