Glass-Technology International

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THE LEADING MAGAZINE FOR THE INTERNATIONAL FLAT GLASS INDUSTRY

Turomas
LAMINATED AND SAFETY GLASS CUTTING TECHNOLOGY FOR TVITEC

LiSEC
GLASTRONIC GIVES NEW LIFE TO USED MACHINES

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SUPER SPACER® INSULATING GLASS LINES ARE AT THE HEART OF PRODUCTION AT DESCHANET

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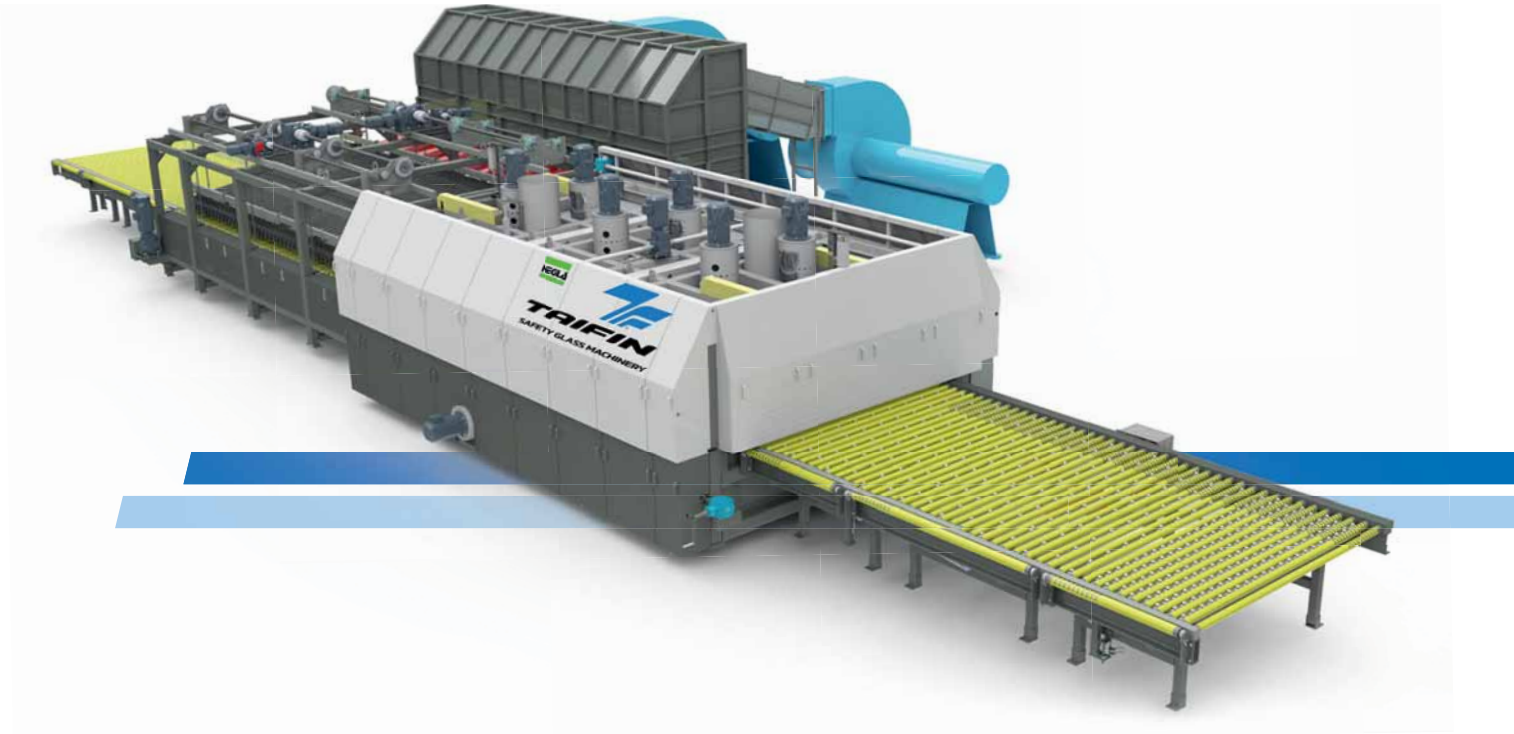

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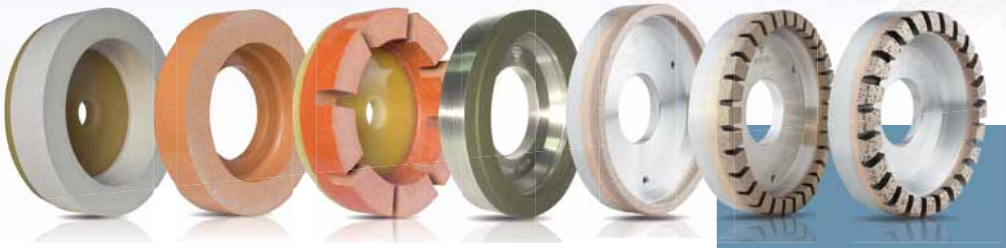

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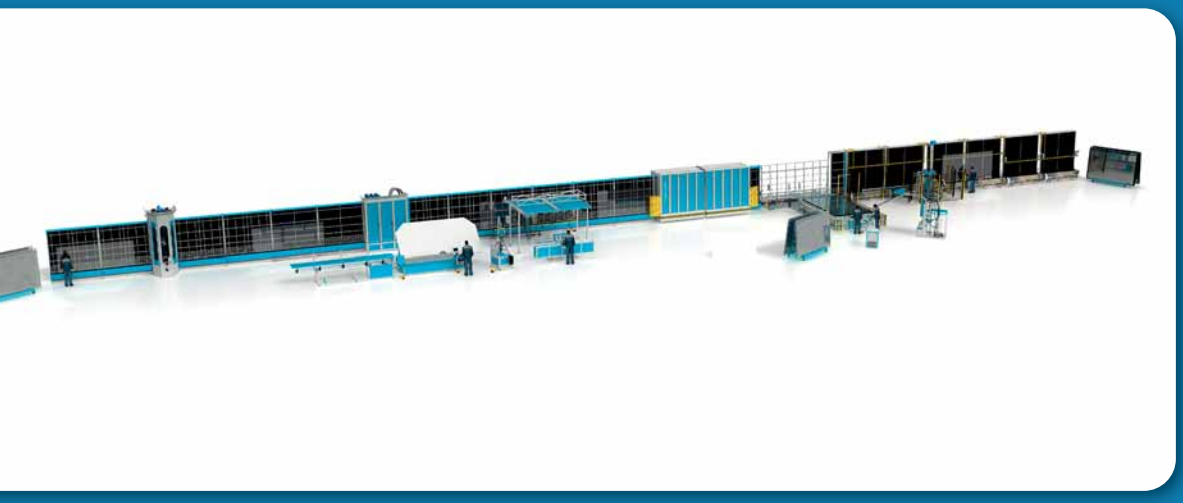

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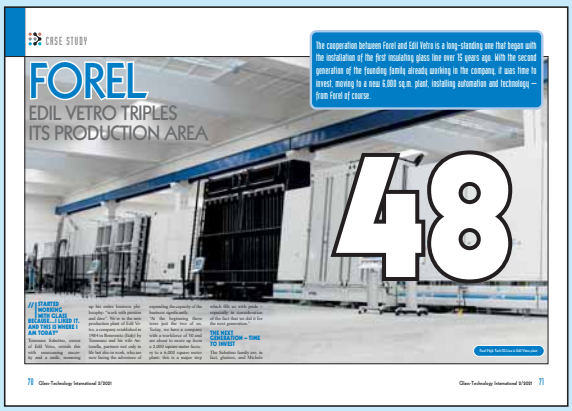

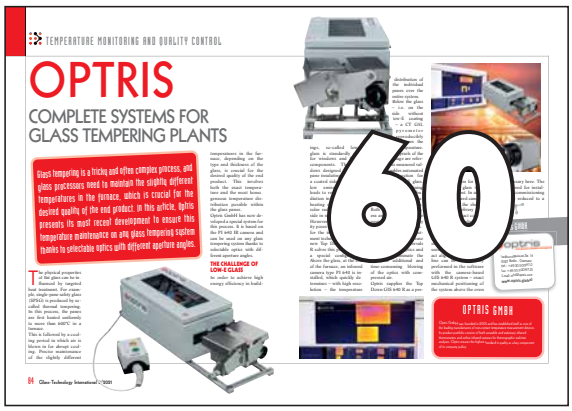

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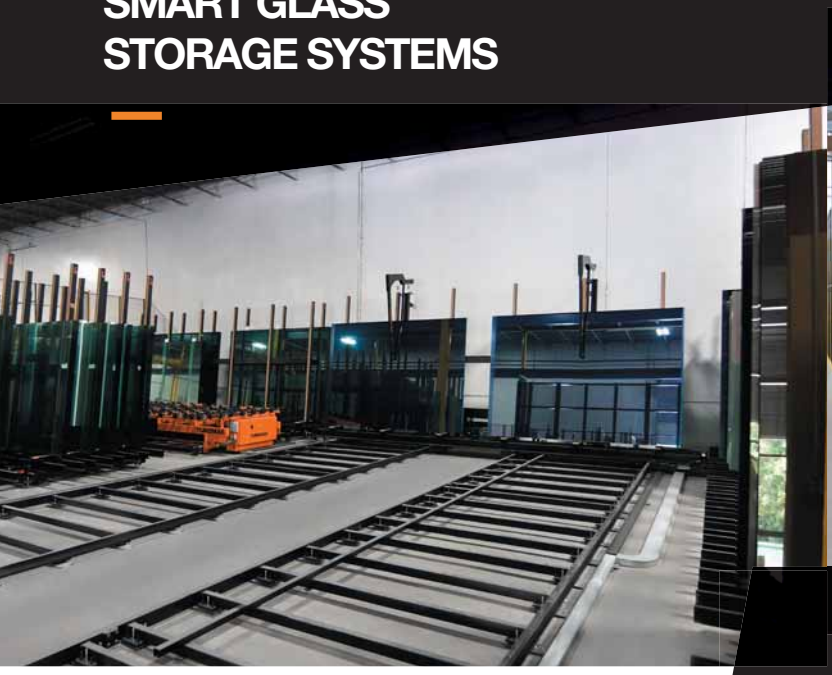

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2021 FAIR CALENDAR

The magazine will be distributed at the following Trade Fairs

issue	exhibition/conference	date	venue	deadlines
2021 1	MIR STEKLA	22-25 March	MOSCOW Russia	Editorial files: 29-01-2021 Deadline Adv files: 05-02-2021
2021	FLATGLASS 2021 world directory			Editorial files: 26-02-2021 Deadline Adv files: 08-03-2021
2021 2	VETECO	Postponed	MADRID Spain	Editorial files: 26-03-2021 Deadline Adv files: 02-04-2021
	CHINA GLASS	6-9 May	SHANGHAI China	
2021 3	GLASSTEC	Cancelled		
	SPECIAL ISSUE - VIDEO INTERVIEWS			
	GLASSTECH MEXICO	4-6 August	GUADALAJARA Mexico	
2021 4	GLASS SOUTH AMERICA	1-4 September	SAO PAULO Brazil	Editorial files: 19-07-2021 Deadline Adv files: 30-07-2021
	GULF GLASS	12-15 September	DUBAI UAE	
	GLASSBUILD AMERICA	13-15 September	ATLANTA (GA) USA	
2021 5	VITRUM	5-8 October	MILAN Italy	Editorial files: 03-09-2021 Deadline Adv files: 10-09-2021
	ALL VITRUM EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE SPECIAL FEATURE			
	GPD - GLASS PERFORMANCE DAYS	20-22 October	TAMPERE Finland	
2021 6	EURASIA GLASS	3-6 November	ISTANBUL Turkey	Editorial files: 11-10-2021 Deadline Adv files: 18-10-2021
	GLASSTECH ASIA	16-18 November	BANGKOK Thailand	
	ZAK GLASS TECHNOLOGY	2-5 December	MUMBAI India	

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FOR **FLAT** AND **BENT** GLASS

BOVONE

Strength, performance and high integration in complete lines

The BVR 160 Vertical Washing Machine by **Bovone**, made entirely of stainless steel, washes and dries glass with thicknesses between 3 and 30mm and heights of over 1,600mm. The front casing is movable to adapt to different glass thicknesses.

The washing of the glass sheets is carried out in the following steps:

- pre-wash;
- washing: performed by two pairs of cylindrical brushes;
- rinsing with a couple of dedicated ramps.

All the ramps are removable and equipped with quick lock nozzles to facilitate maintenance operations.

The internal sectors of the cylindrical brushes are designed and built to minimize passages, thus avoiding contamination.

The configuration of the large cold water tank, with stainless steel filters and pump, makes maintenance as easy as possible thanks to wheels and quick couplings for the pipes and electric plug for the pump.

Drying takes place via a pair of diagonally inclined air knives and powered by a soundproofed fan equipped with filters and adjustable distributor. The air knives are made of thick steel with the lips machined to reduce noise and increase performance: the sound pressure level is within 82 dB.

The BVR 160 Vertical Washing Machine is equipped with an operator panel through which the various processing parameters can be managed: the electromechanical components are of the highest quality.

All Bovone washing machines integrate easily with other machines within modular lines.

The BVR 160 Vertical Washing Machine can be integrated with optional equipment such as:

- hot water tank equipped with armoured electric resistance and insulating cover panel;
- inspection lamps positioned on the out conveyor to check the properties of the glass after washing.

WWW.BOVONE.COM

GLASTON

BVGlazing builds value for its customers

"Glass has become a feature of the building – not just something you're looking through. That's why all the glass we deliver must be of the highest possible quality," said Andrew Dolphin, General Manager Glass Operations at **BVGlazing** in Toronto. "**Glaston's** RC350 and FC500 have helped us expand our business to greater capacity with outstanding glass quality."

BVGlazing is the result of the August 2016 merger of two dominant forces in the North American architectural design, manufacturing and construction markets – *Allan Windows Group* and Global Architectural Metals Group. The goal was to combine resources and the century of experience in the development of bold new products and efficiencies servicing the window wall, curtain wall and railing industries. Since then, the company has been chosen for many truly iconic buildings throughout North America, completing over 30 projects per year.

About four years ago, BVGlazing purchased a Glaston RC350 tempering furnace and entered into the tempering business. Then two years later, they purchased a Glaston FC500 tempering furnace.

The core business for BVGlazing is high-rise residential and commercial construction. Earlier, condos used much smaller and conventional glass with standard double silvers. Now, these projects are utilizing large wall facades and incorporating the entire pallet of low-Es – triple silvers, reflective low-Es and tints.

"The buildings are really becoming show-pieces," Andrew explains. "Glass is obviously a huge part of that. So, the quality of our tempering has a tremendous impact on the end result. The glass finished product needs to be flat and without any distortion. And that's a trend that seems to be continuing."

"The control we have with the furnace, especially the FC500, with thermocouples and thermal scanning lets us make adjustments on the fly. We also have Glaston's iLooK online quality control system on the FC500, which helps us nail down a really good recipe for flat glass and limited roller wave."

HTTPS://GLASTON.NET

RCN SOLUTIONS

New concept in lamination

Active listening is the best service skill and helps to understand customer needs. It involves attentive consideration of what the customer is requesting, explaining or experiencing. And especially, it is a commitment built day by day, a consistent attitude resulting in new business opportunities. And with this in mind, **RCN Solutions** is striving to improve on this challenging and delicate job.

The company knows, thanks to the feedback from its customers, that cleaning the glass edges after lamination is a major problem. The laminating interlayer squeezes out during the process and, since it cannot be removed hot, to clean it cold it is a hard job, due to the particular specifications of the laminating interlayer, REVA BF, granting high adhesion and quality in safety glass.

Removing the excess is essentially a manual job carried out by means of blades or other tools, but it requires time and additional costs to the end product.

So the matter was how to solve this problem without interfering with the laminating process.

As a matter of fact, by using the 'RD Clean Concept', there is no need to adjust the pump aspiration values, with the risk of air bubbles. This RCN system allows to maintain time and quality scheme unchanged, according to RCN programs. At the same time, it does not force or involve the operator in changing parameters for any laminating run, going to adjust whatever during the operations.

So, RCN SOLUTIONS is proposing a unique possibility, a system granting the final product without troubling the production, without efforts, no extra finishing required, and most important no need for labour which means money saving.

However, the concept has another, not less important purpose: the UNI EN 12453-3 standard, concerning the dimensions and the finishing of the edges of the laminated glass, determines the tolerance of the thickness of the interlayer after lamination – tolerance that with the use of current bagging system, pressing strongly on the glass edges – can result, in some cases, lower than required, thus compromising the acceptance of the end product

'RD Clean Concept', developed by RCN, does not cause any interlayer thickness reduction, thus assuring triple advantage: clean edges at the end of the process, perfect thickness of the interlayer after the process, and a money saving of about 40 percent of the labour costs.

The combination of service along with the RCN ability for development, has allowed design and production of a system to issue laminated glass that can be simplified by calling it clean edges, which embodies the idea there is no need to remove the exceeds of the laminating interlayer from the edges after the lamination.

Although the terms clean edges can sound familiar, the definitive, successful solution is by RCN only, and involves a technique specifically designed and tested.

This project, RCN is proud to say, came from an idea of Davide Ricchi, junior partner of the company, who believed strongly in this concept by researching, experimenting materials and testing continuously until the results have been the expected ones. This new system is patent pending.

WWW.RCNSOLUTIONS.IT/EN/HOME-ENGLISH

SOFTSOLUTION

WAPRO invests in new LineScanner technology

The LineScanner recently installed at **WAPRO Gmbh & Co. KG,** an insulating glass factory in Diedorf, Germany, utilizes the latest in LineScanner technology. At the inspection station located after the washing machine, the **SOFTSOLUTION** LineScanner has inspected every single lite since the start-up.

As soon as the LineScanner detects any surface quality or coating defects, the signal lamp turns red and all defects are highlighted and displayed on the monitor indicating the exact positions of each defect. The LineScanner then stores all scan data in the connected archive database. Employees can quickly and easily access the archived data for statistical reports and much more. In addition, the data can be tied directly to production information to easily look up past results should any questions about the quality of a unit arise in the future.

WAPRO is the leading flat glass processing company in central Germany, it has been producing high quality, multifunctional glass since 1998. Since 2020, the 2nd generation has been running the business. The company, which belongs to the UNIGLAS Group, decided to continue the successful cooperation with SOFTSOLUTION.

Martin Wagner, Production Manager at WAPRO, said, "The installation and commissioning went smoothly. Markus Oberklammer was brilliant with his expertise, which he was able to pass on to our dedicated employees through his friendly manner. The LineScanner is primarily used to further improve quality and support our employees at Visio. After purchasing a new washing machine and Visio in 2020, the latest generation of LineScanner was on our bucket list."

"After inspecting the scanner at GKT in Brakel, it quickly became clear to us that we wanted to use this tool. The quality of the scans and the handling were convincing right away," continued Martin Wagner. "We are looking forward to working with the tool and thank the company SOFTSOLUTION for the great product."

WWW.SOFTSOLUTION.AT

TECGLASS

Compact and all-in-one solution for fabrication of premixed colours

Always focused on providing customers the best solutions for the digital printing industry, **Tecglass** has developed VITRO MIX, an innovative tool that makes the fabrication of premixed colours easier, shortening the delivery time of your customized projects.

Nowadays, production of RAL, Pantone, NCS or any other customized colour is a key aspect in the industry, so VITRO MIX has been designed to facilitate the manufacturing of these inks.

VITRO MIX SOFTWARE is included in the scope of supply, providing the colour formulation and enabling all information stored in a computer ready to use with Tecglass' range of inks (Jetver Base and Jetver Ultra).

WWW.TECGLASSDIGITAL.COM

AKARMAK

Two glass lamination autoclaves for the US

Akarmak, a leading autoclave provider for glass, composite, building material, rubber, tire and sterilization industries, has successfully completed two installations in the US.

The glass lamination autoclave installations were carried out in the US for two major glass processors, in Kansas and Florida, in late February and early March 2021. The Kansas glass lamination autoclave project was delivered to *Manko Glass*, this is the second autoclave purchased by the customer within two years, for their location in Manhattan, KS. The second installation took place in Miami, Florida at *Interglass*.

The Akarmak autoclaves are suitable for 2500/2600mm (8.25") x 5000mm (16.50") glass size were delivered including vacuum system, cooling tower, glass loading trolley as a complete turnkey package with ASME certification.

The Akarmak Autoclave:

- Working Pressure: 13 bar (189 psi)
- Working Temperature: 150˚C (302˚F)
- Glaston ProL Glass Lamination Line

Akarmak advanced user-friendly control system (Siemens) Akarmak autoclaves can be equipped with optional features: glass loading trolley and cooling tower As successful worldwide installations and after-sales service are paramount to Akarmak's success, the installations were done during the pandemic by an experienced Akarmak technician.

WWW.AKARMAK.COM

GUARDIAN GLASS

Guardian Bird1st™ Etch glass for flexibility while protecting birds

Guardian Bird1st™ Etch glass joins **Guardian Glass'** family of bird-friendly products to give architects additional options to achieve their desired design aesthetic and glass performance while reducing the likelihood of bird collisions with windows.

"Guardian Bird1st™ Etch glass gives architects greater flexibility to select the best coated glass for their project," said Chris Dolan, Director, Commercial Segment and Technical Services, Guardian Glass North America. "By pairing a Bird1st Etch pattern on surface 1 and a Guardian SunGuard® low-E coating on surface 2 of an insulating glass unit, the project can achieve desired energy performance while meeting bird-friendly standards."

Available in four different patterns on translucent glass, Guardian Bird1st™ Etch glass products include Threat Factor scores (Threat Factor scores indicate the percent of times in which birds will not avoid collision) to quantify collision-avoidance effectiveness.

These products are available on Guardian UltraClear® low-iron glass and standard clear glass and can be paired with Guardian SunGuard® SuperNeutral® 68, SNX 62/27 and SNX 51/23 coatings on the same lite of glass, as part of an insulating glass unit. The glass can be heat-treated and used with laminated glass for safety and other benefits. Guardian Bird1st™ Etch glass is currently available in 96"x130" size on 6mm thick float glass through the Guardian Select® Fabricator network.

WWW.GUARDIANGLASS.COM/EU/EN?SAVE=TRUE

The New Generation of Digital Printing

Creaglass is the innovative technology set up by **System Digital,** a **high-performance single-pass drop-on-demand inkjet digital printing** that offers important applicative solutions in the field of glass for architecture and constructions, automotive, household appliances and means of transport.

www.systemdigital.it

VITRO ARCHITECTURAL GLASS

Launch of Solarvolt™ BIPV glass modules

Vitro Architectural Glass has announced the launch of Solarvolt™ building-integrated photovoltaic (BIPV) glass modules, which combine aesthetics and performance of Vitro Glass products with CO2-free power generation and protection from the elements for commercial buildings.

For overhead glazing, façades, balconies and sunshading elements, Solarvolt™ building-integrated photovoltaic (BIPV) modules merge renewable power generation with glass design – Public Safety Building, Salt Lake City, Utah

Solarvolt™ BIPV modules can be used to enhance various components of commercial building exteriors, including balustrades and balconies, overhead glazing and skylights, façades and opacified spandrel glass – all while passively generating solar power, reducing air conditioning costs and even replacing conventional cladding materials.

BIPV modules can be used with virtually any Vitro Glass product, including Starphire Ultra-Clear® glass, Acuity™ low-iron glass and the company's full range of tinted glasses. Performance can be further optimized by using Solarban® solar control, low-emissivity (low-E) coatings.

"Solarvolt™ BIPV modules are the next step in enhancing the sustainability and energy efficiency of Vitro's range of architectural glass products," said Nathan McKenna, director of marketing and innovation at Vitro Architectural Glass. "We're proud to offer yet another way to utilize our products to support increasingly stringent environmental and performance codes in commercial construction projects without compromising design or aesthetics."

Solarvolt™ BIPV modules are available in a variety of configurations, including multiple solar cell arrangements and three unique photovoltaic crystalline silicone types for various effects on aesthetics and performance. The range of design options makes it possible to use Solarvolt™ BIPV modules to create dynamic, colourful designs.

"Solarvolt™ BIPV modules are an excellent way to bolster a project's energy efficiency and stack sustainability benefits," added McKenna. "If you're already installing a wall, balcony or roof that uses glass, why not also let it generate electricity?"

Vitro will manufacture Solarvolt™ BIPV modules using both glass-glass composite – solar panels with solar cells arranged between

→ two glass lites – and glass-film techniques. The modules will be available in sizes up to 98” x 146” and in thicknesses of up to two 12mm lites.

Vitro Architectural Glass has long been committed to sustainability as both the first US glass manufacturer to have its entire collection of architectural glass products recognized by the Cradle to Cradle Certified™ Products Program and the first North American float glass manufacturer to publish third-party verified Environmental Product Declarations (EPDs) for its Flat Glass and Processed Glass products. This latest offering represents Vitro’s recommitment to realizing the full potential for environmentally friendly glass innovations on a global scale.

To realize its offering of Solarvolt™ BIPV modules, Vitro Architectural Glass acquired assets from solarnova, a Germany-based manufacturer of BIPV modules with successful commercial installations throughout Europe and North America.

Solarvolt™ BIPV modules have been previously tested by Kiwa, according to IEC standards, under the solarnova brand. All Solarvolt™ BIPV certifications and warranties are registered under ILUMIMEX S.A. de C.V., a Vitro company. Solarvolt™ BIPV also is undergoing new certification testing to IEC, UL and CAN/CSA standards and is pursuing CEC and SGCC certification.

WWW.VITROGLAZINGS.COM

GLASSTEC

Next event to be held 20-23 September 2022

The **glasstec** trade fair will not take place as planned due to the ongoing pandemic and the ongoing global lockdown measures, as well as international travel restrictions.

In close coordination with associations and partners, Messe Düsseldorf decided to cancel glasstec, which was postponed from 2020 to 2021 and was planned from 15 to 18 June 2021. The next glasstec will take place regularly 20-23 September 2022.

Commenting on this Erhard Wienkamp, Managing Director of Messe Düsseldorf, said that holding the event successfully on the planned dates in June could still not be guaranteed under the given circumstances, "As of March 3 the German Federal-State Conference has decided to further extend the nationwide lockdown. Based on this decision and due to the current level of infection rates and the associated international lockdown restrictions we cannot guarantee holding the event in the accustomed format and quality. Especially as a result of the travel restrictions, glasstec with its high percentage of international exhibitors and visitors would not be able to live up to its standing as the world's leading trade fair for the glass industry. We have re-assessed the situation with our partners and jointly opted in favour of cancelling glasstec in June early on. The planning certainty of our exhibitors, visitors and service providers is our highest priority. All activities will now centre on the successful holding of glasstec 2022."

