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glass WORLDWIDE

November/
December 2022

Featuring AGC, Verescence, Pilkington, Vetropack, Schott & Wiegand + technology, market reports & events. News & Virtual Marketplace: glassworldwide.co.uk

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Welcome

It was a pleasure for members of the *Glass Worldwide* team at glasstec 2022 (pictured above) to catch up personally with such a broad cross section of old friends and new acquaintances from the international glass community. With an acute awareness of the challenges ahead tempered by coverage of a myriad of potentially game-changing developments being introduced by glassmakers and their suppliers, this issue of *Glass Worldwide* reflects the mood from glasstec as well as from around the international hollow, flat and speciality glass sectors.

At a time of unprecedented market conditions, optimising manufacturing processes has never been more important and glasstec provided glassmakers and processors with the welcome opportunity to learn about the latest technological advances and solutions from leading suppliers. An extensive glasstec review in this issue reports on new developments showcased by hundreds of the exhibitors present, complemented by a broad selection of Technology articles to assist with multiple areas of production. In addition, readers can benefit from accompanying digital presentations of the latest innovations in the recently expanded Virtual Marketplace at www.glassworldwide.co.uk.

The industry's tone is also prevalent throughout our series of exclusive interviews with prominent glass manufacturers who are expertly positioned to report on prevailing market conditions and expectations for 2023 and beyond. In addition to significant developments from Vetropack and Schott in the following pages, Oliver Wiegand (Managing Director of Wiegand-Glas), Neil Syder (Managing Director of Pilkington UK), Bruno Portellano (General Manager of Verescence Spain) and Ronny Van Broekhoven (Site Manager at AGC Glass Europe's Mol plant) provide a fascinating overview of how their diverse businesses are combining new practices and manufacturing know-how with invaluable expertise from within their plants and wider company groups to face challenges and opportunities head on.

And while this issue's Opinion columns and regional reports confirm the impact of global challenges that few could have predicted even a year ago, the unwavering belief collectively remains that glass is rooted in an unparalleled position to be the material of choice in all sectors served if serious short-term hurdles can be overcome and promised steps towards carbon neutrality are taken.

The *Glass Worldwide* team would like to thank advertisers, subscribers and partner organisations for their continued support and encouragement during 2022. Your backing cements *Glass Worldwide's* status at the heart of the glass community and bestows on us a unique position to report on the constant evolution of the international glass industry, its products, manufacturing processes and people. We look forward to partnering with you all again in 2023.

The Glass Worldwide team
www.glassworldwide.co.uk

HOT TOPICS
www.glassworldwide.co.uk

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Glass Worldwide is published bi-monthly
by Chameleon Business Media Ltd
22 Hartfield Rd, Forest Row,
East Sussex RH18 5DY, UK.
www.glassworldwide.co.uk

DAVE FORDHAM
Publisher
Tel: +44 (0) 1342 315032
Email: davefordham@glassworldwide.co.uk

REBECCA COLEGROVE
Editorial Consultant
Email: rebeccacolegrove@glassworldwide.co.uk

ALISON SMITH
Designer for Blue Daze Design Ltd
Email: copy@glassworldwide.co.uk

GRAHAM LOVELL
Senior Sales & Marketing Manager
Tel: +44 (0) 1342 321198
Email: grahamlovell@glassworldwide.co.uk

FRAZER CAMPBELL
Publisher
Tel: +44 (0) 1342 322278
Email: frazercampbell@glassworldwide.co.uk

DEBBIE FORDHAM
Publisher
Tel: +44 (0) 1342 322392
Email: debbiefordham@glassworldwide.co.uk

SAM DUNMORE
Administration and Subscriptions Manager
Tel: +44 (0) 1342 322133
Email: samdunmore@glassworldwide.co.uk

DAVID MOORE
Technical Advisor
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Glass Worldwide (ISSN No: 1748-6661, USPS No: 023-676) is published bi-monthly by Chameleon Business Media Ltd, GBR and distributed in the USA by Asendia USA, 17B S Middlesex Ave, Monroe NJ 08831. Periodicals postage paid New Brunswick NJ and additional mailing offices. POSTMASTER: send address changes to Glass Worldwide, 701c Ashland Ave, Folcroft PA 19032

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Complementing the industry acclaimed content of *Glass Worldwide,* visit the recently expanded Virtual Marketplace for a showcase of more than 160 digital presentations of the latest innovations from the following glassmakers and their suppliers. To find out how your company can be featured, email Dave Fordham: davefordham@glassworldwide.co.uk.

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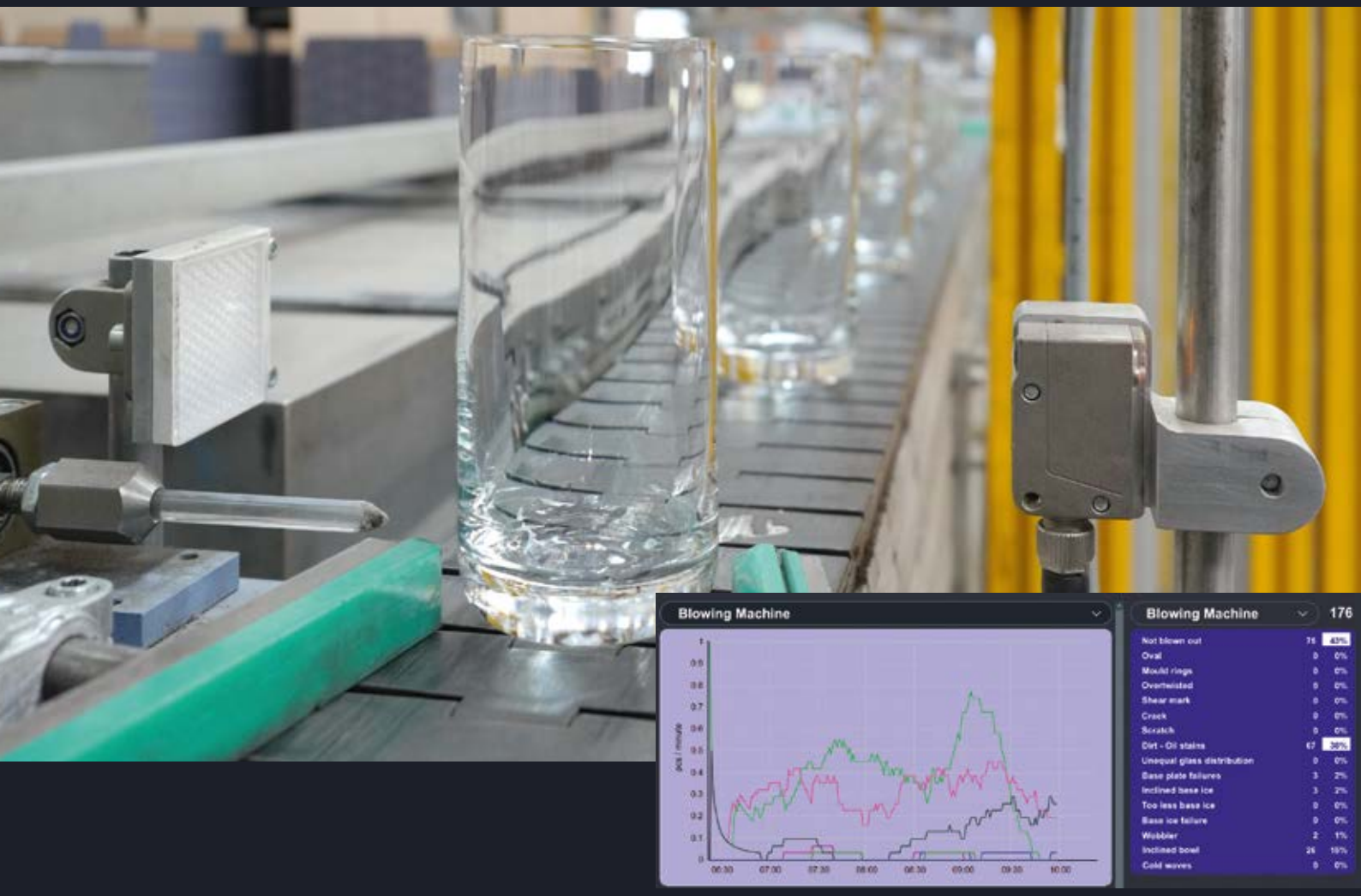

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News For the latest news, visit the Hot Topics section at www.glassworldwide.co.uk

O-I reports improved business outlook

In advance of participation in an investor conference, O-I Glass's Chief Financial Officer John Haudrich provided the following business update for the third quarter of 2022: "O-I continues to perform well and our business outlook has improved. Favourable third quarter performance primarily reflects stronger net price realisation and solid operating performance while quarter-to-date shipment levels have been consistent with our expectations of flat to slight volume growth in the third quarter. In addition to an improved business outlook, the company continues to deliver on key transformation initiatives. Following the fair and final resolution of legacy asbestos liabilities in July, the company completed its $1.5 billion portfolio optimisation programme in August with proceeds used to reduce debt and pre-fund upcoming expansion initiatives. Reflecting a healthier balance sheet, both Moody's and S&P have upgraded O-I's credit rating over the past few weeks. O-I is performing well, advancing its strategy and is a much more resilient and agile company as we continue to navigate elevated market volatility," noted Mr Haudrich.

"The company now expects third quarter 2022 results will be at the high-end or slightly exceed its adjusted earnings guidance of $0.55 – $0.60 per share," he continued. "Reflecting continued momentum into the fourth quarter, the company has improved its full-year 2022 outlook and now expects adjusted earnings of $2.10 - $2.25 per share compared to prior guidance of $2.05 - $2.20 per share. Likewise, O-I is raising its full year outlook for Free Cash Flow to at least $200 million (previously at least $175 million) and maintaining Adjusted Free Cash Flow of at least $400 million," Mr Haudrich concluded.

www.o-i.com ●

O-I Glass has become "a much more resilient and agile company".

Glaston to supply five new-generation solar lines in China

Supplier of equipment, services and solutions to the architectural, automotive, solar and display glass industries Glaston has signed a contract with long-term customer Kibing Glass for five flat tempering lines for solar panel tempering.

Specialising in float glass, energy-saving building glass, low-iron ultra-white glass, photovoltaic glass, and pharmaceutical glass, Kibing Glass already operates close to 20 Glaston insulating glass lines and has been investing to expand its photovoltaic glass production base in China and Malaysia. The company has ordered Glaston's CHF Solar line, which is designed for high volume and operates 24/7 with an automatic setup. With a cycle time per glass of 15 seconds, daily continuous running throughput is approximately 250 tonnes. The order, valued at close to €5 million, has been entered in Glaston's Q3/2022 order book. The CHF Solar lines will be delivered to the customer's facility in Malaysia during the first half of 2023.

"Kibing Glass is a highly valued customer and we are honoured to support their growth initiatives in the solar business," said Sasu Koivumäki, CSO at Glaston Corporation."Glaston's tailor-made solar concept, which combines huge volumes and high-quality thin glass, is a perfect choice."

www.glaston.net ●

Glaston has identified the solar industry as a growth-capturing customer segment.

Ayrox acquires Sharples

Operating for more than 60 years in the field of glass and plastics optical stress measurement, polarimeters, calibration standards manufacturing and calibration services, Sharples Stress Engineers will cease to exist in its current configuration following the retirement of Owner Ed Sharples. The company has been acquired by Ayrox srl, a well-known player in the field of glass quality control, who assure a "seamless" transition for new and existing clients.

"We have been collaborating for a long time with Sharples, so it was a natural step for us to acquire the future of Sharples and to make it stronger with our ISO 17025 accredited calibration services" services," said Ayrox' Chief Technology Officer Mikko Suomi.

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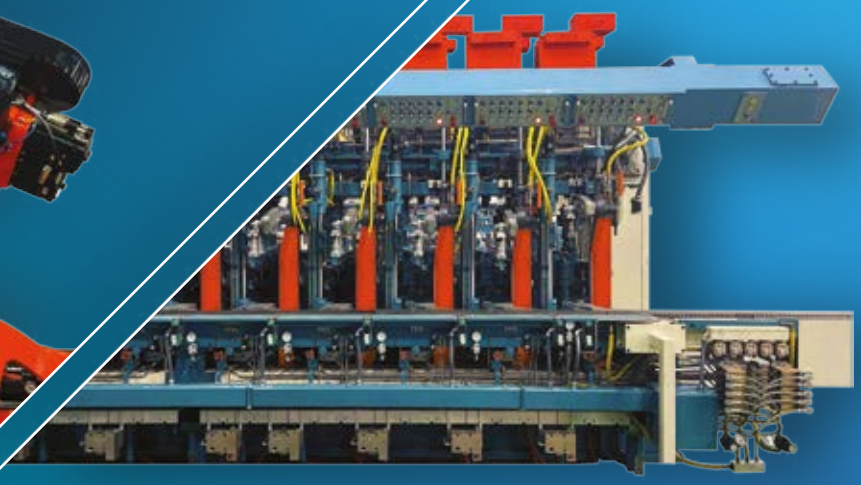

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HFT to build first-of-its-kind project for CPS

Calgary-based Canadian Premium Sand (CPS) has contracted HFT to construct North America's first-ever integrated glass manufacturing facility to produce rolled glass for photovoltaic solar panels. The plant will be built on a 121-acre greenfield site in Selkirk, Manitoba, south-west Canada. HFT will also design a related sand-processing facility roughly 160k north, near Seymourville, Manitoba, which process low-iron silica sand to support the production of low-iron premium clarity glass at the Selkirk site.

HFT will serve as the engineering, procurement and construction contractor, delivering all aspects of the Selkirk and Seymourville projects, beginning with design and pre-construction activities. Following final investment decision expected in Q1 2023, HFT will continue with equipment and material sourcing, though to the construction execution of onsite works, including not only the process line, but also the full complement of site development, buildings, utilities, infrastructure, and roadways, concluding with commissioning, start-up and training.

Within the Selkirk plant, HFT will be responsible for all aspects of the glass process line, and will work with experienced global partners – including PCL, Zippe, Fives and Bottero – to deliver everything from raw material reception, batch plant, furnace, rolling machines, lehrs, and cutting line, as well as the post-manufacturing fabrication of glass (grinding, drilling, heat strengthening/tempering, and coating).

"HFT is delighted to be entrusted by CPS to provide a first-of-its-kind project in North America," said Sam Leaper, HFT's Director of Glass Business Development. "HFT's experience, as well as that of our global partners, for concise planning, commitment to engineering excellence, and diligent co-ordinated project execution, will deliver a high-quality manufacturing facility with the long-term reliability, sustainability and efficiency that CPS requires. Pre-construction activities have already begun to meet CPS's production timeline and operational goals."

www.hft.com ●

GEA installs gas cleaning system at Guardian Glass Czestochowa

Machinery and plant manufacturer and solution provider GEA has installed a high-performance gas cleaning system at Guardian Glass' 1,000tpd capacity float glass factory in Czestochowa, Poland. The commission included a dry DeSOx reactor, followed by an electrostatic precipitator for dust removal, a downstream DeNOx reactor and associated components for storage, transport and dosing of reagent and precipitated dust. The new cleaning system reduces emissions for dust, SOx and NOx by up to 90%, whilst re-use of dust and reaction products separated in the electrostatic precipitator helps to reduce the amount of raw material required per ton of glass produced. Special attention was paid to safe plant operation even at high gas temperatures. In this case, water is injected directly into the DeSOx reactor to cool the raw gas. Another safety feature is the active plant bypass by means of a second blower.

Despite the impact of the global Corona pandemic, GEA was able to meet the project schedule in a joint effort with the customer and the new gas cleaning plant was successfully completed in early 2022, GEA announced at glasstec.

www.gea.com ●

GEA's gas cleaning solution installed at Guardian Glass' site in Czestochowa, Poland. (Photo: GEA)

Fives supplies Pochet with France's first electric furnace for luxury bottles

Pochet Group, a key partner of the luxury industry specialising in glass packaging for perfume, skincare and make-up, and Fives, an international industrial engineering group, are combining their expertise to reduce carbon emissions and offer eco-friendly glass production.

A division of the Pochet Group, Pochet du Courval, has invested in an electric Prium E-Melt cold-top vertical melter from Fives to reduce CO_2 emissions at its industrial flagship Guimerville plant, in Normandy, France, where it decorates and manufactures glass bottles and jars for prestigious perfume and beauty brands. Supported by Pochet Group's private shareholders, the investment is in line with the group strategy to reduce environmental impact and will require a major transformation, both technological and human.

"This electric furnace will be the very first French furnace dedicated to luxury bottles enabling us to offer carbon-free glass to perfume, skincare and make-up brands that will deliver tomorrow's beauty," said Benoit Marszalek, Pochet du Courval's Chief Operating Officer.

"Fives is committed to providing innovative solutions based on our proven technology to electrify glass process. We help the industry partners to meet their objectives in terms of decarbonisation, as well as to train technicians and operators at the plant level," responded Alexandre Brusset, Vice-President of Glass at Fives.

www.groupe-pochet.fr / www.fivesgroup.com ●

Pochet and Fives have signed a strategic partnership to make glass production more environmentally-friendly.

Grenzebach ENVELON brings solar production to Bavaria

Investment and consolidation in Grenzebach Group's headquarters in Hamlar, Germany, has resulted in the opening of a state-of-the-art automated facility for the production of ENEVLON solar panels. The new plant, which has a 300,000m^2 annual capacity, will create numerous new jobs in the Bavarian town and marks another major step in expanding synergies with the Grenzebach Group.

Grenzebach Founder Rudolf Grenzebach, principal shareholder Sonja Grenzebach-Proeller, Dr. Steven Althaus, CEO of the Grenzebach Group, and Hans-Peter Merklein, General Manager of Grenzebach ENVELON GmbH, opened the new production facility in the presence of guests from the worlds of business and politics. "We are proud of this forward-looking step," stated Dr. Althaus. "With its photovoltaic façades, ENVELON can make a major contribution to the energy transition in Germany, Europe, and overseas. This will help effectively combat climate change, which is an urgent necessity for all of us – and set the course for the future direction of our company."

According to Mr Merklein, the combination of Grenzebach's know-how in glass production technology and digitalisation and ENVELON's start-up spirit results in an exceptionally effective combination. "By consolidating ENVELON production in Hamlar, we are remaining true to our 'Made in Germany philiosophy'," he explained. "We believe in the potential of our photovoltaic façades and are focusing on organic growth here in Bavaria."

www.grenzebach.com ●

Grenzebach founder Rudolf Grenzebach (centre) opened the new ENVELON production facility.

Ardagh creates bottle for Belvoir Farm drinks range

Belvoir Farm's new range of low-sugar, non-alcoholic Botanical Sodas features a new glass bottle design that was produced by the company in collaboration with Ardagh Glass Packaging – Europe (AGP-Europe) and B&B Studio. The 500ml bottle made from 45% recycled glass has a reduced weight of just 380g and a retro shape with a short neck that curves into a tall, slender profile. AGP-Europe's design team used its digital in-house embossing technique to create the bottle's design details, which maintain the integrity of the glass, protecting the carbonated drink inside. The 'Belvoir Farm' branding is embossed around the shoulder and a recessed band around the base of the bottle contains the embossed text 'CRAFTED WITH BOTANICALS'. Decorated with art-worked labels, the fully recyclable glass bottles are in keeping with Belvoir Farm's sustainability commitments and are filled in the company's solar-powered bottling hall, which generates up to one third of its electricity requirements. The Belvoir Farm Botanical Sodas bottle is a finalist in two packaging industry awards.

www.ardaghgroup.com ●

AGP-Europe helped to design Belvoir Farm's retro-styled Botanical Soda bottles.

Energy savings at O-I equivalent to powering 4,300 homes for a year

The release of O-I Glass's 2022 sustainability report details the glass bottle and jar manufacturer's sustainable advancement in transforming process, products, and interconnected relationships with key stakeholders. O-I has reportedly collected in excess of 100,000 tons of glass packaging through 49 closed loop programmes, thereby conserving 152,000m^3 of landfill space, 116,000 tons of raw materials and the energy equivalent to power 4,300 homes for a year. The company has also implemented nine community recycling programmes and two special collection programmes through its 'GLASS4GOOD' initiative.

Randy Burns, O-I Chief Sustainability and Corporate Affairs Officer.

The report highlights O-I's systems-based approach to sustainability, including improved energy efficiency, upgrading furnaces with gas-oxygen technology, advancing lightweighting of glass packaging, creating more resilient supply chains, and partnering with stakeholders to advance glass circularity.

"We are building a strong, resilient organisation designed for the future," stated Andres Lopes, CEO of O-I Glass. "Through our holistic approach to sustainability O-I is solving [...] consumer and customer demand for more sustainable production and processes."

"The progress shared in this report is a result of continuous engagement with our customers, suppliers, employees, and communities to align our sustainable focus with the evolving needs of an ever-changing ecosystem," said Randy Burns, O-I Chief Sustainability & Corp Affairs Officer. "True sustainability depends on continuously transforming everything from the fuels, processes and technologies we use to the relationships we have with our suppliers, customers, communities and our nearly 25,000 employees."

The full sustainability report is available on O-I's website.

www.o-i.com ●

Encirc progresses 100% recyclable pallets with Britvic trial

Glass container manufacturer and filler, Encirc, part of the Vidrala Group, is working with beverages giant Britvic to trial the removal of plastic shroud packaging on drinks pallets set for the retail sector. The experiment will see Encirc replace the shrouding on thousands of pallets with recyclable straps, and substituting the single-use cardboard that layers the pallets with reusable plastic that can be washed after delivery. Aiming to remove an estimated 2,000 tonnes of plastic packaging from Britvic's retail supply chain every year and prove that 100% recyclable pallets are viable, the trial will contribute to Britvic's circular packaging and reduced direct carbon footprint goals, as well as helping Encirc to reduce its emissions in line with Vidrala's Science-Based-Targets

"We've been working with Britvic since 2005 and our shared ethos and planet-first thinking is what makes this partnership great and concepts like this a reality, explained Encirc Sales & Marketing Director Rob Turvey. "Our 360 service where we manufacture, store, fill and distribute products to retail, from a single site is already unique, and this trial will further help us slash wastage and inefficiency."

"We look forward to seeing the results of the trial," added Craig Sayer, Britvic Leeds Site Operations Manager. "It's so important to us that we work with companies and suppliers like Encirc who share our sustainability ambitions, helping us progress with the goals in our Healthier People, Healthier Planet strategy."

The trial marks the latest initiative following the recent partnership extension between Encirc and Britvic – with the new deal seeing Encirc fill Robinsons 500ml glass cordial bottles.

www.encirc360.com ●

Encirc is removing plastic shrouding and single-use cardboard from thousands of pallets.

Industry support for charitable fundraiser

Co-organised by glass industry stalwart Ian Robertson and his brother Duncan to raise funds for local charities, the Five Towns Golf Classic charity event was held at the Darrington Golf Club near Pontefract in the UK this September with *Glass Worldwide* sponsoring the trophies.

The 28th event was was well-supported and teams representing local glassmakers and suppliers included Gillian and Baines, Graphoidal Developments, Marpack, Sheppee International and Stoelzle. The winning team was Stoelzle and the winning individual was Adrian Lightowler, also from Stoelzle, who was presented with his trophy by former Leeds United and Northern Ireland international footballer John McClelland.

Ian Robertson commented: "It was encouraging to be supported by *Glass Worldwide* and by all the companies and friends; our thanks go to them all. It shows once again that in spite of their own challenges, companies are still willing to support those less fortunate and we look forward to seeing them all again next year". ●

Stoelzle's Adrian Lightowler (right) with former footballer John McClelland.

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Corning expands fibre manufacturing capacities

To meet growing demand for high-speed connectivity in Europe, Corning has opened a new optical fibre manufacturing facility in Mszczonów, Poland. One of the largest optical fibre plants in the European Union, the facility adds approximately 250 employees to the company's workforce of more than 3,000 in Poland and builds on Corning's successful 20-year history of manufacturing in the region, where it currently manufactures optical cable and connectivity components at its campus in Stryków.

"We congratulate Corning on the opening of this advanced manufacturing facility," said Józef Kurek, Mayor of Mszczonów. "We are pleased that Corning turned again to this region's talented workforce to bring its innovations to life."

Corning is also expanding its US manufacturing capacity to meet growing bandwidth demand in North America. In August the company announced it will open a cable manufacturing plant near Phoenix, Arizona. A cable manufacturing expansion announced last year in North Carolina is currently "ramping up". By adding fibre manufacturing capacity in Poland, Corning aims to increase local supply and manufacturing to serve global markets.

Corning's new Mszczonów plant is one of the largest optical fibre facilities in the EU.

"Corning is expanding its fibre manufacturing operations in Europe as our customers accelerate investments in future-ready networks," said Corning Chairman and Chief Executive Officer Wendell P. Weeks. "From broadband to 5G to cloud computing, tomorrow's networks all depend on optical fibre. This facility will ensure we can continue to efficiently serve our customers in Europe and beyond."

www.corning.com ●

Glass Sellers gathering encourages sustainable glassmaking

The Court and Livery Dinner of the Worshipful Company of Glass Sellers of London was staged on 28 September at the Girdlers' Hall in London. Liverymen in attendance at the grand occasion included representatives from renowned glass companies such as FIC, Glass Futures, *Glass Worldwide* (official journal of Glass Sellers), Nazeing Glass Works and O-I.

L–R Paul McLavin (O-I), Maria Chanmugam (Prime Warden), Stuart Hakes (FIC) and Frazer Campbell *(Glass Worldwide)* were amongst attendees.

Claire Spooner, Head of Decarbonising Transport at EPSRC UKRI was a guest speaker and discussed understanding energy demand across industrial sectors such as glassmaking and how providing technological solutions for production will assist the long-term goal of net zero glass manufacturing. "Since the last 40 years there has been a 50% increase in energy efficiency in UK glass furnaces" commented Ms Spooner before detailing future targets as well as sustainability initiatives headed by Past-Master Richard Katz in his current role as CEO of Glass Futures.

Barbara Beadman, Master of the Worshipful Company of Glass Sellers, also detailed how the Company is contributing as an active member of the Livery Climate Action group, formed in 2021 to assist livery companies to manage their impact on climate change and the environment by reducing greenhouse gas emissions and making responsible use of resources.

www.glass-sellers.co.uk ●

Franke rebrands under Robur acquisition

Furnace inspection company FRANKE Industrieofen Service has joined Munich-based industry service specialist ROBUR and will now offer its inspection and monitoring services under its new branding 'FIOS'.

"Operating in the glass and aluminium industry we are already very well known in Germany and the central European region – but together with ROBUR we want to expand our reach," said Dr. Norbert Pfitzner, Founder and CEO of FRANKE/FIOS. "The talks to join the group were friendly, transparent and partnership-driven from day one and I'm very happy to […] have FIOS join ROBUR to create a platform for our future growth."

Explaining the change in the branding, Dr. Pfitzner related how, "In the past we have already been called FIOS by our international clients and this was inspiration for us to also pick up this name officially as our future brand. Based on our heritage and experience, we will expand our business for our clients and, together with ROBUR, offer industrial service along the life cycle of our clients' assets."

"Our philosophy at ROBUR has always been to bring specialists together and have them work collaboratively on finding solutions to the challenges our customers face," noted Florian Kopp, Co-Founder and Managing Partner of ROBUR. "With a focus on digital transformation, supporting ecological change and the ROBUR partnership, we can offer our customers and partner companies the ideal basis for growing together and mastering the challenges of today collaboratively within a group of specialists. We are delighted that Norbert, together with his colleagues at FIOS, have chosen to shape this further growth in and with ROBUR."

www.robur-industry-service.com ●

L–R: Norbert Pfitzner, Founder and CEO of FRANKE, and Florian Kopp, Co-Founder and Managing Partner of ROBUR.

Vertech'-Bucher Emhart collaboration takes data collection to the next level

Supplier of forming machines, inspection machines, controls and parts to the glass container industry Bucher Emhart Glass (BEG) has partnered with Vertech', provider of software solutions for the glass industry, including its SIL4.0 monitoring system, to take data collection and usage in the glass plant to the next level. Described as a "market changer collaboration", the co-operation will give glassmakers producing hollowware, tableware and tubes or decorating glass single point data access to complete line data, from batch to palletiser, including all relevant forming parameters collected from and around the IS machine. Based on the correlated data BEG and Vertech' will be able to offer applications and solutions that increase efficiency of the glass plant and quality of the containers.

"It was a totally natural partnership because Bucher Emhart Glass specialises in hot end forming machines and sensors […] and we, as Vertech, digitalise all the plant," Vertech CEO Ulas Topal told *Glass Worldwide.* "After some discussion with Bucher Emhart Glass we noticed that we might have some synergy working together."

The partnership will involve sales, marketing and development, he explained. "We are going to choose a particular development to do with Emhart directly," with "benefits [that] will be directly impacted to the customer." For example, an Emhart specialist with an overview of the system will be able to "see directly or remotely what's happening on the machine," and advise the customer "to change some settings" if required. "If you put all this know-how, this intelligence inside the [Vertech'] software, thanks to the know-how of Emhart, then it will benefit the customers," Mr Topal concluded.

The companies signed the partnership agreement on 20 September at the Emhart booth during glasstec.

www.vertech.eu

www.emhartglass.com

Ulas Topal (centre) and members of the Bucher Emhart Glass and Vertech' management teams finalising a data collection and usage co-operation.

People & posts

Do you have a company appointment to tell the world about? Email us at news@glassworldwide.co.uk

Schneider-Electric's 'Green Grass' team strengthened


Gary Café.

Gary Cafe joined the Schneider-Electric 'Green Glass' team on 12 September 2022 as Schneider continues to increase its investment in the future of the industry. Gary is an Energy & Sustainability Strategist and Engineer with more than 15 years' experience guiding some of the largest multinational companies through the energy transition. With strong knowledge of industrial processes and (corporate) challenges/opportunities for decarbonisation, he is looking forward to focus on the glass sector to help it become a leader, and beacon, among heavy industrials. Gary has already been strongly involved in many glass decarbonization projects and becomes a valuable member of Schneider-Electric's Green Glass team, as International Account Manager – Glass.

www.se.com ●

Promotions at Graphoidal


Andy Clarkson.


Alex Fisher.

Manufacturer of lubrication and coating technology for the glass container and tableware industries Graphoidal Developments has promoted Andy Clarkson to the position of Sales Manager. Formerly a technical sales engineer, Mr Clarkson will support the company's growing network of group sales offices, agents and distributors around the world.

To help Graphoidal achieve its business goals, the company has augmented its senior management team by promoting Alex Fisher to Customer Support Manager. Mr Fisher joined the business in 2010 as a trainee workshop engineer and progressed to a service engineer in 2014. Actively carrying out a customer support role since June last year, he is now tasked with driving customer support and overseeing Graphoidal's service team.

www.graphoidal.com ●

GMIC appoints new Executive Director


Kerry Ward.


Bob Lipetz.

The Glass Manufacturing Industry Council (GMIC) has appointed Kerry Ward Executive Director Designee, starting in October, to overlap with the tenure of Bob Lipetz, who retires at the end of 2022. Mr Ward comes to GMIC with decades of experience in association management, most recently with the American Library Association, and will participate in the 83rd Conference on Glass Problems (GPC).

Outgoing Executive Director Mr Lipetz has been with the GMIC for the past 12 years, where he instituted considerable growth, taking over and growing the GPC, organising the Usable Strength Coalition, initiating the GMIC Glass Manufacturing Industry Report, organising the annual GMIC symposia and other programmes, as well as initiating joint programmes with ICG, the American Ceramic Society, the US EPA Energy Star and GlassTrend. He gives his final official address at the GPC where he will present "A Love Letter to Glass Manufacturing". *Glass Worldwide* is the preferred journal of GMIC and official journal of GPC.

www.gmic.org ●

Pro-Sight builds commercial support team


Pete Cooper.

Manufacturer of cold end and QA inspection equipment Pro-Sight has appointed Pete Cooper to head a new team for commercial support to container glass, globally. Mr Cooper joined the group as a sales engineer in 2020 and has since completed a BSc (Hons) at De Montford University.