"glasstec has been and still is the most relevant global event for the glass industry, machinery producers and skilled crafts, and it brings together people from all over the world. A glasstec held in 2021 can, unfortunately, not fulfil this expectation. Business has already started to pick up for the glass sector and will make glasstec an international festival for the glass industry again next year," added Egbert Wenninger, Chairman of the glasstec Advisory Board and Chairman of VDMA's Glass Technology Forum.

For 2022 organisers are additionally working on a hybrid trade fair experience with a view to also allowing digital participation in conferences and Special Shows such as glass technology live. glasstec 2022 will open its registration portal for interested companies in June 2021. The glasstec team is available to answer any questions from all exhibitors, visitors and media.

WWW.GLASSTEC-ONLINE.COM.

VIPROTRON

ECO Scanner at Nowak Glas

Nowak Glas has been building its reputation as a leading glass processing company in Germany. Their factory in Wattenscheid has a strong focus on insulating glass and many kinds of safety glass.

A horizontal **Viprotron** ECO Scanner System was installed to optimize their laminated glass production and keep high quality standards. Its compact size made a retro-fit installation in the existing Benteler-line very easy. Only two camera heads cover the width of 2.80 meters.

The screen displays the actual glass dimension, quality zones, each defect and its precise position

They were put into operation in summer and offered great results from the beginning. The Scanners inspect every single glass right after the washing machine for scratches, bubbles, dirt and fingerprints etc.. A large screen shows results and defect positions in real time. Defective panes are sorted out to make sure none of them are processed in laminated glass.

This ECO Scanner quality check assures a much better and reliable output than any visual inspection ever could. It is a great solution to save time and cost during the production process and to reach the best product quality possible.

WWW.VIPROTRON.DE/EN

PILKINGTON

Market benchmark for transparency in glass

Pilkington Optiwhite™ extra clear glass, which is produced in **Pilkington's** plants in Italy, Germany, UK and the US, is the most coveted product in the glass industry today. Why? Because it exceeds the ordinary concept of glass transparency and out-performs its traditional alternatives.

Thanks to its high levels of light transmission and almost no green cast that is inherent in standard float glass offerings, Pilkington Optiwhite™ is perfect for applications with exposed edges, particularly when thicker sheets are specified, which in standard alternatives would demonstrate a greenish tint due to the iron oxides contained in their raw materials.

By comparison, Pilkington Optiwhite™ extra clear glass is obtained from a rigorous selection of raw materials, high grade sand with a reduced iron oxide content, and a thorough and careful control of the various parameters during the melting process – ultimately providing the market with an outstanding product.

Thanks to the resulting great colour neutrality, Pilkington Optiwhite™ is the ideal product for showcases that contain paintings, valuable objects and works of art, as well as for interior design solutions, where it can be successfully used for stairs, furniture, balustrades and partitions.

By allowing maximum light transmission, Pilkington Optiwhite™ is perfect for windows in buildings that receive limited amounts of light from the outside, providing greatly enhanced natural light and the additional benefit of reducing electricity consumption.

By providing Pilkington Optiwhite™ in thicknesses from 2 mm to 19 mm, *NSG Group* offers architects and designers the widest range of extra clear glass in the market.

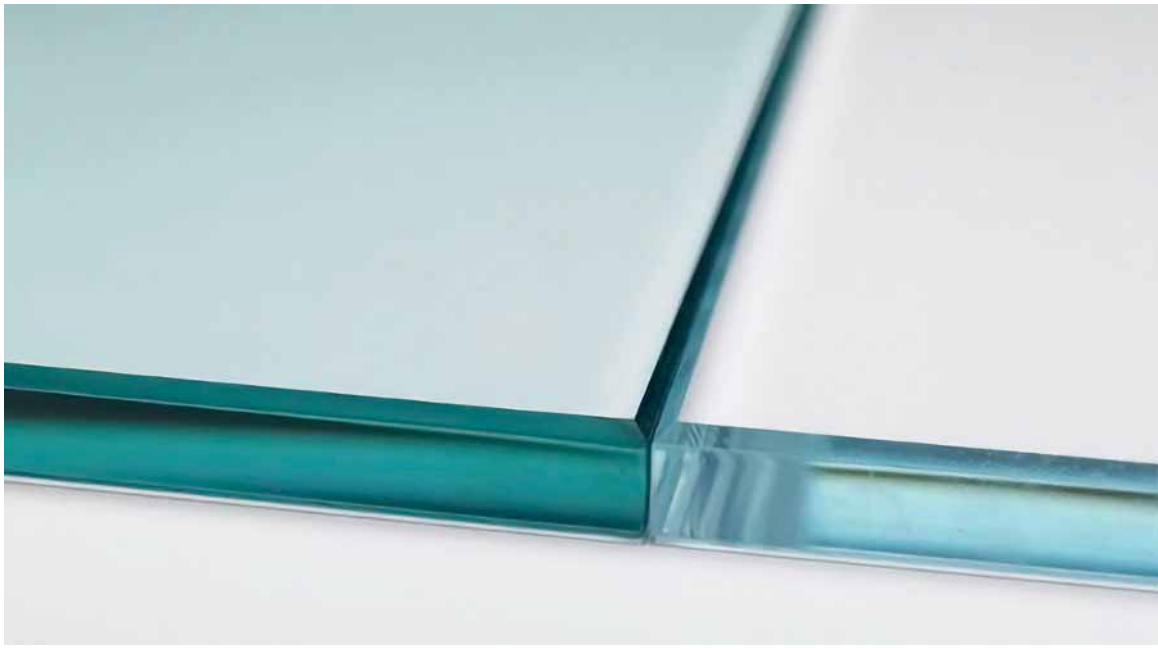
The glass can also be used as a substrate for a number of other functional glass products providing thermal insulation (Pilkington K Glass™ OW or Pilkington Optitherm™ S3 OW), solar control and low-E properties (Pilkington Suncool™ OW range), noise control (Pilkington Optiphon™ OW), safety and security (Pilkington Optilam™ OW), fire protection (Pilkington Pyrostop®), anti-reflective properties (Pilkington OptiView™ OW), anti-corrosion properties for bathrooms (Pilkington OptiShower™ OW), decoration (Pilkington DesignPrint, Pilkington Screen Printed Glass, Pilkington Enamelled Glass) and more.

It can be used as single glazing or as a part of insulating glass units. It can be easily processed, toughened, laminated and bent. It is available in standard sizes, but NSG Group can also supply Super Jumbo glass plates of up to 20 m in length. These oversize glass plates offer the largest architectural glazing dimensions currently available on the European market. In addition, and upon request, a width of more than 3.21m can be considered for supply.

By supplying Super Jumbo extra clear glass plates, NSG Group helps architects and engineers to realise their customers' concepts such as the K11 Art & Cultural Centre in Hong Kong or the Urìa Menéndez Headquarters in Madrid.

The glass has been successfully used for many great projects worldwide including the amazing glass platform, Le Pas dans le vide in Chamonix, the beautiful Antinori Winery in Bargino and the outstanding La Terrazza in Milan.

WWW.NSG.COM/EN



KERAGLASS and PUTEOLANA

Top quality with Vision 700 Convection

The meeting between **Keraglass** and **Vetreria Puteolana,** a company founded in 1997 by Angelo Testa – who was subsequently joined at the helm by his brother Lorenzo – and which over the decades has become a benchmark for glass manufacturing throughout southern Italy, is a partnership in the pursuit of Italian quality.

The company's leadership has been handed on to the next generation of the family and is now strengthened by the acquisition of Vision 700 Convection, a tempering furnace that encapsulates the values of the Keraglass brand.

"Even in a delicate period like the one we are going through, we have not stopped pursuing the path of quality," commented Angelo Testa, "which is why the decision to opt for Keraglass products was a natural one, not only because a furnace like the Vision 700 gives us guaranteed reliability that other competitors simply cannot offer, but also because we share the same company values."

"Every time an Italian company chooses our products I am glad and proud," added Stefano Spezzani, "because I feel that there are still enlightened entrepreneurs like the Testa family, who understand the difference between a product of genuine quality and one of fleeting quality. For us, being present in an important manufacturing area such as Pozzuoli is another milestone in the development of a network of partnerships with quality companies."

The Puteolana plant is a glassworks specialising in various processes including lamination, IG unit and tempering.

By incorporating the Vision 700 Convection into its tempering line, the Pozzuoli-based firm aims to raise the standard of glass it produces to unprecedented levels in terms of mechanical and thermal resistance, while retaining the same aesthetic properties.

All this is made possible by the distinctive characteristics of a furnace with state-of-the-art engineering, which calibrates the heating phases on the various areas of the glass sheet by means of independent radiant panels and an exclusive convection system above and below the roller bed. The result is operational flexibility and processing performance, which are driving a winning team founded on Italian manufacturing excellence.

WWW.KERAGLASS.COM

From left: Michele Testa, Simone Testa, Laaraj Oussama, Davide Montipò, Stefano Spezzani, Michele Testa, Antonio Testa, Angelo Testa

THE DIGITAL EVOLUTION + SPEEDY + PRECISE AND + DYNAMIC

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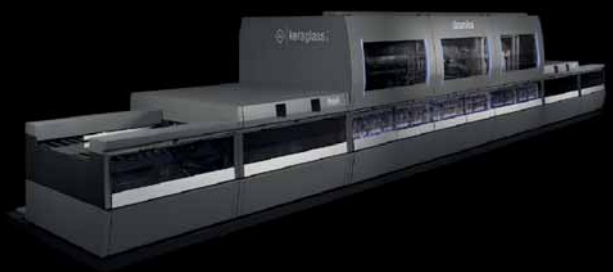
www.keraglass.com



- \+ EXCELLENT VERSATILITY BOTH IN "SINGLE-PASS" AND "MULTI-PASS"
- \+ HIGH PRODUCTIVITY
- \+ DIMENSIONAL PRE-CHECK OF THE GLASS SHEET
- \+ EXTREME FLEXIBILITY IN SIZE AND GRAPHIC
- \+ CONSTANT AVAILABILITY

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keraglass

VITRO

LUMAX® reflective vision glass for Latin America

Vitro Architectural Glass announced the launch of LUMAX® 51 and LUMAX® 68 glass, two neutral-reflective glass types specially formulated for commercial buildings in many of the warm/hot climate zones in Latin America that still lack, to significant degree, the design, enforcement and implementation of energy-related building codes.

Designed with a neutral, light-grey aesthetic, both products were created for use in areas where coated low-emissivity (low-E) and multi-pane insulating glass units (IGUs) have low market penetration or have not been widely adopted. Each is formulated with a basic magnetron sputtered vacuum deposition (MSVD) coating, which is applied to the interior side (second surface) of a monolithic glass panel.

Compared to conventional clear glass, LUMAX® 51 and 68 glasses can limit solar heat gain by up to 33% compared to uncoated clear glass yet transmit nearly six times as much daylight as uncoated reflective glasses. Dark, uncoated reflective glasses are commonly used to block heat energy from entering commercial buildings the hot, sunny climates of Latin America, but they also can limit the health benefits and energy cost savings associated with natural daylighting.

"The current trend for homes and buildings is to maximize clarity, views and light transmittance while reducing the effects of the sun's heat," said Fernando Diez, general market manager, Vitro Architectural Glass. "Our new LUMAX® glasses provide an affordable way to accommodate these trends while also reducing demand for air conditioning and artificial lighting."

While LUMAX® glasses perform well as single, monolithic panes of glass, Vitro Glass recommends pairing either glass with clear glass in double-pane IGUs to maximize solar performance, reduce noise and increase durability.

LUMAX® glasses can be laminated, tempered or heat-strengthened to meet strength or safety glazing requirements. They are available coated on clear glass substrates in 6mm thicknesses. Sheet sizes are 1.80 x 2.50 and 2.50 x 3.60 meters.

WWW.VIDRIOSLUMAX.COM

LANDGLASS

Three tempering furnaces in Malaysia

The installation of three **LandGlass** tempering furnaces at the *Jinjing* Science & Technology manufacturing base in Penang, Malaysia, is making progress with one intelligent glass tempering furnace being the first to be put into production. In the near future, relying on its own ultra-white glass products and technical advantages, *Jinjing* Science & Technology is going to make Malaysia an important solar glass export base to drive the development of related industries.

As a first-line solar glass enterprise in China, the CNY 1 billion investment project in Malaysia by *Jinjing* Science & Technology epitomizes the fact that China is strengthening the economic and trade cooperation with the OBOR (One Belt, One Road countries and moving towards common prosperity.

In November 2020, with the Regional Comprehensive Economic Partnership (RCEP) agreement formally signed, the 'One Belt One Road' (OBOR) strategic plan will work with the RCEP to further open the economic and trade channels across Europe, Asia, and Africa and build a new platform for economic globalization. LandGlass will also continue to play its strength and experience in the intelligent glass tempering machinery, to promote intelligent manufacturing and lean management in the glass processing industry.

WWW.LANDGLASS.NET

TRULITE NEW BERLIN

Investment in an Osprey 9 inspection system

Trulite operates over 26 fabrication facilities throughout the United States and Canada, making it one of North America's largest architectural glass and aluminium fabricators and distributors. Trulite's New Berlin Wisconsin facility recently commissioned the latest anisotropy and distortion inspection technology for their new 112″ furnace – they installed a LiteSentry Osprey 9 Complete.

The Osprey 9 Complete measures highly accurate anisotropy and true optical distortion in any form. Quality tests for total stress (nm), iridescence, and centre/white haze along with pocket distortion, roller wave, and edge kink ensure that Trulite's New Berlin facility fabricates the highest quality tempered glass for IG and laminated products.

Gary DiDio, LiteSentry President, said, "LiteSentry is delighted to continue our 14-year partnership with Trulite in providing our market-leading technology for anisotropy & distortion inspection. Trulite has recently purchased four additional Osprey systems, demonstrating their commitment to quality production. Their teams are knowledgeable with LiteSentry systems over several years, I'm confident they know how to use the Osprey real-time measurements to control the quality of their tempering products."

"I am extremely excited for the quality control the Osprey 9 Complete will do for us ranging from soft coat IG glass, to laminated glass, to heavy glass," said Gregg Vanier, Vice President Midwest Region at Trulite. "The investment of the Osprey 9 Complete demonstrates Trulite's proven commitment to operational excellence, making sure that our customers' orders are on time and meet the project specifications."

WWW.TRULITE.COM - HTTPS://LITESENTRY.COM

PILKINGTON IGP

Plant expansion in Ostroleka, Poland

Insulating glass leader, **Pilkington IGP**, is expanding its plant in Ostroleka, Poland. The project includes, among other things, enlargement of the production hall and office space, the total area after the expansion will reach almost 10 thousand square meters.

The size of the plant will be more than doubled compared to the current situation. The new space will allow for further investments, such as retrofitting with modern equipment and doubling the production lines. The main goal of the implemented activities is to increase productivity and output, as well as increasing the efficiency and ergonomics. Despite the pandemic, the construction works were finished as planned.

"We decided to continue the previously planned modernization of the plant in Ostrołęka. This is not our first initiative. Recently, in 2019, we completed the construction of a new glass processing plant in Białystok. Our subsequent investments are a response to the growing demand on the construction market and architectural," said Krzysztof Granicki, Managing Director – AG Europe East & Nordic, *NSG Group*. "The plant in Ostroleka is extremely important for the local community. Its history dates back to 1995. It was then that the PST Sp. z o.o. company was created, which initially employed 15 employees. The plant was taken over by us in 2014. We currently employ over 100 people, and thanks to the expansion, this number will double. Recruitment will start in early January."

Pilkington IGP manufactures toughened, enamelled, screen-printed and IGUs for structural glazing, as well as glass processing and distribution. The company's plants are in: Skierniewice, Kraków, Bydgoszcz, Bialystok, Ostroleka and Szczecin.

WWW.PILKINGTON.COM/EN/PL

NORTH GLASS

Renovation for Neue Nationalgalerie

The aim of the Neue Nationalgalerie refurbishment project is to repair all damaged features and correct serious safety deficits. Works include fire-prevention measures, renovation of the entire exterior, removal of the root cause of glass breakage, an overhaul of the concrete shell and the renewal of building technology. The building must also meet the requirements of a modern museum with regard to issues such as air conditioning, safety, lighting, storage functions and visitor services.

The upper layer is a large glass courtyard covering an area of 2600 square meters. The huge square flat roof is supported by eight cross-shaped columns, which are mainly used for special exhibitions. The lower layer can accommodate permanent collections and provide special exhibition and learning platforms for viewers and schools. In addition to exhibition space, museum buildings include libraries, shops and cafes.

In order to ensure the openness and unity of the curtain wall, all glass is produced by one Chinese company only – **Tianjin NorthGlass**. The glass curtain wall in the upper hall will use super-large structural glass, with a width of more than 3.5 meters. Such a wide toughened laminated glass is extremely rare in European architectural applications and super glass is more like a bridge between space and light.

Joachim Jagger, director of the Neue Nationalgalerie, said, “After years of renovation, the sun-filled glass halls and basement spaces are shining, and the new glass, the perfect painting of the steel roof and the freshness of the building as a whole are particularly impressive.”

The building has a clear and rational style with a minimalist but detailed structure. NorthGlass has the same way to make very simple glass with complex but subtle craft.

WWW.NORTHGLASS.GLOBAL/INDEX/INDEX.HTML

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GLASSTECH ASIA NEWS

First issue of 2021 released

Recognising the revolutionary impact of architectural design on the construction and glass industry, Issue 1 of **Glasstech Asia News** features exciting case studies that focus on energy saving, architectural functionality, and optimizing solar energy.

Moreover, as the need for functionality becomes increasingly apparent, glass organisations are spurred to introduce creative solutions that tackle the issue of functionality in the current global market in various aspects. With highlights on AGC's WAVEATTOCH 5G glass antennas, photovoltaic glass and NTU's liquid window, readers will be able to learn and catch up to the latest innovations in the industry.

Glasstech Asia and Fenestration Asia introduce an exciting line-up of events for all glass professionals.

27 April, from 3pm to 6pm Bangkok GMT+7l, the second online conference will take place, drawing attention to important topics in both the Glass and Fenestration sectors.

Glasstech Asia 2021 will be held concurrently with Fenestration Asia, bringing together international experts specialising in all sectors of glass and providing exclusive opportunities to network and generate business leads.

Glasstech Asia and Fenestration Asia will run 16-18 November 2021 at IMPACT Exhibition & Convention Centre, and the organizers welcome interested exhibitors to reserve their booths now.

WWW.GLASSTECHASIA.COM.SG

BAVELLONI

Nine machines installed in Bangladesh

Nasir Glass Industries Limited (NGIL) is a multi-functional float glass company located in Bangladesh using the best technologies to bring quality products to the market. Over the years, this loyal customer of **Bavelloni** has placed considerable orders for a variety of Bavelloni machinery.

When it was time to increase their production capacity, NGIL relied once more on Bavelloni's extensive flat glass processing technologies to cover their requirements.

This particular investment included different Bavelloni equipment: a REV 372 SR+REV 372 R cutting solution for straight and shaped cutting of monolithic glass, two VE 500 V10 mitring machines provided with higher and longer racks suitable for heavy loads and big sheets, one horizontal washer, two semi-automatic bevelling-edging machines model SB10 and, last but not least, two VT 1250 double-headed drilling machines.

The commissioning of this important project was completed on time by Bavelloni's authorized Service team and Nasir Glass Industries Limited can now run their newly installed equipment at full capacity.

WWW.BAVELLONI.COM/EN

ROLLMAC

Enamelling and design printing of glass sheets

With COLORGLASS, the single-roller machine by **Rollmac** for the enamelling and design printing of glass sheets by means of an engraved cylinder, enamelling and design printing are quicker, easier and more versatile.

COLORGLASS is suitable from small dimensions such tiles and decorations to large sizes such internal walls, doors and façades. Its single-roller design makes it particularly suitable for companies that work with large production quantities and do not need frequent articulation changes.

COLORGLASS allows to easily enamel and print any kind of flat glass on the market with sheet thicknesses from 2 mm to 25 mm and sizes from 600 mm to 2600 mm. It is also ideal for production lines and in-house laboratories.

COLORGLASS introduces innovative design solutions allowing to work with a reverse engraved cylinder, for generic covers of any type of product, and with a synchro engraved cylinder to obtain, instead, design printing effects; the application of the enamel is perfectly homogeneous and the guaranteed working speed is from 0.5 to 6 m/min.

A wide range and choice of rollers, with different engravings, enables the users to apply a constant and uniform coating

with an enamel quantity from 30 g/sq.m. to 400 g/sq.m. wet (30 to 300 micron) in a single pass. A special laser-engraved rubber roller is available for the glazing of glass sheets not perfectly levelled, i.e. with depressions and swellings. Laser-engraved design printing rollers are available to create silk-screen effects such dots, geometrical motives etc.

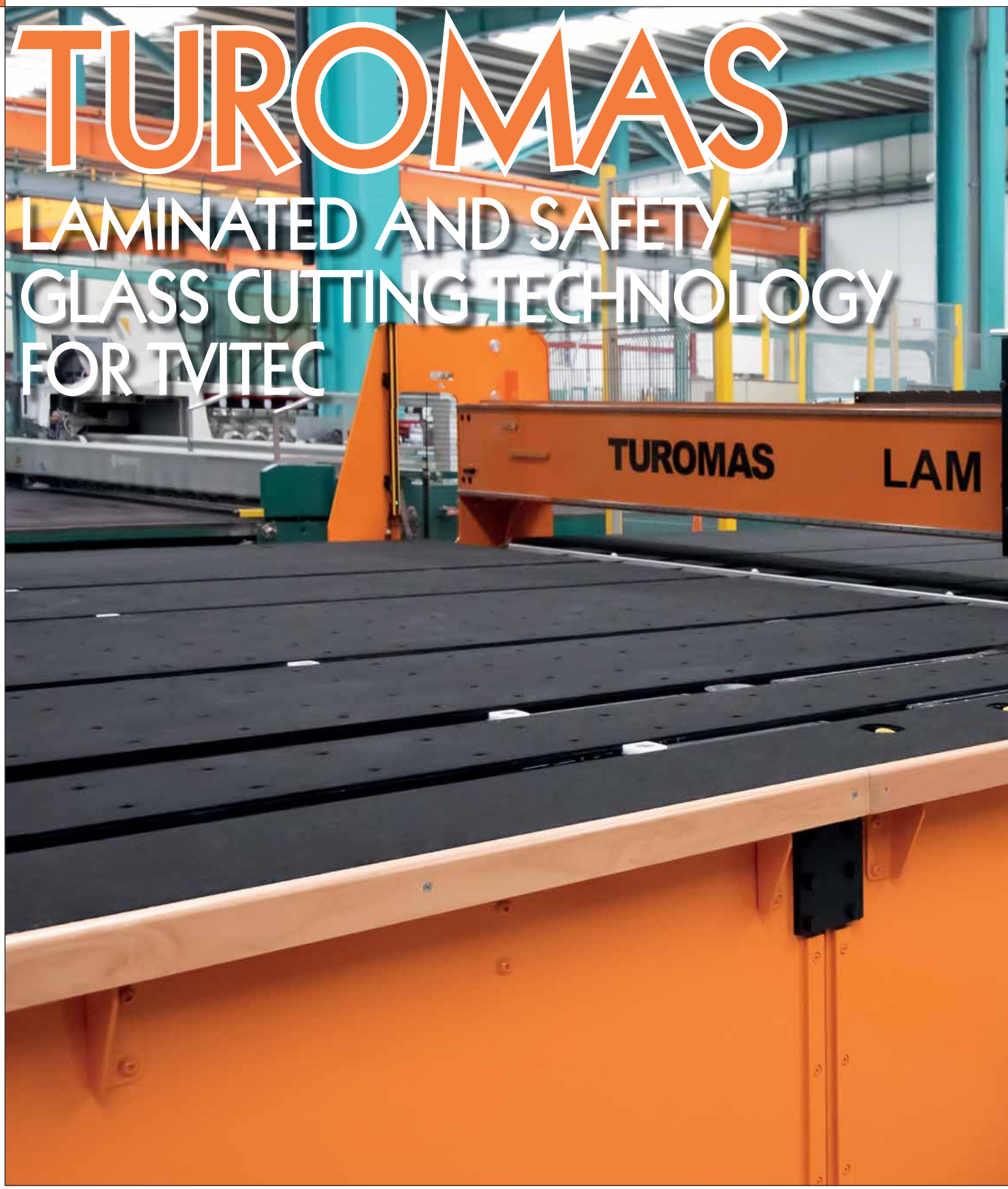
The strong points of COLORGLASS are:

- the speed of colour change, with a complete article change, in a maximum of 15 minutes;
- the geometry of the conveyor belt, made of special rubber and resistant to chemicals, which ensures perfect alignment and constant flatness;
- the 'edge jump' device that avoids the accumulation of colour in the initial and final part of the sheet;
- its ergonomic and easy-to-use design;
- easy maintenance operations as the moving mechanisms have been reduced to a minimum, with a consequent limited consumption of spare parts;
- the panel for the machine controls and the digital displays of the working values, and the digital control of working thickness;
- the possibility of being stand-alone or as part of a larger production line.

WWW.ROLLMAC.IT

TUROMAS

LAMINATED AND SAFETY GLASS CUTTING TECHNOLOGY FOR TVITEC



Tvitec, one of Europe's leading companies in the flat and curved glass sector, has acquired a new Turomas cutting line for laminated glass. The new equipment has been installed in the recently inaugurated manufacturing line for curved glass in León, Spain.

TVITEC, FROM 2008 TO TODAY

Tvitec (Técnicas de Vidrio Transformado), although founded in 2008, has a long history and experience in the glass sector that has allowed and allows it to offer a comprehensive manufacturing system that includes flat glass and curved glass with the highest level of perfection.

Its processing centres, mainly located in Cubillos del Sil (León), in the northwest of Spain, have more than 200,000 square metres dedicated to the processing of high-performance glass. These glass types are tempered, laminated, curved, screen-printed and double- and triple-glazed with the incorporation of coatings that control the transmission of heat, light and sound, and maximise natural light.

All its facilities are equipped with state-of-the-art technology that provide maximum precision in all automated processes, as well as having all the international quality certifications in the glass sector.

It is, at present, one of the largest processors of high-performance glass in Europe, having been involved in the most renowned international construction projects on all five continents.

Works such as the Karolinska University Hospital (Stockholm – Sweden), the Google Headquarters (Silicon Valley – California), the Lime Street skyscraper (London – United Kingdom), the new Santander Bank Headquarters (Madrid – Spain) and even the headquarters of the now famous pharmaceutical company Astra Zeneca (Cambridge – United Kingdom) all have the Tvitec seal.