"Pete joined us at a point when the world was mid-pandemic," reported Managing Director Lincoln Brown. "Since then, he's been critical to Pro-Sight's growth as well as the development of new products like the Sink and Bulge inspection machine. Pete has quickly built strong relationships with existing and new customers throughout the UK and Europe, and with travel restrictions easing is now able to support further afield."

Outlining his ambitions for the company and predictions for the industry, Mr Cooper said: "Pro-Sight is at a very exciting point – we've a collection of new products blossoming, with a couple more to follow which I really think will cause quite a stir. Glass manufacturing is going through a transition period. Part of which involves the movement, and investment, into new technologies for quality enhancement. I'm fortunate to work with a close-knit team of incredible people here, with a genuine passion for the glass industry and progression through innovation."

www.pro-sight-vision.com ●

Long-time futronic employees take retirement

Provider of automation solutions for plant and equipment manufacturers futronic has bid farewell to two team members who played crucial roles in the development of its CIMOG IS-machine control system.


Bernd Kubik.


Johannes Dimmler.

A "reliable problem-solver," Bernhard Kubik was a Service Technician who was employed in quality assurance. His responsibilities during almost 37 years at futronic included testing and repairing control systems, as well as putting systems of all sizes into operation for customers throughout the world. Johannes Dimmler worked for many years as a programmer in software development and was mainly responsible for designing futronic's embedded software, programming microcontrollers and control systems and controlling software quality. As Project Manager, his job at the dividing line between hardware and software development was to assist his colleagues in Technical Support. "I never had time to get bored," reflected Mr Dimmler. "I think it's great that I've not just been an onlooker but an architect of futronic's technological advances."

At a small ceremony attended by the entire staff, Managing Director Michael Preuss thanked his two long-time colleagues for their outstanding service to futronic. Both have now retired from active working life.

www.futronic.de ● ▸

New CEO for Lüscher


Stefan Thulin.


Benedikt Strebel.


Peter Spitteler.

Imaging systems specialist for the printing industry Lüscher Technologies has appointed former Vice President Services & Operations Benedikt Strebel as CEO of the company, effective 1 September. New CSO Stefan Thulin and CTO Peter Spitteler also joined the management team.

Mr Strebel takes over from Peter Berner, who led Lüscher Technologies as CEO for the past 9 years, and has been active in the industry for a total of 40 years. Lüscher thanked Mr Berner for his "tireless commitment" that contributed significantly to the success of the company.

www.luescher.com ●

New marketing team member for Grünig/SignTronic


Hanny Gerber (left) and Sandra Wörle.

Swiss CTS technology company SignTronic and screen technology specialist Grünig-Interscreen have appointed Sandra Wörle to take over the marketing position from predecessor Hanny Gerber.

Over 23 years Ms Gerber worked as Export Manager for Grünig, and then in Marketing with Andreas Ferndriger, Marketing Director for both companies. She retired at the end of September and will now "enjoy travelling the world", having had the opportunity to say 'goodbye' to many work connections at glasstec.

A screen printer by profession, Sandra Wörle completed her masters in 2019 has worked across several branches of screen printing for more than eight years. Ms Wörle is based at SignTronic AG in Rüthi, St. Gallen, Switzerland and is tasked with bringing "new wind and new ideas" to both Grünig and SignTronic, sharing their motto: 'two companies – one vision'.

www.grunig.ch / www.signtronic.com ●

Vitro promotions aid architectural market development and sales


Annissa Flickinger.


Chris Fronsoe.


Andre Kenstowicz.

Formerly PPG Glass, Vitro Architectural Glass has appointed new architectural market development managers to direct teams of national architectural managers in their regions and provide services to Vitro Certified fabricators based across North America and beyond.

Serving the East Region of the USA as Manager of Architectural Market Development will be Annissa Flickinger, who joined Vitro/PPG Glass in 2004 as an architectural services co-ordinator, and most previously held the position of Global Architectural Manager. Ms Flickinger has experience working with architect and design firms around the world to select glazing, improve energy efficiency and achieve the visual goals of façades, with projects including The Jewel Changi Singapore Airport. Ms Flickinger also represents Vitro as an expert in the growing field of biophilia and biophilic design in contemporary architecture.

Manager of Architectural Market Development for the West Region will be Chris Fronsoe, who has a long career of representing building product manufacturers for architects and most recently worked with Vitro as a National Architectural Manager for the Northwest region.

"Both Annissa and Chris have strong experience as salespeople in a wide range of markets, domestically and worldwide," said Heather Brion, Director, United States Architectural Development. "Their mentorship and oversight will be invaluable as Vitro's teams of national architectural managers strive to provide exceptional service to customers in their territories."

Vitro has also promoted Andre Kenstowicz, previously Commercial Account Manager for the Pacific-Mountain region, as Key Projects Manager. Mr Kenstowicz joined the company in 2012 and has experience in architectural promotion as both a sales and architectural manager. "With his proven success in sales, account and relationship management, Andre is a great fit for our key project sales programme," commented Nathan McKenna, Vitro's Director of Marketing and Innovation.

www.vitroglazings.com ●

The greenfield container glassworks in Schleusingen.

On the Spot… Oliver Wiegand

Focusing on energy efficiency, a new end-fired furnace was successfully commissioned earlier this year at the greenfield Wiegand-Glas plant in Schleusingen, Thuringia, Germany. Managing Director Oliver Wiegand exclusively described proceedings with *Glass Worldwide* as well as discussing developments at the plants in Ernstthal, Großbreitenbach and Steinbach am Wald.

GW: What was the motivation for adding a second furnace at the glass container production facility in Schleusingen, Germany, earlier this year and how is the furnace performing?

The new glass plant in Schleusingen, Germany was always planned as a two-furnace operation. The now-closed former production facility was also a two-furnace operation. However, with the new environmental regulations and the increased capacity available, the best solution was to build a new factory only a few hundred metres away from the old one. The performance of the new furnace is excellent in all regards. The energy consumption is below three GJ per ton of molten glass, and the pack-to-melt efficiencies and container quality exceed our forecast.

Due to the increasing energy prices, we slightly postponed the furnace start-up and started production on 14 March 2022.

GW: What were the key elements of this phase of investment in Schleusingen and what new benefits are now enjoyed?

We invested in the latest technologies in all respects. For instance, the HORN furnace we installed is a highly efficient, end-port furnace with extremely low energy consumption. Moreover, all Emhart forming machines are servo electric AIS or NIS machines, and the inspection machines are the latest version of the TIAMA optical and rotating inspection machines. Furthermore, this project allowed us to maximise and leverage desired synergies in production and operations. For example, the batch house can now utilise its full capacity. In addition, the automated logistic infrastructure, which transports pallets to the warehouse, is also operating at full capacity. Even the footprint of the buildings was carefully planned to significantly shorten walking distances between workshops and production.

GW: How have customers reacted to the developments and resulting opportunities?

Our customers have shown a clear commitment to our process improvements by placing advanced orders with us. However, the increasing energy prices due to unrest on the continent is a challenge for both us and our customers. In fact, the war in Ukraine and sky-rocketing energy prices in Europe made it difficult to properly time the starting of the second furnace. The deciding factor became the clear commitment of our customers to partner with Wiegand-Glas through this difficult time.

GW: How did the Covid-19 pandemic affect the project?

The Covid-19 pandemic did not affect the construction of the second furnace. This does not mean that we did not have employees or contractors infected with Covid-19, but we had become better at handling our new reality. However, we did have a six-week delay commissioning the first furnace in 2020 in the new factory because of the Covid-19 pandemic.

GW: What is the next phase of the investment strategy for Schleusingen?

Due to the production capacity increase, it was necessary to build larger storage capacity for finished goods. The new storage warehouses opened a few weeks ago. Also, a state-of-the-art logistics centre was built to reduce truck-waiting times. ▸

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Oliver Wiegand is Managing Director of Wiegand-Glas.

Additionally, our higher demand for raw materials and cullet to support increased production caused us to increase storage capacity for cullet and other raw materials.

A new logistics centre was built in Schleusingen to handle higher production output.

We are also investing in generating our own renewable energy by installing photovoltaics on our buildings. This will allow us to reduce our dependence on gas and oil and reduce CO_2 emissions further.

The biggest project taking place in the next few years is the construction of a large fully-electric furnace. This ground-breaking project is still in the planning phase and is complicated for many reasons. For instance, the significant co-ordination required of the utilities, network, operators and local authorities may ultimately increase the planning timeline.

GW: What are the recent performance highlights and developments at the plants in Ernstthal, Großbreitenbach and Steinbach am Wald? ▸

In our other plants in Steinbach am Wald, Ernstthal and Großbreitenbach we install upgrades with each furnace rebuilt. In all cases, we replace older technologies with the latest melting, forming and inspection technologies. Moreover, we examine whether we can replace fossil energy with renewable energy. Thus, Wiegand-Glas is constantly looking for ways to reduce the dependence on gas and oil. Together with our technology partners, we are also currently developing concepts for large-scale, fully electric and hybrid furnaces. The first hybrid furnace will go into operation at Steinbach am Wald in 2026/27.

GW: What is the status of the rehabilitation of your railway at Steinbach am Wald and what benefits will result?
The work on the rail-loading facility is ongoing and will be completed in the autumn. When finished, we will have new opportunities for outbound and inbound transport. Currently, we load pallets onto railway wagons at nearby rail trans-shipment points. The new railway line and terminal will allow us to load the wagons on site. In addition, transporting incoming goods such as cullet, sand, or soda by rail is being examined and will be realised if possible.

GW: In general, is future growth for Wiegand-Glas more likely to be achieved by greenfield or brownfield expansion?
This is a very difficult question that depends very much on the glass demand of our customers and the growth of the glass packaging market in Europe. Moreover, the answer is highly influenced by political decisions that purposefully or inadvertently affect us. Currently, a brown-field investment is the obvious solution for us.

GW: Across the plants, how is Wiegand-Glas investing in its workforce to maintain the necessary levels of expertise?
The development and training of our own staff is becoming increasingly important. Recruiting skilled labour is becoming more and more difficult. Therefore, it is a great concern for us to further develop and educate our staff internally and externally. Our aim is to further strengthen and expand our position as an attractive employer in the region.


Bucher Emhart Glass and Heye International were originally selected to supply the IS machines for the Schleusingen project.

GW: Having already installed state-of-the-art innovations from leading suppliers such as Bucher Emhart Glass, Dr. Günther Inspections, EME, Glass Service a.s., Heye, HORN Glass Industries, LWN Lufftechnik, MSK, Refmon, Siemens, SORG, Tiama, Tri-Mer, D. Widmann, XPAR Vision, Zecchetti (EMS Group) and ZIPPE, how important is adopting the latest manufacturing technology to achieving the company's goals?
Without continuous investment in new technologies and automation, a manufacturer loses its competitive edge. Accordingly, we constantly optimise our production and cost efficiencies to remain competitive. Furthermore, with each investment we are committed to improving our ecological footprint, improving product quality and safety.

GW: What is the current status and future prospects for the Eco2Bottle, described when introduced in 2020 as 'the world's first climate-neutral wine bottle'?
Since the launch in 2020, our sustainable Eco2Bottle product line has evolved in several subareas. In addition to the climate-neutral wine bottle, numerous other projects have now been realised with various partners. We have developed a toolbox for our customers where they can choose the CO_2 reduction that can be enjoyed with the production of their desired product. The toolbox used in this process has also evolved. We are currently working with a wide range of measures, for example the use of biomethane and green electricity. The accuracy of our product carbon footprint has greatly improved and we can accurately calculate the emissions saved for our customers.

GW: What is Wiegand-Glas' involvement in the ZeroCO2Glas project along with consortium partners HORN Glass Industries, International Partners in Glass Research (IPGR), Stoelzle Glass Group and RWTH Aachen University?
We are researching and developing with various partners across academic and business spectrum to constantly ▸


A project to construct a full-electric melting furnace in Schleusingen is currently in the planning stage.

Partners for the Schleusingen investment included HORN Glass and Bucher Emhart Glass.

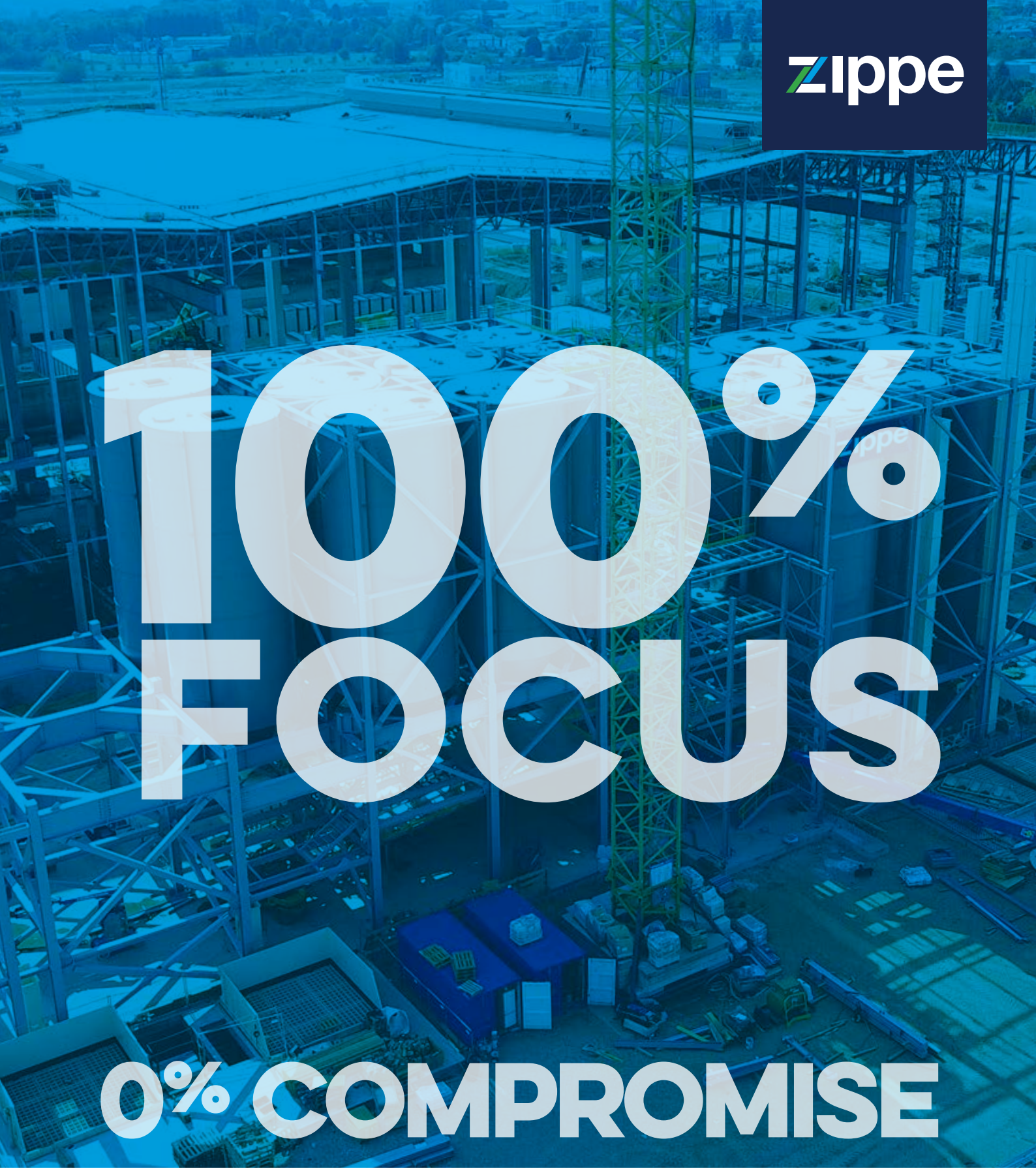
reduce our CO_2 emissions with new technologies. One project is the production of a CO_2-free glass bottle, which is carried out by IPGR. This project is divided into three sub-projects. These are the substitution of natural gas by hydrogen, submerged charging and a CO_2-free batch composition. IPGR will build a small furnace (mini melter) to achieve the project goals. The mini melter is expected to go into operation next year. The IPGR members expect to gain insight into the CO_2-neutral production of glass bottles in large quantities.

GW: To summarise, what are your hopes and ambitions for Wiegand-Glas in the short, medium and long terms?

In the short and medium term, we have to handle the high energy cost and secure a reliable gas supply for our factories. In addition, we must prepare for a recession predicted by many leading economic institutions and advisors. The last and no less important goal is to continue to attract top talents.

In the long term, we must follow our roadmap and reduce our CO_2 emissions to net zero. This includes the development of new melting technologies such as full electric or hybrid-fired melting tanks, which guarantee high quality even with large tonnages. Furthermore, the in-house generation and storage of renewable energy is essential to ensure a consistent energy supply for our operations. To achieve these goals, it is crucial that we maintain our financial strength, continue to invest in cutting-edge technology, and maintain our position as one of the most modern container glass manufacturers in the world. ●

Further information:
Wiegand-Glas, Steinbach am Wald, Germany
tel: +49 9263 800
email: mail@wiegand-glas.de
web: www.wiegand-glas.de



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Market Report 2021/2022

Dorothée Richardt shares BV Glas' analysis of challenges the German glass industry has faced over the last few years, and evaluates the current economic situation against a backdrop of international conflict, rising energy prices and increasing pressure to decarbonise.

For several years now, BV Glas [Bundesverband Glasindustrie – the German Glass Industry Association] has been presenting the economic situation of the glass industry in Germany in this magazine. After the glass industry had to struggle with the economic consequences of the Corona pandemic, there seemed to be light at the end of the tunnel. The UN declared 2022 the International Year of Glass. But the industry is not in the mood for celebration: exploding energy prices and concerns about sufficient supplies of natural gas have brought even more existential challenges.

Under the shadow of Covid

2021 was still very much under the shadow of the Covid-19 pandemic. However, it impacted the glass industry's economic situation to a far lesser extent than in 2020. Total year-over-year growth in revenue in 2021 was 9.0% after a clearly negative result in the previous year. With total revenue of €10.2 billion (2020: €9.35 billion), the glass industry recovered to just above the 2018 level, which is the last time revenue in the double-digit billions was achieved. Domestic and foreign revenue both contributed equally to the strong upturn, with domestic revenue up 9.1% to €6.01 billion (2020: €5.51 billion) and foreign revenue up 8.7% to €4.18 billion (2020: €3.85 billion). The number of employees in the glass industry also developed positively to around 54,000.

IYOG 2022

At the end of 2021 the glass industry was delighted to hear the news that the petition submitted by the International Commission on Glass (ICG), which was also supported by BV Glas, had been successful and that 2022 had been declared to be the International Year of Glass (IYOG2022) by the United Nations. BV Glas immediately proposed the establishment of a regional committee to coordinate all the activities in IYOG2022. The objective was and is to more effectively network people who are involved with glass on a daily basis, to initiate glass-related activities and to inspire enthusiasm among the general public for glass, glass manufacturing and all the various applications for glass. IYOG2022 offers a unique platform to demonstrate how glass is a part of numerous processes in our daily lives, and how it will play an important role in many future applications, such as climate protection and carbon emissions reduction. Part of the activities in Germany is the 'Places of Glass' campaign, a video competition and the new '@das_jahr_des_glases' Instagram account which is attracting a growing community and posting interesting information on the subject of glass.

Total revenue for the German glass industry in 2021 was €10.2 billion (2020: €9.35 billion).

Energy crisis looms

Even before Russia invaded Ukraine, gas prices were on an upward trajectory. In some cases, they were as much as 500% higher than in the previous year. The first companies in the glass industry in Germany raised the alarm, warning that they would no longer be competitive in a few months' time if the energy prices continued to rise. Some of these companies have centuries-old traditions, and now find themselves facing uncertain futures. German glass plants are often located in rural, structurally weak regions where they have always been one of the most important employers. When Russia invaded Ukraine, concerns about the security of gas supply were added to the existing problems.

Results from the HyGlass project are very positive.

The glass industry is not in the mood for celebration due to exploding energy prices and concerns about sufficient supplies of natural gas.

BV Glas and its member companies have since been relentlessly communicating the consequences of an uncontrolled interruption in gas supply, particularly the irreversible damage it would cause to glass furnaces. A business magazine wrote in this regard: 'The glass makers have become a symbol of the endangered German industry!'

Decarbonising glass production

In addition to overcoming the current energy crisis, the topic of decarbonisation remains at the top of the agenda for the glass industry in Germany. It has still the strong support of both European and German legislators, and glass industry customers are also interested in the carbon neutrality of the products. BV Glas has therefore had a CO_2 roadmap drawn up. The Institute for Energy Economy and Rational Use of Energy (IER) at the University of Stuttgart has developed three scenarios for the climate-neutral production of glass. Hydrogen, biogas and electricity are the energy sources of the future, and conventional furnaces will have to be replaced by fully electric or hybrid models. Since these types of furnaces are not yet market-ready, research and development activities will have to be stepped up in coming years.

In 2022, BV Glas and the GWI research institute in Essen (GWI) successfully completed their collaborative HyGlass project. The objective was to investigate the possibility of using hydrogen in regenerative glass furnaces as a long-term replacement for gas. Both hydrogen-gas mixtures and pure hydrogen were examined. The project results are very positive. The experiments and simulations have shown that the use of hydrogen has only moderate impacts on combustion as long as the fuel-air ratio and burner output are maintained at a constant level with a control strategy. However, further comprehensive research is necessary to achieve the desired long-term glass quality consistency.

The conclusion of the past few years is that the challenges facing the glass industry were unpredictable, but the companies have mastered them well so far. Nevertheless, it is to be hoped that the glass industry will find calmer waters again and be able to concentrate on what is one of its main tasks: supplying the population with indispensable everyday goods – made of glass. ●

About the author:
Dorothée Richardt is a Press and PR Advisor

Further information:
Bundesverband Glasindustrie e.V., Düsseldorf, Germany
tel +49 211 4796 331
email: info@bvglas.de
web: www.bvglas.de

Pilkington was the world's first flat glass manufacturer to fire its furnace on 100% biofuel as part of a trial with Glass Futures to find sustainable alternatives to natural gas.

Third-generation glassmaker takes charge

Managing Director of Pilkington UK Neil Syder spoke exclusively to *Glass Worldwide* about taking up the family trade, why the company that he joined as a school-leaver still excites him and how innovation and collaboration with bodies such as Glass Futures and British Glass are crucial to the long-term prosperity of the flat glass sector.

A member of the NSG Group, Pilkington United Kingdom Limited is based in St Helens, Merseyside, and at the NSG Group's European Technical Centre nearby in Lathom, Lancashire. The renowned inventor of the float glass process currently employs around 3,000 people across the UK for its operations, which range from the manufacture of float, rolled and coated glass to glass processing and merchanting, automotive original equipment (OE) and automotive glass replacement (AGR) manufacture.

Neil Syder has a long history with glass – and with the company of which he is now Managing Director – owing to his family's association with Pilkington UK, which began with his grandfather's employment as a Warehouse Manager at the firm's Cowley Hill Works.

Aged five, Mr Syder remembers visiting Pilkington's plant in Halmstad, Sweden, where the family relocated for two years while his father, as Manufacturing Manager, trained the newly-established business' employees to make glass.

"I couldn't claim that I started work at that age but I did go to the plant some weekends when my dad took me in, so I knew my way around the batch plant even then!" Mr Syder recalls. Back in the UK, his father held the position of Works Manager at Pilkington's Cowley Hill and Greengate plants and ran its (newly invented) float lines – "a brilliant time to be working at Pilkington," observes Mr Syder.

Neil's own involvement with Pilkington started in 1987 when he left school, aged 16. Pursuing an interest in engineering and mechanics, he joined the research and development department of Pilkington's Glass Laboratories in Lathom (now the company's European Technical Centre). "Pilkington supported me doing a Higher National Diploma (HND) and then a part-time degree so it could be said that I am chemist by trade," he muses. "I can't say I've used a lot of chemistry in my roles in the past but I guess it's a way of logically thinking and I learned how to approach and solve certain problems." ▸

Career to date

Mr Syder moved to Cowley Hill in the late 1980s, progressing from "quite engineering-focused" laboratory work to a role in operations in the early 1990s. This was the era of 'Pilkington K Glass', when the UK's original hard coated, low-emissivity glass for energy efficiency in homes was in development and just becoming a mainstream product. "We had made it in the lab and then in a plant, but this was really the subtlety of making it better, getting longer runs and tweaking the products to improve, for example, the control of the emissivity and colour," Mr Syder explains. "All those types of things had to be understood fully and with nothing written down, we had to work it out as a group. So it was a very interesting time to be in that type of role at Pilkington."

From there, he moved into different operational roles, working in warehousing, the cutting section, hot end glassmaking areas and working physically in warehouse loading as a manager. "Eventually in the year 2000 I moved into operational, planning and supply and was there for 12–13 years, during which time the role expanded quite a few times," he continues. "In 2013 I moved into commercial as Head of Sales for the UK as well as export. I kept the responsibility of planning and supply, so it was a big role but gave me the chance to balance demand against supply, which was very useful!"

In 2017 Mr Syder was made Head of Operations, a role he held until being promoted earlier this year, taking over from outgoing MD Matt Buckley, who retired after a helpful four-month handover. "Obviously I am very proud to be Managing Director but I think it meant even more to my father – he was extremely proud!" confides Mr Syder.

Management strategy

As Managing Director, Mr Syder's primary focus for the business centres around innovation and sustainability. "I am quite a strategic person, analysing things and seeing what could be done better," he notes. "Over my career, I've seen many things done well and other things that in hindsight could be done better and that has shaped me in some extent to the person I am today and how I manage.

"I've got a very good overview of the business having worked in pretty much all the operational roles as well as knowing how the commercial and financial sides work," he remarks. "My responsibility is to allow people to grow and to facilitate the ability of others. I've done many of these roles myself in the past so I can help by providing focus and shaping their progress by allowing them to develop and improve our operations and products."

Pilkington UK requires the same lifeblood as any company: "diverse ideas and people to make sure that we alter direction as necessary. We have that in an open and honest team and I enjoy the challenge of the different ideas coming from them," Mr Syder says. "I have my own ideas but I welcome input from the team to make the best-informed decisions. Being open minded and working together with inclusion is now coming from the top down and we will benefit greatly from that in the years to come."

As an international brand, Pilkington has a European Managing Director that all countries report to and then a Chief Operator Officer who brings the architectural, automotive and specialty glass sections together. "We also have meetings with operations directors across Europe to discuss challenges, and with commercial teams to ensure that focus on development and new products meets the wider business and not just one area," adds Mr Syder.

Pilkington UK also benefits from being a member of British Glass, the UK glass industry's representative body. "It's good to have that forum," attests Mr Syder. "Some of the challenges I have will be unique to Pilkington but a lot of them will be common challenges so being able to come together and have one voice – to address, for example, a government body – is very useful without getting into competition compliance issues. I am on the British Glass board of directors and attend meetings, as I do with the Glass and Glazing Federation," he adds.

Neil Syder is Managing Director of Pilkington UK.

Production capabilities

The majority of Pilkington UK's operations are all in St Helens, based around three different sites within four miles of each other: Cowley Hill Works, Greengate Works and Watson Street Works. "We have a float line, an offline coater (the float line actually has online coating capabilities), a mirror line, a laminating line and a textured glass operation – so a quite diverse operation overall," comments Mr Syder.

"One of the strengths of the UK operation is that I can't think of another plant inside or outside of NSG that has the capability for making an online coating and offline coating in the same vicinity," he continues. "Cowley Hill Works is four miles away from Greengate Works so close enough to be classed as together. We are able to double up on the efficiency and it does give us many benefits."

Approximately 85% of the glass that Pilkington manufactures in the UK is for the UK, with higher end products accounting for the 15% exported products (for example, solar control). Demand is currently "strong" for the company's offerings for the UK architectural and automotive glazing sectors and "has been all year", reports Mr Syder.

The UK5 float line at Greengate operates "one of the best furnaces in the world," he maintains. "We've got all the assets in the UK to a very high ▸

standard and that really does help us to innovate, especially with the team at Lathom being able to make ideas a reality."

Research and development

Pilkington's UK operations benefit from close proximity to the brand's European Technical Centre in Lathom (nine miles away). "There are other R&D facilities around the world, including in Japan, but the major R&D facility is in Lathom," confirms Mr Syder. "We are very committed to it and innovation is our core strength. As the centre of excellence and development for the NSG Group, a lot of products will be developed in the UK plants because of their proximity to the European Technical Centre. Also, the experts from the European Technical Centre travel the world to other plants and I'm always happy for them to go to our UK sites and share different ways of doing things and technology developments. They need to focus on the R&D side of course, but I'm very happy for the team to spend time on the operations sites because they see how things can work practically. I enjoy having the R&D team around because it's educational all ways round.

"It would be easy from an operational point to get very insular in the UK and focus on just output," he continues. "Obviously that is very important but there is a long-term view on encompassing development from the wider world. For example, we might be experts on glassmaking but we might not be the world experts on carbon capture. Pilkington is very forward-thinking on such topics, but carbon capture is not an isolated glassmaking issue so working with other partners across the world and seeing how they are tackling these issues and how solutions can be developed for use on glass furnaces is very important."

Hydrogen and biofuel trials

Pilkington takes a long view in its approach to principles of sustainability and improved environmental performance, according to Mr Syder. "We've got things we need to do such as improve sustainability and net zero but we look further than that because it's very easy to make glass net zero by making more of it… If we produce low-emissivity glass or solar controlling glass so as to reduce the need to heat the house or produce the energy to keep it cool, that is fundamental and is part of the whole climate crisis. And on top of that we need to keep developing glass with extra functionality that makes living easier.

"Lathom will be working on all of these things and a lot of them will happen at Greengate first, which we've already seen to some extent with the hydrogen and biofuel trials."

As a reminder, during summer 2021, as part of the regional HyNet Industrial Fuel Switching project to produce, store and distribute hydrogen to decarbonise the North West of England and North Wales, Pilkington UK conducted a full-scale production trial over several weeks to demonstrate that its float plant could be safely and effectively fired using low-carbon hydrogen in place of natural gas. In October 2021 HyNet and HyDeploy project team members witnessed the success of a five-day trial using a blend of hydrogen with natural gas in the furnace at Pilkington UK's Greengate site. And in February 2022 the company's support of Glass Futures' £1.7m BEIS (UK Government's department for Business, Energy and Industrial Strategy)-funded project to cut CO_2 emissions from the glass making process saw it become the world's first flat glass manufacturer to fire a furnace on 100% biofuel (made from organic waste materials), which it did for four days, creating 165,000m^2 of the lowest carbon float glass ever produced. Pilkington UK's next major step will likely be when the HyNet project goes live and provides a hydrogen pipeline to the Greengate site.

"The NSG group is committed to net zero; there are targets out there and the UK operation will deliver in line ▸

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The OLC1 online coater in St Helens.

with those; for example, we are in a good position with the HyNet project and we are also benefitting from the Glass Futures project," comments Mr Syder, who believes that the industry research and technology organisation's pilot plant for sustainable glass manufacturing – also in St Helens – will be "a perfect development to try out things and see if they work".

"There is a not a huge competitive edge with this," he underlines: "it's about making the whole glass industry better and more sustainable. I fully support Glass Futures because we don't need every company trying to work out their own net zero solution if we can work collaboratively in a way that is not compromising the competitive nature of the business, and working together on solutions that the world needs. Glass Futures provides us with that. Having a body independently doing this, helping all the glass companies and giving us all the same information to allow us to change our operations at the right time is key."

KEW Technology syngas

More broadly for the future of decarbonisation, "Pilkington is evaluating a range of decarbonisation technologies," says Mr Syder. The company is currently exploring the replacement of natural gas with syngas (also known as 'synthesis gas'), a lower-carbon alternative fuel consisting mainly of carbon monoxide and hydrogen that can be produced from a number of materials that contain carbon, including biomass and municipal waste materials. To this end, Pilkington has partnered with UK-based sustainable energy solutions company KEW Technology for the BEIS-funded 'Modular Approach to Decarbonisation of Energy (MADE) for Glass' project to develop an Industrial Co-location solution for on-site fuel switching. In future trials KEW's modular advanced gasification units will be used to provide syngas as a pressurised natural gas substitute at two of Pilkington's glass manufacturing sites in St Helens.

Solving design challenges

When asked about any Pilkington products that are currently helping to solve key design challenges, Mr Syder came up with a number of examples. Firstly Pilkington Suncool, which is "helping to protect buildings from overheating, without relying on costly and carbon intensive cooling systems." The range of coated, solar control and low-emissivity glass products offers a number of light/heat transmittance options, keeping buildings at a comfortable temperature without compromising on natural light. At two primary schools in Dudley, in the West Midlands, 380m^2 of glazing in areas most at risk of overheating (yes, it can get hot up there…) were replaced with Pilkington Suncool 70/35 solar control glass. "The project has helped bring extra comfort to both Ridge Primary and Gig Mill School, providing a much better learning environment than previously, when the buildings suffered from overheating in summer and substantial heat loss in the winter," reported Mark Chenery, Project Manager at Dudley Council.

Another key product, according to Mr Syder, is Pilkington AviSafe, used to help prevent bird collisions with glass. A uniquely patterned UV-enhanced coating fine-tuned to the optical abilities of our feathered friends, Pilkington AviSafe disrupts reflections on glass so that birds perceive a barrier and know to steer clear. The coating is designed to be aesthetically appealing (to humans) on the exterior surface, and to be barely visible from inside the building. At Mere Sands Wood, a nature reserve in West Lancashire, a new visitor centre has benefitted from glass units made of 6mm Pilkington AviSafe as the outer pane and an inner pane of 4mm Pilkington K Glass S low-e glass. The glazing was installed in areas that most commonly saw bird strikes, providing protection for the birds as well as thermal insulation for the café's visitors.

Mr Syder also mentions NSG TEC glass, which has an intriguing new application in a gaming machine. Last autumn NSG Group collaborated with product design studio Cohda to combine the latter's Power-Tap (P-Tap) wireless power technology with its electrically conductive glass, the result being a glass that acts as a wire – transferring power out through contact alone. UK touchscreen and glass processing specialist Zytronic has now created 'ElectroglaZ', a futuristic gaming concept for casinos and bars featuring 'floating' components powered invisibly from two layers of NSG TEC electrically conductive glass laminated together (electricity flows into the glass via a hidden connection around its perimeter, through the conductive glass' lamination, and out to the touchscreen and other devices via apertures and contact points). The gaming concept was exhibited at the G2E global casino gaming trade event in Las Vegas, where it received "significant interest" from slot machine product developers.

Lastly, Mr Syder lists the popular Pilkington Activ dual-action self-cleaning range with a clever coating that uses the forces of nature to help keep the glass free from dirt.

And there will be more innovations to come. "We need to keep working hard to meet customers' aspirations the best we can while still developing for the future; we are in a strong position to do that," states Mr Syder. "We need to solve our customers' problems and to help them to sell their products, so it's about creating products that meet the customers' requirements and providing service and quality. We've got a lot of that going on at the moment with innovation days and communicating with customers to find out what they need so that we are developing the right products. 'Challenges' is just another word for opportunities," he concludes. ●

K Glass, Suncool and AviSafe are registered trademarks of Pilkington Group Limited

Further Information:
Pilkington Group Limited
(part of the NSG Group),
Lathom, Lancashire, UK
tel: +44 1695 50000
web: www.pilkington.com

Bottles on a production line.

On the Spot... Bruno Portellano

Producing glass insulators for high-voltage electricity in addition to glass bottles and containers for luxury perfumery and cosmetics, Verescence's plant in La Granja, Spain is one of the group's most advanced in terms of CSR and robotisation. General Manager of Verescence Spain and a member of the Executive Committee of the Verescence Group, Bruno Portellano spoke exclusively to *Glass Worldwide.*

GW: What is Verescence's market position and current performance in Spain?
Verescence Spain represents 20% of Verescence's overall turnover (in second place after France). We have something that characterises us, which is the double line of business: perfumery and cosmetics (the heart of activity) 60% and insulators 40%, which is a historical activity in the plant – the first insulator was manufactured in 1932.

GW: What is the history and current capabilities of your production facility in La Granja?
The glass tradition dates back more than 260 years with the construction of La Granja Palace. However, our most recent industrial history began in 1932 with the production of the first glass insulator. The current factory was ▸

The La Granja plant.

Insulators on a production line.

built in 1957 and has always produced various glass products, specialising in perfumery containers since the beginning of the 80s and increasing its added value with the Decoration plant started in 2006, as the most recent activity.

Our current annual production capacity is around 200 million containers (over 24,000 tons) and more than three million insulators (over 11,000 tons).

GW: What products are manufactured there?

We manufacture two high-quality and sophisticated products. On the one hand, packaging for high-end perfumery and cosmetics, to which we add decorative finishes such as lacquering, silk-screening, hot stamping, as well as labelling and gluing of accessories.

Verescence La Granja is also the centre of excellence of the Group for the production of the Verescence Collection (standard bottles that can be customised by brands).

On the other hand, we manufacture high-quality and high-performance tempered glass plates for the electrical transformation and distribution industry, which we test and assemble in order to deliver them ready to be installed in transformation lines and plants.

GW: Typically, who are your main customers and how would you describe prevailing market conditions?

[Our] main beauty customers are major groups such as Natura (Avon), Puig, Revlon, Coty, LVMH, Chanel, L'Oréal…

More than 100 million insulators manufactured by Verescence La Granja Insulators are installed in more than 100 countries.

GW: How many people work at the La Granja plant and what levels of expertise are employed?

As of 28 February, we have our own workforce of 452 people. In addition, there are a significant number of employees who come to the factory on a daily basis to provide services to the factory through contract work, such as security, cleaning, medical service, maintenance, forklift and lorry loading personnel. We also hire workforce through a temporary employment company, basically for production. Therefore, taking into account all of the above, we have an average of 650 people working at Verescence La Granja.

Regarding the levels of experience or knowledge, there are people who have been working in our plant for more than 30 years and whose know-how about the manufacture of glass containers for perfumery, insulators, maintenance of facilities, glass processing or how to handle the manufacturing lines, is very deep and crucial to achieve high-complexity and quality products. Glass is a challenging material to deal with; counting on people who have witnessed and managed similar problems, although never precisely the same for so many years, is fundamental for us.

Furthermore, we are continuously recruiting new people into the organisation, who, by working in parallel with the experts, [undergoing] ongoing training and internal promotion, acquire the necessary knowledge.

There are more than 100 university graduates and a very high number of people holding vocational training [at Verescence La Granja]. Moreover, we are an accredited training centre. This means that every year we [run] specific internal courses for Professionalism Certificates and ▸

Inauguration of the logistics centre on 9 June 2022.

other similar [qualifications], which provide our workers with internal training that can be recognised by external professional training courses. These certificates are awarded to employees who did not have any professional education or training when they joined the company. In 2021, more than 4,104 hours of training were provided at our glass school.

GW: In general, how important is the plant to the local community? Verescence La Granja is the biggest company in Segovia [a historic city northwest of Madrid] and is one of the economic drivers of the region. The plant is of vital importance in the local community. In a town of around 5,000 inhabitants, having a company that generates both direct and indirect employment is essential. Not only are we providing jobs, we also contribute to the generation of wealth [in the region], as many of our suppliers are local. One of our objectives is helping suppliers to develop; it is part of our CSR strategy.

Verescence La Granja's relationship with local institutions and organisations is also very important and we have always maintained close contact. During the Covid-19 crisis, in addition to donating glass bottles for hydroalcoholic gel packaging, as well as disposable protective equipment (masks, gowns, anti-spatter glasses) for hospitals and the Junta de Castilla y León governing and administrative body, we made our 3D printer available to produce components for protective masks donated to the local authorities. ▸

A bottle at the decoration plant.

Verescence La Granja also expressed its solidarity with those affected by the volcanic eruption of La Palma [on 19 September 2021] by donating essential PPE (helmets, gloves, yellow vests and FFP2 masks) to help the work of the emergency teams deployed on the island.

GW: What are the highlights of recent upgrades in La Granja as part of the company's Excellence 2018 plan?

During the current year 2022 as well as since 2018 we have undertaken the various improvement actions specified in our Excellence Plan, of which the following have already been completed:

- The rebuilding of a new, more energy efficient Perfumery and Cosmetics furnace with improved capability and glass quality
- Installation of a particulate and SOx filter for the reduction of emissions to a minimum.
- Automatic greasing.
- Complete modernisation of new cold glass lines with the most advanced optical inspection machines.
- Implementation of new, faster and more efficient automatic decoration equipment in silk-screening.
- Modernisation of new glass container moulding machines
- Improvement of working conditions, ergonomics and flows.

Insulators on a production line.

GW: What is the strategy for future investment and how does the 'Verescence 2022 – Forming The Future' strategy impact proceedings in La Granja?

Automation, robotisation, digitisation at the service of CSR and competitiveness is the strategy. For the past three years, the Verescence 2022 – Forming the Future strategic plan has guided Verescence's strategy. Structured in five pillars centred around sustainability, it aims to make our Group the world reference in the sustainable beauty market, thanks to numerous investments that will accelerate our transformation to Industry 4.0 by continuing to automate and digitise our process so we can improve the working conditions of our employees and the industrial performance of our production sites.

Despite the Covid-19 crisis, we stayed the course, with notable advances at Verescence La Granja, such as:

- 2020: The integration of collaborative robots (cobots) which work alongside our teams and allow for the rapid and safe automation of a number of tedious and repetitive tasks, while maintaining a high degree of flexibility and preserving our know-how. Verescence La Granja was the pilot site of the Group for the development and standardisation of cobots.
- 2021: Automation of the insulator assembly line with investments in automatic robots.
- 2022: A new logistics centre positioned outside the production areas. We've invested €600,000 in this state-of-the-art infrastructure designed to centralise and digitise all logistics operations. It is accompanied by significant improvements: reduced risk of accidents by removing 90% of truck traffic in our factory, lower CO_2 emissions by replacing 25% of our fleet of conventional diesel trucks with electric trucks, and construction of new quality workspaces for our shipping departments and also for the drivers of our transport service providers. ▸

Bruno Portellano (centre) highlighted Verescence's commitment to industrial excellence, innovation and sustainable development during a visit in April 2021 from Gautier Lekens, the Minister-Counselor at the French Ambassy in Spain.

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GW: How would you summarise Verescence's sustainability strategy in La Granja?
Verescence has a three-pillar CSR strategy: 'People First', 'Eco-solutions' and 'Act For Society'. Every year we publish a sustainability report on our website with all the [company's] KPIs and CSR performance and all the initiatives that we put in place in our plant for each pillar.

Our Spanish production site is located in the municipality of La Granja de San Ildefonso in Castile and León – declared a biosphere reserve by UNESCO in 2013. Priority is therefore given to the safety and preservation of this protected ecosystem. For example, Verescence La Granja is collaborating with [global energy provider] Iberdrola in Spain for the supply of renewable energy through a long-term power purchase agreement, aiming at carbon-neutral electricity consumption. Since January 1, 2022, 80% of our electricity consumed in Spain has been of renewable origin guaranteed – a reduction of around 9,000 tonnes of CO_2 per year.

Water is another key question in La Granja, which is why we are proud to announce that by the end of 2022 the facility should reach 'dry plant' level – i.e. a plant where water is withdrawn only for domestic needs – thanks to all the actions implemented during the last two years.

Verescence La Granja has maintained its EcoVadis Platinum medal in 2022 with a score of 83/100. This is the highest level of distinction awarded by EcoVadis, the world's most trusted provider of business sustainability ratings.

GW: What importance do you put on recycling in the regions served?
Together with atmospheric emissions, waste generation is one of the main environmental aspects of the glass industry. Verescence La Granja has been working on continuously improving its waste management, achieving 96% of recycling in 2021 as part of the Verescence Group's CSR policy.

We also conducted a study on which decorated cullet could be recycled in our own furnace, allowing us to start recycling in-house lacquered glass with water-based paint or decorated with organic inks and hot stamping. This approach enables us to reduce the amount of coloured cullet sold and to increase the amount of cullet recycled internally, leading to savings in terms of natural gas, CO_2 emissions and transport. This is a clear example of how taking an eco-friendly approach to design and decoration affects the recyclability of the product.

In 2021 Verescence La Granja started to take part in the circular economy by integrating 20% post-consumer recycled [PCR] cullet into our perfumery furnace. This new composition, named 'Infinite Glass 20' has replaced extra flint glass and became our new standard. This makes it possible to meet consumer expectations in terms of sustainability, to meet the eco-design objectives of brands, and finally to reduce our energy consumption and greenhouse gas emissions (5% lower emissions) while limiting our impact on natural resources.

In the insulator business, we have made the 'Environmental Product Declaration' and we inform our customers how to recycle the insulators at the end of their life.

GW: What strategy is Verescence adopting for increased digitalisation in La Granja?
As part of the digitisation of our operations, we will improve the management of our industrial performance by implementing a new generation MES (Manufacturing Execution System) software solution that collects all the production data (quality, productivity and yield) in real time.

GW: What specific measures are you taking to control energy, raw materials and other production costs?
Verescence La Granja was ISO 50001-certified in 2021. Also, we have furnaces with heat regenerators to be efficient in energy consumption. The use of PCR cullet has decreased the [amount of] raw material needed and CO_2 emissions produced.

GW: How can suppliers of plant, equipment, materials and services contribute better towards improving manufacturing processes and helping Verescence reach its goals?
We involve all our suppliers in our sustainable development approach in order to contribute to the improvement of CSR performance throughout our value chain. For example, to reduce supply times for our customers, eliminate unnecessary transport costs and reduce waste by ensuring better quality control, we integrated the sorting activity of our partner Macanse at our La Granja site in 2021. This initiative (called 'Door to Door') had already been introduced in Mers-les-Bains (France) in 2014.

GW: What do you consider to be key to a successful relationship with such suppliers?
A good relationship with strategic suppliers requires at least the following:

- Effective Communication: Two-way communication is fundamental for building a win-win relationship between the two parties.
- Respect: Considering the needs and opinions of the other side is key in building any relationship; it is necessary to learn from the other to build a mutually beneficial partnership that lasts over time.
- Transparency: sharing information, intentions and objectives.
- Honesty: being rigorous in the fulfilment of each party's commitments.
- Trust: in the other party to make the relationship long-lasting.
- Flexibility: Being prepared to adapt to changes proposed by the other party that may bring improvements.
- Innovation: To look for innovative ways of working and solving problems together.

GW: What are the benefits of being part of a global operation with further facilities in France and USA?
While having the autonomy necessary for our agility in order to support customers locally, being part of a global operation help us gain complementary expertise through cross-regions best-practice sharing. Benchmarking is a common practice between our sites to improve the performance of our processes and spread innovations. Regular inter-site exchanges take place, whether it involves assistance in delicate situations or with the start-up of new equipment, such as the deployment of hot stamping in Spain in 2020, helped by the expertise of our French teams. It's also an opportunity to encourage international mobility to support our strategy and send Verescence experts for training.

GW: How would you summarise the opportunities and challenges Verescence faces in Spain?
With the rise in energy prices and major supply chain disruptions in recent months, we need to continue to adapt our business and build our resilience so that we can maintain our operations and supply chain at a high level. ●

Further information:
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The AGC Glass Europe factory in Mol, Belgium is celebrating its 100th anniversary.

100-year anniversary for Belgian flat glass plant

Site Manager Ronny Van Broekhoven recounted to *Glass Worldwide* the origins of AGC Glass Europe's Mol plant in Belgium and explained how operations have evolved since the first bricks were laid 100 years ago.

Headquartered today in Louvain-la-Neuve, central Belgium, AGC Glass Europe produces, processes and markets flat glass for the construction industry, car manufacture and other industrial sectors. The origins of the Mol plant extend back to 1922, with the foundation of the 'Compagnie Internationale pour la fabrication mécanique du verre' (F.M.V.), which is still visible on the mosaic staircase of the main building.

"You could think it's an old factory and yes it is… at the outside, but inside the factory you can find a lot of innovation and a state of the art float line," says Ronny Van Broekhoven, who joined the company in 1997 as its General Services Manager, and has been its "proud" Site Manager since 2008. "Proud because 100 years is a long history," he clarifies, of his role in be overseeing AGC's historic centenary celebrations, and "proud also because the team is so great and thankful. 85% of our people live within 10km of the factory (including myself), so we are an important employer for the region."

Location, location, location

One hundred years ago the factory's location on the Colburnlei [road] in Gompel, Mol, northern Belgium, was strategically chosen to make the most of numerous advantages: the nearby Kwaadmechelen–Dessel canal, the international rail line between Antwerp and München Gladbach, the Mol–Wezel main road and the immediate proximity of the Mol-Donck sand quarries and Limburg coalfields. In short, Mol was the ideal location, with enormous potential for starting up a factory – as well as being right in the heart of the beautiful Kempen region, now designated a national park.

However, back in 1922, there were no specialist glass workers to be found in the Kempen. As a result, dozens of workers were brought in from the glass industry in Hainaut/Henegouwen to train local workers in the art of glass-making. All these workers of course also had to be housed, leading to the construction of a number of residential areas (cités) around the factory. Over time these gradually expanded into a fully-fledged community with all the facilities you'd expect: among them were built a factory school, a church and the 'Casino'. Contrary to what its name suggests, this latter building was never in fact a conventional casino, rather it was principally a venue for events, festivals and gatherings, while at the same time serving as a hotel for employees. With its own football club (the Union Sportive) and brass band ('De harmonie'), community life was also thriving. You can imagine this must have been a huge amount of ▸

Ronny Van Broekhoven (left) with Niels Schreuder who works in Public Affairs & Communication at AGC Glass Europe.

The increasing climate change, the scarcity of fossil energies and the uncertain political situation: All this is causing a growing boom in solar power worldwide. The Indian government, in particular, is forcefully pushing this development, and Grenzebach – a partner of the glass industry in India since 1996 – is by their side. Through our own branch near Mumbai, we now support production plants for pattern glass, a basic component of PV modules, throughout India and in adjacent countries. If you have plans for your own market: Just contact us!

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construction for the 'tranquil Kempen'. And you'll still find traces of this even today: looking around the AGC Mol site there are many buildings to be seen that bear witness to this past. The history of the company is truly entwined with the history of the Kempen.

Royal visit and wartime experience

One important milestone in the history of the site is the visit to the factory of then King Albert I on 6 November 1929. According to one eyewitness and former director, Mr Schrijvers, the king and his entourage were the only people ever to have entered through the large iron gate opposite the entrance to the main building. This has since disappeared, being replaced by a small wall with a fixed gate. Despite the presence of the iron gate in front of the main building, the factory was at the time always accessed from the Colburnlei, where metal roller doors are now located.

King Albert I visited the plant in 1929.

1930 saw the merging of F.M.V. with a mirror factory at Moustier and the Roux glass business, giving rise to the name Glaver. Even then the factory already had a reputation for superior quality and for its specialisation in particular products, a market position it retains to this day.

Unfortunately, the factory has also known more difficult times, and was not spared during the Second World War. Many of its staff were called to arms, imprisoned, or fell victim to the hostilities. The far-reaching restrictions in the construction sector, and on the supply of raw materials – imposed by the occupying Germans – brought the factory to a complete standstill. In addition, parts of the facility were used by the occupiers for storing materials. Liberation by British forces appeared to be light at the end of the tunnel; ▸

The Mol plant was constructed in 1922.

King Albert I and his entourage were the only people ever to have entered through a large iron gate opposite the main building.

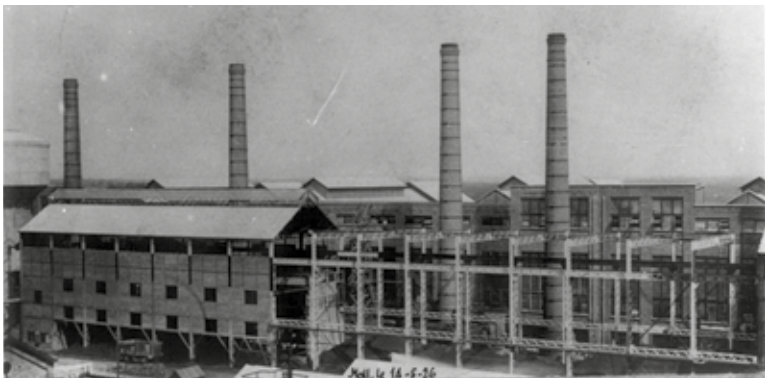
but before that large parts of the factory had been burned, causing enormous damage to the northern and eastern parts of the site.

Growth and expansion

Nonetheless, despite the difficult economic situation immediately following the end of the war, the people of the Kempen refused to be deterred and set about rebuilding the factory. The icing on the cake was a new product, launched onto the market in 1948: the double-insulating Thermopane glass. In the years that followed, the factory saw nothing but expansion and exponential growth. Additional furnaces were built to provide a total of six, the capacity of each furnace being increased through application of the latest technologies, raising the scale of production to a truly industrial level.

1960 saw the merger between Glaver and Univerbel, resulting in a new name – Glaverbel – that is still widely known even today. While this immediately resulted in various extensions to production areas, the exponential growth experienced meant that the administration building also had to be enlarged. The 'main building' as it is known today already existed, but comprised just a single storey. Addition of a second floor was achieved without needing to

AGC Glass Europe's Mol plant in 2022.



The Mol factory in 1926.

interrupt business in the main building for even a single day.

Over time, the glass business' products gradually became more differentiated. As the machines were adapted, becoming more specialised, the historic factory increasingly grew to resemble the structure that we now know as the Coater, Float, Kempenglas and Vertec departments.

The creation of Kempenglas NV, however, didn't happen until 1998, 17 years after the acquisition of Glaverbel by Asahi Glass in 1981 – a move that saw Glaverbel taken into the global AGC organisation. The 'Glaverbel' name was consequently changed in 2007 to AGC (Flat) Glass Europe.

Current manufacturing capabilities

Today, the AGC Mol site comprises four production units and 620 employees. The company's Vertec department deals with cutting, grinding, etching, chemically tempering the glass, particularly for the car interior markets and touch screen production. The Coater department coats the glass (via vacuum deposit) produced in Mol for automotive business: sunroofs and windscreens, while the Kempenglas department is where AGC's insulating glass (double or triple) is assembled for building applications.

The company's float line, "totally renewed in 2019" with a 400tpd furnace specialises in extra thin (up to 0.5mm) and extra clear glass and runs 24/7 all year round. "We produce for automotive markets (windscreens, sunroofs and car interior), electronics (touch screens), solar (solar mirrors) and medical services (microslides)," says Ronny Van Broekhoven. Extra capacity was required to stay current and meet future demand for innovations. "We invested many millions of euros in our plant," he continues. "We did a cold repair of our float line […] We also spent on new machinery to bring added value to the glass such as an extra etching line, laser cutting, and chemical tempering."

The AGC Glass Europe group recycles around 1,000,000 tonnes of cullet per year, saving about 1,150,000 tonnes of raw material and 700,000 tonnes of CO_2 emissions.

Ronny Van Broekhoven, Site Manager at Mol.

Centenary celebrations

"On 14 May we invited all our colleagues and their partners to celebrate our 100 years," says Mr Van Broekhoven. "We [were able to] celebrate it at the lake shore" – from where, "in the past […] white sand has been taken out to produce our glass."

AGC Mol is also planning (at time of writing) to open its doors in the first weekend of October: "Our colleagues will be able to show their families how the factory looks like from the inside," explains Mr Van Broekhoven. "Also, neighbours, politicians and some colleagues from other plants will be invited."

It is "great that our 100-year anniversary happens in the same year the UN declared as the International Year of Glass because of the importance of glass in daily life," he adds. Throughout the year, AGC has been organising initiatives: an internal video campaign called 'United by Passion for Glass' starring AGC employees from all over Europe and Brazil passionate about glass. For its external stakeholders: customer events, local happenings, celebrations at its plants and a social media video campaign entitled 'It's a kind of magic' to help people discover and learn more about the magical aspects of glass. "AGC likes to take this opportunity to celebrate the role played by glass and its many benefits to society," notes Mr Van Broekhoven.

Continuing to strive for innovation and the development of new products in Mol is shaping a future for AGC Glass Europe that is as bright and sparkling as the glass that it manufactures – ensuring that the company will have even more to celebrate when it reaches its next milestone. ●

About the author:
Ronny Van Broekhoven is Site Manager at AGC Glass Europe's Mol plant

Further information:
AGC Glass Europe, Mol, Belgium
tel: +32 14 81 95 11
web: www.agc-glass.eu

A greener way to enjoy beer

By introducing Vetropack's lightweight glass bottles for another beer in its range, Austria's Mohrenbrauerei brewery is cutting its CO_2 emissions, explains Simone Koch.

Vetropack's robust, lightweight returnable glass bottle is creating a sensation in the Austrian state of Vorarlberg. Enjoying a wide variety of innovative beers is very much part of life in this corner of the country, where the offerings are somewhat stronger than in the nearby Allgäu region and include seasonal and creative beers that offer special taste experiences. The Mohrenbrauerei – a brewery founded by Johann Mohr at Dornbirn back in 1763 – is to thank for this. The brewery passed into the ownership of the Huber family in the 19th century and still maintains close ties with the local people and the region. A market share of 53% sends out a clear message, and many Vorarlberg expats remain loyal to their favourite beer long after leaving the region.

Mohrenbrauerei first used Vetropack's exceptionally sustainable 0.33l lightweight glass bottle for its Mohrenbräu Pfiff beer. Offering a reduced carbon footprint of up to 25%, the bottle is now also being used for the brewery's Mohrenbräu Spezial beer.

Overall CO_2 emissions per bottle are slashed by no less than one quarter compared to a normal 0.33l returnable bottle.

Combining tradition with innovation

Andreas Linder, Mohrenbrauerei's Head of Marketing, reports: "We view ourselves as a brewery that is innovative and sustainable. Of course, we also do our job with professionalism and passion, and we take a holistic approach to the subject of beer. That includes the dialogue we maintain with customers and the catering trade, our diverse range of products, and also aspects such as service and product expertise, regular maintenance and modernisation of the production plant and dispensing equipment – the list could go on." Visitors to Mohrenbrauerei can discover a world packed with experiences, attend a seminar on brewing or train as a beer sommelier, and sample international beers of all styles that are almost impossible to find elsewhere.

The last two years have seen the addition of a lager and a wheat beer to the brewery's range, which also includes trending varieties such as Pale Ale and Radler Grapefruit, as well as a series of local specialities. Alongside these beverages, Mohrenbrauerei offers about six creative beers each season: these are brewed on a small scale (around 200 to 600 bottles), becoming highly sought-after collectors' items. For the 2022 summer season, for example, Mohrenbrauerei created a new Mojito beer.

Thermally tempered glass reduces wear on the contact surfaces (scuffing).

Repackaging a best-seller

With a market share of over 30%, the brewery's distinctive high-strength Mohrenbräu Spezial is its most popular product. Since 2022, this beer has also been available in the 0.33l lightweight glass bottle by Vetropack. A special process is used to manufacture this returnable bottle, which weighs a mere 210g (instead of 300g). Thermally tempered glass reduces wear on the contact surfaces (scuffing).

Mohrenbrauerei began using Vetropack's lightweight glass bottles over three years ago for its Pfiff 'March Beer' and Radler varieties: this cuts logistics costs because the volume that needs to be moved from A to B is reduced by 1,000 tonnes per year. "And for Mohrenbräu Spezial, the savings will turn out to be many times greater," Mr Linder is delighted to point out. "This fits excellently with our image as an innovative and sustainable brewery that values and promotes social solidarity – to take another example, we also meet our entire energy requirement with green power." Overall CO_2 emissions per (lightweight) bottle are slashed by a quarter compared to a normal 0.33l returnable bottle.

Sustainability trailblazer

Another reason for switching to Vetropack's 0.33l lightweight glass bottle is that the height of the crates containing these bottles is lower, so they can be stacked six-high on a pallet, instead of five-high as before.

All in all, this is a major step on the path towards greater sustainability – and the history of this journey goes back a long way: the first discussions between Vetropack and Mohrenbrauerei took place in 1998. "Back then, Mohrenbrauerei was the only brewery in Austria that was ▸

Mohrenbräu Spezial is now the second Mohrenbrauerei beer available in a sustainable 0.33l lightweight glass bottle from Vetropack.

willing to commit to the lightweight glass experiment," explained Mr Linder. "That really put us ahead of our time, because a packaging change of this sort shouldn't be underestimated. It includes detailed product tests – how does the bottle feel, how does the beer behave in it, what does the label look like, and so on. Then the process has to be co-ordinated with everyone involved and, finally, there is the technical conversion of the bottling plants. But at the end of the day, it's the market or the end customers who decide whether the product will be a success. In that regard, it's no exaggeration to say that we encountered some scepticism at the start. And for a long time, the sustainability issue didn't have the priority that it enjoys today. Fortunately, things have changed: nowadays, it's important for many customers – and some of them are even specifically looking for sustainability."

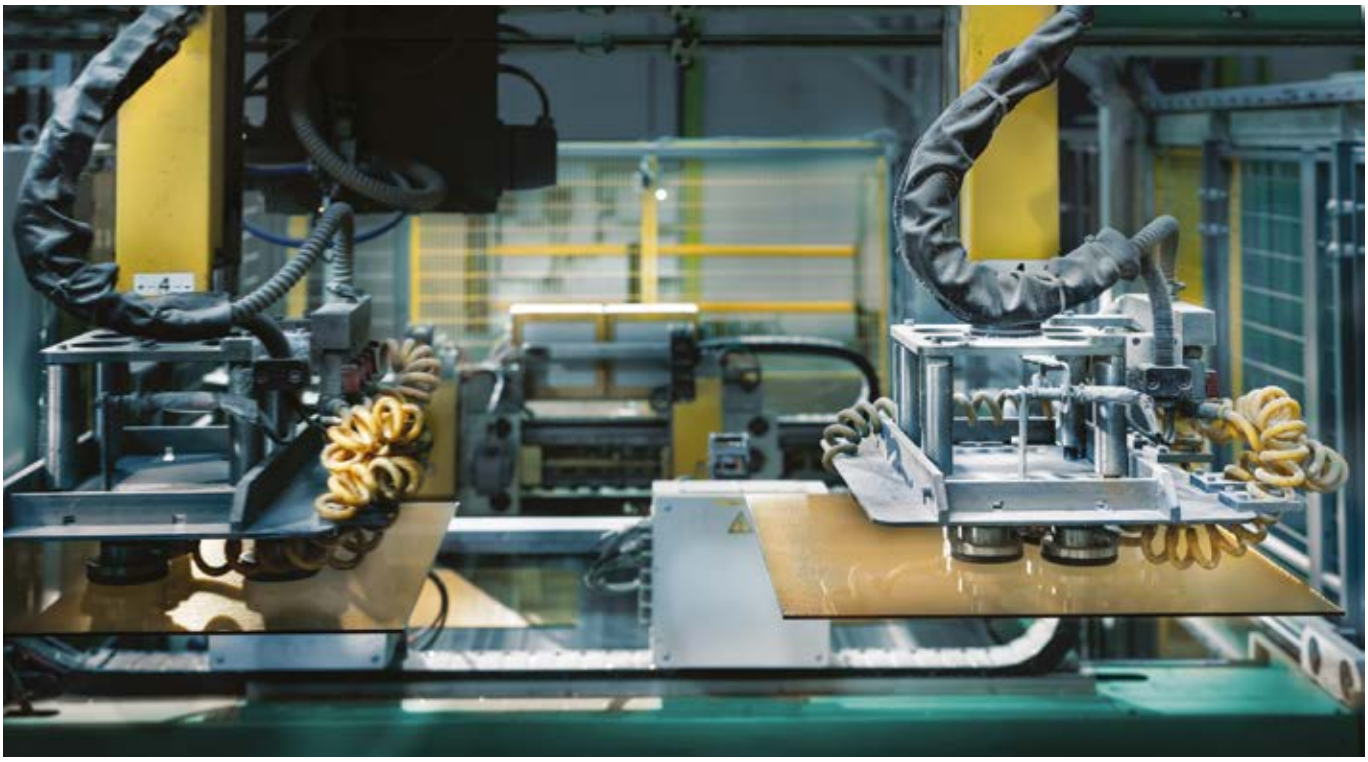
So Vetropack's 0.33l returnable bottle for Mohrenbräu Spezial comes at exactly the right time, offering a way to improve the brewery's climate footprint and make production more sustainable. But that's not all: at a time when overall beer consumption is declining throughout the world, it also gives Mohrenbrauerei access to new target groups – for example, people who pay particular attention to the environment and those who have little carrying capacity or prefer smaller quantities.