NEW LAMINATED GLASS CUTTING LINE LAM5045XR

With the need to renew the laminated glass cutting line, together with the desire to improve the cutting process, the company from El Bierzo started a process of purchasing equipment that would satisfy two needs: efficiency and cutting quality. It was precisely this, the cutting quality of the Spanish machine manufacturer, that was the differentiating factor that made Tvitec opt for the Turomas solution: “We need to renew the machinery with the most efficient equipment and Turomas is at the forefront of this type

Karolinska University Hospital (Stockholm, Sweden)

Astra Zeneca Headquarters (Cambridge, UK)

Banco Santander Headquarters (Madrid, Spain)

Javier Prado, President of Tvitec

of tooling that we need. In the cutting of laminated and monolithic glass, Turomas is a good player, a good bet to have a guarantee of success," Says Javier Prado, Presiodent of Tvitec.

Along with the quality of the cut, another of the aspects that favoured the purchase decision was Tvitec's confidence in the Spanish manufacturer. The business relationship between the two companies goes back more than 30 years and has always been nurtured by excellent service.

"Turomas has been with us as a supplier for 25-30 years, if not more, and has always been there for us," said Javier Prado, President of Tvitec.

The purchase of the new Turomas laminate line will allow Tvitec to meet and exceed the high quality and productivity demands of its customers – important façade designers, engineering firms, construction companies and architects who design and build unique buildings all over the world.

CHARACTERISTICS OF THE NEW LAM 504SXR LINE

Throughout its 30-year history, Turomas has been working at the highest international level, developing and improving its range of laminated glass machinery. This has provided Turomas with a specific know-how that has enabled the Spanish company to position itself at the forefront of this type of cutting solutions.

In particular, the LAM 500 series is designed for companies that require maximum productivity and automation. It allows fully automatic positioning, rotating, stripping, cutting and separating of glass up to 12+12 mm, even on high-strength butyral glass.

The structural design of the range is assembled as a whole to gain in robustness and avoid stresses that compromise its performance. The surface of the table made of aluminium sheets, ensures the air flow and minimises possible air cushion losses.

The glass is positioned using honeycomb belts with a non-slip texture and a traction system centred on the table structure. Thanks to this system, it is possible to move 12+12 mm glass sheets with a total anti-slip guarantee of and ensuring a perfect positioning with respect to the cutting bridge.
In addition, it incorporates an automatic rotation system patented since 2001. This system works by combining the movements of two independent suction cups that manipulate the lower face of the glass on the X and Y axes, offering rotation in safer conditions and avoiding contact at all times with the low emissivity layer of the glass in order to preserve all its qualities.

TUROMAS CUTTING HEAD

The cutting head that integrates the installed line consists of four tools, two upper and two lower. Each one acts independently and is dimensioned to exert the appropriate pressure for a specific range of glass thicknesses.
The tools are equipped with a height adjustment sensor and are offset from the vertical axis to ensure perfect alignment with the cut. To ensure the best cutting quality, the system actively monitors the pressure exerted by each tool and continuously stabilises and regulates it according to the thickness of the glass and the cutting speed.
The head has a constant lubrication system that favours the movement and penetration of the cutting wheel in the glass to obtain the perfect cut and ensure correct operation over time.

CUTTING AND SEPARATING SYSTEM

The upper cut is carried out by a nylon wheel that descends and moves along the glass to carefully perform the first operation. Next, a ruler parts the glass from the underside; both tools are fitted with sensors to control and ensure the ideal stroke and pressure for each glass thickness.
The PVB is heated by a specific infrared lamp and, at the same time, the two sides of the glass are separated by the traction exerted by two sets of independent suction cups at the bottom to allow the entry of a blade that cuts the PVB.

100% COMPATIBILITY WITH LOW-EMISSIVITY GLASS

The entire range of machinery is fully compatible with low-emissivity coated glass, since devices never come into contact with the part of the glass where the low-emissivity layer is located at any time during cutting.
It incorporates a stripping system with a high performance suction system managed by a control device that constantly stabilises and monitors the pressure applied for the perfect removal of the low emissivity layer.

LISEC

GLASTRONIC GIVES NEW LIFE TO USED MACHINES

Five years ago, LiSEC took over Hungarian company GLASTRONiC with the objective of separating the used machinery business from the new machinery business in Austria, and of establishing a separate company for this purpose in order to meet a constantly increasing demand. In this article, Johann Stöger, member of the management at GLASTRONiC, speaks about the company and its activities.

Johann Stöger and Zoltan Szekernyes, who has been a member of the management team since 2019, have been managing GLASTRONiC since July 2020. This is an ideal partnership: Mr. Stöger focusses on sales and the commercial aspects of the business, while Mr. Szekernyes' technical expertise enables him to focus on production and quality.

ABOUT GLASTRONIC

GLASTRONiC was founded by Jüllich Glas in 2001. The company has its headquarters in Oroszlány, Hungary and has a total of 30 employees. LiSEC completed its takeover of the company in 2016. Two years later, a new hall was added, and the year after that another hall was rented. GLASTRONiC is split into two divisions: new machinery/steel construction and used machinery. LiSEC products such as ASM and MSA, glass storage racks, and other logistics frames are manufactured at the site in Hungary.

Used machinery is purchased, cleaned, refurbished, put into operation on site, then dismantled and shipped to the customer. The company generated revenues of EUR 5.5 million in 2020.

SPEAKING TO GLASTRONIC

In this interview, Mr. Stöger talks about the his-

tory of GLASTRONiC, corporate processes, sales markets, his goals, and much more.

LiSEC: In your previous role as regional sales manager at LiSEC, you were responsible for new machinery sales. What was it like transitioning to the company management of GLASTRONiC, and therefore to selling used machinery?
Stöger: The process of selling used machinery is very different to that of new machinery, not only in terms of customer needs and requirements. As long as we take a certain delivery window into account, new machinery is always available, whereas in the case of used machinery, the specific type required might not always be immediately available. Despite that difference, the move was straightforward. It goes without saying that everyone is feeling the strain during these unprecedented times. Nevertheless, the atmosphere at the company is generally positive.

LiSEC: Can you describe the process of purchasing used machinery?
Stöger: The process often begins with a customer showing interest in new machinery. It is standard practice for the vendor to enquire if there is an older LiSEC machine that is to be replaced by this new machinery and if it can be repurchased. If the customer agrees to this, the vendor gets in touch with me. An initial asset valuation is then carried out based on the age of the machine. If the customer shows interest, they either accept the offer directly or a service technician visits the customer to determine what would need to be done to ensure the machine is serviced properly. Of course, the costs are decisive in this regard and serve as a basis for further negotiations with the customer.

LiSEC: Can machinery be too old to be purchased?
Stöger: The hardware of LiSEC machines lasts forever, but the control components in machines installed before the year 2000 can no longer be purchased. When a control system is retrofitted, you usually have to replace all the drives, cabling, control cabinets, etc. That would be too costly and wouldn't make financial sense for anyone – that's why we don't buy those machines.

LiSEC: Can a customer sell an old machine without buying a new one?
Stöger: Yes, there is no obligation to purchase new machinery. Customers often get in touch with us to tell us that they have something they would like to sell. We follow the same procedure in these cases: We carry out a valuation of the machine based on its age, the service technician assesses the machine if the customer shows interest, and then we enter into negotiations with the customer etc.

LiSEC: Does GLASTRONiC also purchase or look for special-purpose machines on the back of a specific request from individuals?
Stöger: Yes – our network is huge, so we are sure to find what customers are looking for. For example, a few months ago, a major customer had an emergency

situation and needed a sealing machine urgently. So we looked all over Europe for one. We managed to find and refurbish a suitable sealing machine and install it at the customer's site within three weeks. The customer was happy, as they had a fully functional machine in their production hall within three weeks.

LiSEC: What regions does GLASTRONiC sell used machinery to?

Stöger: We sell them the world over. We recently sold a cutting table to a customer in South Africa. We've sent an insulating line to Australia, two cutting tables to the UK, an insulating line to China, a KBF to Slovenia, a bending machine to Germany and a press to South America. The only place that is difficult to sell to is America as they have different electrical specifications there and the machinery needs to be supplied according to UL guidelines. If we were to supply a used machine to a customer in the United States, we would have to reverse the entire control cabinet, which wouldn't be profitable.

LiSEC: Is GLASTRONiC a good fit for LiSEC's strategy?

Stöger: We are a very good fit for LiSEC's strategy because LiSEC does not offer entry-level machines. With GLASTRONiC on board, we have the ability to offer LiSEC products at an entry-level price – high-quality, properly refurbished machinery with state-of-the-art PCs whenever possible (upgrade available for purchase). That way, the customer can acquire an excellent machine that will last for a good 10-15 years.

LiSEC: What goals have you set yourself for GLASTRONiC?

Stöger: Our main objective is to ensure that our customers are satisfied. We need to continuously improve and refine our operations and processes so that we can achieve that. Another goal is to develop an international purchasing strategy for used machinery.

LISEC

LiSEC, with its headquarters in Seitenstetten/Amstetten, is a globally operating group, and has been providing individual and comprehensive solutions in the field of flat glass processing and finishing for over 55 years. The service portfolio comprises machines, automation solutions and services. In 2019, the group, with around 1,250 employees and over 25 locations, generated total revenues of around EUR 224 million, with an export rate of more than 95 per cent. LiSEC develops and fabricates glass cutting and sorting systems, single components and complete production lines for insulating glass and laminated glass fabrication as well as glass edge processing machines and tempering machinery. With reliable technology and intelligent automation solutions, LiSEC sets standards in quality and engineering and significantly contributes to the success of its customers.

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A+W SOFTWARE

HAPPY BIRTHDAY, INDUSTRY 4.0!

Dr. Michael Küttner
A+W Software GmbH

Industry 4.0 is having a birthday – and a big one at that! The term was used for the first time at the Hannover Messe in 2011 as the name for a project of the German Federal Government. The main goal is the digitalization of all industrial processes based on intelligent, continuous networking.

So Industry 4.0 doesn't come from Silicon Valley – who knew? It's fair to say, however that American scientists and engineers had begun working on the 'Internet of Things' ten years before that – and that's where Industry 4.0 actually came from.

2016 – INDUSTRY 4,0 AT GLASSTEC

2016 was the year of Industry 4.0 at glasstec. The term 'glass industry 4.0' was born. And highly digitalized systems and robots controlled by intelligent software were everywhere. 2016? From this, you might conclude that the flat glass industry was a little late to the party.

In 2008, that is, three years before the coining of 'Industry 4.0', A+W and its machine partners implemented a highly automated insulated glass production system at the medium-sized insulated glass producer and Climalit partner Comayco. This system has fully automatic sorting in cutting and fully-automated robotic packaging at the end of the insulated glass line. The entire production, with approximately 640 units per shift, is run by four employees.

This example shows that Industry 4.0 is not something that suddenly appeared on the horizon in 2011. Instead, this development has happened over decades; however, due to increasing digitalization and automation and with changing markets as the catalyst, it has accelerated rapidly.

> Ten years ago, the name Industry 4.0 was used for the first time, with development actually taking place over decades. Since then, it has continued to grow and, thanks to increasing digitalization and automation, along with changing markets as the catalyst, it has accelerated rapidly.

Meanwhile, manufacturing like that at Comayco can now be found at many in-sulated glass companies – even if the fully-automatic robotic packaging at the end of the insulated glass line is being adopted only slowly.

All information provided clearly: A+W Production Terminal on a Forvet Chi-ara processing line

SPEED – FLEXIBILITY – THE HIGHEST QUALITY

Now, we are seeing dynamic Industry 4.0 environments more frequently in processing as well. State-of-the-art CNC processing lines are controlled so cleverly by intelligent bidirectional interfaces across all chained processings that the delivery times are getting much shorter even as quality is increasing. The software company A+W makes such interfaces available for all modern systems, thus implementing even more Industry 4.0 requirements.

A barcode scan is enough to transmit all processing parameters to the next machine – there are no more wait times. For companies with clever business ideas, this inspires new and exciting business ideas: the Munich glass finisher Spiegel Thomas, for example, delivers any lite ordered within 24 hours in Bavaria; TG lites within 48 hours. "Dynamic production and top quality," explains Managing Director Maximilian Rössler, "are only possible with the highest degree of automation."

Constant barcode scans are also the critical element for recording process data and lite tracing. Only with well-organized PDC with barcode registration and clear production screens can lites be traced continuously in production, identified with certainty, their sequence changed, responses to customer inquiries about production status provided reliably, etc.

Thomas Knott, IT Manager at insulated glass manufacturer Schöninger: "The A+W barcode tracking has taken all of our production organization to a new performance level. Only with it are we in a position to truly organize ourselves efficiently without long information paths, complicated inquiries, and time-consuming remakes."

With barcode scanning, more and more companies are taking leave of tradition-al industrial scanners and instead using high-quality smartphones and other smart devices for scanning. The A+W Smart Companion app for production, stock, and inventory makes this possible. A+W Smart Companion supports the whole value chain – from goods receipt to dispatch – and at the same time, it serves as an info terminal ('where is lite n. 03532?'). Long walks and tiresome searching are avoided.

10 YEARS OF INDUSTRY 4.0 – WHERE WILL WE GO FROM HERE?

A+W CEO Peter Dixen says, "Classic automation can be applied to individual machines and process steps without affecting subsequent processes and other areas in the office and in production. In Industry 4.0, by contrast, the foremost concern is intelligent communication in complex systems. All commercial and production-related processes are networked with one another – 'from quote to cash'. Machines communicate with one another, with people, with workpieces, with software systems based on a uniform data platform. With increasing digitalization, ordering, production, and delivery processes based on a uniform data platform will organize themselves ever more independently and optimize them selves constantly with each process step."

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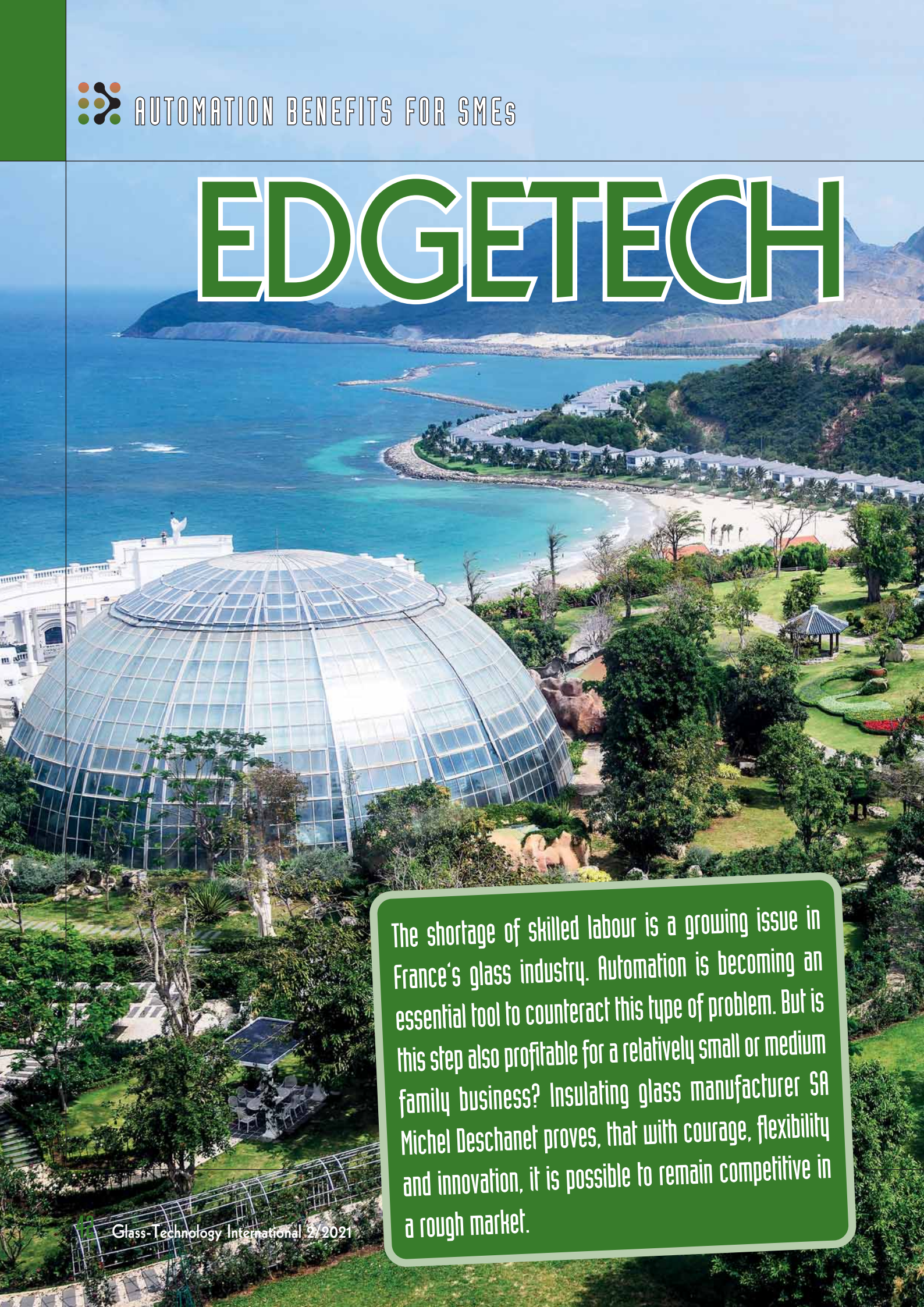
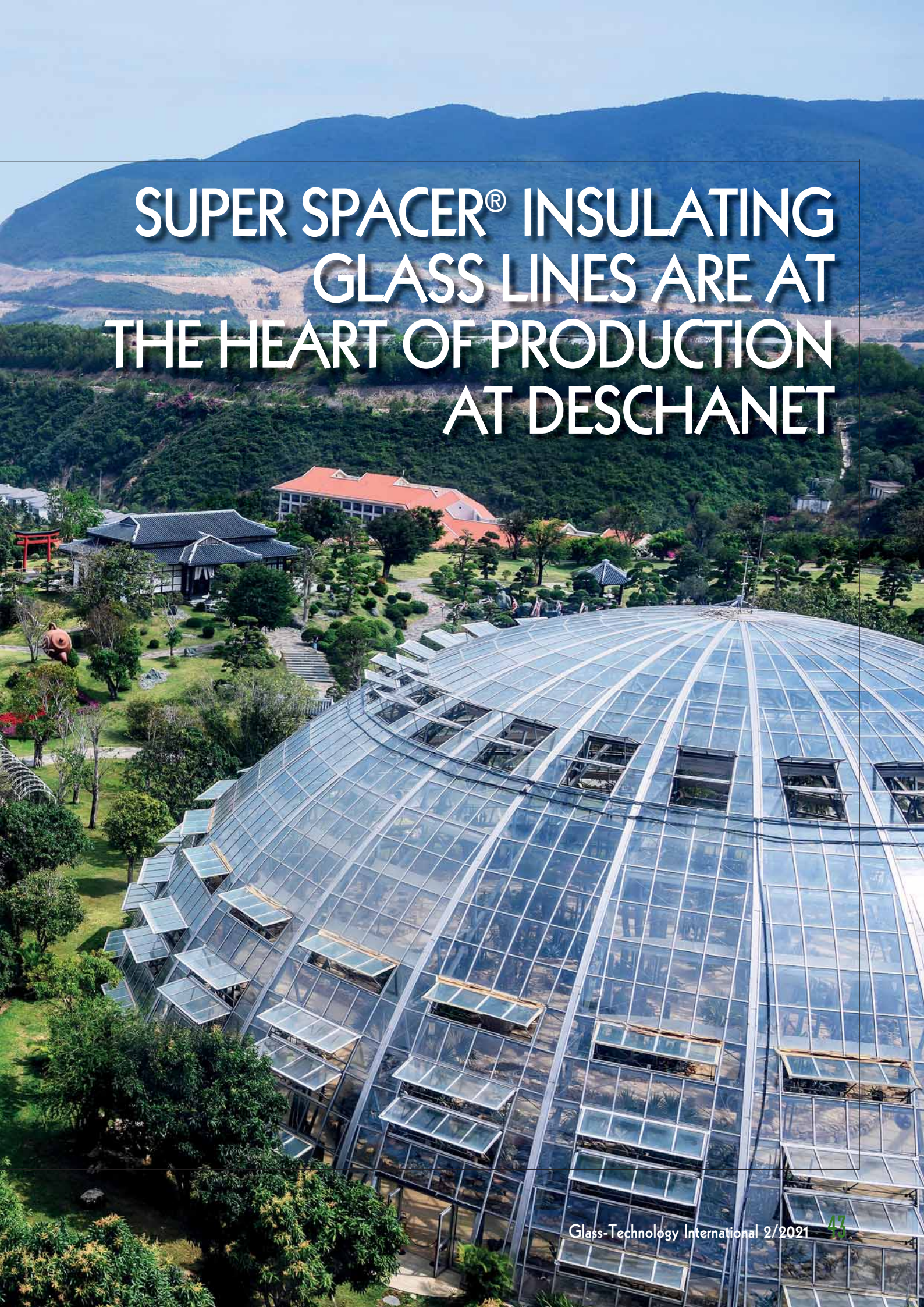
Scanning of edge bond labels with A+W Smart Companion on an iPhone

EDGETECH



The shortage of skilled labour is a growing issue in France's glass industry. Automation is becoming an essential tool to counteract this type of problem. But is this step also profitable for a relatively small or medium family business? Insulating glass manufacturer SA Michel Deschanet proves, that with courage, flexibility and innovation, it is possible to remain competitive in a rough market.

SUPER SPACER® INSULATING GLASS LINES ARE AT THE HEART OF PRODUCTION AT DESCHANET




The first Deschanet project with Super Spacer®: the Tropical House at the Zoo de Vincennes

An investment made in 2012 for an automatic line for the production of triple insulating glazing with Super Spacer® by SA Michel Deschanet is something that Pascale Roche-Deschanet has never regretted. Today, with the ongoing pandemic it is easier to maintain safety distances and to compensate for sickness-related downtime with an automated production. "Thanks to end-to-end automation we can provide optimum protection for our employees, respond flexibly to customer requirements and guarantee on-time delivery," Madame Roche-Deschanet concludes.

AUTOMATION ENSURES COMPETITIVENESS

Together with her husband Didier Roche, the daughter of the company's founder runs the insulating glass manufacturer SA Michel Deschanet, based in Augny, France. In 2019, they once again invested millions for a second automation step. The high demand towards laminated glass and the significant increase in the number of glass variants lead the company to rationalize storage.

"As a family business, we always have to be agile and innovative in order to remain competitive. In 2018, we developed a 'fully automatic' concept to optimize our production upstream of the insulating glass lines," explains Roche.

From unloading the delivered glass sheets, to cutting and storing them in a buffer store up to feeding around 100 different glass types to the lines for double- and triple-glazing, the entire production process at Deschanet is now fully automated. Units with different glass structures and combinations of float glass and laminated glass can now be produced easily. The automated cutting alone has increased the daily volume by 40 per cent.

Deschanet was an early adopter of triple-glazing with Super Spacer® warm edge.

PRODUCTION EFFICIENCY AND QUALITY ASPECTS

In addition to production efficiency, quality aspects played a major role in the investment in the first Super Spacer® line in 2012. "At Deschanet, we firmly believed that energy-efficient triple-glazing would give us a competitive edge," explains the company owner. Indeed, at that time, a large proportion of new windows in northern European countries and also Germany were already triple-glazed. In France, on the other hand, double glazing was still booming. The development proved that was Deschanet right. Today, 40 per cent of the insulating glass units produced in-house are triple-glazed, predominantly with Super Spacer® T-Spacer™ Premium Plus as warm edge spacers.

DEMANDING STRUCTURAL GLAZING AND FAÇADE PROJECTS

"For demanding structural glazing and facade projects, we get the most out of our production in terms of quality and efficiency," explains Roche. "We were the first French company to process Super Spacer in an automated way. This allowed us to reduce the production process essentially to the three steps of spacer application, joining glass sheets, filling and pressing them with gas, and applying the secondary seal." Above all, the precision with which the spacers can be applied is a quality feature that customers also appreciate, because it shows in the aesthetics of the installed windows, especially the neatly finished edge seal. A tolerance of less than one tenth of a millimetre even for the large panes of 2,500 x 3,500 millimetres cannot be achieved with manual processing.