0.5-litre bottles as well?

Andreas Linder sums up: "Of course, we pioneered the lightweight glass bottle from Vetropack, and we shall miss that unique status as the new packaging becomes more widespread in the market. But its advantages are clear to see, and the potential is simply gigantic. So we're proud that we played our part in this – and, who knows? It might soon be time to extend this approach to include the 0.5l bottles. Although nothing specific is planned as yet, in principle I see no reason why the success story shouldn't continue in this direction."

About the author:
Simone Koch is Communications Director at Vetropack Group

Further information:
Vetropack Group, Bülach, Switzerland
tel: +41 44 863 34 34
email: corporate.communications@vetropack.com
web: www.vetropack.com



Using Siemens' simulation technology, Schott was able to pre-test whether the loader's layout would fit in the available space and if required cycle times could be achieved.

Fully loaded thanks to simulation

Before building a new raw glass loader for the production of ceramic glass cooktops at its site in Mainz, Germany, specialty and ceramic glass manufacturer Schott linked together a number of simulation tools to explore its capabilities. The benefits that resulted have literally paid for themselves, recount Stephan Schöppler and Timo Walter.

For more than 50 years, ceramic glass cooktops from Schott have remained bestsellers thanks to a range of technical properties. Not only are the cooktops made exclusively from sustainable natural materials but they can also withstand high temperature differences and thermal shocks. In addition, they're an extremely robust product with high chemical resistance. Having won four German 'Brand of the Century' awards (2013, 2016, 2019 and 2022), it's even more interesting to learn how Schott is able to guarantee this quality level day after day.

"Quality is determined by a large number of important factors in the manufacturing process, from melting and moulding to quality control," explains Matthias Stubenrauch, Production Manager at Schott in Mainz, Germany. It's possible to produce large batches of increasing complexity and variety only if the process works consistently on the highest level.

Simulated engineering

Material experts know that raw glass is loaded from the furnace to production lines before undergoing cutting, drilling, edge grinding and further finishing through ceramisation in a 900°C furnace. When a new machine was being built for loading raw glass in cold post-processing at the end of 2021, it was the first time that a team of Schott experts had used a comprehensive simulation instead of working on the machine directly.

For some time, Schott has been converting selected machines to 'digital native CNC,' better known as Sinumerik One from Siemens. This innovative controller represents a further component in the digital transformation of machines because it works with software to create the machine controller and associated digital twin from one engineering system – and in this way contributes to

Ceramic glass cooktops from Schott are made exclusively from sustainable natural materials and can withstand high temperature differences and thermal shocks.

the seamless integration of hardware and software.

Schott took its loader one step further: for engineering, the in-house experts immediately opted for Siemens' Create MyVirtual Machine/Operate software, which automatically meant a virtual Sinumerik One. This eliminated the need for a real hardware controller because the virtual Sinumerik One already has the Simatic S7-PLCSIM Advanced software – making it possible to generate virtual controllers for simulating an S7-1500 or ET 200SP CPU and use them for the comprehensive simulation of functions. All that was needed was a simulation computer to shift the work to a purely virtual environment.

A virtualised CNC system makes work faster, more flexible and better overall because all of the machine's functions and feasibilities can be tested ahead of time. Complete virtual modelling of the development process significantly shortens product development time while also speeding up commissioning. Collaboration within the team also took on a new facet because the digital twin of engineering creates a virtual basis for discussion where all the disciplines can easily be consulted before the real machine is built. Machine concepts and functions can be systematically discussed beforehand. This reduces the risk of misdirected investments as well as a dependence on available hardware or free test racks.

Connecting to robotics

Schott then took simulation even further. This project was the first time that the company linked its existing and proven Process Simulate robotics simulation software to Create MyVirtual Machine/Operate software, which was new to Schott. This version is ideal for plants that use a lot of robots, and raw glass loading processes are a good example of this. The Process Simulate 3D simulation platform from Siemens is a technology for robot and plant simulations. In addition to basic functions for geometry simulation and offline programming, Process Simulate has an abundance of functions for modelling plants and controllers as realistically as possible on one platform.

For example, Schott was able to pre-test whether the machine's layout would fit in the available space, whether there would be a risk of collision, and whether the exacting cycle times could be achieved. Using the geometry simulation and layout planning in the simulation system, it was possible to reduce the functional risks in machine operation to a minimum. Even before the machine was built, Schott was able to ensure the concept and acquaint itself with all the functions. Simit software from Siemens – which already had a long track record at Schott – served as the link between Create MyVirtual Machine/Operate and Process Simulate. This made it possible to couple Create MyVirtual Machine/Operate with Process Simulate and develop the behavioural model further.

Simulation during ongoing operation

The machine has now been operating at Schott in Mainz since spring 2022. If additional functions are needed, Schott won't have to shut down the line because a collaboration between a variety of simulation tools will once again prove its worth and deliveries of ceramic glass cooktops to the global markets will continue reliably. ●

About the author:
Stephan Schöppler is Global Account Manager at SCHOTT AG and Timo Walter is Sales Executive at Siemens Digital Industries Software

Further information:
Siemens AG, Mannheim, Germany
tel: +49 172 6265348
email stephan.schoeppler@siemens.com
web: www.siemens.com/glass

Gas crunch puts glass factories in peril

Skyrocketing prices for natural gas threaten to disrupt operations of glass factories across the European Union, with eastern members seeming to be in particular jeopardy given their strong dependence on Russian energy supplies, reports Vladislav Vorotnikov.

European gas prices are now about 10 times higher than their average level over the past decade, driven by fears that Russia could further restrict or even stop gas supplies in retaliation for military assistance to Ukraine. At the beginning of the Ukraine war, the Russian state gas monopoly Gazprom stopped natural gas exports to Bulgaria, Finland, Poland, Denmark and the Netherlands over non-payment in roubles.

The current energy crisis in Europe poses two major risks to the glass industry, commented Bertrand Cazes, Secretary General of Glass Alliance Europe and Glass for Europe. "First, there is a risk that gas shortage leads to interruptions in gas supplies to glass factories, which would cause irreversible damage to installations. This risk exists, but it can be mitigated by convincing authorities that gas factories need continuous energy supplies. We have convinced EU authorities of the need to prioritise glass production. The same must be done across [European] countries," said Mr Cazes.

The second risk is that skyrocketing natural gas prices would make the European glass companies less profitable and less competitive on the global market, according to Mr Cazes.

Dependence on Russian gas varies across Europe. In 2021, Bosnia and Herzegovina, Moldova and North Macedonia got 100% of their natural gas supplies from Russia, Eurostat estimated. Almost all countries in Eastern Europe traditionally relied on Russian imports, as in 2021, Latvia sourced 92% of its natural gas supplies in Russia; Serbia 89%; Bulgaria 79%; Slovakia 68%; Hungary 61%; Slovenia 60%; and Poland 50%.

The difference is drastic if compared to Western Europe, where fears over the availability of natural gas are also being voiced. In this part of the region, Germany has the highest dependence on Russian natural gas imports at around 50%, followed by Italy with 38%, France with 15% and Belgium with 14%, Eurostat reported.

Glass industry consumption

The European glass sector consumes roughly 4.5 billion cubic metres of gas per year, approximately 70–80% of the sector's total energy consumption. The total gas consumption of the glass sector represents 1.1% of all gas consumed in the European Union. This figure does not fluctuate greatly from year to year, as glass furnaces continue using gas even when a slight downturn in activity is observed, except when furnaces are completely stopped at the end of their service lives, according to Glass for Europe.

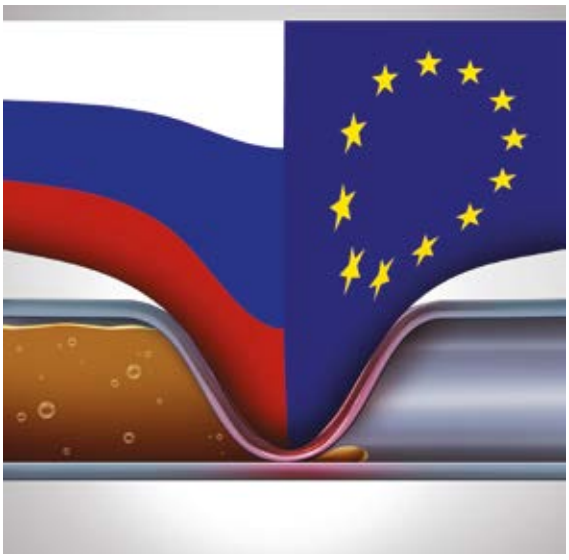
So far, there is no information that the energy crisis has impacted the [glass] output in any of the Eastern European countries.

"The industry is trying to produce [glass] in the required quantities to meet demand," noted Véronique Favry, Coordinator of Glass Alliance Europe. "On that basis, one can presume that the overall utilisation rate in the sector is high, which means anything above 85%. No production curtailment has been announced in the glass sector," she added.

Bracing for the worst

The current crisis has been building up for a while. In September 2021 – five months before Russia's invasion of Ukraine – the International Energy Agency (IEA) pointed out that Russia was preventing a significant amount of gas from reaching Europe. The IEA raised the alarm further in January, with Executive Director Fatih Birol highlighting how Russia was creating "artificial tightness" in markets and driving up prices at exactly the same time as tensions were rising over Ukraine.

In response to the Russian gas blackmail, the European Commission has adopted plans to gradually end Europe's dependence on Russian fossil fuel, completely abandoning Russian natural gas imports by 2027. These plans involve expanding natural gas supplies from alternative sources, switching to LNG and renewables, and a set of other measures. The biggest question, however, is how Europe plans to cope in the immediate future and to go through the next winter in the current predicament while alternative supply schemes are still being established.



Fears remain that Russia could further restrict or even stop gas supplies to Europe.

IEA warned European authorities not to rule out the possibility of a complete cut-off of Russian gas supplies. The analysts estimated that gas rationing is the only meaningful solution to avoid blackouts and production disruptions.

The 'Save Gas for a Safe Winter' plan that European authorities announced in July of 2022 set a target for the 27 member states to reduce their gas demand by 15% between August 2022 and March next year. That reduction is based on countries' average gas consumption during the same months over the previous five years. The plan is focused on curtailing demand by businesses and in public buildings, rather than private homes. However, there are no guarantees it will work if the flow of Russian natural gas stops completely.

"Glass companies across Europe are extremely concerned that their industrial assets may be completely lost in the coming months if gas supplies are not guaranteed to the industry," stated Véronique Favry. "Beneath industrial assets, it is the survival of some glass manufacturers and their suppliers that is endangered with repercussions in the downstream processing activities.

"This concern is above and beyond concerns of energy ▸

prices, even if current prices remain a major challenge for the whole industry," Ms Favry added. "The glass sector is therefore in need of its continuous and constant gas supply requirement-reality being recognised in both EU and national prioritisation plans for gas deliveries."

Glass industry groups in several countries warned about irreversible plant damage in the event of a Russian gas supply stoppage. For instance, in a recent statement, the German Association of the Glass Industry reported that it would take a month to restore operations if damage is sustained. The German glass companies estimated they needed around 70% of the gas quantities used in normal operation to function without impairment. This figure is likely to be similar across other EU member states.

Concern has been voiced about loss of assets in the EU glass industry if Russian gas supplies stop completely.

Biting prices

However, even if Europe manages to subvert the gas shortage, the record-breaking prices promise to hurt glass factories.

"Ten-fold increases in energy prices are bound to have massive impacts on production costs," forecast Bertrand Cazes. "Beneath production costs, it is the competitive position of Europe's glass makers that is endangered when competitors from other parts of the world, such as China, South-East Asia, the Middle East or even Algeria are still enjoying affordable energy. Ultimately, many glass production sites in Europe are or could be in danger of closures," Mr Cazes warned.

He added that current energy prices were unimaginable several months ago; they are not sustainable for most of the glass industry.

"Immediate and impactful action is needed from European authorities," stated Mr Cazes. "Under the present circumstances, the form of the support matters less than its urgent delivery and its scale. It must be proportional to the energy shock the industry is facing," he underlined.

Cost-cutting

Various European glass producers have reported embarking on cost-cutting solutions aimed at mitigating the dependence on natural gas. This is a tall order, but given the colossal uncertainty, glass factories have no choice but to seek cost-cutting options.

"Glass manufacturing is an energy-intensive process. Although we are implementing many initiatives aimed to reduce energy demands, it will not be possible to produce glass without gas in the short to medium term," commented Georg Feith, CEO of Stoelzle Glass Group.

"Our furnaces operate on gas 24 hours a day, 365 days a year. We are also providing services by using electricity in replacement of gas, in most cases, this is done while our furnaces are being built. However, a major conversion from gas to electricity is dependent on the availability of electricity from renewable sources. Currently, a significant part of the available electricity comes from gas-fired plants," Mr Feith added.

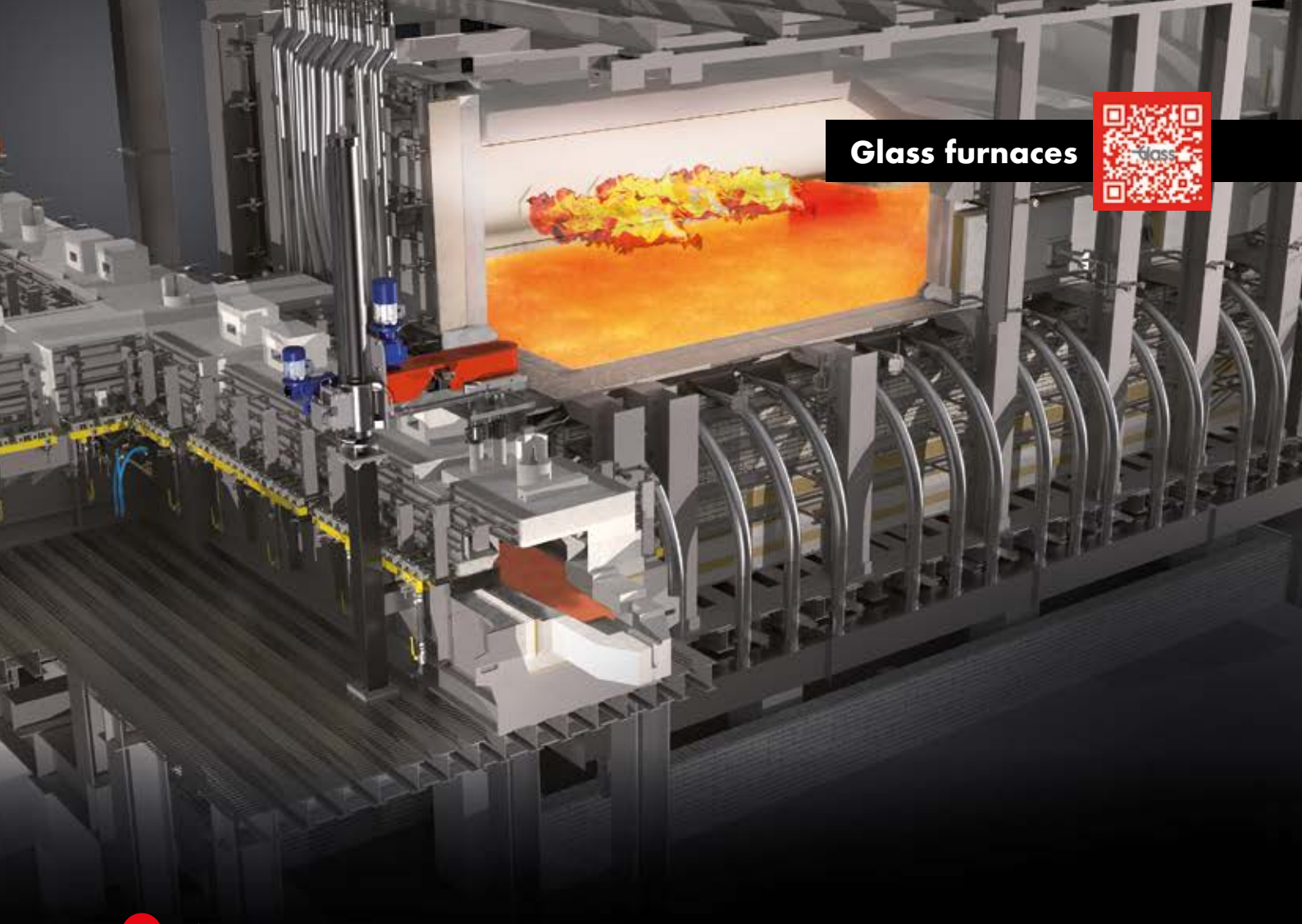
In order to mitigate the current challenges, glass factories are looking into various ways of lowering their natural gas requirements. This is a tricky task, especially since the deadline is rather tight.

"An alternative to gas is the conversion to heating oil," suggested Mr Feith. "We are currently examining options for replacing natural gas with heating oil so that in the future, we can at least fire our furnaces with heating oil and thus replace 60% of our gas demand with heating oil in individual plants. This process also requires burners, tank- and line systems, which currently have a delivery time of up to nine months," he cautioned; adding that, "When many more energy-intensive companies make the switch from gas to oil, sourcing heating oil will become challenging."

Undoubtedly, the 2022/23 season will be a big challenge for European economies and glass producers. There are also fears that the current crisis could be long-term. Belgian Energy Minister Tinne Van der Straeten has warned that unless the European Union moves swiftly to impose price caps on natural gas, the next five to 10 winters in Europe will be terrible. ●

The European glass industry is feeling the sting of the gas crunch.

About the author:
Vladislav Vorotnikov is an independent international journalist



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Glass giant exits Russia

Guardian Glass has exited Russia. One of the largest global glass companies has sold its glass manufacturing facilities in Russia. The decision to leave this country was based on Russia's expanded invasion of Ukraine in February of 2022, Richard McDonough reports.

David Robertson is the President and COO of Koch Industries.

An era ended on 28 July 2022. What began with great hope ended with the horrors of war.

Many saw opportunities for growth as countries in Central and Eastern Europe strived to secure their freedom from Soviet domination. It was in the latter years of the 20th century. The Berlin Wall had gone from an infamous barrier along an international boundary within Germany to a structure where average people could chisel pieces of concrete from the fortification. Fencing between Hungary and Austria was breached, allowing people to flee the Iron Curtain.

As the 21st century dawned, growth opportunities seemed even greater in Russia itself. The company now known as Guardian Glass was one of several global glass companies that made investments in a future that appeared to be bright. Please note that this glass company has used several names in the past few decades, including Guardian, Guardian Industries, and Guardian Glass.

Two brand new float glass plants were built by Guardian Glass in the Russian Federation. The first one in Ryazan, Russia; the second one in Krasny Sulin, Russia. Growth in the region continued to be seen as viable as Guardian Glass was acquired by Koch Industries in 2017. Yet, when the first tanks rolled across international boundaries and the initial bombs fell on Ukraine on 24 February 2022, many realised that the challenges that looked achievable in the years after the fall of the Union of Soviet Socialist Republics were no longer possible to attain.

Dawning reality

This expanded invasion of Ukraine by Russia confirmed the new reality facing the world.

The invasion and takeover of Crimea in 2014 was but the beginning of a wider effort – and longer-term goal – of Russia to destroy Ukraine as an independent nation. The war in eastern Ukraine that had killed thousands of civilians since 2014 was no longer seen by many as simply an internal struggle involving "volunteers" fighting for autonomy within Ukraine.

The military actions during the winter of 2022 made clear that decisions had to be made by many businesses that operated in Russia, in Belarus, and in Ukraine. Choices that appeared years earlier to be theorical were now mandatory. A number of businesses left Russia almost immediately. Others strived to end long-term business contracts.

On 28 July 2022, Koch Industries announced that Guardian Glass had exited Russia.

The announcement of the exit was made by David (Dave) Robertson in an email to employees. In that email, Mr Robertson, the President and Chief Operating Officer of Koch Industries, stated that "In recent months, I have kept you apprised of the latest business updates regarding the two Guardian Glass plants in Russia with approximately 600 employees. In April, I shared that Guardian was working with its local management team to find an exit strategy that maintained our commitment to employees' safety and did not result in the Russian government taking over the plants and financially benefiting from them."

"As of today [28 July 2022]," Mr Robertson continued, "Guardian has responsibly and safely accomplished this – having sold its business in Russia to Vladimir Alexandrovich Voronin, President of FSK Group, a private enterprise in the construction industry. This is an outcome facilitated and supported by plant employees and complies with all applicable sanctions, laws and regulations.

"We continue to condemn Russia's actions and aggression in Ukraine and remain united in support of all who have been harmed by this horrible conflict," Mr Robertson concluded.

Earlier statements

To provide some context for the decision by Guardian Glass to exit Russia, consider the earlier statements issued by Koch Industries, including one issued by Mr Robertson to employees on 21 April 2022. In that statement, he explained that ▸

Guardian Glass Float Glass Plant in Ryazan, Russia in the autumn of 2021. (Photo provided courtesy of Koch Industries, 7 October 2021.)

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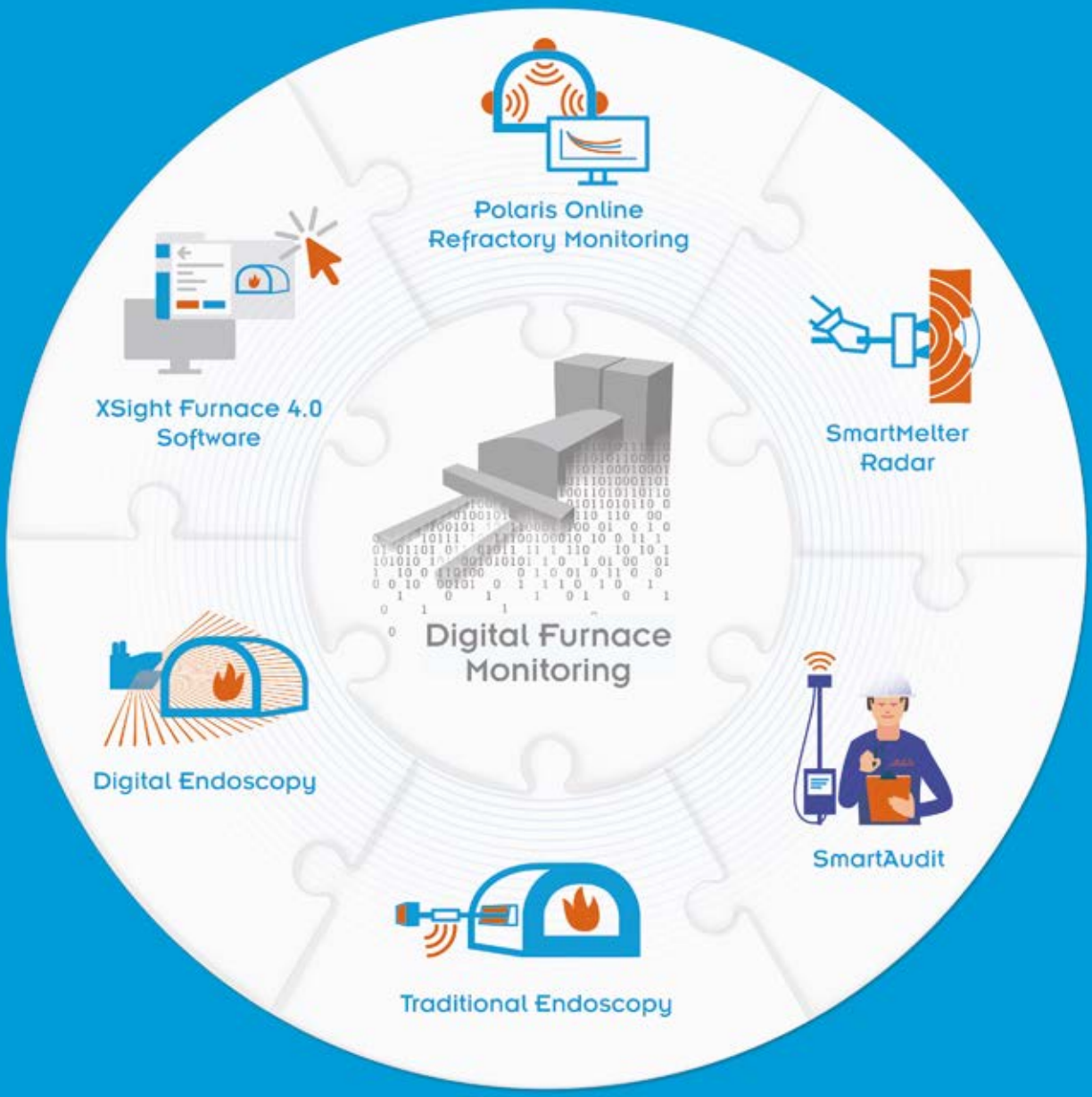

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The former Guardian Glass manufacturing facility (the large white coloured structure) can be seen in this aerial photo of Ryazan, Russia. Photo provided courtesy of the United States Geological Survey, 2022.

"Sanctions announced in early April, combined with the Russian government's response and other actions, have made conditions untenable for Guardian to continue operations in Russia. As a result, Guardian asked its Russian employees to shut down the two glass plants. When made aware of this plan, Russian authorities repeated earlier warnings that local Guardian employees would violate Russian law and be prosecuted and imprisoned if they followed through with any shutdown activities, further reinforcing our concerns for employees' safety."

Mr Robertson noted that, "As a company and as individuals, we have consistently condemned Russia's action and remain united in support of all employees and others who are harmed by this terrible war."

On 24 March 2022, Mr Robertson had detailed specific reasons why Koch Industries was continuing operations at the two Guardian Glass plants in Russia:

"It is important to clarify why Guardian continues to operate these glass facilities. The health, safety and well-being of all Koch company employees is our top priority. As I wrote last week, abandoning the Guardian plants in Russia would put our employees there at greater risk and do more harm than good. This is true for multiple reasons.

"Russian officials have threatened to punish local employees of manufacturing facilities that shut down. Specifically, the General Prosecutor's Office in Moscow has warned foreign companies that shutting down their operations may lead to criminal prosecution of local employees, including up to seven years' imprisonment. Russian First Deputy Prime Minister Andrey Belousov publicly issued the same threat to foreign companies considering exiting the country. We take these threats – and our commitment to our employees – very seriously.

"The Russian government has also stated that it would seize and continue to operate manufacturing facilities that are abandoned or closed. It's important to note that glass plants cannot simply be shut off, as they are furnaces that typically run continuously for more than 20 years before being torn down and rebuilt. They do not turn on and off like a light switch."

"If Guardian were to walk away from these glass facilities, it would give full control of the assets to the Russian government, who we believe would keep them running and capture 100% of the financial benefit.

"Finally, and contrary to false assertions, Guardian's operations do not aid the Russian war effort. None of the glass produced at the facilities in Russia is for military use. Eighty percent of the glass produced at these facilities is for residential, whilst the remainder is for office and commercial buildings.

"This is an extremely volatile and uncertain situation in which we will continue to make decisions that we believe will avoid causing harm to our employees or Ukraine. This includes complying with all applicable sanctions, laws and regulations. We will closely monitor the situation and modify our decisions as circumstances warrant. We certainly understand that others will make decisions that are appropriate for their particular situations."

About a week earlier to that email message, on 16 March 2022, Mr Robertson had issued an email to employees in which he stated that, "The horrific and abhorrent aggression against Ukraine is an affront to humanity. It violates our company's values and principles, which are grounded in the fundamental truth that the system most conducive to human wellbeing, progress, civility and peace is one based on respect for the dignity of the individual, the consistent rule of law and the right to freely exchange goods and services. Principles always matter, and they matter most when they are under pressure."

He continued by noting that "…Guardian Industries operates two glass manufacturing facilities in Russia that employ about 600 people. We have no other physical assets in Russia, and outside of Guardian, employ 15 individuals in the country. Whilst Guardian's business in Russia is a very small part of Koch, we will not walk away from our employees there or hand over these manufacturing facilities to the Russian government so it can operate and benefit from them (which is what The Wall Street Journal has reported they would do). Doing so would only put our employees there at greater risk and do more harm than good."

"To be clear," Mr Robertson stated, "Koch companies are complying with all applicable sanctions, laws and regulations governing our relationships and transactions within all countries where we operate. We will continue to closely monitor the situation and keep you updated as needed."

During the past few months, Koch Industries has donated at least (US) $1.85 million for charitable purposes in Ukraine, according to the company. The funds were designated, the company said, for "general support and employee assistance to humanitarian and refugee organisations in the region."

Among organisations receiving support from Koch Industries were Polish Humanitarian Action: (US) $600,000; World Central Kitchen (US) $300,000; International Federation of the Red Cross and Red Crescent Societies (US) $300,000; UNHCR (US) $300,000); and the Koch Employee Assistance Fund (US) $350,000. ▸

Aerial view of the former Guardian Glass manufacturing facility in Krasny Sulin, Russia. Photo provided courtesy of the United States Geological Survey, 2022.

Ryazan, Russia

In autumn 2006, Guardian Industries Corp. announced that it was going to build a float glass plant in Russia. At that time, the investment in this glass plant was estimated to be valued at (US) $200 million. According to the announcement, the plant was designed to produce 750 tonnes of glass daily through the efforts of a workforce of about 300 people in Ryazan, Russia.

Just last year – on 16 August 2021 – Guardian Glass announced an expansion of its glass plant in Ryazan. The company stated that, "to support the increasing demand for laminated glass in Russia and the Commonwealth of Independent States, Guardian Glass is adding a new jumbo laminated glass production line at its Ryazan, Russia plant. This investment supports the region's strong growth in the commercial, residential and interior sectors and, from within those sectors, the call for glass products that address safety, security and acoustic performance."

At the time, Guardian Glass saw great potential for this expansion. "This investment illustrates our continued optimism and excitement about Guardian Glass' expansion in Russia and the CIS," said Guus Boekhoudt, Executive Vice President of Guardian Glass in this news statement issued in summer 2021. "This project underwrites our vision to be a preferred partner to our customers, suppliers, employees and communities based on a foundation of mutual benefit."

"We appreciate our customers' support and are happy to keep evolving our relationship by offering them additional product options," stated Elena Rassudimova, the then-General Manager of Guardian Glass Russia, in the 2021 news statement.

In August 2021, Guardian Glass saw potential for this expansion in Ryanzan. (Photo provided courtesy of Koch Industries, 7 October 2021.)

"We are very proud of what our team and our partners are accomplishing in a challenging environment."

Krasny Sulin, Russia

A few years after beginning construction on its first float glass plant in Russia, Guardian Industries announced plans for a second float glass plant in the country.

On 24 February 2011, the company stated that it planned "to build a float glass manufacturing plant in Krasny Sulin (Rostov region), Russia. The (US) $220 million plant will be Guardian's largest, producing 900 tonnes of glass per day, and will include a technologically advanced glass coater."

This news statement indicated that estimated employment was expected to include 300 people. It was noted that the glass plant was located 594 miles from Moscow in the southern part of Russia near the Azov Sea.

"The location is a good fit for Guardian's growth strategy to supply glass to Russia and neighbouring countries," this 2011 news statement detailed. "In 2008, Guardian began production at its plant in Ryazan, Russia, serving the Greater Moscow region. Guardian was one of the first companies to invest in Eastern Europe beginning construction in Hungary in July 1989 prior to the fall of the Berlin Wall, and presently operates facilities in Hungary, eastern Germany and Poland, among other European locations."

Company leaders were pleased with the support from local leaders in Russia. "We appreciate the outstanding support we received from Rostov Governor Golubev and his administration," said Russell Ebeid, the then-President of Guardian Glass Group, in a news statement at the time. "It is evident that they view new investment as a priority, and the government works hard to streamline the development process to attract new projects that will create new jobs. Guardian is bullish on Russia given the excellent growth at our first plant in Ryazan and the customers we have in the country. The timing is right for the region and for Guardian."

"We have enjoyed strong support in Russia from both the government and a wide variety of customers," stated Lajos Sapi, a then-Vice President of Guardian Industries at that time. "We look forward to continued growth in the country as we work closely with our customers and suppliers."

Financial details on the sale of the two plants to FSK Group were not disclosed by Koch Industries. Future plans by FSK Group for the two float glass plants in Russia have not yet been publicly released by that firm.

As developments take place, *Glass Worldwide* magazine will provide further updates. ●

The Ryazan plant was designed to produce 750 tonnes of glass daily. (Photo provided courtesy of Koch Industries, 7 October 2021.)

About the author:
Richard McDonough is a civic journalist based in the USA. He writes on a variety of topics in the glass industry.

Further information:
TwoCents.News
email: gloinechronicles@gmail.com
web: www.twocents.news

Will there be a new dawn for the Ukranian glass industry?

A multi-billion recovery plan and the relocation of operations from Russia could herald the beginning of a new era for Ukraine's glass industry, particularly the float glass sector. However there is less hope for the country's hollow glass industry to mount a post-war recovery, reports Vladislav Vorotnikov.

The Russian assault is taking a heavy toll on the Ukrainian economy, which is set for a 35% to 40% contraction in 2022, as estimated by Ukrainian government officials. As many as 10 million Ukrainians were forced to flee, seeking shelter in the neighbouring countries, with hundreds of industrial facilities shut down and dozens destroyed or damaged.

The immediate future looks nothing but grim as the conflict has entered a stage described by NATO Secretary-General Jens Stoltenberg as a "grinding war of attrition." Almost all forecasts now see the war dragging on into 2023, draining resources from economies on both sides.

Since 2016, when the Lysychansk float glass factory went bankrupt, Ukraine remained a net importer of float glass. In 2021, the country imported 340,000 tonnes of float glass, worth four billion hryvnias ($150 million), data from the State Customs Service showed. Despite the tense political relations, Ukraine purchased 150,000 tonnes of float glass from Russia and 100,000 tonnes from Belarus. The rest was imported from Turkey, Poland and Bulgaria.

At the beginning of 2022, Russia and Belarus ramped up the export of float glass to Ukraine. In January–February, Russian exports totalled 273 million hryvnias ($7.5 million), up by 50% compared with the same period of the previous year; export from Belarus stood at 200 million hryvnias ($5.5 million), an increase of 25% against early 2021, the Customs Service reported. However, all trade with Russia and Belarus was halted immediately after 24 February, when Russian troops crossed the Ukrainian border.

Oleksiy Bubnov, CEO of the Ukrainian association of glass windows and facades, said that float glass is now imported to Ukraine from Poland, Bulgaria, Turkey and Azerbaijan, although in smaller quantities than before, as the domestic demand is currently nearly 50% lower compared to the pre-war level.

Ukrainian demand for glass containers dropped by 50%.

Still, the deferred demand is enormous. Nearly 116,000 residential buildings, dozens of shopping centres, industrial facilities, offices and other real estate were destroyed or damaged in Ukraine as of July 2022, the Ministry of Community and Territorial Development estimated.

As the fights and shelling continue, housing construction has been nearly stopped across Ukraine. Investors are not rushing to embark on new projects, [nor] citizens to replace broken windows, said Mr Bubnov, adding that the delayed demand is likely to manifest itself this autumn, closer to the heating season, when living with shattered windows would not be an option for citizens any longer.

Eyeing post-war recovery

In July 2021, Ukrainian President Volodymyr Zelensky rolled out a $750 billion recovery plan for Ukraine, involving reconstructing infrastructure objects and residential buildings. Denys Shmyhal, the Ukrainian Prime Minister, said Ukraine's direct infrastructure losses amounted to more than $100 billion, adding more than 1,200 educational institutions, 200 hospitals and a countless number of infrastructure objects that were destroyed or damaged.

The new plan is expected to be at least partly covered by Russian assets frozen in Western jurisdictions since the beginning of the invasion. Over the past few months, top European politicians and lawmakers have spoken in favour of the idea of using frozen Russian assets to rebuild Ukraine. Western countries now have $30 billion worth of assets belonging to sanctioned Russians and over $300 billion worth of Russian Central Bank reserves.

Natalia Yeremeeva, head of the Ukraine glass company Stekloplast, said that the first signs of enormous demand for float glass are already seen. In particular, the company evidences an inflow of customers from

the Kyiv region, where heavy fights against the Russian troops took place in March-April.

"The picture is similar in other regions. For example, Kharkiv needs to be glazed nearly all over again," explained Ms Yeremeeva, adding that Stekloplast had considered moving its production westwards, far away from the front line as many other companies did. However, once the war is over, the highest demand for float glass is expected to be seen in the eastern regions, where the heaviest fights take place, so it was decided to keep production in Dnipro.

Ms Stekloplast reported that the company is running on its stock of glass, which will not last for long. However, a lack of workforce is the biggest challenge. According to Ms Yeremeeva the company is struggling to find new employees as most young men have joined the armed forces to defend their country.

The city of Licychansk, Ukraine.

Float glass plant becomes reality?

Since the bankruptcy of the Lysychansk float glass factory, several companies reportedly mulled plans to build a new float glass factory in the western regions of Ukraine. However, these plans have not materialised, owing to limited domestic demand and tough competition with glass suppliers from Russia and Belarus.

Alexander Kirilenko, co-owner of the Ukrainian glass windows manufacturer FRAM, calculated that building one float glass factory with two production lines (worth some $800 million) would be enough to meet the domestic demand, although he believes this is not likely to happen any time soon. "Rather, it would be built on the border with Ukraine in one of the EU countries," he said, admitting that investors require stable conditions and cheap natural gas to justify building a float glass plant.

The main reason why Russian and Belarussian imports dominated the Ukrainian glass market in the past few years was that they had access to cheap natural gas, explained Mr Kirilenko. Glass imports from Europe, on average, were 30% more expensive

compared to the Russian glass, and this year due to a sharp Ukrainian hryvnia devaluation and a further rise in the natural gas prices, the price of float glass on the Ukrainian market jumped by 50% to 100% compared to last year, he estimated.

However, as trade ties with Russia and Belarus look to be broken entirely, and it is hard to imagine supplies from the eastern neighbours will resume any time soon, Ukraine may eventually see a float glass plant built in the country.

Oleksiy Bubnov disclosed that there is a potential investor ready to build a float glass plant in Ukraine, but that work could be only started when the fighting ends.

More float glass will be required to rebuild damaged infrastructure and residential buildings.

Ukraine businesses also harbour hope that some of the world's largest glass manufacturers could relocate their production assets from Russia to Ukraine. Since the beginning of the invasion, Western businesses have found themselves under pressure to sever ties with the Russian market. Asahi Glass Co. pledged to suspend investments in its Russian factory, while Guardian announced its intention to pull out from the country (see page 66).

Ukraine's leading economic publication *European Pravda* suggested that the mass exodus of Western companies from Russia could raise the chances of a float glass factory construction in Ukraine in the next several years.

Bearing the cost of war

In the hollow glass industry, the post-war recovery looks like a tricky task since the financial situation in the segment was dire even before the Russian invasion. In early 2022, the

Ukraine used to import float glass from Russia and Belarus.

Ukraine Glass Association reported that three hollow glass plants had suspended operation due to soaring natural gas prices.

"Glass companies in Ukraine are rapidly becoming unprofitable and are actually at the stage of bankruptcy and complete closure," stated the association. "Ukraine may lose an entire sector of the real economy and significantly increase its own import dependence, which is a direct threat to the national economic security of the state."

With the beginning of the Russian assault, the market situation deteriorated further, as the upward rally on the natural gas market accelerated, while a significant share of glass container producers and beverage companies suffered destruction. For instance, the Kyiv region's authorities reported that the Vetropack plant in the Hostomel sustained some damage. In early March, this part of the country was occupied by Russian troops. The invaders were repelled in April but at the cost of immense destruction.

Local business unions estimate that the demand for glass containers in Ukraine has plunged by nearly 50% due to mass immigration. Most Ukrainian beverage producers temporarily suspended operations or now work at a low capacity utilisation ratio.

The future of the Ukraine hollow glass industry is tightly linked to consumer demand and progress on the battlefield. Currently, millions of Ukrainians have ended up in territories controlled by Russians, while millions more have fled to Europe.

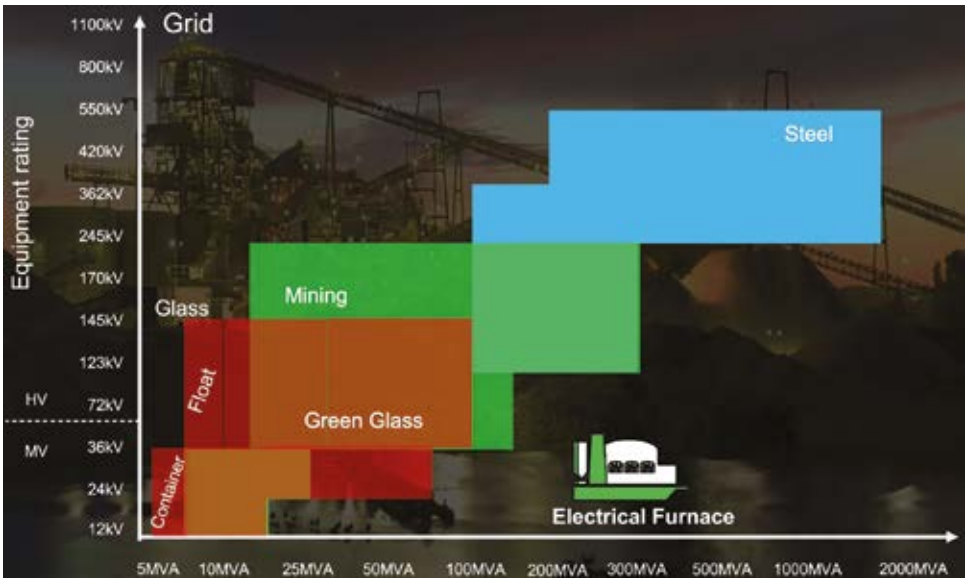
Margaritis Schinas, Vice President of the European Commission, estimated that from 2.5 to three million refugees might eventually stay in Europe. The longer the war rages, fewer Ukrainians will ultimately return to their homeland. Before the beginning of the fully-fledged war, the Ukrainian population was estimated to be close to 45 million. One of the key questions now is what shape and size the Ukraine market will have when the war is finally over. ●

About the author:
Vladislav Vorotnikov is an independent international journalist

Powering 'Green' Glass for a sustainable future

René Meuleman considers the power requirements for hybrid furnaces and fully-electrical boosting, and reveals how Schneider-Electric can help glass manufacturers to prepare for the evolving energy mix that is necessary to achieving decarbonisation goals.

René Meuleman, Senior Solution Architect 'green' glass at Schneider-Electric.



Stepping up to high voltage will be unavoidable.

Our purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. At Schneider Electric we call this 'Life Is On'. Furthermore, we say that electricity is the most efficient and best vector for decarbonisation; and when combined with a circular economy approach and solutions, we will achieve a climate-positive impact as part of the United Nations' Sustainable Development goals.

The mission of our 'Green Glass' initiative, the one I am part of, is perfectly aligned with this. When Dave Fordham from *Glass Worldwide* asked me if I would like to contribute an article, of course I said "yes". We at Schneider Electric are highly motivated and fully engaged to help industries of the future achieve their decarbonisation goals, today and tomorrow.

Our past

Let's first look back to understand where the glass industry came from, starting with one of the biggest game changers ever: the regenerative furnace. The world's first commercially successful regenerative furnace was built for a small glass making company at Rotherham, South Yorkshire, in 1860.[1] Since that day, the industry has dedicated a lot of R&D money and effort to keep on increasing the energy efficiency of fossil fuel-fired glass furnaces, and progress continued until the start of the third millennium. Further energy improvements have now almost come to a stop, which leads to the conclusion that the traditional regenerative furnaces are no longer improvable without the introduction of additional, mostly expensive add-ons such as batch preheaters or waste heat recovery systems. We still need to consider these but they will not provide the solution.

It is interesting to note that in 1859, almost at the same time, John Tyndall – Irish physicist, Fellow of the Royal Society, and a spectacular Victorian-era beard-with-no-moustache kind of guy – added detail to Fourier's concept of the warming atmosphere. In particular, he found evidence showing that it was water vapour and carbon dioxide that trapped heat in the atmosphere.[2]

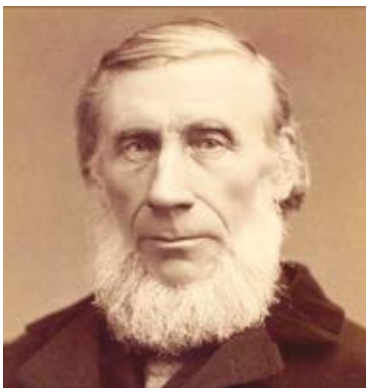
Our present

Today, the glass industry has come to a point in time in where, instead of using fossil fuels, it has started to consider alternative, renewable heat sources to run energy-intensive melting, fining and conditioning processes. One goal is a reduced carbon footprint in order to maintain a social licence to operate. The obvious choices seem to be electrical energy or the use of hydrogen. Both have pros and cons, and they share availability, cost price and infrastructure problems. Many initiatives are investigating the use of both, separately and together in hybrid solutions, which is good. The glass industry needs to know its options. But knowing that electrical energy for direct heating is far more energy-efficient than producing and then burning hydrogen, and greatly reduces NOx and SOx emissions, it's already safe to say that electrical energy will play a major role in future glass manufacturing.

Our electric future

For float and container manufacturing, we must look at the amount of installed power; for the furnace alone this will reach from 12MW up to 50MW. When focus shifts from combustion systems towards electrical boosting installations, not only will furnace designs start to look different but electrical utility systems around the furnaces will also change.

With hybrid furnaces, we even would need to consider both combustion and electrical heating systems. Perhaps even consider on-site electrolysis which will put another burden on the amount of



John Tyndall discovered the impact of CO_2 emissions on global warming in 1859.

installed power required. Systems will move from low and medium voltage up to high voltage equipment, and ensuring those systems are as energy efficient as possible is an absolute must. More space will be required and figuring out how and where to position those systems will be unavoidable.

It ultimately changes the energy mix of glass sites: electricity being the major power; a significant portion being fully reliable; and all electric supply being produced from sustainable sources.

How can Schneider Electric contribute?

In most cases however we need to answer the question of how to get the required electrical power into the plant first. Will the grid accommodate it? What will it cost and how will the price per MWh develop? In most regions, this alone will be a challenge. Our Energy and Sustainability Services team possesses the knowledge to assist you in overcoming those problems.

The requirement for more electrical boosting power will also lead to more and bigger electrodes running higher currents. Size and number of electrodes are limited but nevertheless, power control systems will need to move up in current and input voltage. To keep capital spending and operational costs down and evaluate the space required, Schneider Electric uses sophisticated systems design tools; systems, transformers and power control will change and we are finding clever ways of controlling those systems at the same time.

Safety and maintenance of electrodes will become increasingly important. The way we look at electrical furnace boosting is changing dramatically, and we have our analytics and AI teams, together with our partners, focusing on these complex problems as well.

Once the furnace is in operation and becomes part of the value chain, we must make sure it is also as energy-flexible as possible to accommodate the utilities to get us the best electrical power tariffs in return. Schneider Electric Green Glass together with our partner CelSian are working on tying modelling, control and EcoStruxure Microgrid Advisor together to get the most out of furnace designs.

Schneider envisions a process transformation and a complete plant design in which Power & Process are closely integrated from the early design phase to long term operations and energy management.

Conclusion

Although the glass community is facing extremely complex problems, these are exciting times in which the industry will come back on top and will find new technologies having an impact similar to what the regenerative furnace had 160 years ago. Let's do what we need to do together!

In the spirit of John Tyndall: "Experimental facts alone cannot satisfy the mind: we desire to know the cause of the fact; we search after the principle by the operation of which the phenomena are produced."

1 "Glass Technology" – *European Journal of Glass Science and Technology Part A,* Volume 54, Number 3, June 2013, pp. 93–99

2 https://science.anu.edu.au/news-events/news/how-we-discovered-climate-problem
https://www.bbc.com/news/science-environment-15093234

About the author:
René Meuleman is Senior Solution Architect 'green' glass at Schneider-Electric

Further information:
Schneider-Electric, Baarn, the Netherlands
tel: +31 6268 79952
email: rene.meuleman@se.com
web: www.se.com

On the Spot... Arun Varshneya

Following his election as the Society of Glass Technology's 58th President, Arun Varshneya of Saxon Glass Technologies exclusively outlined to *Glass Worldwide* the organisation's current priorities and the ambitions for his tenure.

GW: What does it mean to you personally to be elected as the new SGT President?
My first reaction is to thank my late father in India who had the vision way back in early 1962 to ask me to join the Department of Glass Technology ('Elmfield') [at the] University of Sheffield as a B.Sc. student. He must be feeling very proud today and saying, "See, I told you so!" from the heavens. Soon after I arrived, I watched the SGT staff in the Elmfield library working hard with the abstracting service for the *Journal of the Society of Glass Technology Transactions.* It was impressive to watch their dedication. Sixty years later with [… myself] becoming the SGT President, those library meetings have now come around in full circle. It is a great personal honour.

GW: How long have you been involved with the Society and in what capacities?
You can argue that I have been involved with the SGT since August 1962. In 1968, I helped with the organisation of the International Congress on Glass in London in some small way. My active involvement since has been the major undertaking of having my textbook, entitled *Fundamentals of Inorganic Glasses* second edition, published by the Society. They did a marvellous job. Other activity has been publishing, reviewing and teaching a short course on glass on behalf of the Society and continuing to help organise and participate in technical meetings.

GW: What challenges and opportunities come with presiding over a UK-based body from America?
The 'Big Pond', I hope, won't deter my staying connected with the membership. I hope to use 'cyber technology' to communicate frequently. Physical presence could be a bit difficult, but I hope to travel to the UK for important occasions. Remember though:
'How fleet is a glance of the mind,
Compared with the speed of its flight
The tempest itself lags behind,
And the swift-winged arrows of light.'
(From *The Solitude of Alexander Selkirk* by William Cowper)

All we have to do is to just 'think about each other' frequently to stay connected!

But, since I am also quite active in the American Ceramic Society and the International Commission in Glass, my feeling is that opportunities for 'cross-pollination' of ideas can only help.

Arun Varshneya (right), Saxon Glass Technologies President and new SGT President with Stuart Hakes, FIC CEO and outgoing SGT President.

GW: What legacy does immediate past President Stuart Hakes leave behind?
Stuart clearly worked hard to guide us through the pandemic. I was concerned that the SGT could go ▸

SGT gathering at a recent GPC event in America.

under but he managed to keep us afloat; he managed to retain the key (hardworking) staff. That is a unique experience I hope the SGT doesn't have to go through again. [Among other] wonderful things he did was to establish great relations with *Glass Worldwide* and Glass Futures. In time, these working partnerships should prove to be invaluable.

GW: What do you consider to be the SGT's primary objectives?

Like all non-for-profit organisations, the primary objective has to be the dissemination of sciences, technologies, the arts, and the history to the benefit of the society-at-large. This is usually accomplished by way of timely publications and organising technical meetings with regular frequency. A corollary of the primary objective is also to outreach the young and [older candidates] to encourage them and motivate them to find careers in glass and to stay connected.

Alfred's Ceramics Corridor Innovation Centre, which houses Saxon Glass Technologies Inc.

GW: What will be the main focus of your tenure?

1. Increase membership. We may need to review what benefits are being provided in lieu of the membership dues.
2. Develop a 'Glass Alliance', much like 'Star Alliance' [the world's largest international airline alliance, comprising 26 member airlines]. SGT members should be 'cross registered' in other societies such as the American Ceramic Society to be able to attend their meetings at 'membership rates'. Likewise, ACerS members should be able to attend an SGT meeting at membership rates. There may be options to [allow] online access to 'other society' publications at reduced rates. We already have an alliance with the Deutsche Glastechnische Gesellschaft for the common publication of technical journals and close working relations with *Glass Worldwide* and Glass Futures. I would like to expand on them.
3. Enhance the technical quality of publications and invite increased submissions. To this end, I welcome Professor Alastair Cormack as the first step in this direction.
4. Develop 'Sustainability Through Glass' symposium at the annual meeting, or in conjunction with Furnace Solutions. On the US side, a glass conference relevant to the glass industry is the Glass Problems Conference (GPC) offered by the Glass Manufacturing Industries Council (GMIC) and the Alfred University. The conference is endorsed by *Glass Worldwide* and the American Ceramic Society. The GPC is very broad in its coverage. I would like to offer a more focused conference on 'Furnace Solutions and Sustainability through Glass' covering energy solutions, zero carbon approach, resource conservation, environmental protection and recycling. I think that we could be unique in such an offering on the eastern side of the Atlantic.

GW: How relevant is the SGT to young glassmaking professionals and students, and how can glass compete with other industries to attract future workers from the graduate pool?

Well, if I look back, the SGT was very relevant to me (and I seem to have done alright). I found excitement in reviewing and proof-reading the late Professor Alfred R. Cooper's papers in SGT's *Phys Chem Glasses*. The discovery that alkali ions can move under the influence of an electron beam while analysing quantitatively for constituents using an electron microprobe hooked me [on] glass research and to connect with the glass professionals through the SGT. I do believe the young will be motivated through SGT to seek careers in the glass profession. I also think that glass as a material will gain more importance relative to other materials in our conversations over a pint.

GW: In recent years, *Glass Worldwide* has assisted in facilitating and promoting SGT get-togethers at international events such as the Glass Problems Conference. Can we expect an even greater global presence from the Society moving forward?

Certainly. The wonderful relationship with *Glass Worldwide* has been invaluable to the SGT. I have already had a preliminary conversation with the Director of the GMIC who, along with Alfred University organises the GPC, over our closer collaboration. There are some other notable glass industry-related international conferences which are more of the trade show type. Among these, Glassman, glasstec, and Glass Performance Days are quite well-known. We will need to explore new ways to interact with some of these to increase our global presence. ▸

The SGT's Furnace Solutions conference in June 2022 attracted a record audience.

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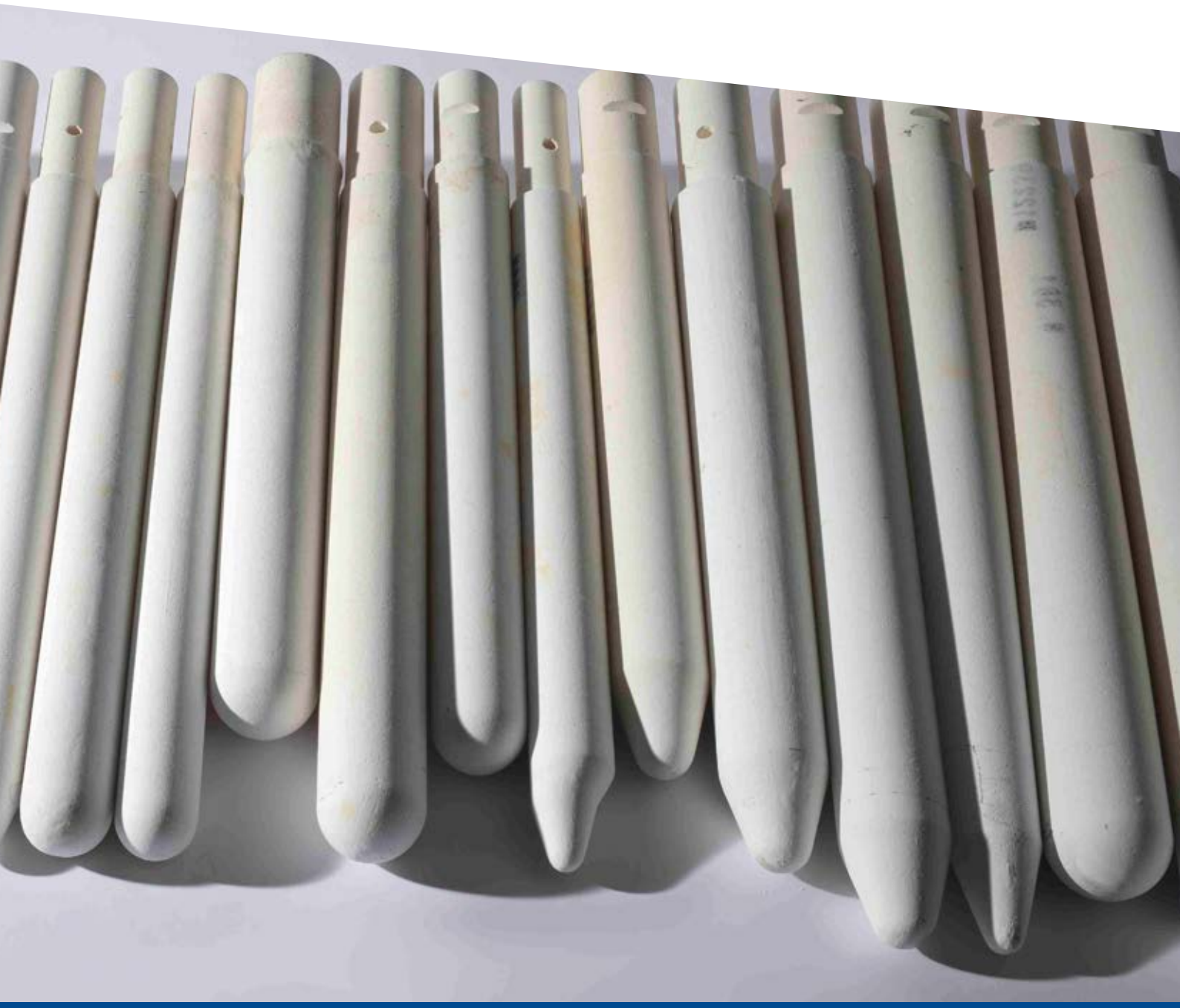

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GW: How will the Society co-operate with other international bodies for mutual benefit, such as the American Ceramic Society (ACerS)'s Glass and Optical Materials Division (GOMD)?
The same applies to the GOMD. Since I have a fair standing within the GOMD, I have had many individuals who have offered to help. All do feel that the SGT, ACerS, perhaps the Indian Ceramic Society and maybe even the Japanese Ceramic Society should come closer. Perhaps my concept of a 'Glass Alliance' will take form, hopefully before my term is over.

GW: How do the SGT's publications contribute to the industry?
SGT is fortunate in having a partnership with the Deutsche Glastechnische Gesellschaft in bringing joint publications which cover European glass industry. In the USA, the *International Journal of Applied Glass Science* focuses on applied glass topics of interest to the industry. I also think the close working relationship with *Glass Worldwide* is a huge plus in connecting with the glass industry. We perhaps need to cultivate these relationships with more and more publications and gear ourselves to organise conferences on topics relevant to the glass industry.

GW: What role do SGT events play in proceedings, especially the Furnace Solutions Conference which attracted a record audience in 2022?
Furnace Solutions of the SGT is about the only platform where issues of glass furnaces are the central theme. As I mentioned previously, a close 'competitor' would be the annual Glass Problems Conference in Columbus OH. I think that [… large] distances often deter physical attendance in light of the issues initiated by Covid-19 pandemic. There is room for regional-focus conferences to satisfy the membership.

GW: What are the Society's plans for events in 2023?
Currently, I understand the Furnace Solutions and the Annual General Meeting with technical presentations are being organised – somewhere I would like to insert a 'Sustainability through Glass' symposium. Additionally, I would want to have a regular meeting on glass in healthcare.

GW: If a reader of *Glass Worldwide* was considering becoming an SGT member, what advice would you offer?
My advice to potential members has always been, "Walk with us" and start spending volunteer time to help with the organisation of symposia on various topics and actively participate in committees to make yourself visible. Make yourself heard in the process. SGT members often enjoy lots of camaraderie. You could learn to smile end-to-end!

GW: Following on from your Personality Profile interview in the May/June 2019 issue of *Glass Worldwide,* what are the latest developments at Saxon Glass Technologies?
Our focus has always been on glass in healthcare. I take pride in the development of the chemically-strengthened glass cartridge that created a market revolution, more so because the device helps save thousands of human lives each year. (Do you recall Alan L., Manager at the Las Iguanas Restaurant in Quayside, Cambridge, September 03, 2018?). Interestingly enough, we are working on yet another 'life-saving' glass product which we hope will make a revolutionary change in the way surgeons treat injuries. We are, however, several years away from the marketplace so I can only be hopeful.

GW: What pointers on lightweighting would you pass on to the wider glass container industry following the success of chemical toughening at Saxon?
Immersing in a bath of molten salt is not the only way to strengthen a glass product. Please read my series of three articles with "Lessons Learned and Yet to be Learned" ending in their titles in the *International Journal of Applied Glass Science.* The most pertinent publication is the "Stronger Glass Products: Lessons Learned and Yet to be Learned" in *IJAGS* 2018; pp140–155. Look forward to a 'high-view'-type publication encompassing the three articles, where I may be analysing the various lightweighting techniques and discuss the plusses and the minuses, hopefully in *Glass Worldwide.*

GW: Is there anything else you would like to add?
"Learning is a never-ending pleasure" is my usual tagline whenever I autograph my textbook. But beyond that, I would like to see all of us glass professionals develop a sense of responsibility towards Mother Earth for her protection for generations to come. These generations ought to be able to "sing Heigh-ho! unto the green holly, this life is most jolly" (from *As you Like It* by William Shakespeare). ●

Further information:
Society of Glass Technology, Sheffield, UK
tel: +44 114 2634455
email: christine@sgt.org
web: www.sgt.org

Saxon Glass Technologies Inc, Alfred, NY, USA
tel: +1 607 587 9630
email: varshneya@alfred.edu
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In distinguished company – Dr. Corinne Claireaux was a speaker at the IYoG opening ceremony in Geneva in February 2022.

Developing future glass experts

CelSian's Academy provides ever-evolving training courses for the glass industry. Glass Scientist, Trainer and Manager of the Academy Dr. Corinne Claireaux shares her journey into the glass industry and explains how pop star Beyoncé helped to inspire her teaching methods.

"Being a girl is no reason for not being good at maths." This sentence can sound a bit tough at first but, in reality, it was only the reflection of my mother's care for me. It was indeed one of her life mottos that she kept on repeating when I was younger, and I am happy she did! Those words stayed with me and guided me towards my studies in science and then a career in that field.

I started my glass education at the University of Rennes, France, which has a large and dynamic glass team. The lecturers were passionate and by highlighting how glass is a complex and useful material, they made me fall in love with it. This passion for glass is what I try to reproduce and convey when I give lectures during our courses. I am constantly searching for this "Wow!" moment when the trainees' eyes sparkle. As a trainer, there's nothing more rewarding and enjoyable than the atmosphere in a room when the content of the course perfectly aligns with the audience – when a new skill or concept is acquired and a door opens in their minds.

Advocate for glass science

I had the chance to do an internship in Turku, Finland, at Åbo Akademi, on bioglasses. One year later, I was working as an intern in Saint-Gobain Recherche on innovative windows. Versatility is what makes glass such a wonderful material. It is at the same time a mass-production commodity and a state of matter that is studied academically. It can be used to repair your bones and your teeth, protect you from the rain while letting light in, insulate your home… I am still fascinated by the diversity of its applications.

I've never looked back since and I heavily advocate for glass science every time I meet students. There's chemistry and physics; history and innovation; fundamental and applied research; heavy-industry and small, specialty, handcrafted production; there's science and beauty; we need this material so much that it is produced everywhere in the world… I could go on and on and on.

Part of my education comes from national and international glass organisations such as the USTV in France, which organises many events, seminars, conferences and workshops, and the ICG, which organises a summer school with high-quality lectures provided by amazing scholars. In addition to being educational, these gatherings and events make people feel they belong to a community. That is a key strength of the glass world.

Dr. Corinne Claireaux is Glass Scientist, Trainer, and Manager of CelSian's Academy.