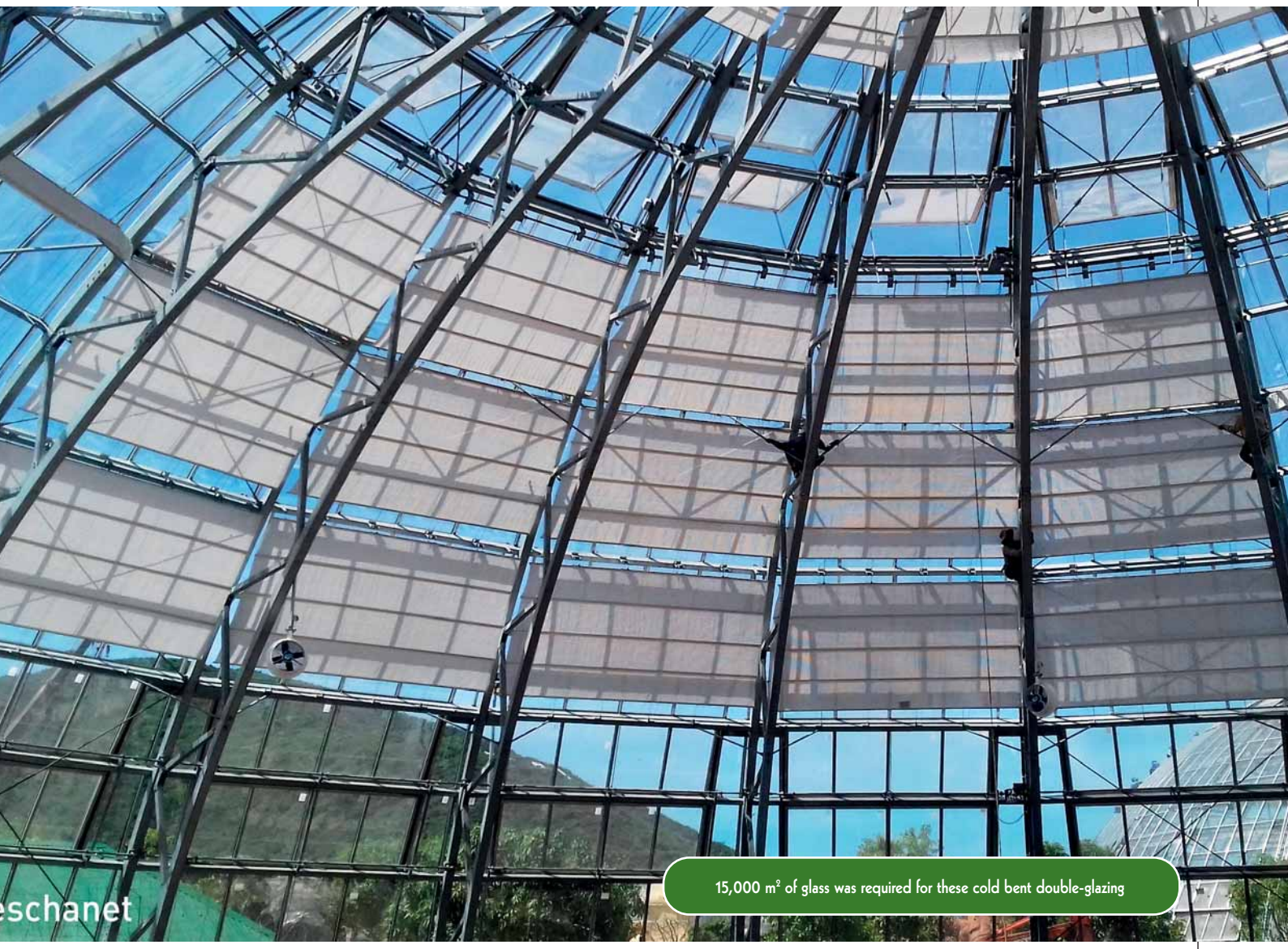
ENERGY EFFICIENT GLAZING FOR GREENHOUSES AND TROPICAL HOUSES

An estimated 900,000 square metres of glazing


© Deschanet


© De

with Super Spacer® have been delivered to date. The very first major order with the flexible warm edge was a lighthouse project in France: 6,000 square metres of cold-bent, high-performance double-glazed insulating glass for a new tropical greenhouse at Vincennes Zoo in Paris. At 100 meters long, 40 meters wide and 16 meters high, the 4,800 square metres glass vault, under which the landscapes of Guyana and Madagascar spread out over 3,000 square metres of planted area in a humid tropical climate, is immensely impressive. The glass panels are extremely translucent to give the plants ideal growing conditions, and the double glazing, in combination



15,000 m² of glass was required for these cold bent double-glazing

with natural ventilation, is designed to support the ambitious energy efficiency targets. Because, of course, keeping such a large glass dome at a constant 20°C to 25°C and 75 per cent relative humidity is an energy challenge. The glass structure is regularly humidified from a system of nozzles, which can mean a surprisingly damp shower for some visitors. Due to the size of 1.5 x 0.75 meters, the panels could be fitted into the structure on site with an angle of 4° to 5°. Extensive structural calculations as well as tests such as accelerated ageing had been performed in advance for ATeX approval.

All Deschanet products are CEKAL certified. By focusing on energy-efficient insulating glazing with outstanding thermal performance, Deschanet offers a real differentiator for customers seeking HQE® (Haute Qualité Environmentale) certification, BBC (Bâtiment Basse Consommation) qualification, or certification to one of the other standards in use internationally.

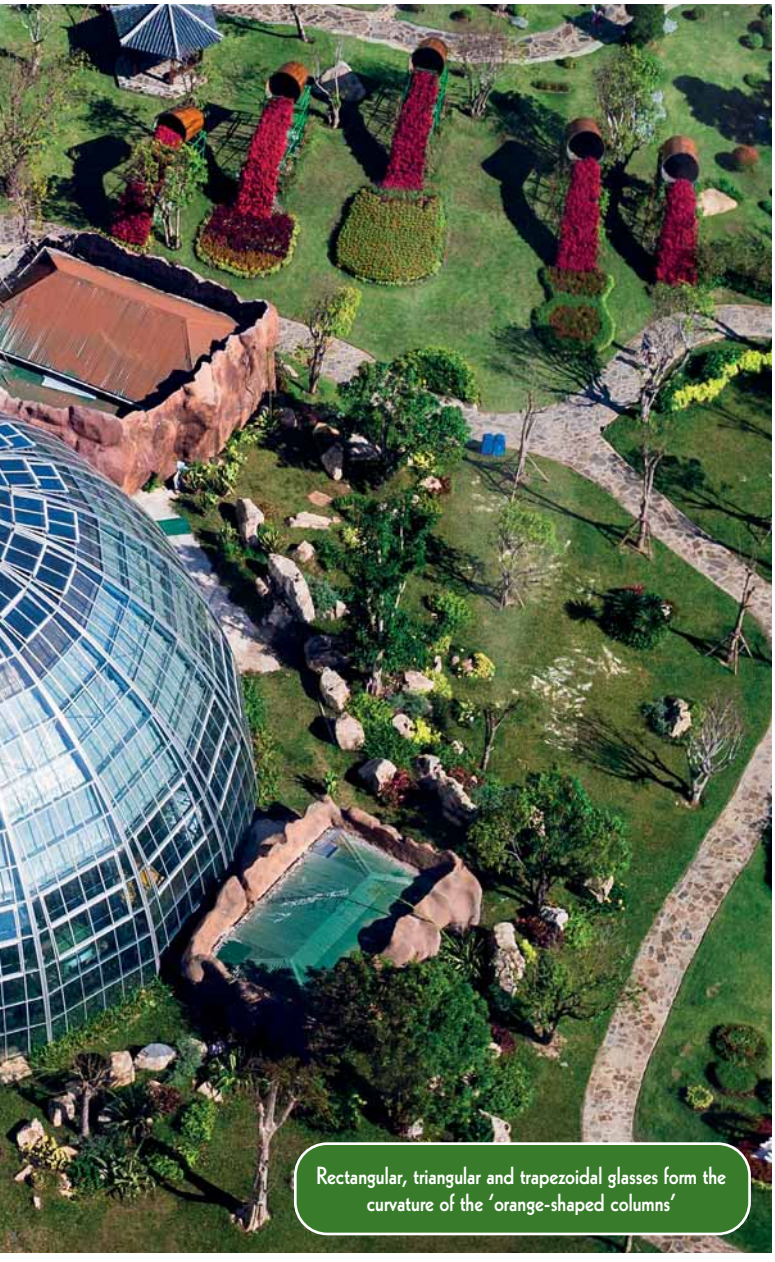
AUTOMATION MAKES IT FASTER AND BETTER

"Deschanet is a prime example of how automation can increase production capacity while producing high-quality insulating glass much faster and more profitably," said Fabrice Keller, Area Manager for France at Edgetech Europe GmbH. "The smooth integration of the application robot for Super Spacer is a key aspect of this. No matter what window format or glass structure, the line can operate without interruption thanks to the sophisticated component logistics."

Speed was also required for their second major greenhouse project, which Deschanet completed in 2017. Facade contractor Mtechbuild had won the contract to build five dome-shaped greenhouses. Mtechbuild supplied the steel structure, and Deschanet produced 15,000 square metres of toughened glass mounted in double-glazing, which were cold bent on site, within two and a half months. "The project was a very special challenge, as five glass domes, one of them larger than

the dome of the Reichstag building in Berlin, had to be manufactured, transported by ship to Vietnam and fully assembled in six months," explains the head of Mtechbuild, Franck Champaign, head of Mtechbuild.

The greenhouses are a central part of the 'World Garden' in the Vin Pearl theme park in Nha Trang and each symbolizes a different climate zone. The largest has a diameter of 52 metres and is home to cacti, while the other four are 36 metres in diameter. Most of the climate control is provided by natural ventilation and textile solar shading, supported by the double glazing with the energy-efficient Warm Edge spacers. The structure of the glass half-domes resembles an orange peel with gaps tapering towards the top and meant a special challenge for Deschanet: in order to follow the shape of the dome exactly, triangular and trapezoidal glasses were manufactured in addition to the basic 1.60 x 1-metre glasses for the exact fit. The entire glass structure with Super Spacer®, a secondary seal made of silicone and a special tempering glass coating was tested in advance for suitability for cold bending to ensure the tightness of the edge seal even under tension.



Rectangular, triangular and trapezoidal glasses form the curvature of the 'orange-shaped columns'

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EDGETECH EUROPE

Edgetech's Super Spacer® flexible foam-based spacer systems acts as energy-efficient warm edge spacers in insulating glass windows. They significantly reduce energy loss to the outside, largely prevent condensation and also contribute to the lifetime of a window. On average, worldwide, more than 300 million metres are sold annually in over 90 countries.

Edgetech Europe GmbH, located in Heinsberg Germany, is a fully-owned subsidiary of Quanex Building Products Corporation, an industry-leading manufacturer of components sold to Original Equipment Manufacturers (OEMs) in the building products industry. Quanex designs and produces energy-efficient fenestration products in addition to kitchen and bath cabinet components, with its head offices in Houston, Texas. Based on turnover Edgetech/Quanex is the world's largest manufacturer of spacers. Edgetech Europe GmbH is a sales location for the markets in continental Europe and one of the three worldwide Edgetech production plants, with a total of 480 employees and 17 extruders.

FOREL

EDIL VETRO (ITALY) TRIPLES ITS PRODUCTION AREA

//I STARTED WORKING WITH GLASS BECAUSE... I LIKED IT. AND THIS IS WHERE I AM TODAY"

Tommaso Sabatino, owner of the Company Edil Vetro, reveals this with unassuming sincerity and a smile, summing up his entire business philosophy: "work with passion and dare". We're in the new production plant of Edil Vetro, a Company established in 1984 in Benevento (Italy) by Tommaso and his wife Antonella, partners not only in life but also in work, who are now facing the challenge of a significant expanding of their business. "In the beginning it was just the two of us. Today, we have a company with a workforce of 30 employees and we are about to move up from a 2000 square meters factory to a 6000 square meters plant: this is an important step, which fills us with pride, especially in consideration of the fact that we did it for the next generation"

THE NEXT GENERATION - TIME TO INVEST

The Sabatinos are in fact a family of glaziers. Follow-

The cooperation between Forel and Edil Vetro is a long-standing one that began with the installation of the first insulating glass line over 15 years ago. With the second generation of the founding family already working in the company, it was time to invest, moving to a new 6,000 sq.m. plant, installing automation and technology – from Forel of course.

Forel High Tech IG Line in Edil Vetro plant


From the left. Michele, Tommaso and Piero Sabatino

ing the example of their parents, Michele and Piero also decided to join the company.
"I have three children," explains Tommaso Sabatino "The eldest two are already in the glazing business, and they may also be joined one day by their younger sister. When they told me that they wanted to work with me, I realised that it was time to invest, and that we had to step up to the next level in automation and technology. Our partner in this ambitious project was Forel. From the very beginning of our dealings with them, they have impressed us with their technology, creativity and ability to listen to our needs, while their after-sales service has always responded quickly and met our needs completely. Given the feeling of mutual trust that had built up between our companies, they were our natural choice for our machinery investment."

A LONG STANDING COOPERATION

The cooperation between Forel and Edil Vetro is a long-standing one. After the first insulating glass line, installed over fifteen years ago, a succession of other successful projects

VERTICAL CUTTING LINE FOR LAMINATED GLASS

We can summarize the main philosophy of this machine in two words: automation and simplicity. The cutting line can be supplied with an automatic glass storage with multiple racks. Each rack has a loading capacity of 12 T which allows a massive glass storage volume.
The line is equipped with two cutting bridges, capable of processing laminated glass sheets with thickness up to 8 mm + 4.56 mm PVB + 8 mm, with the maximum cutting length up to 6.000 mm. The bridges have two opposing cutting heads and two breakout bars (front and rear), to allow the opening of the cuts uniformly and along its entire length. After cutting and breakout a special infrared lamp and a blade will be used to separate the glasses. Between the two cutting bridges a patented rotating section allows the rotation of the glass sheets from landscape to portrait and vice versa. Both bridges can be equipped with a device for the low-e coatings removal. The fully automated cutting line can be managed by a single operator.

Edil Vetro Automated storage and Vertical cutting line

has followed. The latest of these are a complete vertical cutting line for laminated glass and the recently installed "High Tech" insulating glass line. Both of these solutions are already installed and fully operational at the new production site, along with all the other machines purchased by Edil Vetro for tempering, laminating, horizontal cutting and edge processing.

INSULATING GLASS WITH FOREL

"In our plant," explains Sabatino, "the entire insulat-

Automated stock


Forel High Tech IG Line

"HIGH TECH" INSULATING GLASS LINE

The "High Tech" IG line is capable of producing insulating glass units in sizes up to the Jumbo format (6,000 x H=3,300 mm), and weighing up to 400 kg per linear meter (assembled units). The line can work with conventional rigid spacers and also, adding of a specific applicator, with flexible or thermoplastic spacers.
The "High Tech" IG lines can process quadruple IG units (3 chambers), stepped units with offsets of up to 100 mm on the leading and bottom sides, and up to 300 mm on the trailing and upper sides. The total thickness of the IG units can be up to 100 mm.
These lines can handle glass curvatures up to 2.5 mm per linear meter and may also be equipped with a gas filling circuit for both argon and krypton. To ensure the maximum productivity, these lines can be equipped with continuous sealing technology and semi-automatic dosing units switchover.

ing glass units production cycle is carried out with Forel machinery: laminated glass sheets (Jumbo size: 6,000 x H=3,300 mm) are loaded into the automated storage, which feeds the vertical cutting line, which is equipped with two cutting bridges and a central rotation section, Using two separate IG production lines has significantly increased our flexibility and allow us to process different orders simultaneously. The first of these two insulating glass lines is dedicated to the residential applications. This line is producing mainly single chamber units up to 2000 mm in height, and can also process shaped units. It is very precise and is capable of ensuring high production outputs, within a specific range of sizes. We wanted to improve our capabilities, so that we could also be competitive with more challenging sizes and characteristics: that's why we installed a new Forel "High Tech" Jumbo IG line. This new line has substantially increased our competitiveness."
The "High Tech" IG line represents Forel's last evolution in terms of IG units production, designed to offer the most effective choice of options for the production of IG units for residential and commercial applications, like glass facades. Boasting a host of exclusive, innovative solutions, this line is capable of producing double, triple or quadruple insulating units up to 6000 x H=3300 mm, including stepped units and shapes, as well as offering many other possibilities. The impressive production capacity of this IG line and the superior quality of the finished products make it a strategic choice.
"Edil Vetro today supplies many different customers operating in all applications for flat glass, from interior furnishings, residential and commercial IG units to very complex projects," explains Piero Sabatino. "With this new plant and our new investments in different machinery, our goal is not only to consolidate our existing position but, more important, to expand further. The new production site has just been completed, but we already have another further expansion project in the pipeline."
"We inherited our passion for this job from our father," concludes Michele Sabatino. "We saw our parents build Edil Vetro with their time, patience, hard work and enthusiasm, and it is because of their example that we decided to join the company and become part of its future. What you can see today was not made only by investment in machinery and buildings, but also by a solid human factor, because we believe that passion makes the difference."

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FIERA MILANO

TVITEC

HIGH-TECH GLASS APPLICATIONS FOR NEW GENERATIONS OF SHOPPING MALLS

Open Sky Madrid, Lyon Part Dieu and Aleja Ljubljana are revolutionising architecture for important commercial buildings with sustainability and design. In this article, glass processor Tvitec, shows us how glass can ensure eco-efficiency and sustainability, while maintaining iconic-style architectural characteristics.

Europe's new shopping malls highlight the importance of architectural glass. These projects represent the best example of integration technology and advanced sustainability systems. The three buildings stands out for the high-energy-efficiency glass modules that clad the façade, fabricated with Tvitec solutions.

OPEN SKY. GIANNI RANAULO. TORREJÓN-MADRID

Open Sky, about to open its doors, has 95,000 square metres of shopping area surrounded by nature, including two lakes. Its commitment to sustainability, along with the iconic design of Gianni Ranaulo, work just like magnets. Tvitec manufactured state-of-the-art flat and curved glass for the transparent enclosures of this mall. More than 10,500 metres of insulating solutions in double-glazing, with

The Open Sky shopping mall, located in Madrid (Spain), is an iconic design of Gianni Ranaulo Architects

tempered and laminated glass, were used to ensure maximum safety. The Tvitec 6 metres of curved glass for Martifer brings together great elegance with the eco-efficiency of double-glazing.

ALEJA SHOPPING CENTER. LJUBLJANA. ATP ARCHITEKTEN

Europe's largest shopping centre, opened during the pandemic, pays great attention to minimising energy loss to the outside and not absorbing external heat. Tvitec contributed to this energy-saving approach not only with double glazing with solar control coatings, but also with security laminated glass and also decorating the complex's distinctive outer layer with digital screen printing with its Tecglass technology. The installation by Italy's Pichler façade company is a true work of art. More than 5,000 metres of shaped glass are cleverly combined with metal parts.

LYON PART DIEU. LYON. MVRDV ARCHITECTS

The extension of one of Europe's largest centres stands out for its eco-efficient and eye-catching façade, which combines glass with a precast concrete system, also by the Spanish firm Prehorquisa. The design is by the prestigious Dutch studio MVRDV. Tvitec processed double glazing with solar control for increased user comfort, and laminated and strengthened safety glass in 8 to 12 mm thickness units. The installation was carried out for the French customers Coveris and Allouis Face in Tec, with excellent results.

TVITEC – GLOBAL, SUSTAINABLE TECHNOLOGY EXPERTS

Tvitec System Glass, with its international quality certified production facilities of almost 200,000 square meters, is one of the largest high-performance glass manufacturers in Europe. Tvitec offers a comprehensive glass production system – for both flat and curved glass –that manufactures to the highest level of perfection. Tvitec 4.0 factories are equipped with state-of-the-art technology to ensure maximal precision in all automated treatments. As such, the company brings considerable added value to the glass specifications, ensuring the highest level of thermal insulation, safety, acoustic and aesthetic benefits for the building. Tvitec also produces 'Oversized Glass' of up to 12 meters in length, prioritizing maximal sustainability and luminosity to create spaces that generate a feeling of comfort and wellbeing.

Tvitec System Glass

tvitec SYSTEM GLASS

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EVA FILMS

SATINAL

SECOND EVA-FILM PRODUCTION LINE IN ITALY, LAUNCH OF STRATO® COLOUR

Satinal never stops innovating: during the difficult 2020 pandemic-year the technical team worked hard and successfully installed the second EVA-film production line in Italy. At the same time, the R&D team developed new products and now introduces the innovative STRATO® COLOUR product range.

In its growth path to become market leader, Satinal is continuing to invest in the enhancement of production capacity and flexibility thanks to the second new production line installed in its manufacturing plant in Italy. In this way, the company is adapting its response to the growing demand along with flexibility in deliveries.

INVESTMENTS, RESEARCH AND DEVELOPMENT

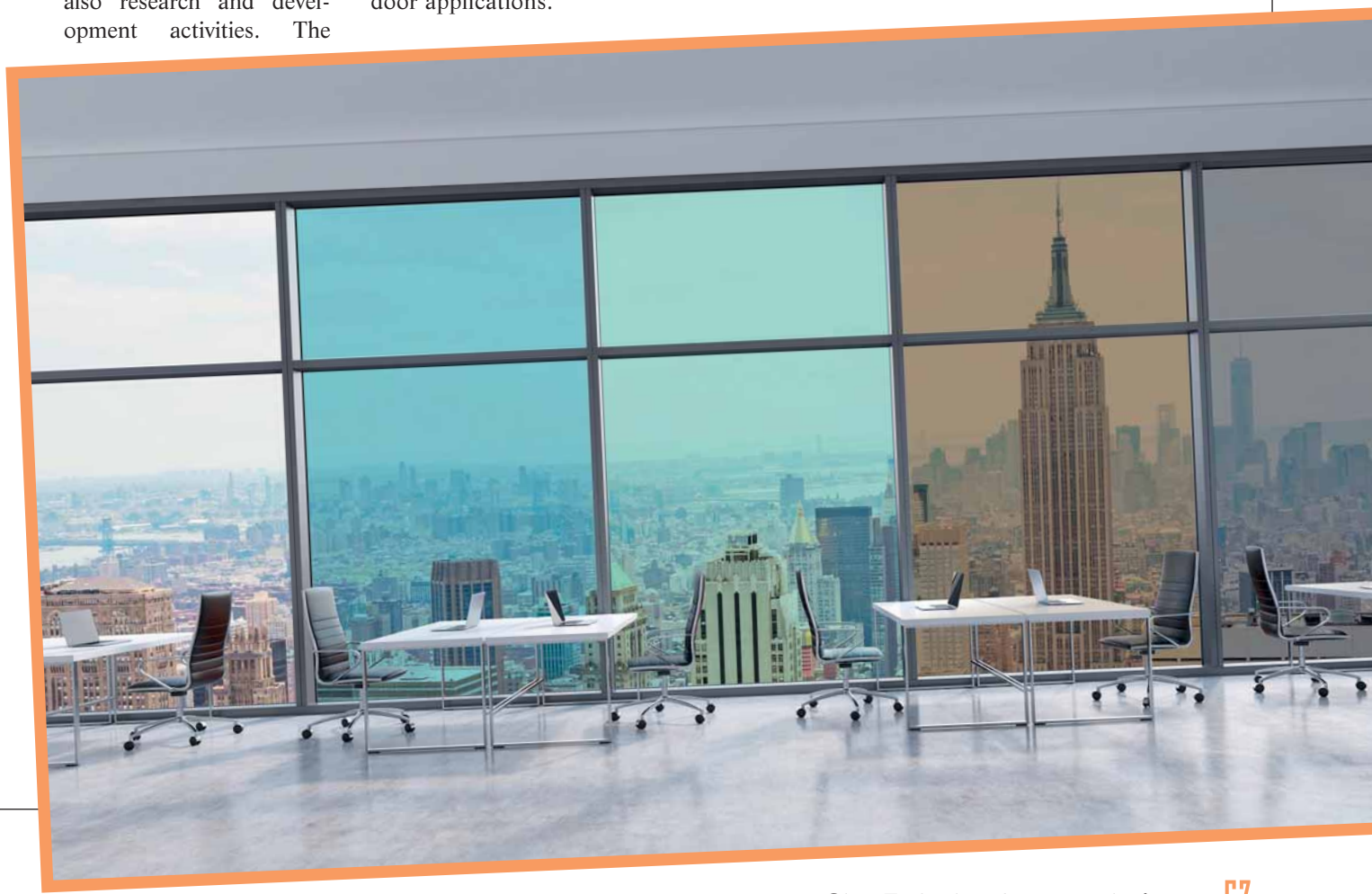
Not only investments, but also research and development activities. The radical product innovation from the S-LAB laboratory is the new colour range STRATO® COLOUR: colour becomes freedom, creative elegance, transparency and brilliance in the latest collection of STRATO® COLOUR interlayers for glass lamination, designed to reflect the global trends of the modern world.

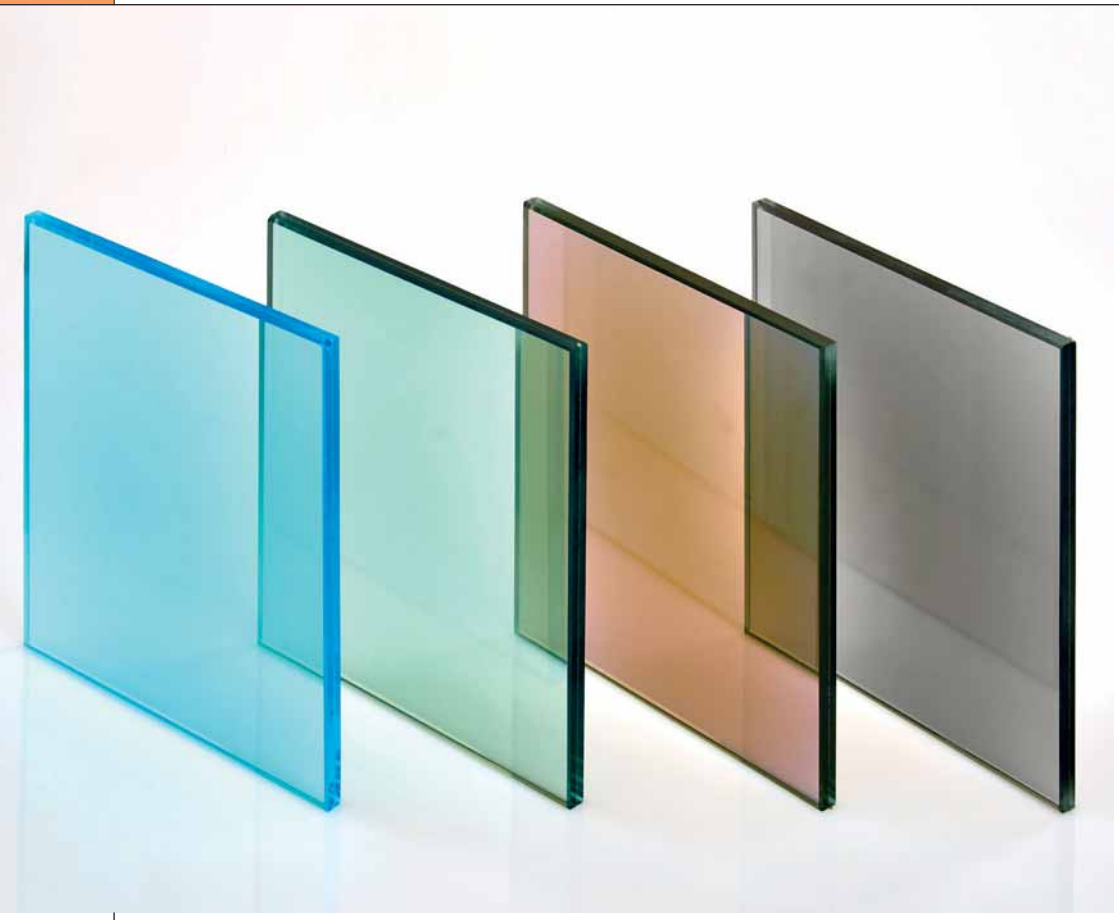
SATINAL, faithful to its vocation as market innovator, is launching the line of transparent coloured EVA films, suitable for high-end indoor and outdoor applications.

STRATO® EVA INTERLAYERS – NOW WITH TRANSPARENT COLOURS

All the Italian quality of safety glass with STRATO® EVA interlayers is now available for architects and designers also in four transparent colours designed for the contemporary and to reflect global colour trends:

- Comfort Bronze, to express comfort, kindness, human care, to gain the trust of customers.
- Sky Gray, to express a shift from global efficiency to local resilience, the disruption of global supply chains and decoupling economies. To express a new balance between daily working hours and time for oneself, in this new world where past habits have been disrupted.
- Local Light Blue, to express pride in supporting local brands and a renewed localism: your purchase is produced locally. Support for human-to-human relations, a new human dimension of the post-





pandemic world.
- Nature Green: to respond to the new trends of sustainability, green, proximity to nature and changes in our habits: a revolution of what we do and how we do it. It expresses a new concept of home-office, integrated with nature.

MECHANICAL PERFORMANCE

The mechanical performances remain unchanged from the STRATO® CLEAR range, such as anti-burglary, adhesion to glass, acoustic insulation and UV resistance properties, shielding up to 99 per cent of UV rays.
All this thanks to the intense Research and Development activity of the SATINAL laboratory, S-LAB.
Thanks to the quality of SATINAL's EVA film, the colours have an extreme durability over time, they remain stable giving light and charm to the project.
This prodigious collection has all the advantages of safety glass on the facade, such as resistance to atmospheric agents, weathering, safety in the event of impact, protection against UV rays and acoustic insulation qualities from the external environment.

INTERIOR AND EXTERIOR ARCHITECTURAL PROJECTS

In interior and exterior architectural projects, the new colours are added to the STRATO® DECORATIVE range, which includes products such as:
- STRATO® SATINATO: it gives the glass a very elegant and refined aspect, which is adaptable to any type of environment and internal or external element. Furthermore, it gives the glass a special and charming privacy effect.
- STRATO® LEGGERO: formulated to give the glass a slightly satin finish, with a special see-through effect. It allows natural light to freely cross the environments of homes and offices, safeguarding privacy at the same time. It is functional and adapts to any type of application.
- STRATO® BIANCO: the ideal solution for designers who want to create bright-white glass elements. It gives rooms a sense of brightness, as well as amplifying the sense of space. It guarantees uniform colour and coverage, while giving character to classic safety glass.
- STRATO® LATTE: it gives the glass a glossy, milky-white effect. It captures and diffuses the light in the environment, without creating reflections. It is the perfect solution for all those products that are used in environments that require a soft diffusion of light.
- STRATO® NERO: it is the par excellence colour of elegance, giving surprising effects, guaranteeing an always appreciated elegance and uniqueness. In addition, it gives a uniform coverage to the glass.

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OPTRIS

COMPLETE SYSTEMS FOR GLASS TEMPERING PLANTS

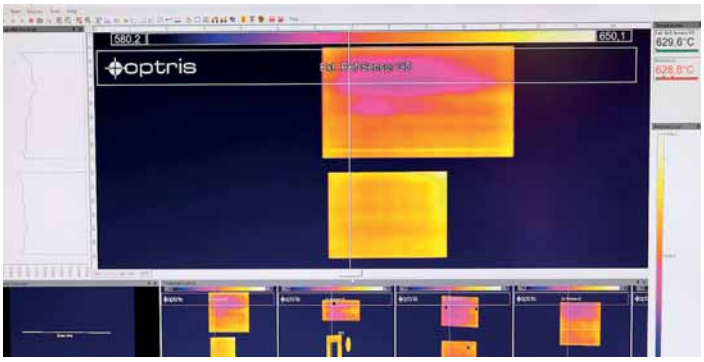
Glass tempering is a tricky and often complex process, and glass processors need to maintain the slightly different temperatures in the furnace, which is crucial for the desired quality of the end product. In this article, Optris presents its most recent development to ensure this temperature maintenance on any glass tempering system thanks to selectable optics with different aperture angles.

The physical properties of flat glass can be influenced by targeted heat treatment. For example, single-pane safety glass (SPSG) is produced by so-called thermal tempering. In this process, the panes are first heated uniformly to more than 600°C in a furnace.
This is followed by a cooling period in which air is blown in for abrupt cooling. Precise maintenance of the slightly different temperatures in the furnace, depending on the type and thickness of the glass, is crucial for the desired quality of the end product. This involves both the exact temperature and the most homogeneous temperature distribution possible within the glass panes.
Optris GmbH has now developed a special system for this process. It is based on the PI 640 IR camera and can be used on any glass tempering system thanks to selectable optics with different aperture angles.

THE CHALLENGE OF LOW-E GLASS

In order to achieve high energy efficiency in build-

distribution of the individual panes over the entire system.
Below the glass – i.e. on the side without low-E coating – a CT G5L pyrometer reproducibly measures the exact glass temperature. The individual pixels of the IR camera image are referenced to this measured value. This enables automated emissivity correction for standard and low-E glass. In addition to determining the temperature distribution, the system also calculates the glass surface area. Both the infrared camera and the pyrometer are equipped with a digitally controlled optics protection system. These shutters significantly increase the maintenance intervals for cleaning the optics and completely eliminate the need for additional and time-consuming blowing of the optics with compressed air.
Optris supplies the Top Down GIS 640 R as a pre-assembled system for easy installation on glass tempering equipment. In addition to the infrared camera, pyrometer and the shutter systems, the delivery also includes a compact control cabinet with all electronic and control components as well as all necessary cables. Compared to the line scanner systems often used in the past, the exact alignment of the scan line can be conveniently performed in the software with the camera-based GIS 640 R system – exact mechanical positioning of the system above the oven is not necessary here. The effort required for installation and commissioning is therefore reduced to a minimum.



Optris GmbH

optris infrared measurements

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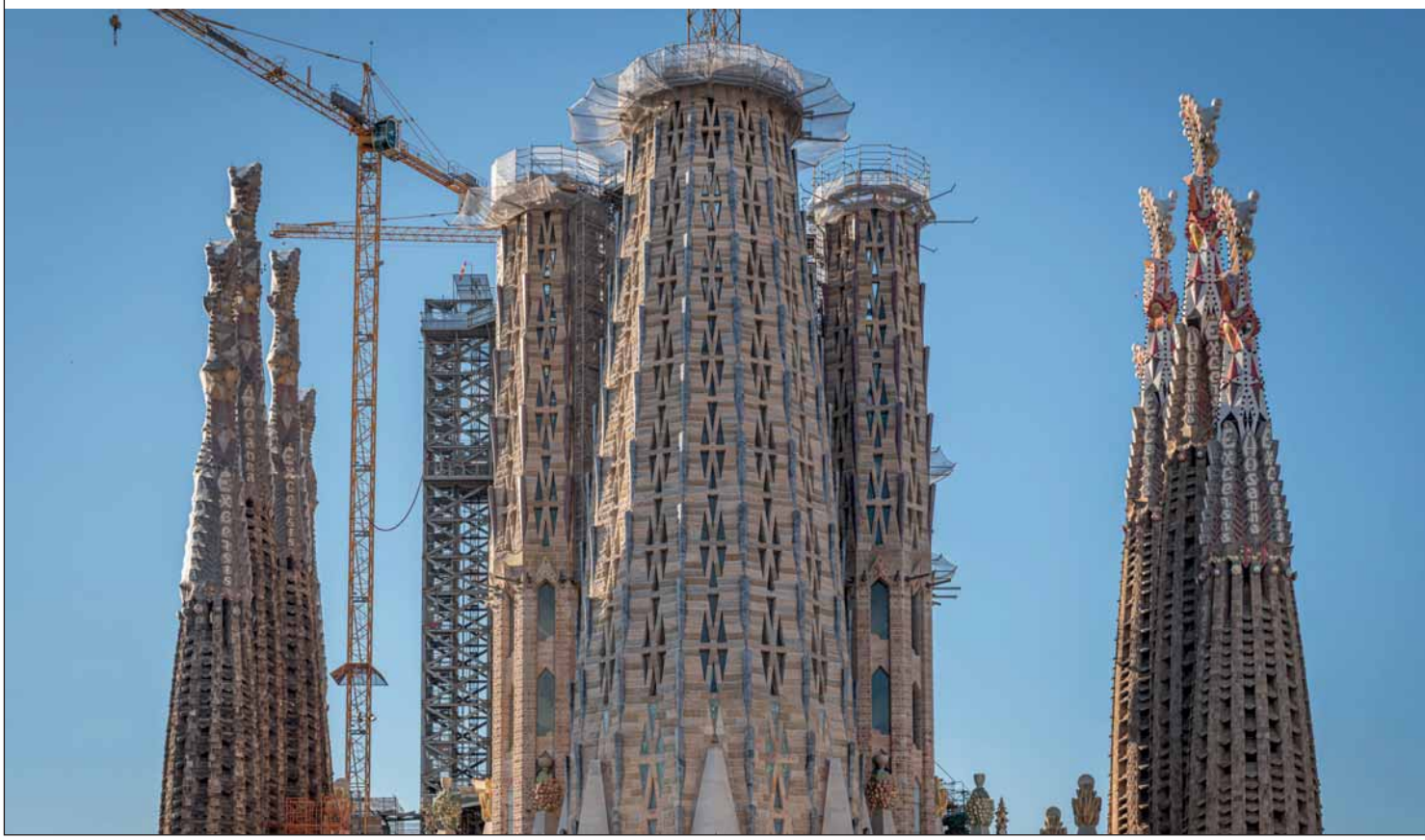
www.optris.global

OPTRIS GMBH

Optris GmbH was founded in 2003 and has established itself as one of the leading manufacturers of non-contact temperature measurement devices. Its product portfolio consists of both wearable and stationary infrared thermometers and online infrared cameras for thermographic real-time analyses. Optris ensures the highest standard in quality as a key component of its company policy.

SEVASA TECHNOLOGICS

INNOVATIVE ANTI-GLARE, VISION-THROUGH LUXPRINT® GLASS AT ICONIC SAGRADA FAMILIA



SEVASA TECHNOLOGICS is an international company specializing in the production of high quality acid-etched and engraved glass. This article gives us an idea of one of the most recent applications of this special glass in the Sagrada Familia Basilica in Barcelona, Spain.

SEVASA (Sociedad Española de vidrios artísticos S.A.U.) was founded in 1983, plant located in Barcelona area.
Sevasa Technologics S.A. started in 2018, a new high technological 8,200 sq.m. plant constructed on an area of 100,000 sq.m., located in the Teruel area.
Each company now produces its own products, and LuxPrint® is a product of Sevasa Technologics.
Sevasa Technologics is state-of-the-art new technology regarding the production of technical acid-etched products, especially technical ones such as the specific anti-glares LuxPrint®, for electronics and oversized up to 9 metres long.
Work is now ongoing to achieve 14001 Environmental Management and 9001 Quality Management Certifications.

LUXPRINT® GLASS – ANTI-GLARE ETCHED GLASS WITH HIGH IMAGE DEFINITION

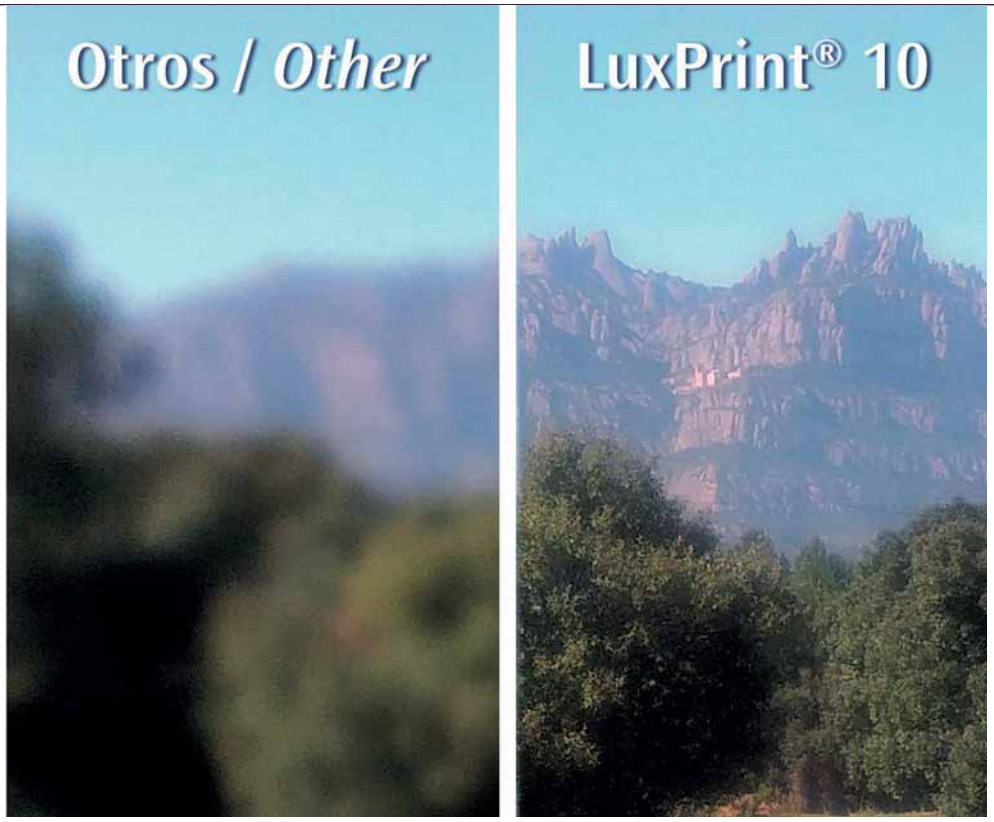
LuxPrint® glass has revealed its most notable and exclusive feature: the ability to see through the anti-glare etched glass with a high image definition, even looking miles away. This feature, unique at international level, has attracted the interest of architects and specifiers with anti-glare requirements in their projects… and among them the most emotional and iconic building of Barcelona: the Sagrada Familia Basilica.

THE CHALLENGE

The simultaneous rising of the basilica's six central towers is a milestone for its construction. Gaudí projected singular triangular openings to the outside in these towers to flood the interior with light and luminosity. He designed them open, but today, for obvious security reasons, they are glazed.
The team of architects in charge required these openings should allow to enjoy different views to the outside and inside, while minimizing the possible glare towards their surroundings, as well as their visual impact.

THE SOLUTION

Sevasa Technologics presented to three solutions: LuxPrint® 6, LuxPrint® 8 and LuxPrint® 10. Each of these products provides a different level of anti-glare and distance vision, on face 1 and with only pure glass, without layers or additives. In addition, it is available in a large format glass sheet (up to 9 metres long).
LuxPrint® 10, on an



8-millimetre thick extra-clear base and Jumbo size, was finally chosen (LP10 8-millimetre + optical 8-millimetre with two types of butyral), forming part of the massive panels of stressed stone, which reach up to 31 tons in weight (an elephant weighs 7 tons) and 5 meters high and wide.

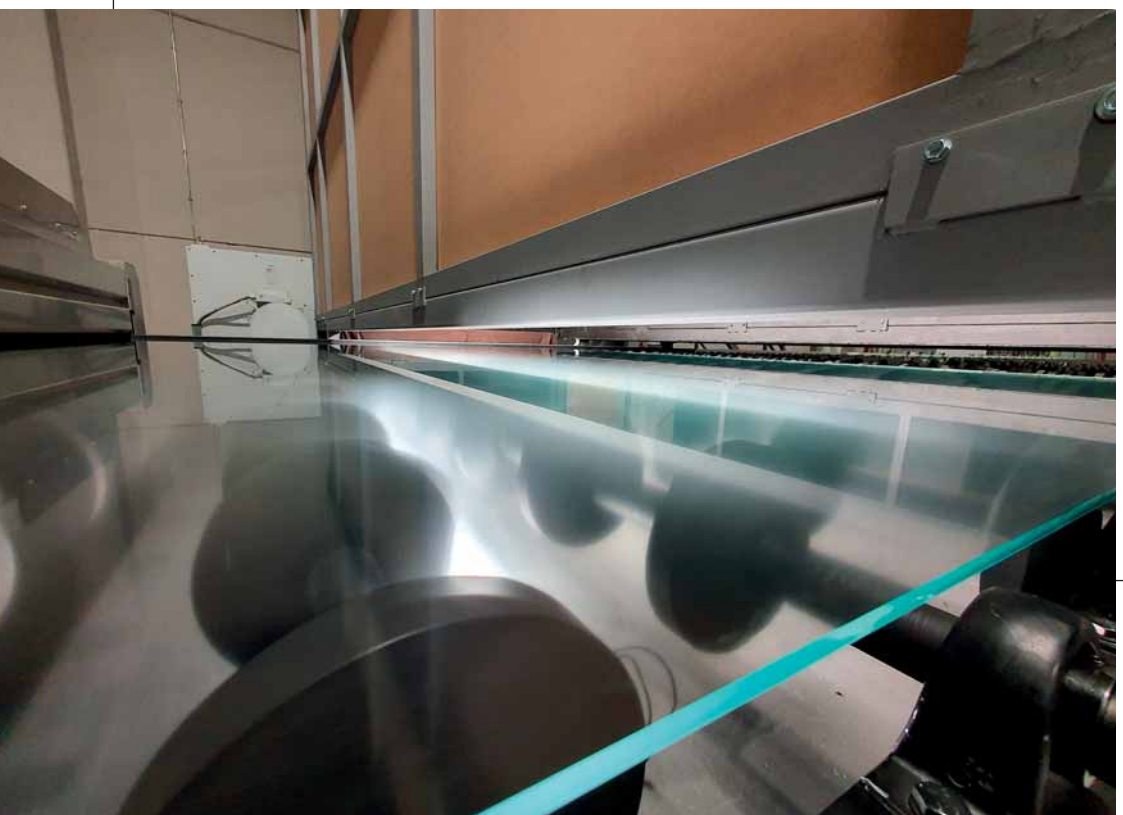
Once the main tower – devoted to Jesus Christ – is finished, it will have a height of 172.5 meters, which will make it the tallest building in Barcelona.

LUXPRINT® – ANTI-GLARE ETCHED GLASS WITH HIGH IMAGE DEFINITION

This is a LuxPrint® unique feature worldwide which multiplies building and design application options. It allows the possibility of achieving glass facades and structures minimizing glare and reflections while being applied even on vision areas if required.

Interestingly, LuxPrint® was created as valuable glass for digital printing (with both organic and ceramic paints), as well as for laminates with marble, stone or wood: it enhances colours and provides elegance, allowing not only to choose the level of anti-reflection and colour-enhancement among its three options, but – and most importantly for glaziers – freeing the glass ideal side for digital printing, even in 2-millimetre thick or extra large sheet (up to 9 meters).

It is ideal for both indoor and outdoor applications.



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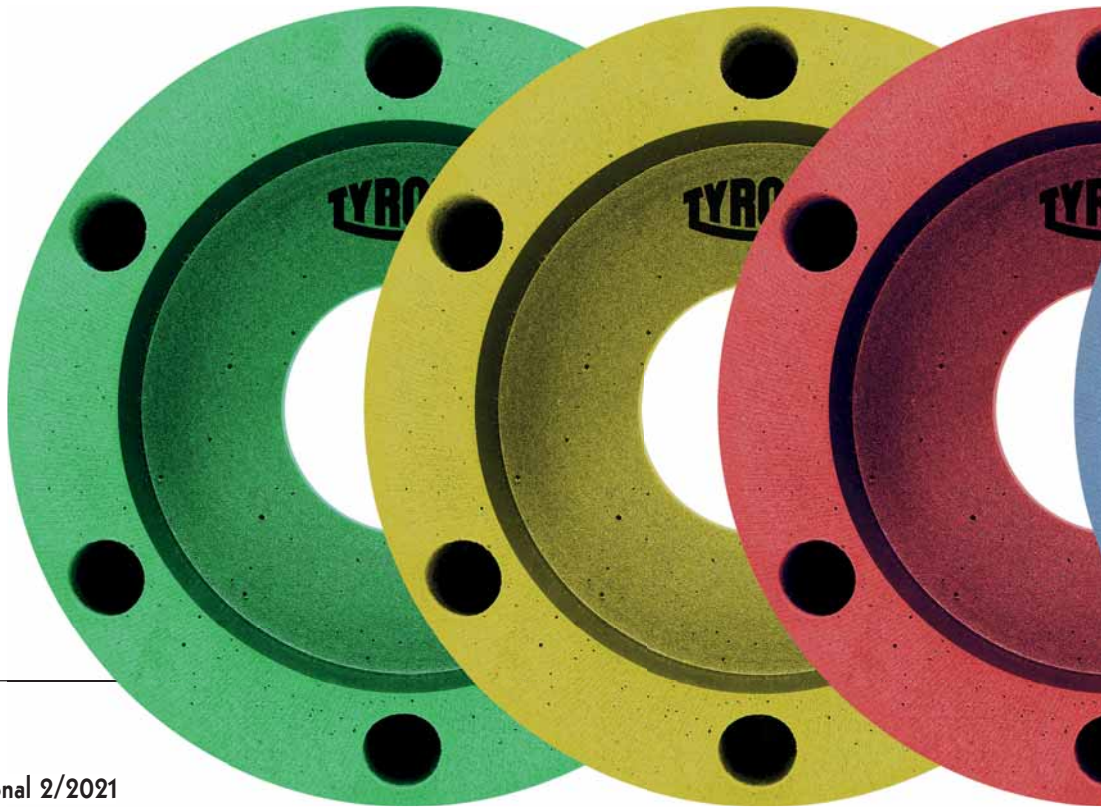
TYROLIT

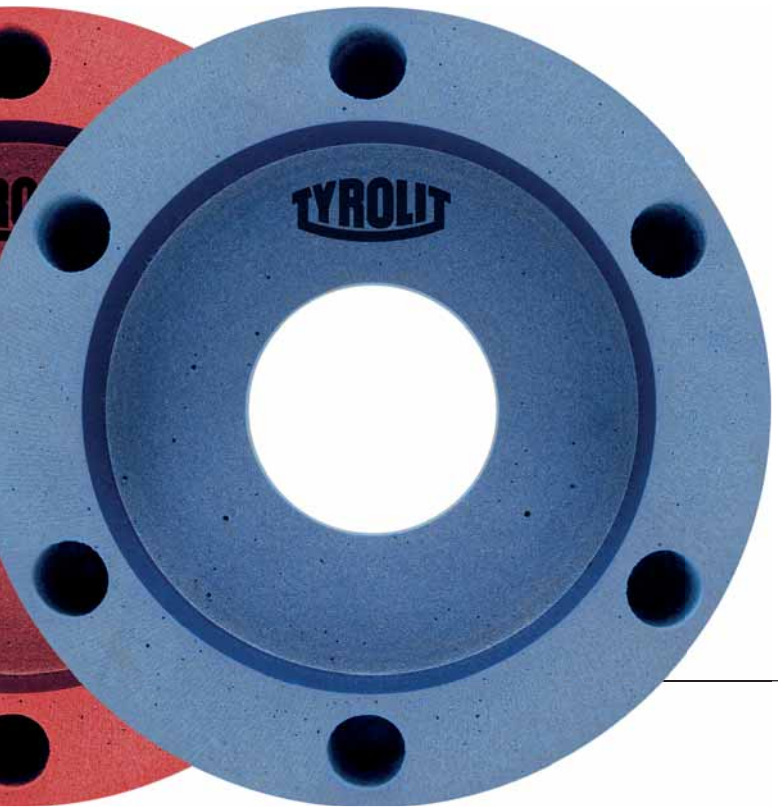
THE COMPLETE SOLUTION FOR GLASS EDGING ON A SINGLE DOUBLE EDGING MACHINE

With more than 100 years of history, Tyrolit is continuing to work with passion for technology, experience and a strong innovative spirit, offering tailored grinding solutions and a comprehensive assortment of standard tools for customers around the world.

STARTING A REVOLUTION IN THE FLAT GLASS PROCESSING

The STARFLEX set of diamond cup wheels, which was first introduced three years ago, started a revolution in the flat glass processing on double edging machines. The STARFLEX universal set is able to grind a wide range of glass types, from 3mm mirror glass to thick glass, or even laminated glass using always the same sequence of tools. The specifically developed bonds and the perfect match of the





metal and resin wheels allow excellent removal capacity at high speed.

CERIUM POLISHING CUP WHEELS

Furthermore, Tyrolit created CERIUM polishing cup wheels for the last steps of glass processing. These cups can be used at very low pressure and high speed and still provide a perfect edge surface quality from the very first piece. CERIUM cup wheels ensure an excellent final polishing quality that reduces roughness of the edge to a very close level to the glass surface.

SURFACE POLISHING WHEELS

In 2021, the sequence for double edging machines was completed with the introduction of polishing cup wheels, which are able to provide extraordinary finishing results in all working conditions. In particular, SURFACE polishing wheels are specifically developed for the flat edge processing on double edging machines. On thick laminated glasses smudging is avoided due to the innovative deep bores. At the same time, excellent working continuity is achieved on thin

glasses. Last but not least, Tyrolit outdid itself with the ARRIS polishing wheels, specifically developed for high quality finish of the arris.

DIFFERENT ABRASIVE GRITS AND BINDINGS

Tyrolit R&D competence on different abrasive grits and bindings together with application know-how allowed Tyrolit to develop and offer a complete sequence of tools that grant an easy machine setup for all glass processing on double edging machine. As a result, there is a considerable increase in productivity.

TYROLIT wheels are available with different attachments and sizes to fit all machines available on the market. And not to forget: TYROLIT is able to offe a full range of tools for straight line edging machines, as well.

THE TYROLIT GROUP

TYROLIT is one of the world's leading manufacturers of grinding and dressing tools as well as a system provider for the construction industry. Headquartered in Schwaz (Austria), the family-owned business combines the strengths of being a part of the dynamic Swarovski Group with over a century's worth of individual corporate and technological experience.

Tyrolit Vincent Srl

TYROLIT

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MAPPI

GLOBAL FURNACE INSTALLATIONS FOR EUROPE AND THE US

This article speaks about how two companies thousands of kilometres away from each other have chosen a Mappi furnace for their production needs. The two companies – MM Tempering in the United States and Steklarstvo Frlan in Slovenia – each with 30 years of experience, are both focused on the quality of the glass they produce, now even more thanks to their acquisitions.

When speaking about global sales and contacts, this is really what we will be looking at here. We will be taking a little 'world tour', visiting two companies that are thousands of kilometres apart: MM Tempering in the United States and Steklarstvo Frlan in Slovenia, each with 30 years of experience. Both companies chose a different type of furnace most suited to their needs from Mappi, also taking into consideration their specific market of course.

MM TEMPERING

MM Tempering is a leader in Georgia's (USA) glass industry. Three words are enough to define this family owned company, founded in 1979: brilliant, unique, and affordable. MM Tempering produces tempered glass, shower doors, glass shelves and more. Over the years, MM Tempering has always looked for better partners, and for quality that could help the company to reach excellence.

One of these partners is Mappi, the Italian company that produces renowned tempering furnaces. Glass-Technology International spoke to a representative of MM Tempering to discover more about this choice.

"We chose a Fox, the 'little' Mappi furnace," said the representative. "It's 1500x3200mm, and we prefer it because it's perfect for our needs. We needed flexibility, ease of use, the opportunity to create small batches, better quality of glass, perfect control of any aspect

of the tempering process, full reliability and reduced energy consumption."

It almost seems like wishful thinking. Have you found all these features in your new furnace?
"Yes, absolutely! The new furnace has only been in operation for a few weeks, yet we have already seen the difference. It's the hero of our workflow."