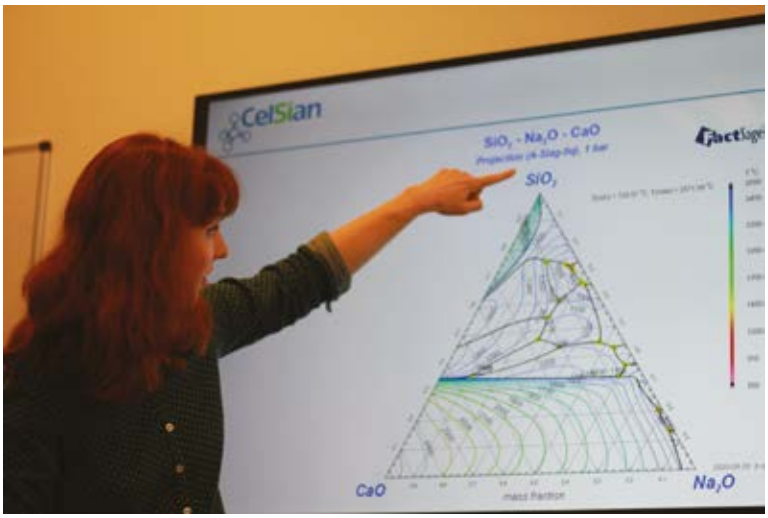
Saint-Gobain is a big company that invests in research.

One illustration of this commitment is its joint unit with the national French centre for research, called the SVI. That's where I did my Ph.D., at the interface between academic and industrial research and development. That allowed me to smoothly integrate into the R&D centre as a glass researcher, and join CelSian five years later.

Opportunities at CelSian

CelSian is full of knowledgeable and dedicated people. We have clear goals and a lot of freedom in the way we achieve them. In every job, there's a work/reward balance. I would say that the difference between working in a big multinational company and at CelSian is that the balance is pushed up. I am not sure I would have had the once-in-a-lifetime opportunity to be a speaker at the International Year of Glass (IYOG) opening ceremony, in the United Nations building [see the March/April issue of *Glass Worldwide*], if I would have worked anywhere else. Thinking about it still gives me goosebumps.

This type of progression from the university to the industry could be an inspiration for other glass companies. Overall, it is difficult to find glass experts. A solution might be to find and develop future glass experts when they are still in the early stages of their careers. Give them a chance when they are still freshly graduated, fund them, train them, and help them build their expertise. Of course, this advice also applies to glass professionals with a longer career. By investing in the training of your team members, you contribute to making them become great professionals and you can improve your talent retention. To quote Henry Ford "The only thing worse than training your employees and having them leave is not training them and having them stay".



Part of Dr. Claireaux's education comes from national and international glass organisations such as the USTV and the ICG.

The diversity challenge

When I started my studies in science in 2006, gender imbalance was significant. In my generation, there were only 20% of females. Unfortunately, gender imbalance is a known fact in what we call the STEM (Science, Technology, Engineering and Mathematics) disciplines and the glass industry is no exception. I am disappointed by the lack of women in the glass industry, and the answer to that complaint is always the same: no one can find skilled women. That's not a satisfactory answer because actions can be taken and one thing that can be done is to train them!

Also, listen to the few women who made it to the factory floor. What could be done to improve their daily life? Their work? Do you offer suitable, female-size PPE? Are the female toilets at the other ▸

Corinne Claireaux presenting 'Empowering the industry through education and collaboration' at the IYOG opening ceremony.

end of the factory? Are there still jokes about who should make coffee? Do you offer flexible working hours and options for home office or remote work? If something is too heavy for a female to lift, too high for a female to reach, or too hard for a female to withstand, perhaps it would be best for everyone, and not only females, to ensure that the tasks are achievable in a safe way with a reasonable amount of effort? Diversity is an improvement for all, and a way to enrich the workplace. I strongly believe that such commitments are the best way for a company to attract young people and future talent. Besides, most university graduates are female. These days, as the glass industry is facing major challenges regarding CO_2 reduction and energy savings, it is important to attract educated workers, and therefore to be attractive to female workers as well.

The glass industry is aware of the diversity challenge and is already taking action. Luckily, there are some great examples to look up to: Prof. Alicia Durán who was president of the ICG when the IYOG was granted, Corning's Principal Research Scientist Dr. Irene Peterson, Saint-Gobain Recherche Paris' Scientific Director Dr. Emmanuelle Gouillart, Şişecam's Glass Technology Director Dr. Ilkay Sökmen, amongst many others. There are many company initiatives, such as the woman in ENCIRC charter. It shows quantitative objectives and lists the way they monitor and intend to achieve them. It includes recruitment strategy, pays equality, training, promotions, education and feedback. I was really happy when I read that Lara Edison won the Michael Garvey award at Furnace Solutions. That's what happens when bright women are placed in a smart environment. I also like the example set by Visy Logistics in Australia. To face the shortage of truck drivers, they created a Female Driver Trainee Programme consisting of a fully-paid, four-week intensive driver training course to obtain a Heavy Rigid Vehicle Licence. One stone, two birds: more truck drivers and more diversity in a massively male-dominated position. Again, training is a very powerful and pragmatic way to increase diversity in the workplace and I hope CelSian's Academy can play a role in it.

Investing in employees

Training is key to the success of a team or a company. First of all, it provides employees with the knowledge and skills they need to perform their daily job. Such knowledge transmission can be achieved by internal training, tutoring and mentorship of newcomers by skilled experts. Providing your employees with training shows that your company cares and invests in them. It contributes to improving morale and adhesion. Now the next step is to provide employees with additional, comprehensive training to improve their capacity to articulate ideas about improvements. Well-trained teams encourage proactive and innovative behaviour. Finally, training allows employees to acquire skills they need to do other jobs, which gives extra flexibility and supports job rotation and career advancement. Training and learning opportunities have a clear positive relationship with scores on workplace well-being and establishment performance. That's why CelSian's Academy, and before that the TNO glass group, has been providing training courses for the glass industry for more than 30 years.

It all started with the General Glass Technology course, a five-day comprehensive training course on glass science and technology developed with the NCNG, the association of the Dutch glass industry. The programme is intense, rich and diversified to be suitable both for complete newcomers to the glass industry and for experts who are looking for a broader overview. During this course, we explain the 'whys' behind the 'hows'. We know that well-trained teams are faster at understanding the root cause behind a problem and taking action to solve it. It has a direct impact on productivity, furnace lifetime, and production quality. These teams understand the reasons for some good practices; they can question them and innovate further. This course is a must-have for every batch and furnace manager, assistant, supervisor and glass technologist. It's such an intense course that it comes with an 800-page handbook that contains the contribution of more than 50 experts from the glass industry and academics. The book was revised in 2020 and we are now on the fifth edition. We always feel very proud when we visit customers and spot the handbook on someone's desk!

Always learning

We also know that providing a training course once to one employee is not enough for motivation and knowledge retention. [CelSian's] portfolio of courses is increasing every year, with shorter, dedicated courses for beginners and experts on different topics. Redox, combustion and NOx emissions, electric systems, sustainability… we try to pinpoint useful topics for the industry. We rely on the knowledge of CelSian's team and external trainers such as Neil Simpson. We carefully listen to feedback too: the newly created courses on annealing and tempering or refractory selection, maintenance, and defects follow suggestions from the industry. Remaining up-to-date is important so we always keep our eyes and ears open.

Even though I've been working in glass companies for more than 10 years, I learn new things every day. Being fed with knowledge keeps me motivated. Then, at CelSian's Academy, we are transforming these stories, papers, articles, books, experiments, observations and videos into compact, accessible, insightful, practical courses. Our work mixes technology and creativity, hard science and human knowledge. Most of us are scientists and technologists, and we are trained in education and teaching techniques by external partners. For example, when the Covid-19 pandemic hit and we were not allowed to meet in person anymore, we had to adapt and we learned how to provide interactive, dynamic, and powerful courses online. We also adapted the schedule of our courses to allow more people, especially those located in Asia and the Americas, to join in without [having to] wake up in the middle of the night or stay connected [until] late. Training requires knowledge, technique and a little bit of performing as well. What trainees don't know is that before starting a course, I always wonder: what would Beyoncé do? ●

About the author:
Dr. Corinne Claireaux is Glass Scientist, Trainer, and Manager of CelSian's Academy

Further information:
CelSian Glass & Solar BV,
Eindhoven, The Netherlands
tel: +31 40 249 0100
email: infodesk@celsian.nl
web: www.celsian.nl

Product management fit for a Smart Plant

A Smart Plant requires smart product management. Hans Renders, Head of Product Management, explains how Heye's approach helps to ensure economical, repeatable, safe and sustainable glass production, offering the best product mix to customers worldwide whilst preparing for upcoming global challenges.

Hans Renders, Head of Product Management, Heye International.

Based at Obernkirchen, Germany, Heye International supplies production technology, high performance equipment and extensive know-how to the international glass container industry. The company's mechanical engineering has set industry standards for more than five decades. Its three sub-brands HiPERFORM, HiSHIELD and HiTRUST form the Heye International equipment portfolio, addressing the glass industry's hot end, cold end and service requirements.

What are the most significant trends affecting customer decisions?

Digitisation, sustainability and a safe working environment are the three biggest trends affecting our product management strategy. The most frequently asked questions from customers always circle around making production more sustainable, more repeatable, preventing critical defects, preventing machine downtime and doing it all economically. So, it's a balancing act to maximise monitoring of events and close the loops at the best price for value ratio.

How is Heye responding to those trends?

Digitisation is at the heart of Smart Plant. Heye offers a modular variety of sensors to adapt our machines to customer needs. GobMaster and BlankMaster sensors directly influence the most important process parameters through monitoring and subsequent regulation. We integrate the needs and specifications from the industry into our own product strategy in direct customer exchange. And, of course, a plant where more defect-free bottles are produced from every tonne of glass is a more sustainable plant.

And where are you innovating products and processes ahead of customer demands?

With every product we bring to market, we keep an eye on future requirements. For example, a sensor which automatically takes the temperature from the blank mould is helpful for daily measurements and statistics, but the control loop that can result from these measurements brings true added value for automation and repetitive success. Based on the fact that Heye has been providing forming and inspection solutions for decades, its knowledge of process and production optimisation benefits all customers, who get even more than they expect.

How close do you think we are to a 100% automated factory floor?

We're not there yet. Let's split the degree of automation into five, where level 0 is no automation and level 5 is 100% automation. I'd say we are somewhere in the middle between partial automation – where some tasks are automated, and conditional automation – where all standard tasks are automated. For instance, some common workloads are already automated, like swabbing by the Heye BlankSideRobot, but others still need to be done by the operator. Coincidentally, robotic swabbing reduces lubricant use by around 75%.

Heye is dedicated to developing solutions for the smart glass plants of the future.

You've mentioned sustainability a few times. How do ideas like planned maintenance promote greater circularity and longer life?

Modern glass container production is more than just using modern forming equipment. Sustainable production is determined by how effectively all the stages of the process work and fit together. Predictive and preventative maintenance are hugely successful in other industries such as automotive. Its main objective is to secure machine availability so there are no unplanned breakdowns both at the overall machine and the section level.

What's next for you and your team?

We are fortunate to have a dynamic team in product management and all product-related departments ready to face the challenges of the future. Internally, we are improving the way we define our structure and processes, then we can better implement our plans. We are Glass People from the beginning. Hence, these plans are controlled by being closer to our customers and ahead of the technical opportunities available to make glass as efficiently and sustainably as we possibly can. ●

Further information:
Heye International GmbH, Obernkirchen, Germany
tel: +49 5724 260
email: marketing@heye-international.com
web: www.heye-international.com

Enhanced burner design for optimum combustion

Dave Fontes details the development process behind Selas' new oxygen flat flame burner, and explains how the thermal processing specialist is enabling customers to have greater control over the staging flow of gas to the burners.

A pioneer of the thermal processing industry, Selas Heat Technology Company has a combustion heritage that is almost 120 years long. Throughout its history and with its acquired brands, Selas has gathered one of the richest collections of patents in the industry, and the company has invented and engineered many proprietary burners and other technologies – this includes oxygen combustion for glass furnaces and forehearths.

The Selas engineering team has now developed a unique flat flame oxygen burner. The history of the flat flame oxygen burner is well known dating back to the mid-1990s. Several types of these burners produce a relatively thin gas flame front, allowing for quick mixing with the natural gas and oxygen. Other flat flame burner types with relatively higher velocities require staging to be included with the burner in an attempt to delay mixing of the natural gas with the oxygen.

Improved flame

The design of Selas' Oxygen Flat Flame Staged (OFFS) burner eliminates these issues. First off, the natural gas and oxygen streams have been conditioned within the burner body creating an even flow of both gas streams. Additionally, velocities of the gases have been reduced, below that of traditional flat flame burners. Finally, the natural gas and oxygen profile is thicker or taller than other burners. The lower velocity and thicker stream of the gases produced in the Selas OFFS delays mixing between the inner natural gas core and the surrounding oxygen. This delay in mixing results in a highly luminous radiative base flame without staging. Figure 1 shows the effects of this design improvement with the cracking of the natural gas and resulting dark streak in centre core of the flame.

To enhance the flame further, Selas has developed a completely new staging concept. Injection of the staged oxygen is fully separated from the main burner body. This offers several improvements compared to current burners. First, cross flow of the gases between the staging oxygen and the flame is eliminated with this

Selas' Oxygen Flat Flame Staged burner in block.

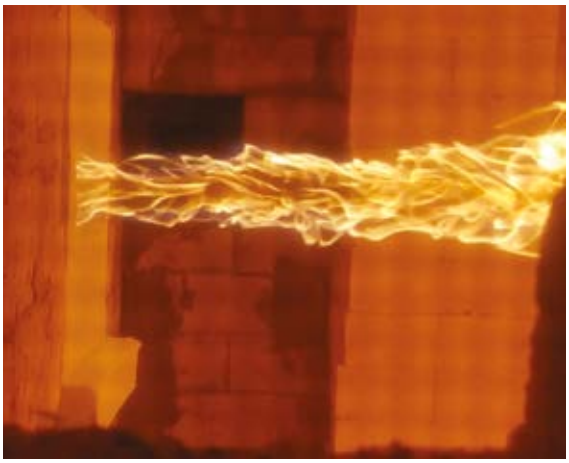


Figure1: The thicker flame root shows strong development for high radiative flux.

Selas Model	Capacity mm BTU		Capacity KW	
	Min	Max	Min	Max
0250	0.5	2.5	147	733
0500	1.0	5.0	293	1465
1000	2.0	10.0	586	2931
1500	3.0	15.0	879	4396
2000	5.0	20.0	1465	5861

Table 1: Burner Capacities
The Selas' Oxygen Flat Flame Staged burner is available in five capacities.

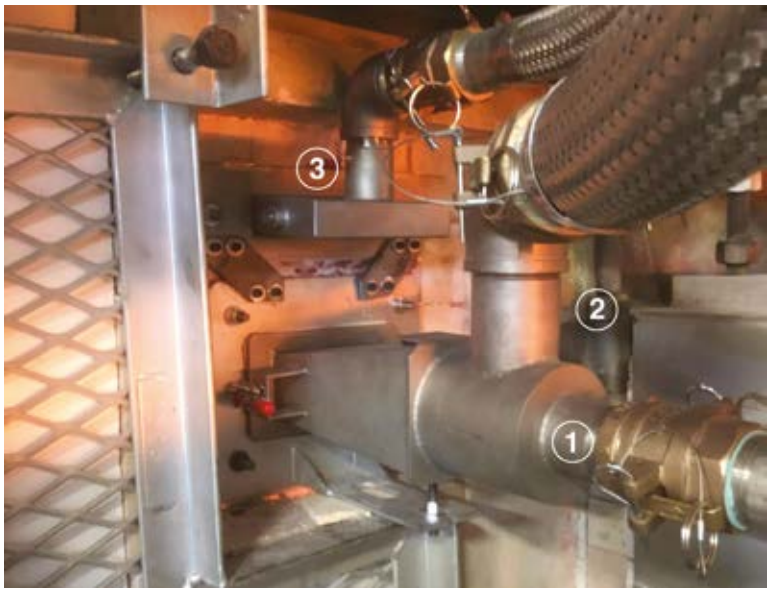


Figure 2: Gas inlet (1), primary oxygen inlet (2) and staged inlet (3) to the burner.

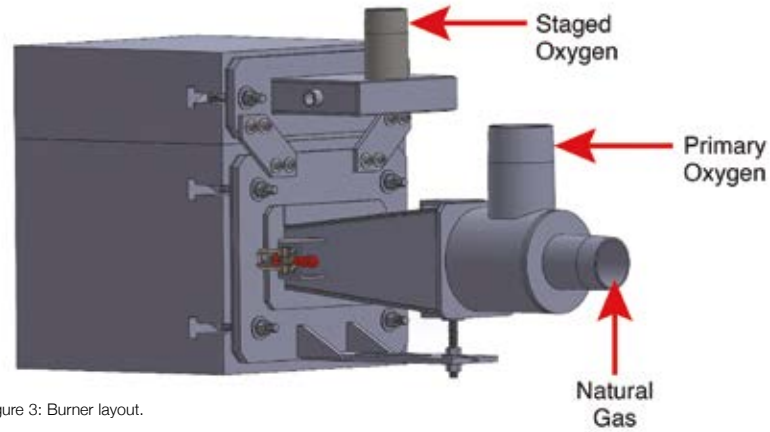


Figure 3: Burner layout.

design. Whereas traditional staged burners have had cracking between the staging and flame portions of the blocks resulting in block damage, this issue is eliminated with the Selas burner. Second, the staging oxygen injection being separated and at a further distance from the flame and burner enhances the delay in mixing, resulting in improved staging effects. Lastly, there is an added benefit of being able to completely automate the staging flow. In figures 2 and 3 you can see the gas inlet (1), primary oxygen inlet (2) and staged inlet (3) to the burner.

Enhanced staged oxygen control

With the separate staged oxygen design and the ability to control the staged oxygen automatically, Selas has developed 'Enhanced Staged Oxygen Control' or ESOC. This is a new control scheme that not only automates the control of the staged oxygen but provides for varying the amounts of staged oxygen to the burners.

Fedorov and Pilon[1] stated that "pulses of reducing gases (e.g., CO) to the furnace atmosphere was found to be an effective way to destroy secondary foams." Other techniques to reduce foam action mentioned by the authors included "an increase in the furnace atmosphere/flame temperature," as well as "pressure fluctuations."

With Selas' ESOC scheme, making these changes and varying the staging profile from burner to burner is readily achievable. Additionally, with ESOC and today's advanced control systems or 'Smart Controls' it is feasible to adjust the staging amount to vary the flame, moving and adjusting heat input to enhance the melting process.

ESOC can be used on just a pair or several burners. Other burners can be set with 'manual staging' controls. In fact, because of the flexibility of the burner and its design, not all burners in the furnace need to be staged, as the staging process and equipment are completely separated from the main burner itself.

Versatile set-up

The burner is designed with five capacities, shown in Table 1, to cover any application from small tableware furnaces, borosilicate operations, to fibreglass, larger container furnaces and float operations. The capacities provide wide operational set-up in all applications. The burner can be used with any industrial gas supply and with the low velocities, ultra-low oxygen pressures are not an issue. The customer purchases the burner outright so it is not part of a long-term costly lease.

With the start of the oxygen firing initiative, Selas has pushed our oxygen forehearths into several operations in Asia. Designs are under way for systems in Europe that include both forehearth and melter combustion systems. Selas has also provided an oxygen forehearth system for a container operation. With all this work, Selas has expanded its manufacturing capabilities with enhancements to its operations in Germany, allowing for system and burner support for the European market. ●

1 "Glass Foams: Formation, transport properties, and heat, mass, and radiation transfer", Andrei G. Fedorov, Laurent Pilon, 2002; Journal of Non-Crystalline Solids 311 (2002) pp154–173

About the author:
Dave Fontes is Product Manager, Glass at Selas

Further information:
Selas Heat Technology Company, Ohio, USA
tel: +1 216 662 8800
email: dfontes@selas.com
web: www.selas.com

Accurate and automated vial production

Featuring its new FLA18 index rotation forming machine and LF518 after-forming line, Italian manufacturer OCMI-OTG's complete processing line for borosilicate vials benefits from servo-driven stations and high-reliability dimensional controls, reports Alessandro Crescentini.

Manufacturer of machinery for the production of tubular glassware OCMI-OTG supplies borosilicate glass tube processing lines for the pharmaceutical industry and hollow glass processing machinery. The company's FLA18 forming machine, developed with index rotation, reportedly offers the same output as OCMI's continuous rotation forming machines with 20 stations. The FLA18's maximum output for 2R vials is 55pcs/min, and the machine can process glass tube diameters ranging from 10mm to 30mm.

Loading

Tube loading is performed by automatic equipment that picks the glass tube directly from the bundle. OCMI offers two options of loaders with different positioning of the bundles and different tube manipulators. There is no manual handling of the tubes, except during loading of bundles into the machine, thereby minimising the risk of cosmetic defects, cracks or marks on glass surface due to frictions between tubes. Customers can choose the most suitable loading option according to the space available in their plant.

Energy and forming options

The FLA18's burners can be fed by natural gas or by hydrogen. The hydrogen option could be attractive to customers aiming to create 'green' factories with a safer environment for operators working around the machines. Hydrogen also provides a more stable flame, which is very important for operations such as tube cutting.

A combination of 18 stations on upper mouth forming crown and 9 stations on lower bottom finishing turret enables the FLA18 to run at maximum productivity, even if a lower station is out service for any reason.

Machine rotation is driven by a torque motor that is supplied together with a water chiller for its cooling.

FLA18 vial forming machine.

The same chiller can be used for the cooling of the forming plungers.

Forming operations are performed through three dedicated servo-driven stations, following the rotation of upper chucks, and are removable in case maintenance operations are required. The parameters of the positions and movements of forming tools, plungers and rollers can all be set from a touch panel and saved as dedicated 'recipes' linked to each type of manufactured vial. From the ▸

Complete new OCMI vial production line.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same touch panel the operator can manage all the parameters relating to the movement of setting plates in the loading column and cutting station, machine and spindles speed, loading stations and dimensional control by camera.

Inspection system and take-out

Featuring a new-generation camera, an OPTIVIAL camera inspection system positioned after the mouth forming operations takes up to 15 pictures of each rotating vial to determine a more precise average value for each dimension. The camera inspection system's software allows statistics to be saved, including rejections for each type of defect and for each spindle.

In the lower machine turret bottom, after the cutting operation, the vial bottom is finished by fire-polishing burners and special flattening buffer. Nine lower chucks driven by independent motors are equipped with blowers enabled by solenoid valves to remove smoke from the inner side of vials – in order to keep alkalinity at limits fixed by ISO standards.

Take-out, with a servo-driven transfer system, has been developed for connection with OCMI's LF518 after-forming line. There is also the option to install a servo-controlled printing station.

Cooling and measurement

Immediately after unloading from the forming machine, conveyor chain V-carriers covered with insulating plates protect the hot glass from contact with cold metal to avoid thermal shocks and consequent marks on the glass surface. The same protection is applied on the packing conveyor after vials are unloaded from the annealing lehr.

After the cooling chain, vials come to the dimensional control section, including check of total length and mouth inner diameter. Control of total length is made by a contact gauge which pushes the vial against a bottom guide in order to detect the measurement. The mouth inner diameter is detected by a camera taking minimum and maximum diameter [reading] with one picture. The average value is taken into consideration for acceptance or rejection of the vial. Data coming from both control stations is displayed on dedicated control panel, and software follows the same user-friendly concept of OPTIVIAL.

The new version of OCMI-OTG's (electrically-powered) vial annealing lehr is fed by a feeding manipulator with six mechanical grippers that pick the vials from line chain and place them in a horizontal position on drilled metal trays. To account for dimensions of the lehr, the design of the trays can be modified according to the specifications of the vials to be processed and the number of vials to be conveyed. A pick-place manipulator with adjustable gripper jaws allows vials up to a minimum length of 30mm to be processed.

Annealing lehr main parameters can also be set by a dedicated control panel: from this panel the operator can set and maintain temperatures for all heaters, and set the parameters for synchronisation of the oven chain, feeder and unloader.

Complete station for dimensional inspection with dedicated control panel.

Packing

The processing line's vision/packing conveyor before the packing station can be adjusted in length (e.g. in case other camera inspection system are installed). A PM-V automatic packing machine, available with four or five box-filling stations placed on a rotating table, can replace traditional manual packing operations. With the automatic option there is no contact between vials since they are picked directly from the line chain through vacuum cups: in this way, the risk of scratches or breakages during packing is minimised.

The PM-A automatic packing machine's software allows recipes to be saved, including specifications of ampoules/boxes, number or rows to be positioned in the box and number of ampoules per each row. With this packing machine, job change is made easy for the operator thanks to a modular vacuum picking arm with blocks that can be added or removed according to the box length and number of ampoules to be picked from machine racks.

Offering users the ability to produce vials with the greatest degree of automation and with highly accurate dimensional and quality controls, OCMI's new line has reportedly already been selected by a number of European multi-national groups for the manufacture of glass vials, including some products that exceed standards usually requested by the market. ●

About the author:
Alessandro Crescentini is Sales Manager at OCMI

Further information:
OCMI-OTG S.p.A., Milan, Italy
tel: +39 0239 09181
email: sales_glass@ocmigroup.com
web: www.ocmigroup.com

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Oxygen combustion with optimum insulation

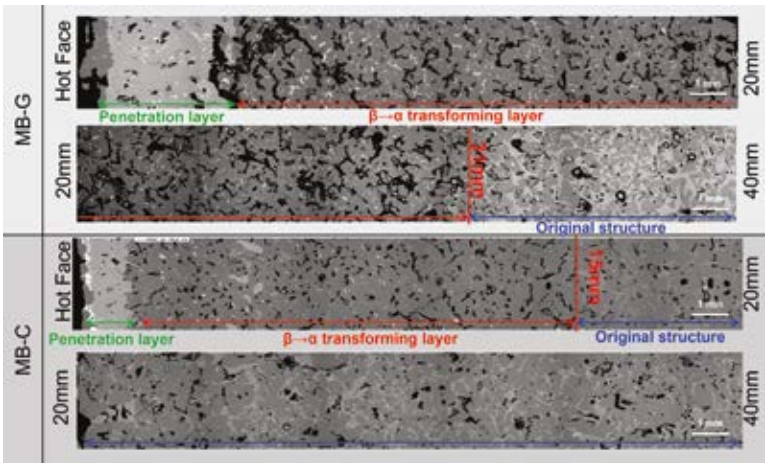
Kenji Matano explains why refractories manufacturer and engineering company AGC Ceramics advocates fused cast refractories and its new insulation monolithic refractory material for the crowns of oxygen combustion furnaces.

	Conventional		TMT	
Materials	Fiber blanket	125 mm	TMT-1000	125 mm
	Insulating block	130 mm		
	Seal backup	65 mm	TMT-1600	240 mm
	Sealing material	40 mm		
	αβ-Fused cast refractory		αβ-Fused cast refractory	
Weight [kg/m²]	479	38% lighter	299	
Diffused heat from surface* [kcal/m²h]	1501	18% less	1233	

Table 1: Heat calculation of Crown with TMT insulation and conventional design.
Typical properties and αβ-structure illustration of MB-C and conventional αβ-alumina fused cast refractory.
**Furnace temperature: 1,600°C; atmosphere temperature: 30°C.*

Oxygen combustion has been applied to glass melting furnaces because of its advantage such as high energy efficiency and low NOx emission. In recent years, carbon neutrality has been called out, and the importance of oxygen combustion has increased even more. Furthermore, the technology may also be effective when burning hydrogen or ammonia, which are expected to be alternative fuels in the future.

On the other hand, oxygen combustion creates a harsh environment for refractories in the crown and superstructure of furnaces because of its high alkaline vapour pressure. Therefore, AZS or high alumina fused cast refractories are used instead of bonding refractories such as silica brick, which has been used in conventional air-combustion furnaces.



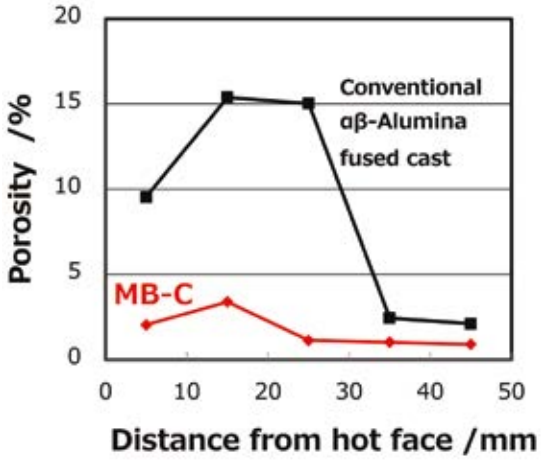


Figure 1. Left: SEM image of cut surface near hot face of conventional αβ-alumina fused cast refractory and MB-C. Right: Porosity vs distance from hot face.

Low exudation fused cast AZS

AZS fused cast refractory shows excellent corrosion resistance to alkaline vapour, therefore it is widely used for the crown and superstructure in oxygen combustion furnaces. However, matrix glass in AZS exudes during use, and if the exudated glass contaminates molten glass of the glass products, it can cause glass defects such as knots or stones because it does not have the same chemical composition as molten glass and includes crystals such as baddeleyite. Therefore, low-exudation AZS is preferred to improve productivity by reducing glass defects.

AGC Ceramics has developed a new low-exudation AZS: 'ZB-1681Z'. [According to the company,] ZB-1681Z achieved 30% less exudation compared with conventional AZS by adjusting the amount and viscosity of matrix glass, and it is confirmed in the actual furnace.

Alumina fused cast

Unlike AZS, alumina fused cast refractory has the advantage that it doesn't cause glass exudation because it contains little matrix glass. Therefore, it is less likely to cause glass defects when used as a crown and superstructure material, and products with an α:β ratio of 50:50 have been used. However, on the other hand, in-furnace peeling of the crown due to alteration has been reported during use, and there is a risk of premature failure of the crown. This phenomenon is due to the fact that α-alumina is stable in the atmosphere of oxygen combustion furnace such as soda lime glass, therefore β-alumina changes to α-alumina, and at the same time, the brick becomes porous (see Figure.1).

AGC Ceramics has developed a new αβ-alumina fused cast refractory: 'MB-C' which has an αβ ratio of 70:30 in order to reduce peeling. MB-C can be used for crown of oxygen combustion furnaces, and can be expected to have a higher durability than conventional αβ-alumina fused cast refractory.

High-performance insulation

Insulation of glass furnaces has played an important role to reduce costs through energy saving. In particular, fused cast refractories have higher thermal conductivity compared with the silica bricks used in conventional air combustion furnaces; therefore, higher heat resistance and insulation properties are required for the fused cast crown of an oxygen combustion furnace.

AGC Ceramics has developed 'TMT': an insulation monolithic refractory material that offers both high thermal insulation and high thermal resistance up to 1,600°C (see Table 1). TMT consists of products that match the temperature range of use. In addition, since TMT can withstand alkaline vapour, and its insulation performance doesn't deteriorate (unlike insulation blankets), its energy-saving benefits have greater longevity. Furthermore, whereas heat loss occurs between the joints of conventional insulation bricks, TMT can form a construction body without joints, thereby offering a high energy-saving effect in this respect as well. In addition to the crown [… TMT can be used] for breast walls, regenerator walls, ports – and excellent results have been reported. ●

About the author:
Kenji Matano is Manager, Glass Technology Group, Development Centre at AGC Ceramics

Further information:
AGC Ceramics Co., Ltd., Takasago City, Hyogo Pre., Japan
tel: +81 79 448 3370
web: www.agcc.jp

Removing glass from the tin bath

Franz Krommer explains how Grenzebach's dross box has been designed to ensure that ribbons of float glass are handled with utmost precision when being transferred to a roller conveyor.

In float glass production, the dross box is the interface and sluice between the tin bath and annealing lehr. This point in the production process poses particular challenges, because the glass ribbon, which is still very fragile, requires the utmost precision in handling under extreme ambient conditions. The trick is to transfer the glass ribbon from a liquid and full-surface support to a roller conveyor. The Grenzebach dross box can master this tricky process step thanks to innovative technology. Valuable process improvements are achieved with customisable roller technology, special roller sealing and safe maintenance options.

Grenzebach's new dross box ensures improved glass quality through a more homogeneous distribution of temperature across the entire width of the glass.

Roller technology

The rollers are special features of the Grenzebach dross box. The glass ribbon, which is still flexible, is lifted out of the tin bath by three individually driven rollers and conveyed to the annealing lehr. The lift-out rollers form a curve geometry, which can be adapted to customers' production requirements by individually adjusting the height of each roller. This also allows for an equal distribution of the load on all rollers. The result is a flexibly adjustable lift-out curve with settings that can be optionally saved for the varying glass thicknesses.

The roller sealing contributes to a particularly high level of insulation for the Grenzebach dross box. This results in less heat loss and a more homogeneous temperature distribution across the entire width of the glass. The ambient temperature at the edge no longer substantially deviates from the temperature in the centre of the glass ribbon. This provides better glass quality and reduces the risk of a cross breakage.

The rollers are constantly cleaned over three-part graphite bars with pneumatically adjustable contact pressure to ensure a clean process.

Dross box housing

The dross box is not welded to the tin bath but attached to it by means of a clamping device, which is firmly fixed after the tin bath has heated up to 620°C. This way, thermal expansion is accounted for and deformations due to heat effects will not occur on the housing nor on the U-channel.

Maintenance and operation

The Grenzebach dross box is controlled via an innovative user interface. During maintenance, operators benefit from increased work safety and improved access to the end plate and when changing rollers. Rollers can be changed during operation, conserving glass loss. Similarly, the graphite bar change can be performed quickly and easily.

Additional features

The standard Grenzebach dross box is designed for up to 650°C; it can also be specified for up to 850°C. The dross box is suitable for normal and extra-wide float lines. Retrofitting of existing equipment is possible, as is injection of N_2 and SO_2. The dross box' housing has a stainless steel lining; it is insulated and gas-tight, offering protection against corrosion and SO_2 [emissions]. Retrofitting of camera systems and illumination is also possible. ●

The dross box' housing has a stainless steel lining that is insulated and gas-tight.

About the author:
Franz Krommer is Product Manager Business Unit Glass at Grenzebach

Further information:
Grenzebach Maschinenbau GmbH, Hamlar, Germany
tel: +49 906 982 2000
email: glass@grenzebach.com
web: www.grenzebach.com

Generating power from flue gas

Supplier of air pollution control equipment Tri-Mer Global Technologies specialises in advanced customised solutions. Alessandro Monteforte highlights the importance of open communication between the supplier and the customer when devising bespoke air pollution control and waste heat recovery systems.

A good level of co-operation and communication between the end user and a flue gas cleaning system provider can help to ensure an efficient investment and surprisingly low costs of ownership. Open discussion of strategies and willingness to consider alternative proposals can lead to bespoke solutions that become a real 'win-win' project for both parties – for example, a more elegant pollution control solution, performing at the highest efficiency, and generating power from clean, high temperature flue gas that has been there all along.

Two 'real-life' stories are presented here, to demonstrate the gains when 'race-to-the-bottom' CAPEX management tactics are eschewed in favour of a more collaborative procurement approach between solution providers and buyers.

A collaborative partnership led to the most advantageous solution.

A new source of power

In this case study, a container glass manufacturer planned to increase the size of one of its furnaces by 45% during the next cold repair, but the new flow rate would be so great that the existing ElectroStatic Precipitator (ESP) filtration system – even though not very old – would no longer able to maintain guaranteed dust emission limits.

The furnace rebuild team had already been in touch with Tri-Mer Global Technologies (TGT) regarding a feasibility study on waste heat recovery, and aware of the company's credentials as a capable and creative provider of ceramic filter solutions, inquired about a new, modern filtration system based on this technology.

Factoring in wishes for a compact layout and reduced investment costs, an ESP conversion to ceramic filter was proposed instead of a brand-new larger system. This application consists of reusing the external housing of an ESP, removing the internals and the transformers, and modifying [them] to mount and fill the void with ceramic filter elements. Significant advantages could be had from this alternative approach: no civil works; deNOx-ready system; ultra-low dust emission; and – thanks to a modular, pre-fabricated design, completion during and within the same timeframe of the cold repair.

TGT's engineers worked closely with the customer.

However, the customer seemed to be unhappy about having to invest in a different filter technology only a few years' on from the previous installation. In close collaboration with the furnace rebuild team, TGT's engineers tried to find another solution with even more advantages.

The rebuild team assisted immensely with the ensuing information exchange between the new furnace supplier (predicting flue gas temperature range across the entire campaign) and the existing ESP supplier (defining the maximum limits of the ESP's operation with minor overhaul) and allowing TGT access to all the information it needed to develop a more economic solution without new filters.

Utilising flue gas cooling with a heat exchanger and reducing the actual flue gas flow rate entering the existing ESP would keep it low enough to maintain the guarantee on the requested emissions levels and ensure readiness with an automatic tube cleaning system. Four separate – and sometimes competitive – entities were connected with the common target of developing the best solution for the plant.

Although the primary function of the heat exchanger was

for cooling the raw gases, the heat is recovered through a thermal oil loop that, circulating at high temperature, is able to feed an ORC (Organic Ranking Cycle) module for electricity production.

In the end, thanks to the open minded and collaborative approach of the furnace rebuild team and the solution providers involved, a dust emission problem became the source of 700kW of electrical power.

Emission reduction investment

In the second case study, an independent container glass manufacturer with technical confidence in Tri-Mer Global explained the plans for its two-furnace plant. Two cold furnace repairs were to be carried out within 24 months and an ageing ESP needed to be replaced with a more modern technological solution including deNOx capabilities.

Due to the configuration of the plant, creating hot connections to the new filter with the furnaces in operation would not be possible. Additionally, there was a strong interest in power generation from the flue gas heat; a request for a potentially uninterrupted operation of the filtration system during the rebuilds; plus, the solution prepared would need to meet any future regulation restrictions.

The glass producer asked TGT to advise the on best solution, given the timing and all the special needs of the project, with the first overhaul planned only five months later. TGT's engineers outlined a staged solution suitable for the customer's requirements, and allowing them to spread the investment across the furnace campaign.

The first step involved the preparation of connections from the first furnace to the future filtration system, during cold repair. Quick engineering and duct manufacturing was requested to profit from the two months' of operations stoppage.

At the same time, an ultra-efficient, modular catalytic ceramic filter system was developed. The modularity allowed TGT to guarantee the requested availability, with one module potentially off for maintenance while the others continue to operate. The manufacturing and installation of the modules was also phased to allow a faster connection of the first furnace (three modules); while the second furnace remained connected to the old ESP, and all to a common, existing stack. A detailed 3D design was necessary to avoid problems in duct installation. Two additional modules were then installed and ready for the second furnace connection. The modularity of the system was extended to provide maximum flexibility for future needs, with a system ready to easily integrate with the future installation of a sixth module for potential end-of-campaign needs.

Downstream [of] the filtration, working on clean gases, an oil/gas heat exchanger was installed, recovering 9.9MW of heat to feed an ORC module.

With the target of profiting from the high temperatures of the aged furnaces, connections were prepared for the future installation of another heat exchanger (on the raw gas side of the filter), potentially enabling the system to recover 11.2MW, and therefore generate up to 2WM of net power from the ORC.

In both examples, strong and open co-operation between the customer and supplier led to successful and satisfactory solutions.●

About the author:
Alessandro Monteforte is Sales Manager at Tri-Mer Global Technologies

Further information:
Tri-Mer Global Technologies S.r.l., Milan, Italy
tel: +39 02 95158575
email: info@tri-merglobal.com
web: www.tri-merglobal.com

Hard water vs hard liquor

Brandon Aldinger shares results from American Glass Research's study exploring the cause of white deposits that can adhere to the inside surfaces of filled vodka and gin bottles, giving the glass a hazy appearance.

In the past ten years, American Glass Research has received multiple requests to analyse filled vodka and gin bottles that exhibited white deposits adhered to the inside surface, creating a visually hazy appearance. The deposits are reported to appear within 24 hours after filling, but were not previously visible in the empty bottle prior to filling. Moreover, not all of the bottles in the same lot were affected.

In most cases, the white deposits occur on the interior upper sidewall of the container and not the bottom or heel areas. The deposits are patchy and do not cover the entire inner surface. As shown in Figure 1, boundaries between the deposits and clear, unaffected areas are usually sharp. Within the deposits, irregular elliptical or circular features are present, with the outlines of the features consisting of clear areas.

When analysed via SEM-EDX [Scanning Electron Microscopy (SEM) with Energy Dispersive X-Ray Analysis (EDX)], as shown in Figure 2, the deposits are found to consist of pointed crystals with concave, triangular faces that resemble tetrahedrons. The crystals are approximately 2–4µm in size, and are remarkably consistent in their morphology even for samples produced by different manufacturers and filled by different beverage companies. Spectral analysis of the crystals has shown that they are composed primarily of calcium carbonate ($CaCO_3$), with minor and variable amounts of magnesium, phosphorous and sulphur.

A published source relevant to this phenomenon was found in a home distiller's guide (*Making Gin and Vodka*, John Stone; Brewhaus; Calgary, AB 2004). Similar deposits were claimed to be caused by precipitation of solutes out of hard water used to dilute the alcohol to the desired concentration; however, no mention of deposits adhering to the sides of the container was made. Calcium carbonate – the primary solute in hard water – has a solubility of only 0.0014g/100ml in cold water, and is even less soluble in alcohol. Thus, precipitation of $CaCO_3$ upon addition of hard water to alcohol was a plausible mechanism for the issue observed by commercial fillers. Yet the hard water theory still left some observations unexplained. For instance, why did the deposits occur only in some bottles within a lot, and not in all?

A study was therefore designed to explore the mechanism for creation of the white deposits. Water hardness was the primary variable under consideration, while secondary variables of internal treatment (IT) and inside surface roughness were also tested.

Experimental procedures

For the experiment, 1l round stock liquor bottles that had been collected directly off the lehr were used. Some of the stock bottles had been internally treated with difluoroethane as per the glass manufacturer's standard process, and some were untreated. To test the effect of inside surface roughness, bottles in each trial were abraded on the inside surface by wrapping a ball-tipped probe with 150- and/or 600-grit sandpaper and sliding it against the interior sidewall.

A common recipe for simulating hard water was found on a brewing reference site: Epsom salt (magnesium sulphate, Mg_2SO_4) was first added to reverse osmosis (RO) water while stirring. After that component had dissolved, baking soda (sodium bicarbonate, $NaHCO_3$) was added, followed by calcium chloride ($CaCl_2$).

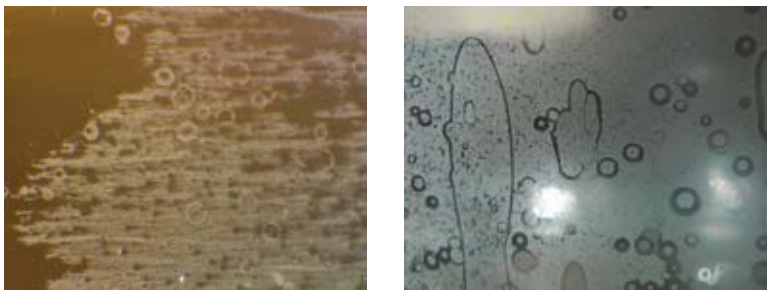


Figure 1: Photomicrographs of white deposits from trade samples (10X magnification).

The bottles for each trial were first filled halfway with 500ml of 95% denatured ethanol. Then, hard water solutions were poured into the bottles up to the approximate fill-point, for a final alcohol concentration of 47.5%. Adding the water to the alcohol was intentional to mirror the commercial dilution process. The filled bottles were then allowed to sit undisturbed while being monitored over the next 72 hours.

The most applicable results were obtained with a hard water solution of 0.025g/l Mg_2SO_4, 0.250g/l $NaHCO_3$, and 0.100g/l $CaCl_2$. Higher concentrations of solutes caused cloudiness or precipitation to appear upon addition to the alcohol, which was not reported to occur in the trade.

Results

For the hard water concentration noted above, the water/alcohol solution remained clear upon filling, and no deposits were present within several hours. White deposits were then observed on the sidewalls of the containers the next day after filling, as shown in Figure 3.

For the internally treated bottles, the white deposits preferentially occurred within abrasions. The non- ▸

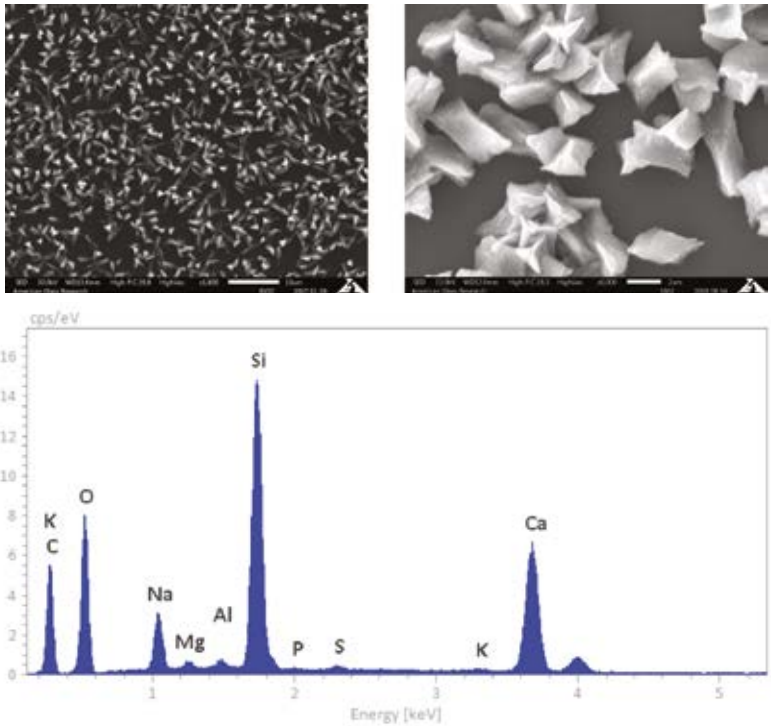


Figure 2: SEM-EDX micrographs of white deposits from trade samples. The EDX spectrum of a typical crystal is also shown; the silicon, sodium, and aluminium peaks are due to the underlying glass and not the crystals.

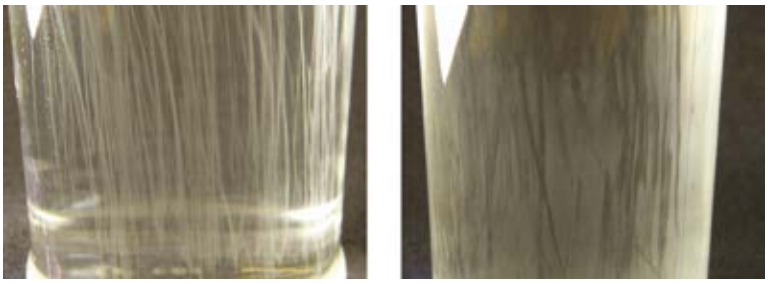


Figure 3: Photographs of representative bottles showing IT-abraded (left) and non-abraded (right).

abraded samples generally contained uniform patches of deposits with well-defined boundaries, generally similar to commercial samples but lacking the complex 'droplet' shapes seen on containers from the trade. For the untreated bottles, the deposits preferentially occurred on smooth areas without abrasions.

After draining the liquid, portions of the white deposits were examined with a scanning electron microscope with X-ray capabilities (SEM-EDX).

As shown in Figure 4, the deposits consisted of crystals that were either small and rounded (No-IT) or hexagonal and crystalline (IT). Despite their differing morphologies, the crystals on both types of bottles had the same composition: $CaCO_3$ with a minor amount of sulphur.

Discussion

Several aspects of the white deposits reported from the trade were successfully reproduced through dilution of alcohol with a hard water simulant:

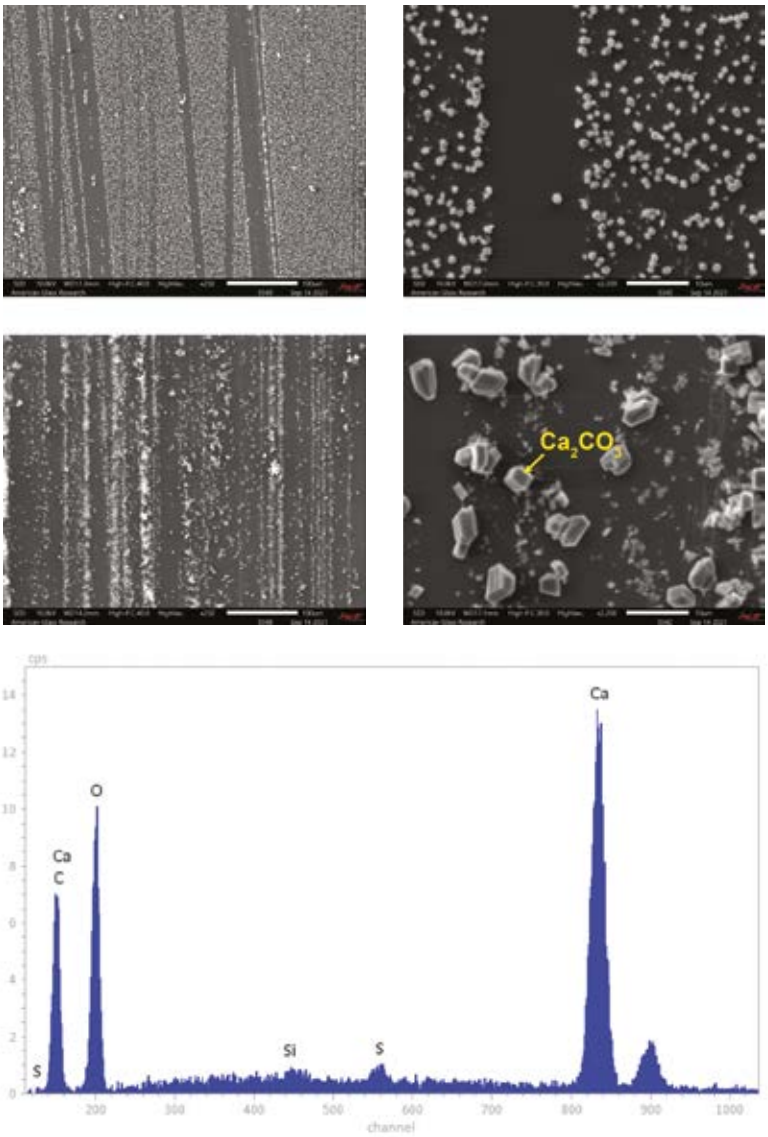


Figure 4: Representative SEM micrographs: no-IT (top) and IT-abraded, along with the EDX spectrum of a crystal.

1. The lab-created white deposits were composed primarily of $CaCO_3$ crystals, which is the same composition for the deposits found in trade samples.
2. It was possible to cause delayed deposition of crystals on the interior sidewall of containers, even when the liquid initially appeared clear. The delay time between filling and the appearance of the deposits was similar to the fillers' reports.
3. Crystals of $CaCO_3$ were created on both IT-treated and untreated bottles, which mirrors samples obtained from the trade.
4. For some bottles, surface roughness in the form of abrasions provided nucleation sites for the crystals. Although as-produced inside surfaces would not have roughness as severe as an abrasion, varying amounts of roughness may explain why some bottles in the trade develop deposits and others do not.

Several characteristics of the deposits analysed in trade samples could not be fully reproduced in the laboratory experiments, including the crystal morphologies and circular deposition features. Because the exact filling conditions used by distillers were not known, it is possible that these differences are due to peculiarities of the filling process.

No noticeable difference in the creation or amount of $CaCO_3$ deposits was found between IT-treated and untreated bottles. Internal treatment is performed to reduce the amount of surface available alkali in the glass; thus, its lack of effect on deposit formation provides strong evidence that the primary source of calcium is from the water used for dilution. This result is of use to distillers who use water high in dissolved minerals for dilution, thereby risking $CaCO_3$ deposit formation regardless of the presence of treatment in their glass containers.

Conclusion

In conclusion, the white deposits observed in filled vodka and gin glass bottles are composed mainly of $CaCO_3$ crystals. The primary cause of these crystals is the addition of hard water to the distilled alcohol during filling. Several characteristics of the deposits found in trade samples could be reproduced in the laboratory via dilution of alcohol with a hard water simulant. Properties of the crystals that could not be fully reproduced, such as crystal structure and deposition pattern, may be due to differences in the filling environment versus the experimental conditions. Finally, the presence of weathering products in the bottles, microscopic surface roughness, and the extent of internal treatment were not fully explored, and may play a secondary role in occurrence of the deposits within a particular bottle or lot of bottles. Despite these remaining questions, it can be concluded that hard water – and not the bottle – is the main driver for creation of the $CaCO_3$ deposits. ●

About the author:
Dr. Brandon Aldinger is a Senior Scientist at American Glass Research

Further information:
American Glass Research, Pennsylvania, USA
tel: +1 724 482 2163 / +31 15 890 40 20
email: tbarr@agrintl.com
web: americanglassresearch.com

Determining thermal transparency

A.J. Faber explores the science involved in decarbonised-glass furnace technologies and shares the development process of a new semi-empirical model for predicting the photon-conductivity of glass melts.

Anyone involved with industrial glass melting (tanks) is familiar with the viscous behaviour of glass melts. The viscosity of a glass melt – defined as the resistance to flow – is strongly temperature-dependent and has important consequences for the flow pattern of the melt in industrial melting tanks. Moreover, this viscous behaviour enables many different types of forming processes for shaping the glass into products, such as blowing, casting, drawing (into fibres) and pressing. The viscous behaviour of glass melts is very unlike the flow behaviour of steel melts. Another physical melt property, which is unique for glass melts and which is not observed for steel melts, is the partial transparency for thermal radiation: at high temperatures a glass melt is a semi-transparent medium for thermal radiation. This implies that different parts of the thermal radiation spectrum will be transmitted to a higher or lesser degree, depending on the NIR (near infrared) absorbing components in the glass melt.

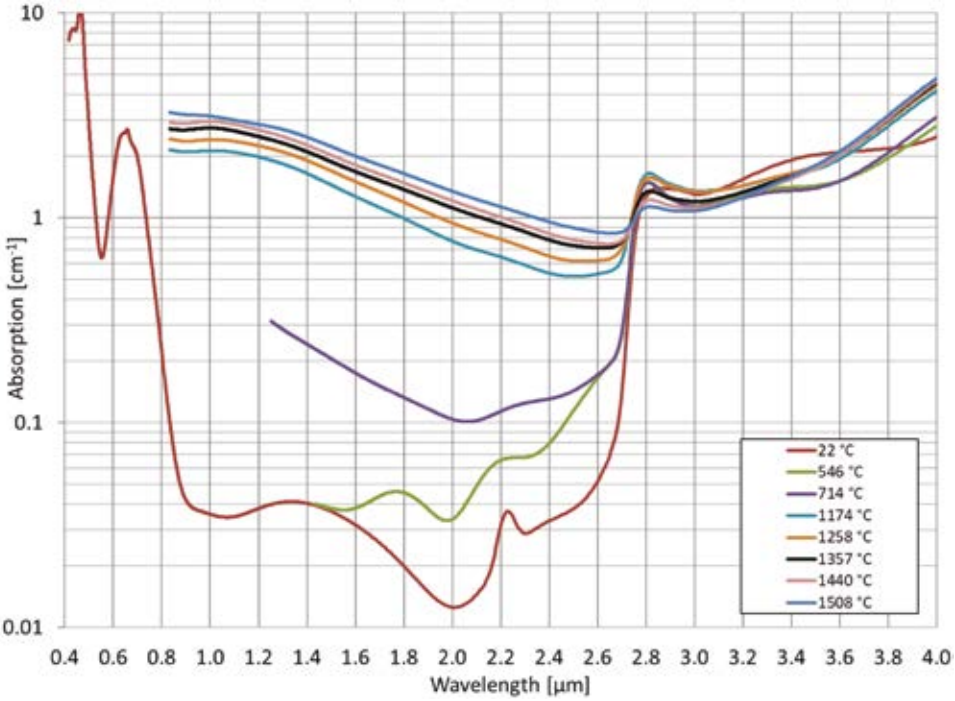


Figure 1: Absorption spectra of Cr^{3+} in soda lime silicate glass melt at room and high temperatures, showing an increase of the NIR absorption with temperature, especially in the region 0.8–2.8µm (source: see footnote [2])

High temperature glass processes

For designing any industrial glass melting process by mathematical modelling simulations, in particular by Computational Fluid Dynamics (CFD), the 'thermal transparency' of the glass melt is a key property. Besides, the cooling behaviour of glass products after forming is also strongly determined by the thermal radiation properties of the glass.

Whereas glass technologists will agree that the thermal radiation properties of a glass melt are as important as the viscosity for describing its physical behaviour, one can wonder why so few scientific descriptions and hardly reliable data on the thermal transparency of glass melts have been published until now. In particular, the exact effects of temperature and redox on the radiation properties are unknown in many cases!

But notably, quite recently two peer-reviewed articles with accurate models for quantifying the thermal transparency of industrial silicate glass melts were published, see: Faber AJ et. al. in *Int J Appl Glass Sci* (2020[1] & 2022[2]), a journal of the American Ceramic Society.

Cold batch on top of melt in full electric furnace.

Scientific background

The thermal transparency of the melt is characterised by the so-called thermal radiation, or photon-conductivity, $k_R(T)$, which is a measure for the amount of heat radiation, e.g. originating from a hot gas flame, transmitted by a glass melt for a certain temperature gradient. The photon conductivity of a specific glass melt is largely determined by the presence and concentration of the colouring transition metal (TM) ions in the glass, including iron (Fe^{2+}),

chromium (Cr^{3+}), copper (Cu^{2+}), cobalt (Co^{2+}), nickel (Ni^{2+}) and manganese (Mn^{3+}) ions. Each of these ions have different, specific absorptions in the visible (VIS), from 0.4–0.8µm, and in the NIR, typically from 0.8–4.0µm. The visible absorptions of the TM ion will give the host glass a unique colour, the NIR absorptions will determine the photon conductivity of the melt at high temperatures. It was found in the previously mentioned – and in a few earlier – studies that these absorptions change with temperature. For example, the change of the spectral absorption of Cr^{3+} in soda lime silicate glass with temperature is shown in Figure 1. This figure shows that the absorption of Cr^{3+} in the NIR increases with temperature. For the other colouring ions, other temperature dependencies were observed. The different temperature effects are explained by variations in the local structure around the specific TM ion in a glass host. A TM ion in an oxide glass host is usually surrounded by either four (tetrahedral coordination) or six (octahedral coordination) oxygen atoms (ligands). However, very often the local structure is not a perfect tetrahedron or octahedron, but structural distortions occur, causing modifications in the site symmetry of the ion. These modifications in the local site symmetry of the TM ion will result in changes in the absorption bands of the TM ion and also in variations in the temperature dependency of the absorptions. These phenomena can be explained by the so-called ligand field theory.

On the basis of a large amount of experimental data and the ligand field theory, a new semi-empirical model for prediction of the photon conductivity of glass melts was developed.

With the validated new model, the temperature-dependent photon conductivity $k_R(T)$ of any silicate glass melt, either uncoloured or coloured with (a combination of) Fe, Cr, Cu, Co, Mn or Ni can be determined reliably. The new model only needs room temperature data as input, in particular: concentration of colouring ions in the glass, iron redox ratio at room temperature and SO_3 content.

Concluding remarks

The new model is essential for reliable and accurate CFD modelling of carbon-free glass melting technologies, such as melting tanks equipped with electrodes, using green electricity. In these electric glass furnaces, the transfer of the heat generated around the electrodes to the cold batch on top of the melt (see Figure 2), is strongly limited by the photon conductivity of the melt. A low photon conductivity of the melt will result in a poor melting rate of the batch and therefore in a low furnace pull rate. Thus, for melting these 'NIR dark' glasses in an economical way, appropriate tank designs and process measures will have to be developed by advanced CFD modelling methods, using reliable input data.

1 Faber AJ et. al. "Characterisation of high temperature optical spectra of glass melts and modelling of thermal radiation conductivity", *Int J Appl Glass Sci.* 2020; 00:1–21. https://doi.org/10.1111/ijag.15111

2 Faber AJ et. al. "High temperature near IR spectral properties and thermal radiation conductivity of (un)colored silicate glass melts", *Int J Appl Glass Sci.* 2022; 00:1–12. https://doi.org/10.1111/ijag.16603

About the author:
A. J. Faber is a Scientific Consultant

Further information:
Physica Fit Faber, Heteren, The Netherlands
tel: +31 6 41639547
email: aj.faber@hotmail.com
web: www.linkedin.com/in/annejans-faber-4959a115/

Overview of the Australian glass industry

Whilst Australia is a modest exporter of glass and glassware products, this country is a substantial importer of these items. Recycling and sustainability continues to be a key part of the glass industry in Australia. Richard McDonough reports.

Australia is the key economic driver in the South Pacific. A variety of raw materials found on this continent help to operate the manufacturing sectors of the nation. Glass packaging operations in the country include local production of bottles, jars and other containers.

International trade has been critical to the success of the glass and glassware industry in Australia through the years. The country was ranked as the 27th largest importing nation of glass and glassware products in 2021, according to the International Trade Centre. Unless otherwise stated, statistics detailing imports and exports of glass and glassware products to and from Australia are from reports issued by the International Trade Centre.

The ranking in 2021 placed the South Pacific country between rankings held by Sweden and Malaysia. Five years earlier, Australia was ranked as the 28th largest importer of glass and glassware products. Its ranking in 2017 placed it between the rankings held by Sweden and the United Arab Emirates (UAE).

The country's role as an exporter of glass and glassware products, however, has been more modest. Australia was ranked as the 63rd largest exporting country of glass and glassware products in 2021. This placed the nation between rankings held by the Philippines and Tunisia. Five years earlier, Australia was ranked as the 59th largest exporter of glass and glassware products. Its ranking in 2017 placed it between Kuwait and Serbia.

To put these variations into perspective, consider that Australia was ranked as the 24th largest importer nation for all products tracked by the International Trade Centre in 2021; it was ranked as the 23rd larger importing country for all products in 2017. Yet, when all products are considered, Australia is an even larger exporting nation. In 2021, the country ranked as the 21st largest exporter for all products; five years earlier, Australia ranked as the 22nd largest exporting nation in the world.

Imports

Australia imports substantially more glass and glassware products than it exports. In fact, in 2021, the country imported more than 12 times the amount of these products that it exported. Whilst the amount of imports fell from previous figures in both 2019 and 2020, imports of glass and glassware products roared back in 2021.

In 2017, imports of these products amounted to (US) $775,102,000; in 2018, (US) $798,121,000; in 2019, (US) $738,473,000; in 2020, (US) $705,726,000; and in 2021, imports of glass and glassware products were valued at (US) $839,041,000.

As has been the case with many nations, China has been the largest source of imports of glass and glassware products into Australia from 2017 through 2021. The volume of these imports has increased – with the exception of a dip from 2018 to 2019 – from (US) $377,289,000 in 2017 to (US) $433,109,000 in 2021. Imports from China represented 48.7% of all imports of glass and glassware products in 2017, and increased to 51.6% of all these types of imports in 2021.

Other large sources of imported glass and glassware products were the United States of America (USA), Germany, the UAE, and Thailand. Together, these four nations represented 20.2% of all imports of these products into Australia in 2017; their portion of the import market for glass and glassware products decreased to 14.7% in 2021.

The level of imports from the four countries, however, varied during these five years. Imports of glass and glassware products from the USA, other than a modest increase from 2018 to 2019 – from (US) $51,262,000 to (US) $51,642,000 – have decreased from (US) $53,103,000 in 2017 to (US) $44,138,000 in 2021.

Both the UAE and Thailand saw steady decreases of their glass and glassware products imported into Australia from 2017 through 2020, with relatively small increases for the two nations in 2021. Imports of these products from the UAE were (US) $41,685,000 in 2017 and decreased to (US) $24,830,000 in 2020; imports from the UAE were (US) $24,937,000 in 2021. Australia imported (US) $32,270,000 worth of glass and

The Honourable Annastacia Palaszczuk, Queensland Premier and Minister for the Olympics, and The Honourable Steven Miles, Queensland Deputy Premier, Minister for State Development, Infrastructure, Local Government and Planning and Minister Assisting the Premier on Olympics Infrastructure, announced a major investment by the Queensland Government in the expansion of the Visy Material Recovery Facility on Gibson Island. Photo provided courtesy of the Queensland Government, 29 April 2022.