Who are your typical customers?
"We're proud to be the premier source for custom glass projects, both residential and commercial. Our aim is to be creative, contemporary, classy, and totally eye-catching, able to have pleased even the pickiest of customers."

Mappi furnaces are well known for their approach to Industry 4.0. Have you found any advantages from this?
"Ease of use is a strength of the new furnace, as it is able to optimize and automate many decisions, leaving the operator free to focus on what is truly relevant. We are really convinced that we have found the best partner for our company."

STEKLARSTVO FRLAN

Glass-Technology International also spoke to Steklarstvo Frlan, a company based in Slovenia, about their 30 years of experience in glass processing.
Matej Frlan said, "Our goal is to adapt extremely quickly to the needs of the market. This includes the choice to equip ourselves with a new tempering furnace. We chose Mappi ATS 4.0."

Why did you choose this Mappi furnace?
"For us was the most important the quality of tempering and the energy consumption. About the quality we were convinced when we visited two companies with Mappi furnaces. For energy consumption we made a comparison with other furnaces and saw the difference."
Energy consumption is a strong point of every Mappi furnace, due to an optimization of process, exclusive software solutions and great attention for control of temperature and isolation.

What do you expect from this new furnace?
"We expect more work and new clients. Now we can produce safety glass in one day. Because of the quality and lower price, we could also carry out more important projects."

Has having better machines changed your approach to work?
"Surely, thanks to this new furnace, and thanks to Mappi's support, we are sure that the future of Steklarstvo Frlan will be even better."

CUGHER

PROVIDING THE RIGHT SOLUTIONS WITH CUSTOMIZATION

Cugher is well-known the world over for its screen printing machines, as well as for a wide range of other machinery for flat glass processing. This article gives us an idea of how the company responds to the demands from today's market with flexibility, complying with prerogatives of Industry 4.0.

For more than 50 years Cugher has been designing and producing screen printing plants for flat glass processing, offering a wide range of solutions that cover the entire productive process, starting immediately after the cutting and washing of glass sheets, up to the phases preceding tempering and bending processes. Besides printing machines, the company provides to its customers technologically advanced systems for drying and handling glass, such as IR and UV dryers, tilt loading and unloading conveyors, flat and vertical inspection stations, rotating tables, stackers, roller and belt conveyors, corner conveyors, tilting bridge conveyors and booking stations.

SPECIFIC SOLUTIONS FOR ALL TYPES OF GLASS

Every type of glass needs to be handled following specific proper solutions to guarantee the maximum care during its transportation along the line, so as to avoid damage and protect the material from dust. Indeed, glass shapes and sizes are parameters that define the characteristics of each single plant. For instance, automotive glass is characterized by a variable shape complexity, depending on its application type (windshield, backlite, sidelites), and by dimensions that rarely exceed 2,600mm. On the other hand, architectural and home appliance glass generally has a symmetric shape, but whilst the first have dimensions easily over 3,000mm, the second can be very small and also drilled.

Flexible engineering, guideline of Cugher's design, allows to develop highly customized solutions. Each single machine is designed to be suited and configured in accordance with customer specifications, without having to use additional resources. The company's high potential for customization is applied in the mechanical and electrical hardware, as well as in the software that coordinates the whole the line.

THE INDUSTRY 4.0

The Internet of Thinks (IoT) is currently an essential requirement in the manufacturing industry and Cugher software perfectly integrates with other control systems, connecting all parts of the plant to enable the real-time sharing of huge quantity of data and to facilitate the control during all production phases. These features allow Cugher to respond to the prerogatives of Industry 4.0, whose goal is to have a fully automatic and interconnected industrial production. In this perspective, the development of new technologies allows to obtain a higher line flexibility, producing small lots at low costs, to reach greater productivity thanks to minor set-up time and error reduction, as well as to increment quality and reduce waste, by adopting sensors and vision systems that monitor production and its results in real time.

RELIABILITY AND INNOVATION

To achieve the described results and guarantee the reliability of each machine according to customers' needs, Cugher refers to the best suppliers in the market, whose high-performing components ensure maximum reliability. This approach reduces the need of after-sales intervention and, in case of necessity, the close relation with selected suppliers enables to quickly respond to every issue. Engineering and production quality is reflected also in the high attention to the safety. Sure enough, right from the early design stages, the application of every single safety devices is considered, using the most innovative available technologies.
Thanks to continuous investments in research and development, Cugher is recognized as one of the most innovative companies in the glass industry. The company intends to continue this way, with the main goal of offering, to different sectors operating in the glass world, a high degree of customization and automation of all line components.

Cugher Glass Srl

CUGHER
Plants for glass screen printing

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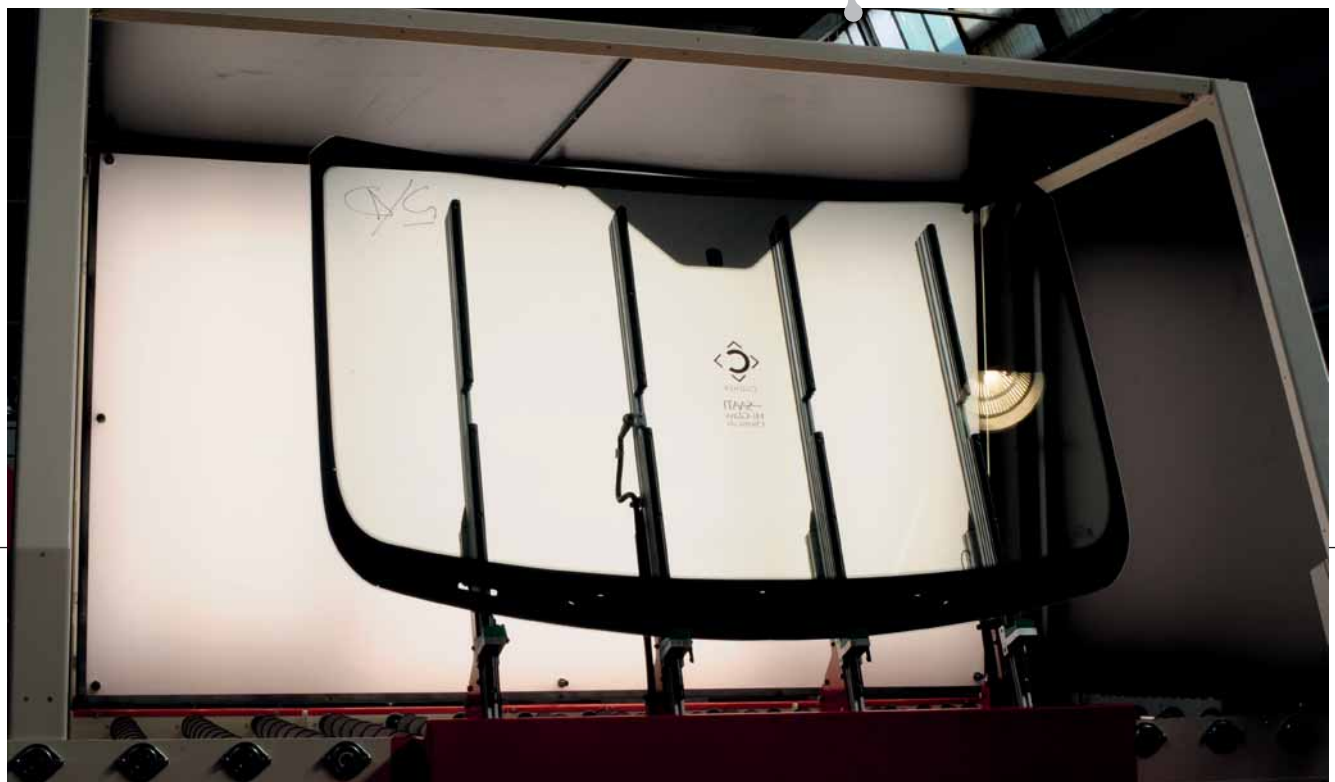

RBM ITALIA

NEW TECHNOLOGICAL FRONTIERS

High quality, adaptability and durability are three of the most requested characteristics in industry – especially in flat glass edge processing. RBM has come up with a new series of hybrid wheels that combine the advantages of rigid cerium wheels with those of rubber wheels, ensuring optimization of TCO (Total Cost of Ownership) processing costs.

NEW RBM HYBRID WHEELS COMBINE THE ADVANTAGES OF BOTH RIGID AND SOFT WHEELS IN A SINGLE TOOL

RBM Italia's extensive research has produced two groups of hybrid wheels which are making a mark in the world of glass processing: the X510 with cerium oxide and the RP320 for processing arris Hybrid bonds are currently available on the market and offer a major innovation in glass processing.

X510 – HYBRID CERIUM OXIDE WHEEL

An innovative group characterized by a hybrid bonds making it unique, as it balances the merits and potential of rigid cerium wheels with those of rubber wheels, in a single tool.
Thanks to its new formulation and remarkable transformation technology, the X510 guarantees unique and incomparable results. High quality, adaptability and durability characterise this grouping that will revolutionize flat glass processing.
In summary, the new hybrid bonds offers:

- incredible brilliance at any processing speed;
- absolute transparency, completely free from halos, mirror finish;
- removal of small defects left by previous processes;
- a considerably longer life than any other cerium wheel on the market;
- reduced consumption regardless of pressure, rotation and advancement (greater insensitivity to the working parameters).

RP320 – GRINDING WHEEL FOR ARRIS

The same principle on

which the X510 wheel is based also underpins the new RP320 arris wheel. Again, its main feature is its amazing versatility plus the perfect uniformity of the entire worked edge.

In summary, the advantages of the RP320 are:

- adapts perfectly to the machine and the glass sheet, compensating for any defects and working more evenly, as do soft wheels;
- unlike soft bond wheels, it ensures a clean and defined profile, without smoothing the edge too much;
- guarantees maximum precision, as per rigid wheels;
- avoids risk of chips, scratches or uneven results.

The RP320 family leaves no mark even at high processing speeds, guaranteeing a highly brilliant arris. Thanks to hybrid technology, it is long-lasting, and can be used both in single pass and after the diamond wheel.

RBM grinding wheels are configured to provide the highest quality performance, and are reliable, versatile and guarantee consistent results.

X510 and RP320 represent an innovation in glass processing that ensures optimization of TCO (Total Cost of Ownership) processing costs.

RBM Italia

rbmitalia

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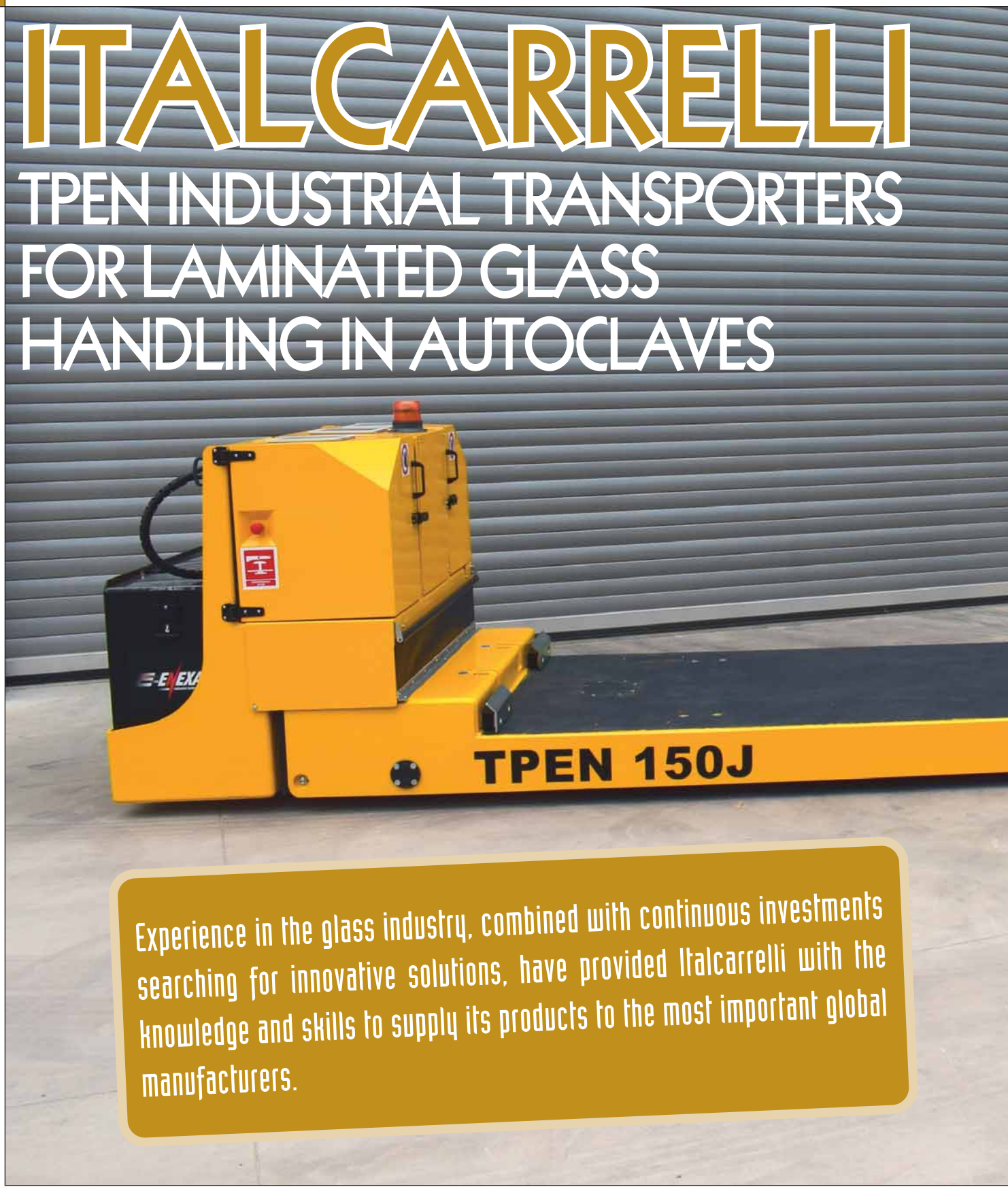
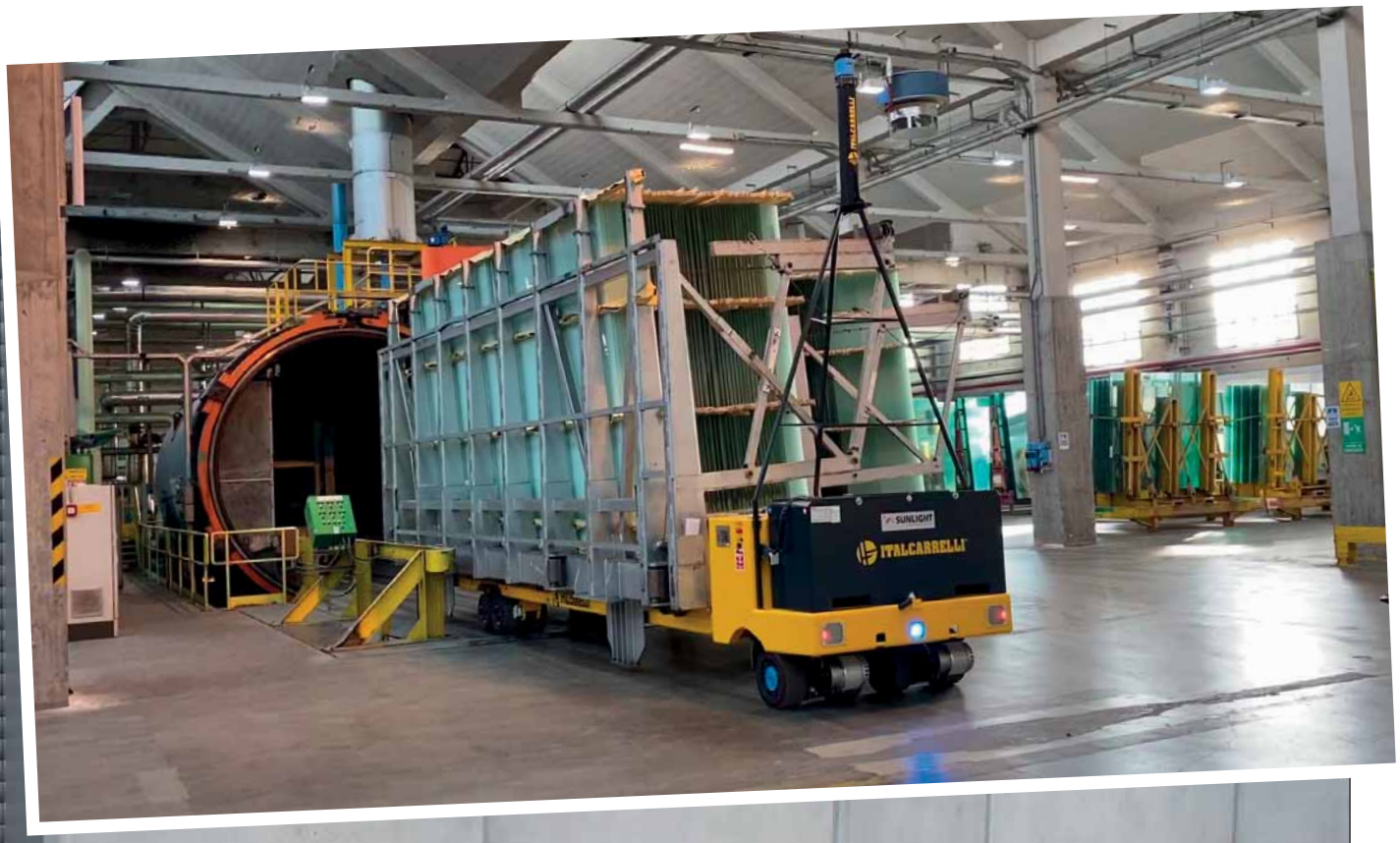
ITALCARRELLI

TPEN INDUSTRIAL TRANSPORTERS FOR LAMINATED GLASS HANDLING IN AUTOCLAVES



Experience in the glass industry, combined with continuous investments searching for innovative solutions, have provided Italcarrelli with the knowledge and skills to supply its products to the most important global manufacturers.



Italcarrelli® is well known for its speciality machines for a great variety of industries including transformers, foundry, aerospace and, of course, glassworks, being specialized in the handling of flat glass.
The company is the optimal partner to rely on thanks to many years of experience in this field and with numerous transport solutions realized for both local manufacturing companies and multinationals, for the most different applications.

LAMINATED GLASS HANDING – IN AUTOCLAVES

Even for the handling of laminated glass in autoclaves, the company is able to support each customer with custom-built industrial transporters thanks to the numerous projects handled and the knowledge thus acquired.
The engineers of the Italcarrelli's Glass Division first analyze the features of each customer, including specific technical and performance needs, the context of use and the production operation. Then they design the most effective logistic solution for the production process, intervening in an intelligent and targeted way. Systems that aim to simplify the handling operations and pay attention to the safety factor given the particularity of the operating context.

THE TPEN SERIES

TPEN vehicles are the ideal transporters for laminated glass handling, and are equipped with patent-pending 'Sicur-Lift' lifting system assuring a double mechanical and hydraulic safety for maximum load stability in all circumstances. They have constructive,

dimensional characteristics such as to be able to deposit the racks with glass inside the autoclave and remove them once the process is finished with high flexibility and safety standards.
Transport vehicles with a capacity of 15-30-50 tons and even more, used for handling DLF/LES sheets to jumbo sheets, thanks to the size of the platform which can be customized according to the needs of the individual customer. Versions with a radio-controlled driving system or LGV (laser-guided) are available, used both for flat glass applications and for automated loading/unloading of the material from the autoclave. With a very resistant frame, high stability and quality components and thanks to the high manoeuvrability and visibility given by special sensors, the positioning inside the autoclave is extremely simple and easy for the operator, reducing manoeuvre times and optimizing personnel and costs and ensuring the highest levels of safety and reliability.

ITALCARRELLI®

ITALCARRELLI® is a global leader in the design and manufacturing of machines and solutions for glass handling and storage in the most diverse industrial applications. Thanks to many years of experience in the industry and to investments searching for innovative solutions, the company has acquired remarkable knowledge and it supplies its products to the most important manufacturers all over the world.

GLASS GROUP

NEW HUB FOR THE FLAT GLASS SUPPLY CHAIN

Innovation, quality and great performance unite the flat glass converting companies in the first independent 'Made in Italy' group, established thanks to the aggregation of five founders, to create a place of growth, meeting and comparison for the Italian and international glass market, as well as for all sector stakeholders.

Glass Group is the first completely independent Italian group that brings together leading glass companies around its brand with decades of experience in the transformation of high quality insulating glass units, united with a view to restarting with their EUR 70 million turnover, 19 factories and about 400 employees, which constitute a significant share of the Italian flat glass market.

AN IMPORTANT MISSION

"Glass Group's mission is first of all to aggregate small- and medium-sized enterprises that have a common need: to grow, in terms of size, know-how and generational change. Our goal is to become the reference point of the flat glass sector," declares Daniele Predari, President of the Glass Group. "The development path, which we will conduct together with our companies, aims to enhance technology, increase skills and promote an increase in quality standards among all members. Glass Group, formerly Glass6Therm S.r.l., aims at national expansion by affiliating manufacturing excellence throughout Italy. In this particular historical moment we have a great opportunity, and we must be ready to seize it together. On the table we have the environmental challenge, also favoured by the maxi facilitation to restart the construction of the Relaunch decree, the possible economic effects of which are estimated at over 20 billion thanks to the eco-bonus increased to 110 per cent. Glass has always been a 100 per cent recyclable material and, thanks to the UNI product certifications, we intend to spread a culture that is increasingly attentive to green issues among the companies of the group."

CREATING A NETWORK FOR GROWTH, MEETING AND COMPARISON

In this perspective of innovation and development, the group was established thanks to the aggregation of five founders (Mornagoglass Srl, Predari Vetri Spa, Vetraria Pescini Srl, Vetreria Romagna Srl, Vetreria Valfon Srl) and 10 affiliates (Aluvetro, Vetreria Lucana di Vetromat Srl), Vetreria Deserto Srl, Vetreria Biava, Podda Vetri Srl, Termovetro Sud Srl, Vitrum & Glass Srl, Vetreria Tacca Srl, Vetropadana Srl and Guidi Glass Srl) federated with the aim of playing the role of hub of the supply chain: a place of growth, meeting and comparison for the Italian and international glass market as well as for all sector stakeholders.
Through synergies and strategic partnerships, Glass Group has set up a large reference network for glass

Daniele Predari - Glass Group

Giorgio Lesanti - Pellini Screenline


Marco Porro - Technoform

Matteo Padovan - FenziGroup

manufacturers for building, architecture and design. The supply chain is represented by main partners, complementary operators in the production of insulating glass, such as Fenzi, the chemical multinational dedicated to the transformation of flat glass; Pellini industries, which develop and manufacture shielding systems for double glazing; the multinational Technoform that develops solutions, not only in the world of insulating glass, but also in other sectors.

"With the aim of continuing to actively participate in the development of the entire Italian glass industry, one of the well-known and appreciated excellence of Made in Italy, the Fenzi Group has enthusiastically decided to participate in Glass Group, an ambitious project that we are sure it will bring know-how and innovative technologies to the sector, working in networks with reliable partners and important realities in the world of Italian glass to which Fenzi has been dedicating passion and daily commitment for 80 years," says Matteo Padovan, Managing Director of Fenzi SpA.

"For Pellini, being a Main Partner of the Glass Group means networking with glass production and processing companies that share our attention to the quality of the finished product and the search for innovative solutions oriented towards sustainability and design, says Giorgio Lesanti, ScreenLine Sales Manager; division of Pellini SpA. "We are confident that the Glass Group teamwork will further favour the diffusion of the integrated ScreenLine shielding as a synergistic element of the performance of the insulating glass."

"In view of the development strategy, the collaboration with Glass Group plays a fundamental role. Thanks to our capillary network and both macro and micro vision of the Italian reality of the sector, we will be able to achieve important common goals. We are confident that this partnership is the right way to develop future solutions at the edge of the glass for insulating glass," says Marco Porro, GM of Technoform Italia. This is Technoform's vision to create innovative solutions and improve the production process of its partners in order to make them market leaders.

Among the business partners we include Aluvetro, leader in the design of indoor and outdoor balustrades; and glassAdvisor, a software house that produces an App for simulating glass and solar shading.

SHARING AN INDUSTRIAL PATH

Glass Group, sharing this industrial path, is an active part in trade associations including UNI (Italian National Unification Body, within the UNI Glass Commission), Assovetro (Leading Division G, Flat Glass Transformers), UNICMI (National Union of Companies Metallic Constructions for Building Envelopes, with the Direction of the Glazing section) and ADI (Italian Association of Industrial Design) and is associated with Confindustria. For the companies of the Group, Glass Group has created the "Glass Group Service Charter" which provides for the support of the Technical Department with advice on quality, safety and finance; the Research and Development Area which favours the development of new products and the restyling and reverse engineering of existing projects; for the training area there are two main areas: Architecture & Design Academy for the development of technical design knowledge on the glass material; and Business School, for the refinement of the skills necessary to grow and make companies more competitive. Finally, affiliates will be able to count on tailor-made integrated marketing and communication services to significantly promote the success of their business.

GLASS Group

GLASS GROUP

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SCHNEIDER ELECTRIC

WHICH CHALLENGES AND OPPORTUNITIES DO THE MAIN OPTIONS PRESENT IN TERMS OF ENERGY SUPPLY, COST, AND DECARBONISATION POTENTIAL?

This article takes a look at five key questions coming from the Paris Agreement made in COP21 in December 2015 from an energy and sustainability standpoint, and what they actually involve for the glass industry.

Gary Cafe
Sustainability Expert
Schneider Electric, Energy and Sustainability Services

We all know or have heard about the Paris Agreement made in COP21 in December 2015 but what does it mean for the glass industry, which has historically been almost entirely reliant on carbon emitting fossil fuels for the melting process? Does it mean that

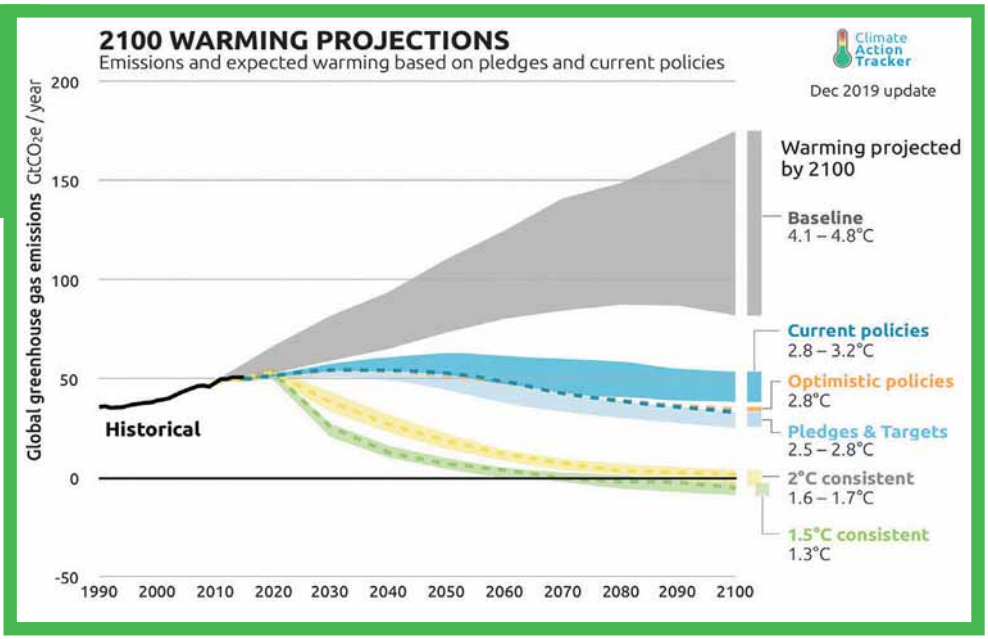


Figure 1. IPCC Dec 2018 update – With current efforts, global warming is likely to reach 1.5 degC between 2030 and 2050. How quickly it's reached is up to all of us

container glass customers will start to move towards paper, bio-plastics, aluminium or a low carbon glass melting process? What about flat glass and tableware?

Let's consider for a moment the decarbonisation trajectory that the Paris Agreement binds us to. In Figure 1, the Intergovernmental Panel on Climate Change (IPCC) has advised us that in order to avoid the worst impacts of climate change, we must limit global warming to 1.5°C above pre-industrial levels, and this means starting NOW on a trajectory towards being carbon neutral by 2050. Owens Illinois, NSG and Saint-Gobain have all made public commitments towards this goal by engaging with so-called Science Based Targets which demand a trajectory towards carbon neutrality by complete decarbonisation – not just burning fossil fuels here and planting trees there to compensate. This suggests that the biggest players in the glass industry are committed to turning their melting processes entirely away from fossil fuels. This article aims to start to address five key questions from an energy and sustainability standpoint – or at least what you should consider when answering the challenge presented to our industry.

1. What are the options today and how do they compare on a pure unit of energy basis?
2. Why do we need to think about this differently than in the past?
3. How green are those options really?
4. What are the supply risks and cost sensitivities?
5. How do we quantify the risk and find opportunity therein?

WHAT ARE THE OPTIONS TODAY AND HOW DO THEY COMPARE ON A PURE UNIT OF ENERGY BASIS?

Of course, there are potentially many options and various 'flavours', but this article will focus on the four highest potential fuels available today. Natural Gas – the business as usual case. Hydrogen – a close cousin of Natural Gas. Hybrid electric and Natural Gas or Hydrogen – A familiar path simply wound up. All electric – the big step.

We can start to study these at a high level by comparing the end-to-end energy flow. To enable this comparison I will unapologetically make some high-level assumptions in the 'back of an envelope' example calculation based on a typical container glass furnace. The exact application and technical nuances may differ depending on the specific technologies chosen for each fuel, but I would argue that the physics and ratios can broadly be applied – even when translated to other types of glass processes.

Starting from the right-hand side of Figure 2 (on the next page), we can see that a 330 T/day output is required from our theoretical furnace. Two key technologies are then chosen for the furnace; either a gas fired furnace or electric. The gas furnace has three input options; Hydrogen from a Steam Methane Reformer (SMR – the most common form of hydrogen production today), hydrogen from electrolysis, natural gas. Each of these options need 4 GJ/T to melt the glass on average but three times as much volume of hydrogen is needed per unit of energy compared to natural gas. Furthermore, current SMR and electrolysis processes have roughly

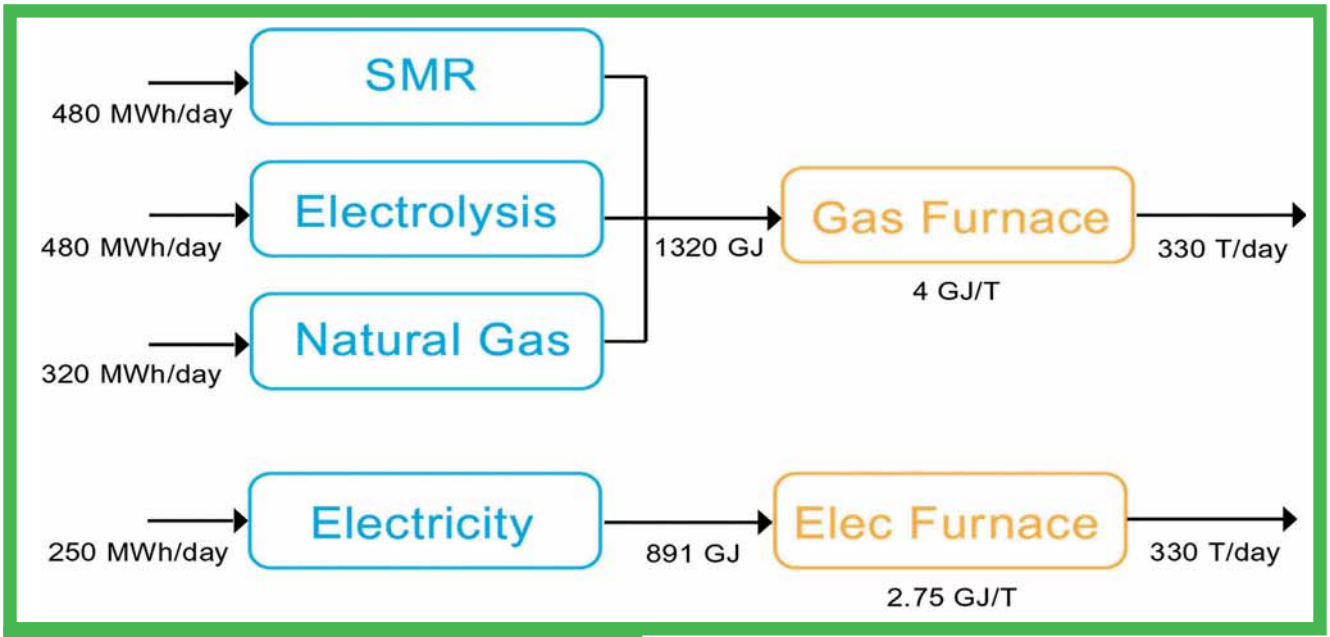


Figure 2 – Back of the envelope calculation of the energy required for each solution

the same energy losses as each other, meaning that both processes need 30 per cent more energy to melt the glass than burning the natural gas in the first place. SMRs are a mature technology and therefore unlikely to get significantly more efficiency in the future, but electrolysis – whilst not yet commercially proven – is witnessing significant investment resulting in breakthroughs in technology and efficiency gains of up to 50 per cent.

By comparison, the same amount of glass produced from an all-electric furnace is subject to a significantly more efficient process, needing only 2.75 GJ/T and no further conversion from the energy grid. This is then around 22 per cent more efficient than a natural gas furnace and nearly 50 per cent more efficient than its green alternative: electrolysis.

WHY DO WE NEED TO THINK ABOUT THIS DIFFERENTLY THAN IN THE PAST?

Historically, energy cost was simply relegated to a single line or two in the business case presented to management for a new furnace. The same business case that devoted 200 lines or more to the Capex breakdown. It can be surmised that with only one fuel to choose from, it made no sense to model this out further. We'd manage it as best as possible but in reality, our competitors were exposed to the same market forces and our customers knew that, and therefore had to accept price adjustments accordingly.

Now we have multiple different variables in the equation; natural gas, power, carbon and renewable electricity. Each of these have different fundamentals and are independently impacted by sovereign risk that varies between countries.

Consider now that tweaking that one energy line on the 200-line business case by just 10 per cent can make a bigger USD/T difference than that of a 50 per cent change in Capex. Said another way; one could work incredibly hard to reduce the Capex of a natural gas furnace design only to have those savings completely wiped out compared to a competitor who chose an all-electric furnace driven by fixed price renewable electricity in a country that implemented a carbon tax that drove the cost of natural gas up by 10 per cent. Complex, and hard to capture and quantify in just one line of a spreadsheet, right?

HOW GREEN ARE THOSE OPTIONS REALLY?

Let's start with the three most challenging fuel sources to decarbonise; natural gas, hybrid electric/natural gas and SMR-originated hydrogen. All of these need a breakthrough in Carbon Capture and Storage or Usage technologies or biogas.

CCS or CCU. Many attempts have been made to get a large number of CCS/CCU pilot projects off the ground in this space spread across all types of needs from SMR to con-

crete to steel and beyond, yet only a handful manage to get government subsidy and even fewer have worked let alone show potential for commercial application. Even if a breakthrough is made, which it could be argued is really needed to facilitate a low carbon future, it makes the energy equation from the first question look even more inefficient given the energy required to drive the additional CCS/CCU process. Biogas is potentially even more challenging to achieve due to the scale required and land availability from a growing population.

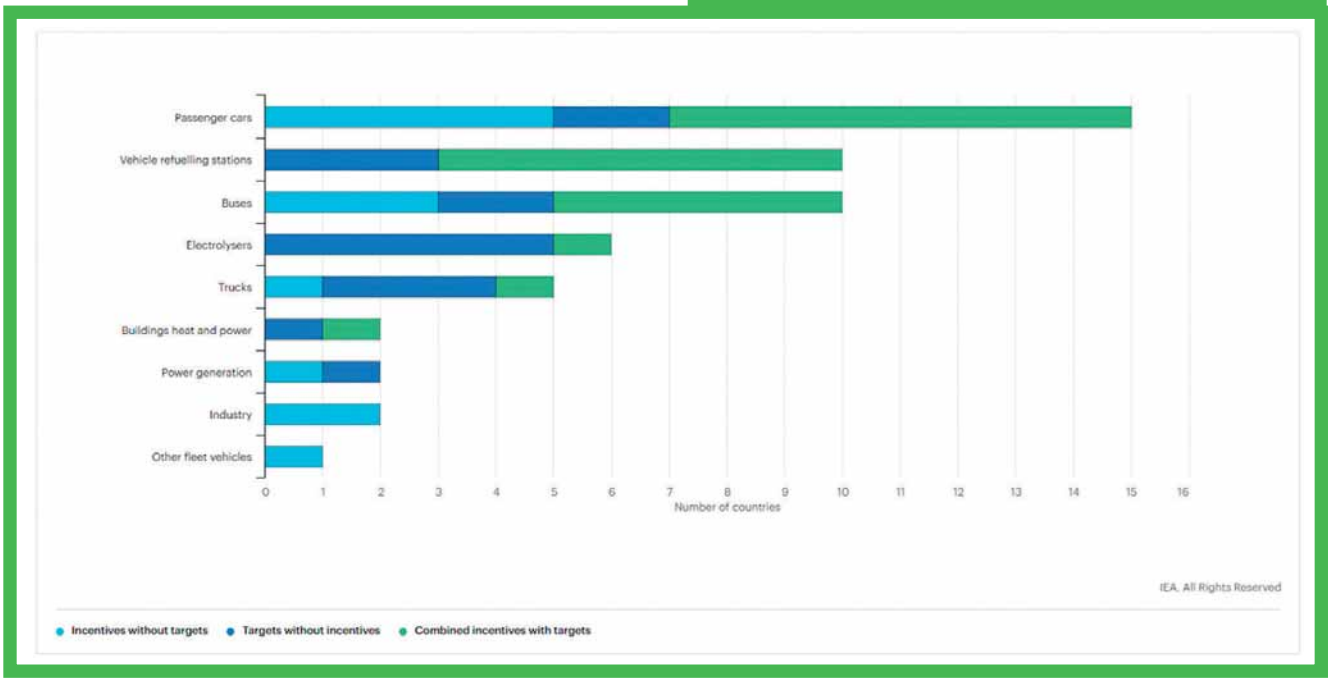
Hybrid electric with green hydrogen from electrolysis can indeed be carbon neutral when powered by renewable energy. A scenario could also be envisaged whereby the extra energy and technology cost of the hybrid approach versus all electric could be worth it due to technical advantages such as pull through rates. I'll leave that debate to the future and to better informed people on those trade-offs than I. I'm simply stating that they should be considered.

All-electric can certainly be powered by renewable electricity in many grids across the world today and therefore be considered carbon neutral when coupled with certificates deeming that electricity to be of renewable origin – even though the grid is far from carbon neutral today. We'll explore how this works in the last part of this article but for now let's say that either the all-electric or electrolysis driven hydrogen solutions can be deemed carbon neutral.

WHAT ARE THE SUPPLY RISKS AND COST SENSITIVITIES?

All these solutions are great in theory but can the energy actually be delivered in a safe reliable form we've grown to expect from our good friend natural gas? Well actually, let's start with our old friend. Will it still be available? I'm not talking physically as there is likely plenty of availability but will the world be able to allow it? With the EU Green Deal, fossil fuels are effectively outlawed in 2050 for the vast majority of users. That's right, illegal – at least so economically punitive it might as well be. That means SMR-based hydrogen is also out. There will then be a huge demand for green hydrogen. That means a massive ramp up from the four per cent it occupies today and by the looks of current government policy as depicted by the IEA in Figure 3, industry will be a long way down the queue from transport and where does glass sit in the industrial queue? Likely behind the likes of steel for instance if Bloomberg NEF's prediction turns into reality that green hydrogen should break even with expensive coking steel plants as early as 2030 under current carbon prices. Comparatively, glass would need a carbon price nearly 10x what it

Figure 3 – Current policy support for hydrogen deployment, 2018 – Hydrogen for industry appears a long way down the queue of governmental priorities.



is today in 2030 to make it green hydrogen competitive with natural gas. Clearly, Steel has an incentive to take the hydrogen well ahead of glass.

Our other option is all-electric. Electricity grids are well established, but with increased electrification from industry, households and electric vehicles, significant investment is required to ensure the power can be delivered. Interconnectors between markets are also needed to ensure that when it's windy in one region, that energy can be transferred to where it's not, or stored in batteries, molten salts or hydrogen. The latter is where the seasonal storage potential of hydrogen can, and likely will, play a role in the future energy world.

HOW DO WE QUANTIFY THE RISK AND FIND OPPORTUNITY THEREIN?

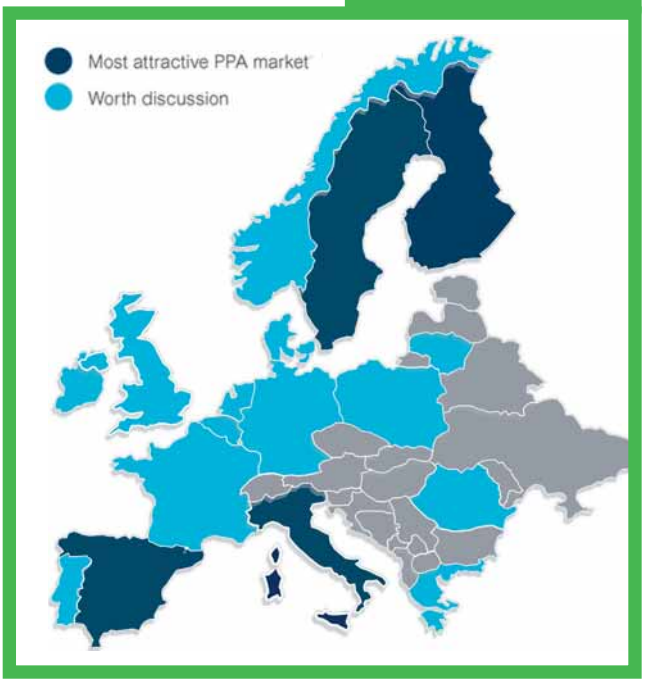
So, with all these varying fundamentals at play, it is crucial that senior managers of glass firms are well informed and understand where the risks and opportunities lie. Solid 10+ year outlooks on carbon, gas and power from professional organisations are key to building potential scenarios. I use the term scenarios because no one has the ability to predict the future and there are large variables at play. The best we can do is build scenarios and perform rigorous sensitivity analysis to show what can happen and therefore what the best- and worst-case scenarios might be. Only then can our management teams move with confidence into this brave new world.

One lever to reduce these market risks is using renewable energy as it has essentially zero marginal cost of production and can therefore decouple itself financially from the energy market. Renewable electricity from technologies such as wind and solar are also dropping in cost and rising in availability. Australia, the US and increasingly, Europe (see Figure 4), are hot beds for so-called corporate Power Purchasing Agreements because Commercial and Industrial buyers are seeing them as lower cost and lower risk alternatives to regular grey procurement strategies. It's not just the B2C or telco sectors who want to green their image either. Bluescope Steel, Ball Corporation and Cummins are just some examples of industrial players taking advantage of the opportunities.

CONCLUSIONS

Unfortunately, we are not in a position to predict the future, nor do we try, but we can take steps to understand the possibilities. The top takeaways recommended from this article are therefore:

1. ensure you build rigorous scenarios for your management using solid 10-year energy market outlooks;
2. start moving now to decarbonise your processes. 2050 is only two investment cycles away;
3. consider supply risks when choosing your energy source;
4. look at de-risking and greening your portfolio with renewable energy.



Also, Caption to : Relative attractiveness of European PPA markets. Note that cross-border structures are available to cover consumption in most European Countries.

THE AUTHOR – GARY CAFE

Gary Cafe is a sustainability expert from Schneider Electric's Energy and Sustainability Services division and works closely with Rene Meuleman of their EuroTherm division to understand and apply his knowledge to the glass sector.

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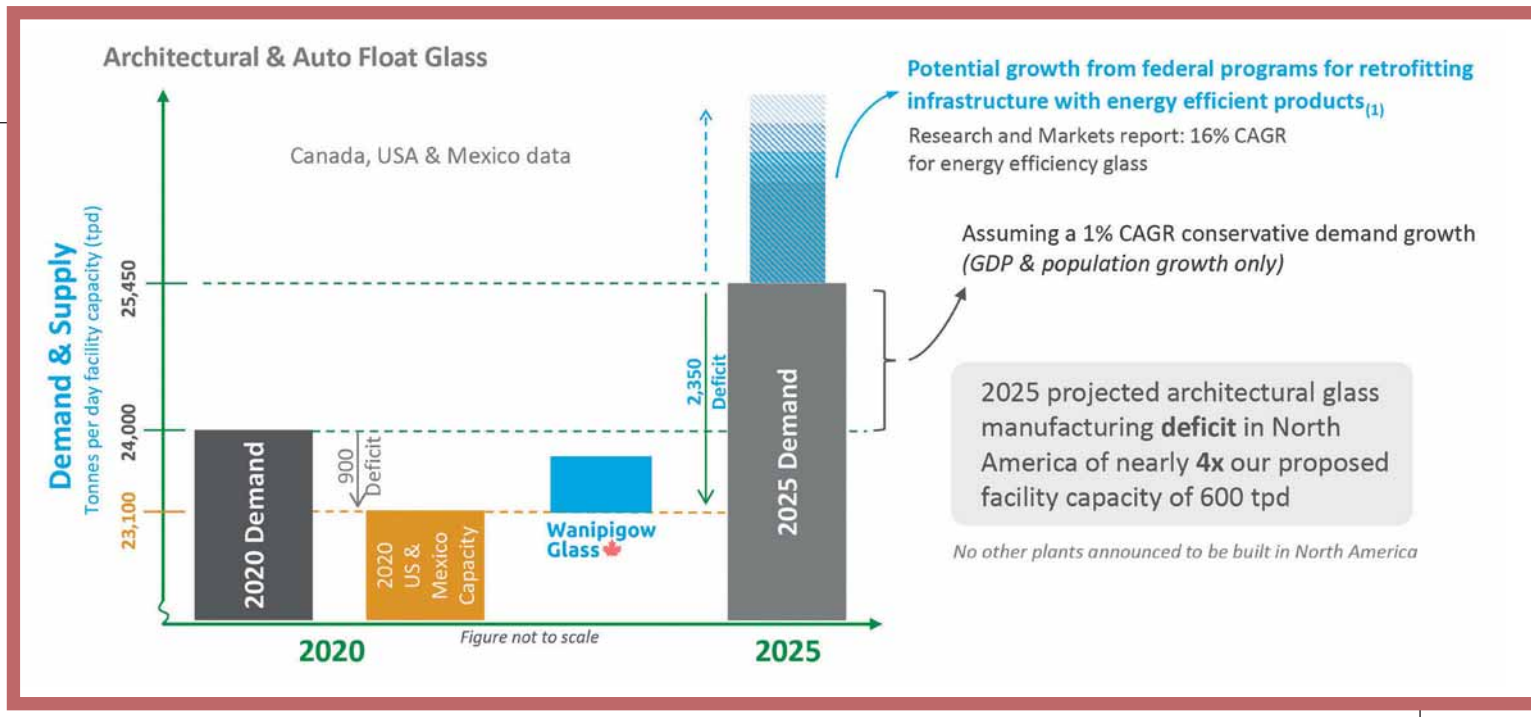
CPS

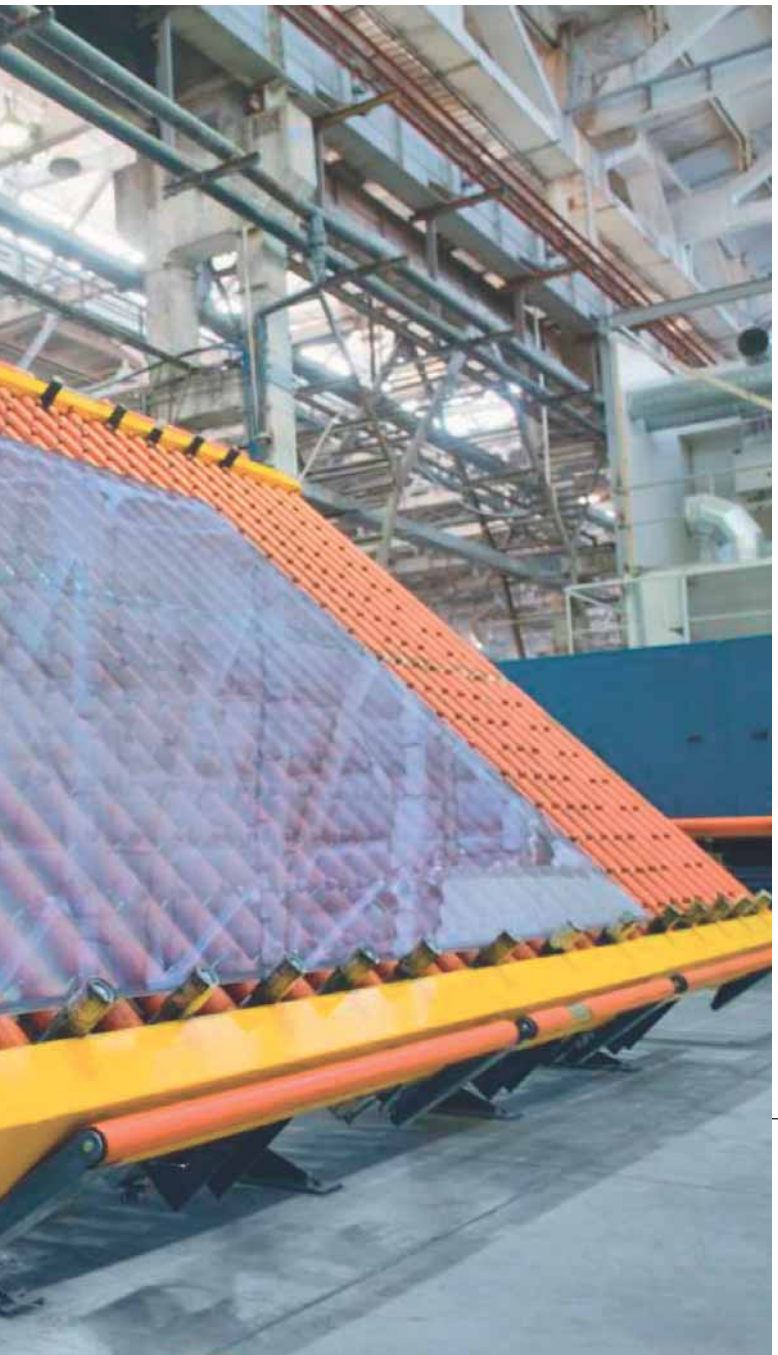
LOW-CARBON MANUFACTURING OF ARCHITECTURAL & SOLAR GLASS

This article introduces the project actually underway in Canada for the low carbon manufacture of architectural and solar glass which, its founders say, will set a new standard for profitable low-carbon manufacturing of architectural and solar glass designed to reduce emissions – quite an important goal.

When setting up any business, there are a series of essential aspects that need to be considered, ranging from technology to emissions, while monitoring sustainability and – last but certainly not least – profitability for the businesses taking part.

CPS has carried out in-depth studies, also with regards to the fact that in the country we are speaking about – Canada – there is no float glass manufacturing capacity, and had come to the conclusion that now is the time to set up float production of special solar glass, also bearing in mind that the organization has its own sand deposit is located





in Manitoba which enjoys long-term manufacturing cost advantages. The new company will therefore benefit of utilizing best available technology and renewable electricity to set a new low-carbon standard for float glass manufacturing.

GROWTH AND DEMAND

Demand for solar glass products manufactured by CPS will be accelerated by:

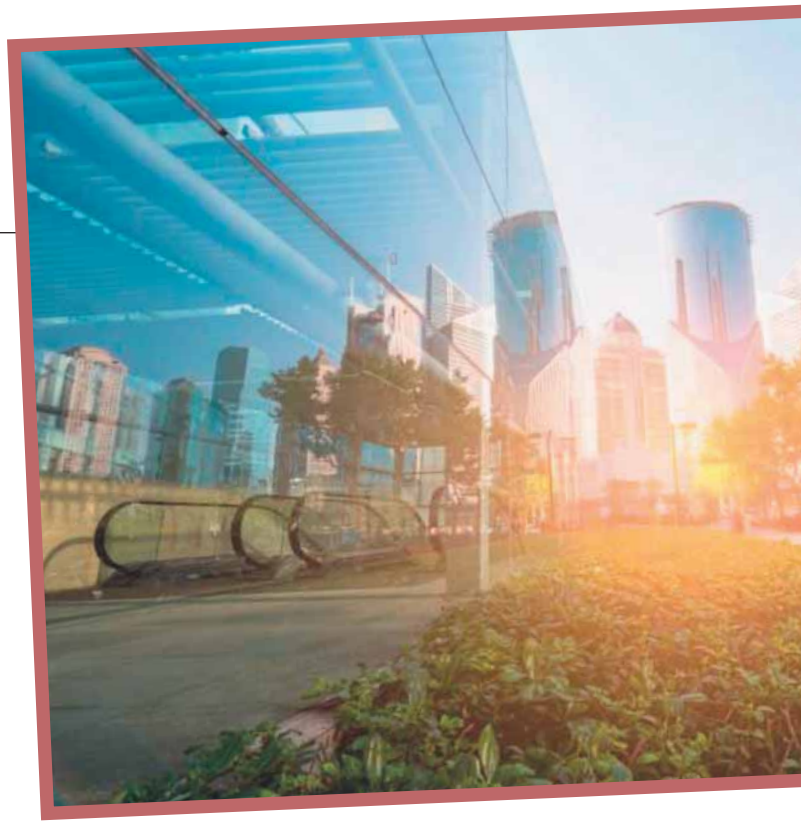
- EU's and Canada's Net-Zero by 2050 plan
- China's Net-Zero by 2060 plan
- USA's carbon-free electricity grid by 2035 plan
- New generation bi-facial dual-glass modules that provide increased conversion efficiency require 2x solar glass

Demand for coated energy efficient glass will be accelerated by:

- 'Canada's Buildings Strategy' federal program for retrofitting old infrastructure to reduce emissions(1, 2, 3)
- Canada's revised plan for achieving Paris 2030 emission targets(4)
- Future buildings design will require an assessment of embodied carbon of products utilized, making low-carbon manufacturing critical in meeting new LEED and Canada Green Building Council standards(5)
- Solar glass used in solar panels and coated architectural glass used in energy efficient products save more energy upon installation than used in manufacturing, creating a unique carbon negative product(6)

INCREASING FOCUS ON LOW-CARBON MANUFACTURING

For architectural products, the new company's focus will be on the following guidelines and programs which accelerate demand for energy efficient archi-



tectural products. These guidelines also focus on embodied carbon from manufacturing of building products.

- Canada Building Code 2020 (energy efficiency)
- LEED building rating system (life-cycle analysis)
- Energy Star 5.0 certification program
- Build Smart – Canada's Building Strategy (retrofitting infrastructure to reduce emissions)

The following considerations will likely be incorporated into design parameters and building codes by architects and developers across the world, increasing the focus on low-carbon manufacturing:

- Canada Green Building Council – Case for Building to Zero Carbon (2019)
- European Standard EN 15978 specifies calculation method for building environmental performance (2017)
- Finland's Ministry of Environment publication: Roadmap for low-carbon construction (2019)
- International Green Construction Code (2018) – design and construction of sustainable, resilient, high performance buildings
- Comprehensive approach on Carbon Assessment and applying it through the building design cycles (2017)

'SPEAKING' TO CPS

CPS is a company that owns quarry rights to a very large reserve of low iron silica sand in Manitoba. Our plan is to build an industry-leading sustainable float glass manufacturing and coating facility in the greater Winnipeg and supply that operation from our sand reserves.

Our facility will contribute to global efforts to reduce emissions through sustainable manufacturing of carbon negative glass products. We aim to set a new standard for low-carbon manufacturing of glass utilizing renewable energy from the provincial power grid for the facility's electricity supply. We will also incorporate the latest technology and sustainable operating practices including waste heat recovery and recycled municipal water for cooling.

What will we produce?

Our high-quality sand will facilitate the manufacture of solar glass for use in solar panels, or ultra-clear energy efficient architectural float glass for use in energy efficient buildings and homes.

A process is underway to determine what the Company's long-term production plan will focus on – either fully dedicated to solar glass, fully dedicated to architectural glass, or a strategic combination of the two. This will be influenced by direct feedback from potential customers and detailed analysis of our customers' supply chain.

How did we land on this strategy to build a sustainable float glass facility?

We investigated potential industrial uses for the high-quality silica sand and associated value-add manufacturing opportunities. We quickly realized that the iron content before processing of our sand is low and fairly unique in North America. We also determined that with basic processing the iron content could be reduced even further making it ideal feedstock in the production of high end glass products.

Combining the potential of the resource and the significant logistics, sustainability and cost benefits of locating a facility in Manitoba led to our vision of building a low-carbon float glass facility in the province.

We believe the project timing is ideal for Manitoba. It is aligned with provincial climate action priorities, sustainable development mandates, new employment targets, and the project will contribute to economic recovery following the COVID-19 pandemic as the he float glass operation will produce over 300 full-time

PROJECT SUMMARY

- Wholly owned silica sand deposit suitable for high quality glass manufacturing
- Cost-competitive low-carbon manufacturing process
- High growth markets aligning with global climate action plans
- Shareholder alignment with notable board and management ownership positions
- A green investment to produce carbon negative products for a rapidly growing need

permanent jobs in Manitoba. Moreover, there is substantial economic spin-off opportunity for the community and the province including: secondary business creation for suppliers and services and manufacturing and fabrication of further value-added glass products.

What is the importance of sand as a raw material for glass manufacturing?
Silica sand is the primary raw material used to manufacture float glass. There are very few silica sand mines in North America with sufficiently low iron levels to produce high quality glass. Low iron content in the source silica sand is essential for production of premium glass because it improves clarity and transmissivity of light through the glass.
The more light that is able to pass through the glass, the more efficient a solar panel can become and the more specialized coatings can be applied to architectural glass.

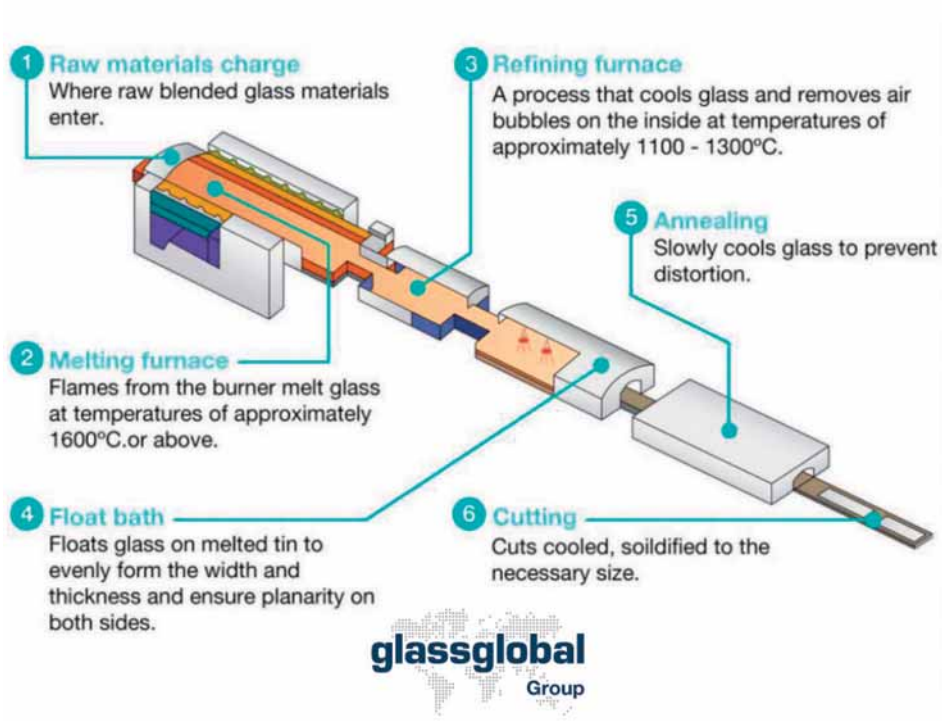
What is your view on the future of this market?
Global demand for float glass is high and projected to increase substantially with demand outpacing North American supply for years to come.
Both Canada and the USA have climate action mandates. Policies supporting these mandates focus on reducing energy consumption by buildings. Retrofitting older buildings with low-E coated glass and ensuring new building codes mandate low-E coated glass form a key component of climate action policies and incentives.
Further, the new US Administration's goal to de-carbonize the electricity grid by 2035 will drive growth in renewable energy infrastructure. Solar power will contribute to this and that contribution will drive strong growth in the manufacture of high efficiency solar panels. CPS will be capable of producing the glass coverings for these solar panels and potentially facilitate an increase in North American solar panel manufacturing capability.
Building design and city development standards will soon start incorporating life-cycle carbon assessment, placing a greater emphasis on low-carbon manufacturing and responsibly sourced material for future development. We are building a low-carbon facility in North America with a focus on future development needs.

LEADERSHIP

Glenn Leroux – President & CEO
Anshul Vishal – VP, Business Development
Ann-Marie Osinski – Senior Financial Consultant

What are the next steps?
CPS is a small group of entrepreneurs that have been working on developing this business plan. We recognize the need to strengthen our management team with float glass industry expertise and will be recruiting the talent to do so. Our enhanced team will then guide the detailed design of our float glass facility, contract the services and suppliers to build the facility then start construction. The team will also work to establish supply contracts with our float glass customer base.
We are going to make decisions on our production portfolio in the coming months. That determination will coincide with starting the front-end engineering and design (FEED), permitting and regulatory applications needed to enter construction contracts.

What is your end goal/vision?
We see a float glass manufacturing facility as a starting point for a larger vision. With over 96 per cent renewable electricity from



Source: CM Project Ing
Conceptual generic rendering of facility

KEYS TO SUCCESS

Expanding our core team with glass industry veterans
Market focused products
Building strategic technical and operational partnerships
Operational excellence

the provincial power grid at very competitive rates, we hope to build out a centre of excellence in the province focused on silica based value-added manufacturing. This could include a solar panel manufacturing facility adjacent to our facility utilizing our solar glass product or fabrication and glazing businesses utilizing our architectural glass product.

Because of the magnitude of our silica sand resource, we see significant potential for a long-term, silica industry based growth strategy for the province of Manitoba.

REFERENCES

1. 13% of all emissions in Canada is from energy consumption in buildings (Natural Resources Canada)
2. Build Smart - Canada's Buildings Strategy (2017)
3. IRENA - REmap Transition Pathway 2019 to 2050
4. Government of Canada's proposal to UN Climate Change panel
5. MANTLE Low-Embodied Carbon Report (and additional sources)
6. White Paper: Industrial Decarbonization & Energy Efficiency Roadmaps to 2050 – Glass; Report for United Kingdom

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glassproblemsconference.org

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COMPANY	website
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Hegla
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Lisec Group
North Glass Technology
Schiavo
Torgauer Maschinenbau
Turomas

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Ashton Industrial Sales
Bando Kiko
Bavelloni
Bottero
CMS
Di Gregorio
ECOL
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Goldglass Technologies
Guangdong Northglass & Juisun Technology Industrial
Hegla
IOCCO Group
Italcarrelli
Keraglass
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

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

HANDLING EQUIPMENT FOR FLOAT GLASS
Bovone Elett.
Bottero
Di Gregorio
ECOL
Glaston Group
Goldglass Technologies
Hegla
IOCCO Group
Italcarrelli
Lisec Group
Schiavo
Torgauer Maschinenbau
Turomas

TROLLEYS AND CLASSIFIERS
CMS
Di Gregorio
Forel
Hegla
Lisec Group
MOVETRO
Schiavo
Si.Ste
Tecno Glass
Torgauer Maschinenbau
Turomas

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

VACUUM LIFTING EQUIPMENT
Bottero
CMS
Di Gregorio
ECOL
Fenzi
Forel
Glaston Group
Hegla
Lisec Group
Schiavo
Si.Ste
Torgauer Maschinenbau
Turomas

CRANE SUCTION CUPS FOR LARGE SHEETS
Bottero
Di Gregorio
Fenzi
Glaston Group
Hegla
Lisec Group
Schiavo
Turomas

TRANSPORTATION TONGS
Bottero
Fenzi
IOCCO Group
Schiavo
Turomas

SUCTION CUPS
ADI
Bottero
CMS
Fenzi
Glaston Group
Hegla
Schiavo
Si.Ste
Turomas

CONVEYOR BELTS
Ashton Industrial Sales
Cugher Glass
Di Gregorio
ECOL
Glaston Group
Schiavo
Turomas

PACKAGING MATERIALS AND SYSTEMS
ECOL
Hegla
Schiavo
Vismara

ACCESSORIES
Bottero
CMS
Fenzi
Hegla
Helios Quartz
Mole Moreschi
Schiavo
Turomas

Straight-edge and shape cutting

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

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

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

LOADING AND TILTING MACHINES
Bando Kiko
Bavelloni
Bottero
CMS
ECOL
Euromec

Forel
Glass Company
Glaston Group
Hegla
Intermac - Biesse
IOCCO Group
Lisec Group
Schiavo
Tenon (Beijing) Equipment
Turomas

CUTTING TABLES

Bando Kiko
Bavelloni
Bottero
CMS
Euromec
Fenzi
Forel
Glaston Group
Hegla
IOCCO Group
Lisec Group
Macotec
Schiavo
Tekno Kilns
Tenon (Beijing) Equipment
Triulzi
Turomas

CUTTING OPTIMIZERS

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

CAD SYSTEMS

Bavelloni
CMS
Lisec Group
Prodim
Schiavo

ARMOURED AND LAMINATED GLASS CUTTING MACHINES

Bando Kiko
Bavelloni
Bottero
CMS
Glaston Group
Hegla
Lisec Group
Schiavo
Turomas

ROUND OR SHAPE CUTTING MACHINES

Bando Kiko
Bavelloni
Bottero
CMS
Fenzi
Glaston Group
Hegla
Lisec Group
Schiavo
Turomas

CUTTING ACCESSORIES

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

SAW MACHINES

Di Gregorio
Schiavo
Tecno Glass

AUTOMATIC SAWS FOR CUTTING LAMINATED AND BULLET-PROOF GLASS

CMS
Schiavo

BREAKING SYSTEMS

Bando Kiko
Bavelloni
Bottero
CMS
Euromec
Glaston Group
Hegla
IOCCO Group
Lisec Group
Schiavo
Turomas

CUTTING MACHINES WITH BREAKING AND EDGE DELETING DEVICES

Bando Kiko
Bottero
CMS
Euromec
Glaston Group
Guangdong Northglass & Juisun Technology Industrial
Hegla
IOCCO Group
Lisec Group
Schiavo
Turomas

GLASS CUTTING FLUIDS

Diamant - AR Nunziata
Schiavo
Turomas

ACCESSORIES

Schiavo
Schiatti Angelo
Talamoni
Turomas

Edging and bevelling

COMPLETE EDGING LINES

Adelio Lattuada
Ashton Industrial Sales
B Solution Licensee of BF Project
Bando Kiko
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
Glaston 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
Di Gregorio
Forel
Glass Company
Glaston Group
Hiseng Glass Machinery
Schiavo
Schiatti Angelo
SGM - Special Glass Machinery
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
Schiavo

STRAIGHT-EDGE BEVELLING MACHINES

Adelio Lattuada
Bando Kiko
Bavelloni
Bovone Elett.
CMS
Glass Company
Hiseng Glass Machinery
Schiavo
Schiatti Angelo

BEVEL POLISHING MACHINES

Adelio Lattuada
Bando Kiko
Bavelloni
Bovone Elett.
CMS

Hiseng Glass Machinery
Intermac - Biesse

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
SGM - Special Glass Machinery
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
Si.Ste
Tenon (Beijing) Equipment

LATHES - VERTICAL AND HORIZONTAL

CMS
Fenzi

EMBOSSING MACHINES

CMS
Fenzi

PORTABLE MACHINES

Fenzi
Helios Quartz
Si.Ste
Tecno Glass

DIAMOND TOOLS

Adelio Lattuada
ADI
Ashton Industrial Sales
Bando Kiko
Bovone Diamond Tools
Bottero
Diamant - AR Nunziata
Diamut - Biesse
Fenzi
Glaston Group
Mole Moreschi
Schiavo
Talamoni
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 Group
Italmole
Mole Moreschi
RBM Italia
Schiavo
Si.Ste
Tyrolit Vincent

POLISHING AGENTS AND OXIDES

ADI
Bovone Diamond Tools
Diamant - AR Nunziata
Fenzi
Schiavo
Tyrolit Vincent

POLISHING BELTS

Diamant - AR Nunziata
Di Gregorio
Fenzi
Schiavo
Si.Ste

COOLANTS

Adelio Lattuada
Bovone Diamond Tools
Fenzi
Schiavo

GLASS GRINDING AND BEVELLING COOLANTS

Schiavo

SEPARATORS FOR GLASS-SOLIDS

Ashton Industrial Sales
Dieffe Macchine
Filtraglass
Schiavo
Vitrosep

ACCESSORIES

ADI
CMS
Fenzi
Helios Quartz
IOCCO Group
Mole Moreschi
Schiavo
Schiatti Angelo
Tyrolit Vincent

Washing

HORIZONTAL WASHING MACHINES

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

VERTICAL WASHING MACHINES

Adelio Lattuada
Ashton Industrial Sales
Bavelloni
Best Makina
Di Gregorio
ECOL
Forel
Glass Company
Glaston Group
Hiseng Glass Machinery
IOCCO Group
Lisec Group
Neptun
Schiavo
SGM - Special Glass Machinery
Shanghai North Glass Technology
Si.Ste
S.T. Group
Stefiglass
Tenon (Beijing) Equipment
Triulzi

WASHING MACHINES FOR AUTOMOTIVE GLASS

Bando Kiko
ECOL
Glaston Group
IOCCO Group
Triulzi

WASHING PURIFICATION SYSTEMS

Dieffe Macchine
Forel
Glass Company
Glaston Group
IOCCO Group
Schiavo
Tenon (Beijing) Equipment

LIQUID WASHING CONCENTRATES

Diamant - AR Nunziata
Schiavo

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
Goldglass Technologies
IOCCO Group
Triulzi

DRYING OVENS

Bovone Elett.
CMS

Giardina Finishing + HS
Glassprinting
Goldglass Technologies

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
Di Gregorio
Forel
Glass Company
Glaston Group
Neptun
Schiavo
SGM - Special Glass Machinery
S.T. Group
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

AUTOMATIC SEALING LINES

Bavelloni
Forel
Glaston Group
Lisec Group
S.T. Group

AUTOMATIC SPACER BENDING MACHINES

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

BUTYL EXTRUDERS

Bavelloni
Best Makina
Di Gregorio
Forel
Glaston Group
Lisec Group
Neptun
Schiavo
Si.Ste
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group
Triulzi

HOT-MELT EXTRUDERS

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

POLYURETHANE EXTRUDERS

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

POLYURETHANE ENCAPSULATION

Glaston Group
Lisec Group
Schiavo

SILICONE EXTRUDERS

Best Makina
Di Gregorio
Fenzi
Forel
Glaston Group
Lisec Group
Schiavo
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Triulzi

POLYSULPHIDE SEALANT EXTRUDERS

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

GAS FILLING EQUIPMENT

Di Gregorio
Fenzi
Forel
Glaston Group
Lisec Group
Neptun
Schiavo
Si.Ste
Sparklike
S.T. Group
Tecno Glass
Tenon (Beijing) Equipment
Thermoseal Group

DESICCANT SALTS

Ashton Industrial Sales
Di Gregorio
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
Helios Quartz
Schiavo
Sparklike
S.T. Group
Tenon (Beijing) Equipment
Triulzi

Tempering

TEMPERING FURNACES (ARCHITECTURAL GLASS)

CNUD-EFCO
Glass Company
Glasstech Inc.
Glaston Group
Hornos Industriales Pujol
Keraglass
Landglass Technology
Lema
Lisec Group
Mappi International
Schiavo
Shanghai North Glass Technology
Tekno Kilns
Texpack

TEMPERING FURNACES (AUTOMOTIVE GLASS)

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

CHEMICAL TEMPERING EQUIPMENT

Glass Company
R.C.N. Solutions

ROBOT FOR CLEANING SILICA ROLLERS

Eurotech Way

ACCESSORIES

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

Bending

BENDING FURNACES (ARCHITECTURAL GLASS)

Hornos Industriales Pujol
Keraglass
Mappi International
Mazzaroppi Engineering
R.C.N. Solutions
SGLASS
Tekno Kilns
Texpack

BENDING FURNACES (AUTOMOTIVE GLASS)

CNUD-EFCO
Glass Company
Glasstech Inc.
Glaston Group
Keraglass
Mappi International
Mazzaroppi Engineering
R.C.N. Solutions
Satinal Spa
Si.Ste
Taifin
Texpack

ACCESSORIES

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

Laminated glass production

COMPLETE PLANTS

Bovone Elett.
Bottero
Forel
Glass Company
Glaston Group
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Mazzaroppi Engineering
R.C.N. Solutions
Satinal Spa
Si.Ste
Texpack
Triulzi

LAMINATED WINDSCREEN BENDING FURNACES

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

AUTOCLAVES

Glass Company
Glaston Group
Hornos Industriales Pujol
Lisec Group
Triulzi

CLIMATIC CABINS

Forel
Glaston Group
IOCCO Group
Lisec Group
Triulzi

INFRARED OVENS

ECOL
Forel
Glass Company
Glaston Group
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Satinal Spa
SGLASS
Triulzi

PRESSES/BENDING MACHINES

Forel
IOCCO Group
Lisec Group
Triulzi

RESIN LAMINATING MATERIALS AND EQUIPMENT

IOCCO Group
Satinal Spa
Torgauer Maschinenbau

EVA (ETHYLENE VINYL ACETATE)

Satinal Spa

PVB

Everlam
Kuraray - Trosifol

PVB - SHAPING AND CUTTING EQUIPMENT

Ayrox
ECOL
Forel
Glaston Group
IOCCO Group
Lisec Group
Softeco

PVB - WIRING TECHNOLOGY FOR HEATABLE LAMINATES

Ayrox
ECOL
Softeco

ACCESSORIES

Ayrox
Bottero
Deltamax Automazione
Eurotech Way
Glaston Group
Helios Quartz
Hornos Industriales Pujol
IOCCO Group
Lisec Group
Satinal Spa
Softeco
Taifin
Triulzi

Drilling

AUTOMATIC DRILLING LINES

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

MULTI-SPINDLE DRILLING MACHINES

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

DRILLING MACHINES WITH OPPOSITE DRILLING HEADS

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

COLUMN DRILLING MACHINES

B Solution Licensee of BF Project
Bottero
Di Gregorio
Fenzi
Schiavo
Si.Ste
Vismara

PORTABLE DRILLING MACHINES

CMS
Fenzi
Schiavo
Si.Ste

DRILLING AND MILLING MACHINES

Bavelloni
Bottero
CMS
Forvet
IOCCO Group
Schiavo
SGLASS
Vismara

DIAMOND DRILLS

ADI
Bovone Diamond Tools
Diamant - AR Nunziata
Diamut - Biesse
Fenzi
Glaston Group
Mole Moreschi
Schiavo
Si.Ste
Tyrolit Vincent

ACCESSORIES

CMS
Fenzi
Schiavo
Si.Ste

Other equipment and plants

TURNKEY PLANTS / ENGINEERING - FOR BUILDING GLASS

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

TURNKEY PLANTS / ENGINEERING - FOR AUTOMOTIVE GLASS

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

KEY PLANTS / ENGINEERING - FOR DISPLAY GLASS

Bando Kiko
Cugher Glass
Torgauer Maschinenbau

EDGES ROLLER COATING MACHINE

Eurotech Way

WORK CENTRES - CNC CONTROLLED

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

FLOAT PLANTS/LINES (EQUIPMENT & ACCESSORIES)

Bovone Elett.
Horn
IOCCO Group

CULLET HANDLING SYSTEMS

ECOL

COMPLETE BATCH PLANTS

Zippe

VACUUM COATING EQUIPMENT AND PLANTS

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
Goldglass Technologies

SANDBLASTING SYSTEMS, EQUIPMENT AND PLANTS - OPTIMIZERS

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

DIGITAL INKJET PRINTERS

Glass Company
System Ceramics

SCREEN PRINTING EQUIPMENT AND PLANTS

Ayrox
COMSS
Cugher Glass
Deltamax Automazione
ECOL
Eurotech Way
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

CERMAMIC INKS

Glass Company

CHAMBER ELECTRIC KILNS

Glass Company
Keraglass
Tekno Kilns

ACCESSORIES

Deltamax Automazione
Helios Quartz

CUTTERS

Si.Ste

CUTTING WHEELS

Si.Ste

MANUAL GRINDING MACHINES

Di Gregorio

UV ADHESIVES

Si.Ste

Miscellaneous

ADHESIVES FOR GLASS BONDING
Si.Ste

AUTOMATION
Ashton Industrial Sales
Goldglass Technologies
Horn
IOCCO Group
Torgauer Maschinenbau
Zippe

AUTOMOTIVE GLASS APPROVAL SERVICES
Ayrox
Softeco

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

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

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

COLOURS & ENAMELS - OTHER APPLICATIONS
Ayrox
Goldglass Technologies

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

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

FURNACES
Glass Company
Horn
Texpack

FURNACES / HYDROGEN GENERATORS (WATER ELECTROLYSERS)
Nel Hydrogen

GLASS COATING AND TINTING
Giardina Finishing + HS Glassprinting
Glass Company
Goldglass Technologies
Rollmac division of GeMaTa

GLASS TREATMENT FILMS
Glass Company

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

HINGES FOR GLASS DOORS
Si.Ste

METAL ACCESSORIES
Si.Ste

INFRARED TUBES
Helios Quartz
Deltamax Automazione

KILNS
Glass Company
Keraglass
Lisec Group
Tekno Kilns
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
Dieffe Macchine

PUTTIES AND SEALANTS
Fenzi

QUARTZ EQUIPMENT
Helios Quartz

SHAPE CHECKING DEVICES
Easy Automation
IOCCO Group

SHOWER ENCLOSURES
Vismara

SIC HEATERS
Helios Quartz

SOFTWARE DATABASE, PROPERTY PREDICTOR
Synerglass Soft

SOFTWARE SYSTEMS FOR PRODUCTION CONTROL
A+W Software
CMS
Cugher Glass
Deltamax Automazione
Edgetech Europe
Forel
Lisec Group
Optima
Prodim
Synerglass Soft

SOLDERING EQUIPMENT FOR ELECTRICAL CONNECTORS FOR WINDSCREENS AND BACKLITES
Ayrox
Easy Automation
Softeco

SORTING SYSTEMS
Glaston Group
Lisec Group

SURFACE STRESS MEASUREMENT INSTRUMENT
Ayrox
Glass Company
Jeffoptics

TESTING FOR SOLDERINGS
Ayrox
Easy Automation
Softeco

TESTING DEVICES OF BACKLITES ELECTRICAL HEATING
Ayrox
Softeco

THERMAL IMAGING SYSTEMS
Easy Automation
Glass Company
Optris

TIN FLOAT BATH FURNACES
Horn
IOCCO Group

UV LAMPS
Helios Quartz

UV PORTABLE MACHINES
Helios Quartz

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Helios Quartz also produces cutting edge equipment for the glass industry such as **manual and automatic tin side detectors and UV polymerization units.**

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Automation Precision Low-Maintenance

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