Vinpac International is a major glass bottler for the wine industry in Australia. Photo provided courtesy of Vinpac International.

Women working at Australian Glass Manufacturers at 813 Dowling Street in Waterloo, New South Wales. This photograph was included in *Smith's Weekly* and provided courtesy of the State Library of New South Wales, 16 April 1947.

glassware products from Thailand in 2017, and products valued at (US) $20,718,000 in 2020; imports from Thailand were (US) $22,938,000 in 2021.

Imports of these products from Germany increased during 2018 and 2019. A major dip occurred in 2020, with imports into Australia again increasing in 2021. The level of imports from this European country were (US) $29,376,000 in 2017, (US) $33,765,000 in 2018, (US) $35,618,000 in 2019, (US) $26,878,000 in 2020, and (US) $31,378,000 in 2021.

Among the top 15 sources of imported glass and glassware products, beyond the five noted, there were decreases in the levels of imports from two nations and increases in the amount of imported products from seven countries.

Both the UK and South Korea have seen declines as Australian imports of glass and glassware products have declined from the two countries. In 2017, Australia imported (US) $28,411,000 of these products from the UK; in 2021, it was (US) $18,448,000. For South Korea, the amounts were (US) $17,020,000 in 2017, and five years later, (US) $13,741,000.

The seven nations that have seen increases in imports into Australia included Italy, (US) $17,697,000 in 2017, (US) $20,966,000 in 2021; France, (US) $18,456,000 in 2017, (US) $20,692,000 in 2021; Malaysia, (US) $3,490,000 in 2017, (US) $19,217,000 in 2021; Indonesia, (US) $14,085,000 in 2017, (US) $15,566,000 in 2021; Taiwan, (US) $12,093,000 in 2017, (US) $13,088,000 in 2021; Japan, (US) $8,230,000 in 2017, (US) $11,450,000 in 2021; and India, (US) $3,851,000 in 2017, $9,479,000 in 2021.

Please note that one of the top 15 nations listed as a source of imported glass and glassware products into Australia is not actually a country. Instead, the third largest source is identified as "Area NES (not elsewhere specified)." According to the International Trade Centre (ITC), this wording "…is used (a) for low value trade and (b) if the partner designation was unknown to the reporting country or if an error was made in the partner assignment. The reporting country does not send ITC the details of the trading partner in these specific cases. Sometimes reporters do this to protect company information. So, one could say that 'Area NES' is a group of partner countries, but the components of the group vary by reporter, by trade flow, by year and by commodity."

In the case of Australia, Area NES included (US) $30,798,000 in imported glass and glassware products in 2017, (US) $28,100,000 in 2018, (US) $27,665,000 in 2019, (US) $24,694,000 in 2020, and (US) $35,366,000 in 2021.

Exports

The amount of exports of glass and glassware products from Australia has remained relatively steady for four of the past five years. The one exception was during 2020. Glass and glassware products exported from this South Pacific country were valued at (US) $65,783,000 in 2017, (US) $65,731,000 in ▸

2018, (US) $64,656,000 in 2019, (US) $57,348,000 in 2020, and (US) $65,857,000 in 2021.

With the exception of the USA and the UK, all of the countries that were major destinations for exports of these products were in Asia and the Pacific Ocean.

Exports to New Zealand have been at the top of the list for each of the past five years, accounting for 37.5% of all exported glass and glassware products in 2017, and 36.7% five years later. In 2017, glass and glassware products valued at (US) $24,696,000 were exported to New Zealand; in 2018, this amount was (US) $27,267,000; in 2019, (US) $27,804,000; in 2020, (US) $23,663,000; and in 2021, (US) 24,184,000.

Whilst exports to both the USA and China have increased from 2017 through 2021, exports to the USA were more than twice the amount of those to China in 2021. In 2017, Australian glass and glassware products exported to the USA represented 10.2%, whilst in 2021, this figure rose to 17.6%. Exports to the USA rose from (US) $6,732,000 in 2017 to (US) $11,621,000 in 2021, whilst exports to China increased from (US) $5,011,000 in 2017 to (US) $5,610,000 in 2021.

As for exports of Australian glass and glassware products to the UK, the amounts decreased from 2017 to 2018, increased from 2018 to 2019, then decreased again from 2019 to 2020, before increasing once more from 2020 to 2021. The amounts ranged from (US) $2,823,000 in exports in 2017 to (US) $2,197,000 in 2019 to (US) $1,838,000 in 2021.

Singapore, Papua New Guinea, India and the Philippines were among the nations in Asia and in the Pacific Ocean that saw increases in exports of these products from Australia from 2017 to 2021. In most cases, other than the increase to the Philippines, the additional export amounts were modest.

In 2017, Australia exported glass and glassware products valued at (US) $1,957,000 to Singapore, whilst the amount was (US) $2,060,000 in 2021. For Papua New Guinea, the amounts increased from (US) $1,820,000 in 2017 to (US) $1,939,000 in 2021; for India, (US) $999,000 in 2017 to (US) $1,135,000 in 2021; and for the Philippines, (US) $739,000 in 2017 to (US) $1,110,000 in 2021.

Indonesia, South Korea, Japan, and Thailand were among the Asian countries where exports of glass and glassware products from Australia decreased from 2017 to 2021. Other than the amounts sent to South Korea, these decreases were relatively small.

Australian exports of these products to Indonesia were valued at (US) $2,568,000 in 2017, (US) $2,453,000 in 2021; to South Korea: (US) $2,686,000 in 2017, (US) $2,137,000 in 2021; to Japan: (US) $1,972,000 in 2017, (US) $1,859,000 in 2021; and to Thailand: (US) $1,078,000 in 2017, (US) $1,010,000 in 2021.

Expansion of Visy in Queensland

In April of 2022, the Queensland Government made two announcements regarding expansion of glass manufacturing and recycling facilities in this state situated in the north-eastern part of Australia. The Premier and Deputy Premier jointly announced that the Queensland Government was investing (AUS) $16 million in a major upgrade of the Visy Material Recovery Facility (MRF) on Gibson Island. The funds were secured from the Queensland Jobs Fund.

"We made a pledge to the people of Queensland before the last election to provide this funding towards a cleaner future, and we are living up to that commitment," said Dr Steven Miles, Queensland Deputy Premier, Minister for State Development, Infrastructure, Local

Government and Planning and Minister Assisting the Premier on Olympics Infrastructure. "Upgrading the facility will not only create local jobs but also increase recycling capacity to significantly reduce landfill.

"The works include a new state-of-the-art paper optical sorting plant that will be able to turn mixed paper, picked up in kerbside collections, into 100% recycled paper, reducing landfill waste," Dr Miles continued. "The upgrades to the Gibson Island facility will create 11 jobs, which is a fantastic result for locals."

Dr Miles indicated that the total estimated cost for the expansion of this MRF is (AUS) $48 million.

In a news statement issued at the same time, Visy announced that the "upgrade to its MRF at Gibson Island will see up to an additional 30,000kt of material diverted from landfill. Visy currently recycles over 250,000 tonnes of material from kerbside collections a year and is proud to service the majority of South East Queensland's recycling needs". The company stressed the importance of recycling "because as things decay in the landfill they emit methane gas, which is up to 84 times more harmful than CO_2."

Anthony Pratt, Executive Chairman of Visy, noted that "Recycling is an important weapon against climate change and the Queensland Government is to be congratulated for its support for practical environmental measures, like recycling, that all Queenslanders can participate in."

The efforts in Queensland are part of "…a comprehensive Waste Management and Resource Recovery Strategy which aims to promote more sustainable waste management practices that reduce the amount of waste produced by business, industry and households," according to a statement issued by the Queensland Government on 26 July 2022. "Queensland is moving toward a circular economy and the Queensland Government is committed to working with the resource recovery industry to harness the potential value of resources traditionally discarded and improve sustainability."

Beyond the MRF upgrade, the Queensland Government also announced that it would purchase the site of the current glass manufacturing facility of Visy in South Brisbane. Cameron Dick, Treasurer and Minister for Trade and Investment of the Queensland Government, stated that the Queensland Government would pay Visy (AUS) $165 million for its historic riverfront site in West End.

At the same time, Visy announced that it would relocate and expand its glass manufacturing operations in Queensland – part of a broader plan for the 2032 Olympics to be held in Brisbane, Queensland. The International Broadcast Centre (IBC) for the games will be built at the former Visy site.

"Our agreement with Visy will increase the number of Queensland manufacturing jobs with Visy to around 300 and will create an additional 600 construction jobs building the new factory", stated Mr Dick. "Since we secured the 2032 Olympic and Paralympic Games, we've made it clear the IBC could not come at the expense of traditional manufacturing jobs."

Annastacia Palaszczuk, Queensland Premier and Minister for the Olympics said the deal was a win for jobs – today and for the next decade.

"This is a key milestone for one of the vital infrastructure pieces of the 2032 Olympic and Paralympic Games – the International Broadcast Centre," explained Premier Palaszczuk. "This deal secures the site for the IBC, but it also secures the manufacturing jobs currently located at the Visy factory in West End."

Visy in its statement noted that it will be spending (AUS) $500 million on a new glass manufacturing facility in Yatala, Queensland. "The facility, which will produce about 1 billion glass containers a year, will support Queensland's world class, iconic beverage manufacturers," according to the statement.

Mr Pratt indicated that "the state of the art factory will help towards increasing the recycled content in Visy's glass packaging to 70%, reduce landfill, and reduce the use of natural resources by using the most modern energy efficient manufacturing technology ▸

Rendering of the Visy Material Recovery Facility on Gibson Island presented at a news conference held by the Queensland Government. Photo provided courtesy of the Queensland Government, 29 April 2022.

available."

The statement from Visy noted that the upgrading of the MRF and the new glass manufacturing plant in Queensland are part of the efforts to enhance recycling and clean energy infrastructure during the next decade in Australia.

"This is the largest investment Visy has ever made in Queensland," said Mr Pratt, "and is part of my pledge to invest $2 billion in Australia over the decade. I commend Premier Palaszczuk and her Government for its leadership in support of Australian manufacturing."

Wine industry

Among the key beverage sectors of Australia that utilise glass containers is the wine industry.

"Wine Industry Suppliers Association (WISA) members include a diverse range of supplier businesses within the wine sector," according to Shirley Fraser, Executive Officer of the Association. "WISA is a collective of industry supplier businesses, leaders and influencers to the wine industry. Championing supply chain, it is the peak national, not-for-profit, association representing suppliers to the grape and wine sector. Its members are active and committed to adding value to the community through connection, cultivating ideas and networks, advocating, and communicating across all segments.

"Packaging is an integral part of wine delivery, experience and consumer engagement, and continues to offer producers way to convey the messages of their brand positioning, wine style and ethos in sustainability, luxury, cellaring potential, serving occasion and/or innovation," Ms Fraser continued.

"Glass remains the predominant vessel for wine as and in itself compared to other beverages," explained Ms Fraser. Alternative packaging such as pouches, PET, cans and flexible or bag in box, are emerging in new ways and approaches for consumer demand, demographic changes and/or market requirements. All need to be fit for purpose, occasion, and market positioning. Closures of cork, screwcap or alternative materials as well as carton or outer packaging are also part of the decision for how brands present themselves and the ceremony of opening, sealing or storing. We support all businesses and the solutions they provide to the value chain from grape grown to the glass of wine enjoyed."

Saverglass

One of the suppliers to the wine and spirits industries in Australia is Saverglass.

"The date of 3 June 2022 has a particular importance for the Saverglass Group because 20 years ago, the Australian subsidiary opened its doors, in Adelaide, in the South of the continent," according to a statement issued by the company. "An adventure that started under the impulse of Loïc Quentin De Gromard, convinced of the necessity to develop the presence of Saverglass – until then represented by a distributor – into a full-fledged entity, in order to reinforce its presence on the market.

"Initially created to target the wine industry, Saverglass Australia has also contributed to the resurgence of BVS wine bottle caps in Australia and New Zealand," the statement continued. "A real innovation for the Australian market."

Among the reasons cited by Saverglass to expand in Australia was the size of the wine industry in the nation.

"In 2001, Australia was the sixth largest wine producer in the world," the statement explained. "Saverglass was, at that time, the only glassmaker willing to produce a 750ml BVS Riesling bottle for the Clare Valley vineyards on a commercial scale. Following the success of the first bottle launched, Saverglass decided to develop a range of different models and capacities, resulting in over 30 BVS models in the catalogue today."

In addition to its efforts in providing glass containers for the wine industry, Saverglass is also active in the spirits industry.

"Whilst the spirits market was only 5% for almost 15 years, today it's booming in the spirits industry," detailed the statement from Saverglass. "The development of vodka and craft gins has been very fast. The new Australian trend is even

moving towards alcohol-free spirits."

The company anticipates future growth in this South Pacific country. Its statement concluded by noting that "The challenge for Saverglass Australia for the next 20 years will be to continue to grow and maintain its leadership position in the Australian and New Zealand markets."

Vinpac International

Vinpac International is Endeavour Group's bottling and packaging division that is located in South Australia. "We bottle over 10 million 9LE cases annually and have over 500 valued customers," according to a statement from Vinpac International. "We offer customers a complete service of packaging material supply and inventory management, bottling, winemaking, bulk wine storage, laboratory services, warehousing and distribution. We are equipped to use many bottle formats, from 187ml up to 6 litres, all closure types and carton configurations over our three facilities that are located in Barossa, Gawler and McLaren Vale regions in South Australia.

"Throughout the glass supply chain, we look for ways to operate more sustainably," the statement continued. "We have long standing relationships in place with respected glass suppliers and have collaborated with them on innovative sustainable packaging options for our customers."

James Vallance, Commercial Manager at Vinpac International noted that, "Through a key collaboration with Orora Glass we have developed a 750ml Light Weight Sparkling bottle the first of its kind in Australia. To have an Australian-made innovative sustainable packaging option for our customers is important to us. By collaborating with Orora to produce this lighter weight bottle provides a combination of commercial and environmental benefits for our customers."

Sustainability is key to the efforts of Vinpac International.

"Consumers are increasingly aware of how their purchasing habits can impact the environment are looking for packaging options that align with their sustainability values whilst still offering a premium look," according to the statement from the firm. "Lighter weight sparkling bottles weigh approximately 100g less than the sparkling wine bottles currently available in Australia so when Orora developed this new lightweight sparkling bottle, which is manufactured at their state-of-the-art facility in Gawler, South Australia, many customers made the switch to this more sustainable option.

"The strong sustainability credentials that our domestic glass suppliers have and the practices that they have put in place to achieve a circular economy align with our company's sustainability objectives," the statement from Vinpac International concluded. "Both Orora and Visy Glass are significant users of recycled glass (cullet) derived from the South Australia container deposit scheme. This makes a large contribution to avoiding cullet going to landfill, which is something we are passionate about at Vinpac International."

Recycling and sustainability

"Australia has a range of policies and programmes designed to reduce waste and increase recycling," according to a spokesperson for the Department of Climate Change, Energy, the Environment and Water of Australia. "Through the Recycling Modernisation Fund (RMF), Australian governments and industry are investing heavily in infrastructure to sort, process and remanufacture glass, plastic, paper and tyres. To date, (AUS) $45.7 million in joint funding has been invested in 16 glass facilities which will increase Australia's glass processing capacity by around 426,000 tonnes. A further 15 facilities targeting multiple materials will create an additional 57,570 tonnes of glass processing capacity."

The Department spokesperson explained that "Australia began regulating waste glass exports in January 2021 to encourage recycling in Australia and to prevent our waste from ending up in the environment overseas. The regulation ensures that any waste glass that is exported is in a form that is ready for re-use or remanufacture overseas. There was a marked drop in waste glass exports from Australia in the year following the introduction of this regulation (from 25,879 tonnes in FY2019/20 to 335 tonnes in FY2020/21). The combination of waste export regulation and increased processing capacity will significantly increase glass recycling in Australia."

History

Glass manufacturing has been part of the history of Australia. According to information from Barani (an Aboriginal word of the Sydney language meaning 'Yesterday') provided by the City of Sydney, "Glass production was one of South Sydney's main industries in the late 19th century. A number of glassworks were established at Redfern, Alexandria and Waterloo to manufacture bottles for the pharmacy trade; brewers, distillers and winemakers; and domestic use, mainly jars used for preserving and pickling fruit and vegetables."

The statement continued by noting that "Sydney has long been a magnet for Aboriginal and Torres Strait Islander people seeking work opportunities, shelter and connections with community and family. Many worked in private industry in Sydney's southern suburbs. Local industries where Aboriginal people worked [included …] the Australian Glass Manufacturers on South Dowling Street at Waterloo." ●

About the author:
Richard McDonough is a civic journalist based in the USA. He writes on a variety of topics in the glass industry.

Further information:
TwoCents.News
email: gloinechronicles@gmail.com
web: www.twocents.news

Attendees and AIGMF dignitaries at the 2022 Annual General Meeting.

AIGMF awards recognise outstanding achievement

As part of the celebrations for the International Year of Glass, the All India Glass Manufacturers' Federation honoured recipients of its highly contested industry awards during the federation's 2022 annual general meeting in Delhi.

glass WORLDWIDE *Honorary member and preferred journal of AIGMF*

Managing Director of Schott Poonawalla Eric L'Heureux was honoured with the prestigious annual 'C K Somany Award for Innovation and Technology' at the All India Glass Manufacturers' Federation (AIGMF)'s prize-giving ceremony in September. Sangeetha Shenvi, Vice President at Schott Poonawalla, collected the award on behalf of Mr L'Heureux from former AIGMF President Sanjay Somany. The pharmaceutical packaging company was also the recipient of the 'Balkrishna Gupta Award for Exports', presented by former AIGMF President Pradeep Gupta. Both awards are supported by *Glass Worldwide,* preferred international journal of the AIGMF in association with Kanch.

The jury for the AIGMF industry awards comprised of Dr. K. Annapurna, Chief Scientist, Glass Division, CSIR-Central Glass & Ceramic Research Institute (CSIR-CGCRI); Dave Fordham, Publisher, *Glass Worldwide;* Sanjay Somany, Former President of the AIGMF and CMD HNG Industries; P K Kheruka, Former President of the AIGMF and Chairman of Borosil; and Vinit Kapur, Secretary of the AIGMF.

Advances and achievements

As world health safety concerns soared during the Covid-19 pandemic, Schott Poonawalla has been the supplier of vials for vaccines, not only for India but also supporting the global vaccination drive by exporting substantial quantum of vials across the globe including Europe, USA, Russia and South Africa. The company successfully contributed towards 4.3 billion doses of Covid-19 vaccines through the supply of vials, of which three billion doses were provided for India and 1.3 billion doses were provided for the global market.

Eric L'Heureux joined Schott as a QA Manager at Schott Belgium in 1992 and went on to become Technical Director at Schott Indonesia in 1998, and was made President Director of Schott Indonesia in 2001. He also served as the Managing Director of Schott Hungary and was responsible for operations at two plants in France from 2006 until 2009. In 2009, he was appointed Vice President of Schott's Asia operations.

Mr L'Heureux's main contributions towards expansion of operations within the glass pharmaceutical packaging at Schott Poonawalla in India since 2011 include: starting operations at the state-of-the-art plant at Jambusar (Gujarat) with 20 ampoule lines and 16 vial lines producing a total output of more than three million pieces per day; completing the first upgrade of forming and inspection technology at the Jambusar plant; roll out of cosmetiQ inspection system (100% camera inspection system for cosmetic parameters) at the Jambusar plant; and expansion of modules two and three in the Jambusar plant, thereby enhancing capacities to over three billion containers per annum. He has been "instrumental" in starting and stabilising operations at Schott's greenfield plant at Umarsadi (Gujarat) for pre-fillable syringes, cartridges and sterile RTF products.

Under Mr L'Heureux's guidance, Schott Poonawalla today has four state-of-the-art manufacturing units in Daman, Jambusar, Umarsadi and Baddi in India that produce an entire range of products including bulk vials and ampoules, specialty vials and ampoules, siliconised vials, siliconised cartridges and ready-to-fill (RTF) vials and cartridges, siliconised pre-crimped RTF nested cartridges, sterile nested vials and a range of pre-fillable syringes.

Prestigious awards

Thanking the AIGMF and Awards jury, Mr L'Heureux said: "2022 being the International Year of Glass, it is a huge honour to receive the prestigious C K Somany Award for innovation and technology and the Balkrishna Gupta Award during this particular year. At Schott Poonawalla, we continuously ▸

The C K Somany and Balkrishna Gupta awards are supported by *Glass Worldwide,* preferred international media partner of AIGMF.

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AIGMF's Annual General Meeting was staged in Delhi on 2 September 2022.

invest in innovation and cutting-edge technology, not just to meet the needs of our customers, but [to] better them. It is the collective effort and genius of all my teams that drives us forward to meet industry demands, even during challenging times like the Covid-19 pandemic. I look forward to everything we can accomplish together in the years ahead."

Dr Annapurna enthused: "I am honoured to be part of the jury for the AIGMF Awards 2022. I heartily congratulate Mr Eric L'Heureux [...] for winning the prestigious C K Somany Award for innovation and technology with his splendid contribution in innovative technology implementations". Dr. Annapurna also commended Schott Poonawalla for "its exceptional exports in the last year."

Schott Poonawalla's Sangeetha Shenvi with the AIGMF's 2022 Balkrishna Gupta Award for Exports.

"It is very fitting that Eric L'Heureux should receive recognition on the 30th anniversary of him joining Schott because his vast experience across many of the company's global operations led to the recent success story at Schott Poonawalla," added Dave Fordham, Publisher of *Glass Worldwide.* "Mr L'Heureux's achievements in overseeing the remarkable growth and accomplishments of the Indian operations over the last decade make him a very worthy winner of the prestigious C K Somany Award and *Glass Worldwide* sends sincere congratulations. Having been a front runner in the fight against the Covid-19 pandemic by providing pharmaceutical glass for primary packaging to fill so many vaccines worldwide also fully justifies Schott as the recipient of this year's sister award, the Balkrishna Gupta Award for Exports. It is an honour to be part of the judging process and we look forward to publishing an exclusive interview about Eric L'Heureux and Schott-Poonawalla in a future issue of *Glass Worldwide* and Kanch."

Eric L'Heureux, winner of the 2022 C K Somany Award.

Former AIGMF Presidents Sanjay Somany and Mr S C Bansal presented prizes for winners of the 1st Poem / Essay Writing Contest on 'Green as Glass'.

Hydrogen manufacturing hub

During the annual general meeting, NTPC [formerly known as India's National Thermal Power Corporation]'s D. M. R. Panda, Head of Hydrogen Group and Planning Head of Renewable Business gave a presentation on 'Green Hydrogen Economy: Options for Indian Glass Manufacturers'. Mr Panda highlighted how: "the Indian glass manufacturing industry can position itself as a low-cost, zero-carbon green hydrogen manufacturing hub which can help to achieve India's Net Zero target. As always, the Indian glass manufacturing industry lead[s] by example; it can be one of the early movers in the green hydrogen space and set an example for all MSMEs/hard-to-abate sectors."

Poem/essay-writing contest

The programme also provided an opportunity to honour young people in the country who participated from schools and colleges across India in an annual contest, the AIGMF's first poem/essay writing contest on 'Green as Glass', coinciding with International Youth Day on 12 August, 2022. Online entries were invited from the 7–24-year-old age group, wherein over 2,000 entries were received from educational institutes and individuals across India.

Former AIGMF Presidents Sanjay Somany and S. C. Bansal, Chief Managing Director of Adarsh Kanch Udyog, were jury members wh ojudged the top three entries:

First prize (Rs. 25,000) was given to Akshita Tejwani (14), 10th class student at Maharani Gayatri Devi Girls School, Jaipur. Second prize (Rs. 15,000) was given to R. Shruthi (15), 10th class student of Jawahar Vidyalaya Senior Secondary School, Chennai. Third prize (Rs. 10,000) was given to Kanishk Sharma (16), 11th class student at Ajanta Public School, Gurugram (Haryana).

As a token of appreciation, the top 250 entries of poem/essay contest will receive a specially designed glass bottle calendar made from recycled glass (manufactured by AGI GLASPAC, official main partner for IYOG 2022 Indian activities) carrying the logos of the International Year of Glass 2022. ●

Further information:
All India Glass Manufacturers' Federation (AIGMF),
New Delhi, India
tel: +91 11 23316507
email: info@aigmf.com
web: www.aigmf.com

A pairing that works

Despite marketing attempts claiming otherwise, glass is still the best packaging for wine, says Scott DeFife of the Glass Packaging Institute.

Scott DeFife, GPI President.

glass WORLDWIDE *Preferred journal of Glass Packaging Institute*

Something is happening among the wine critic community and it has a faint musty aroma not worthy of your best bottles. In recent months, many wine opinion writers who typically stick to reviewing the newest vintages have ventured into misguided opinion pieces on glass packaging. There are common elements to their writing: overtones of plastic or aluminium industry marketing agency influence, including quotes from company representatives who design and market wine in a non-glass package, as well as not-so-subtle shaming of producers for pushing expensive and heavy imported bottles.

These pieces of writing often include a twist of concern for the overall carbon footprint of the wine industry but are devoid of any real or current data to prove their hypothesis. Typically, these columns are missing evidence of outreach to the glass industry, a disregard for the full range of issues that make up the complex topic of sustainability, or a data-driven comparison between wine bottles and other container materials when it comes to volume and the distance the product is travelling.

Biased writing

To their credit, these wine columns often open with a listing of the positive attributes of glass for packaging wine – that it is chemically inert; aids in the ageing of wine without impact on taste; and is sealed in a manner to protect the integrity of the product. From here, the writers invariably shift to a narrow focus on the environmental impact of the weight of wine bottles during transport, and may even go as far as blaming glass for climate change. We also see suggestions that glass wine bottles are just not being recycled enough. Not only do these arguments blatantly ignore several other tenets of sustainable packaging, but they also outright exclude comparative data on the low plastic recycling rates or the toxic chemicals often used to recycle aluminium or produce paper cartons.

The focus on weight as the sole marker of sustainability is most often associated with the use of a Life Cycle Analysis, or LCA, which is an analytical tool that is supposed to represent the carbon impact from the beginning to the end of a product's life. These reports are a favourite tool of the plastics industry. While LCAs are meant to be a full 'cradle to grave' study of the environmental impacts of manufacturing practices when putting a product on the market, they lack data on how mismanaged waste impacts the environment. Quite simply, there haven't been adequate academic studies conducted to provide researchers with data to insert into the LCA model, and therefore, they usually do not include it.

Additionally, LCAs exclude data about the toxicity of packaging materials or agricultural practices, have a specific geographic scope of the data inputs, and allow the sponsor of the study to pick the baseline data of comparable containers. For example, the manufacturer could be using a European energy mix and starting with a 100% recycled fibre box, and then deceivingly comparing it to a heavier 100% virgin glass bottle. Those details are never revealed in marketing campaigns.

The writer will then continue their marketing ploy by appearing to humanise the issue with a quote from a vintner or sommelier who claims to have been so driven by concern over the weight of glass bottles that they've decided to switch to packaging their wine in aluminium cans or boxes. The claim is that these materials are "just as good" or "better" than glass because they are lighter.

Here are the facts:

Glass is the only package for wine that does not use some sort of plastic or polymer resin lining. Mixed material packages are far more difficult to recycle than single material packages, and glass uses the least amount of chemicals of all the packaging mixes commonly used for beverage packaging. Production of virgin aluminium and paper is just as, or more, energy intensive than glass, and plastic extraction from fracking and drilling in sensitive environmental areas, as well as end-of-life mismanaged waste and microplastics, have far greater environmental impact than the shipment of glass from one location to another.

Corporate or industry sustainability goals are important and should be respected. The wine industry has serious thinkers working on real ways to reduce the carbon footprint of wine production. The glass industry has been working on this as well, including lowering energy use, extending recycled content, offsetting production impacts by investing in green energy, and a new generation of furnaces and light-weight bottles.

Glass bottles are indeed the perfect container for wine and the reasons are abundant. Unfortunately, these recent columns criticising glass are filled with factual errors that mislead the reader and industry with unnecessary guilt, and essentially provide solutions in need of a problem. Wine and glass are a pairing that works. Glass manufacturers, winemakers and consumers should work together to address the concerns of the industry and continue to advance the sustainability and integrity of wine production. ●

Glass bottles are the perfect container for wine.

About the author:
Scott DeFife is President of GPI.

Further information:
Glass Packaging Institute
Arlington, Virginia, USA
Tel: +1 703 684 6359
email: info@gpi.org
web: www.gpi.org

glass packaging institute

Making moments matter during IYOG

To celebrate the International Year of Glass, Friends of Glass has launched a video-led campaign that commemorates the past, present and future of glass containers and reminds consumers of the importance of recycling

glass WORLDWIDE *Preferred journal of FEVE*

Established by FEVE (the European Container Glass Federation) in 2008, Friends of Glass works with organisations to promote the environmental, health and safety benefits of glass packaging. The European consumer platform has decided to mark the International Year of Glass 2022 – the first time in history that the UN has devoted a year to a material – with a campaign to remind people that this natural, healthy and sustainable material has always been by our side, and has the ideal characteristics to be part of a future with greater environmental ambitions.

The 'Glass Makes the Moments That Matter' video celebrates the past, present and future of glass containers.

Moments that matter

The campaign celebrates the past, present and future of glass containers with a video entitled 'Glass Makes the Moments That Matter' that shows their presence – for more than four millennia – both in everyday moments and on special occasions, highlighting how the vessels are "a common element in our lives that sometimes goes unnoticed, but that has accompanied us from generation to generation."

The video also reinforces the active and necessary role of citizens to recycle their glass products.

The age of glass

Glass has been a vital material in the progress of our civilisation, an essential element in the most important technologies, facilitating and promoting a more sustainable and greener future.

"Our life, our way of life, would not be possible without the existence of glass, and its many applications have led [some] to say that we are in the Age of Glass," commented Prof. Alicia Durán, CSIC researcher at the Institute of Ceramics and Glass, and President of the International Year of Glass. "This material is applied in fields as diverse as art and architecture, engineering, biomedicine, renewable energy, telecommunications, security or trade. And as a container, being an inert and permanent material, it perfectly meets the most stringent requirements for food safety and recyclability."

Raising awareness

Being inert means that glass does not allow the migration of toxic substances to the contents or the environment, thus taking care of our health, but also of the environment. It is manufactured from natural and very abundant raw materials, but its main component [can be] cullet, which comes from recycled glass. As it is a permanent material, it loses neither quality nor quantity in the recycling process, replacing the raw material, saving energy and reducing emissions. In order to make the most of the ecological qualities of glass containers, it is very important to continue with the work of raising awareness so that each and every used container is deposited in the green container. Friends of Glass' initiative encourages consumers to join in the celebration of the International Year of Glass 2022, choosing glass and always recycling it.

"From generation to generation, glass has always been by our side."

The 'Glass Makes the Moments That Matter' video can be viewed here: www.friendsofglass.com/international-year-of-glass ●

Glass-bottled drinks at a birthday party.

FEVE
The European Container Glass Federation

Further information:
FEVE, Brussels, Belgium
tel: +32 2536 0080
email: secretariat@feve.org
web: www.feve.org

glasstec 2022 review

Demonstrating its undisputed relevance in the International Year of Glass, the 2022 glasstec trade fair reunited the global glass industry across nine halls in Messe Düsseldorf, Germany, during 20–23 September.

Following a pandemic-induced four-year break, glasstec's restart welcomed 936 exhibitors from 47 countries and hosted 30,000 visitors from 119 countries who came to experience the operational excellence of the sector. In focus were the global trend topics Climate, Resource Efficiency, Urbanisation, Value and Well-Being but also current challenges such as high energy costs, supply chain bottlenecks or skilled labour shortage.

Show data indicated that 75% of visitors travelled to Düsseldorf from abroad, while 75% of attendees identified as executives involved in investment decisions. Visitors were 'highly satisfied' with the ranges on display at glasstec; well over 90% stated they had achieved their set objectives for the visit. For the majority, seeking new suppliers as well as innovations and trends was the main goal. Many of the products and services showcased by the glass manufacturing and processing sectors are reviewed in the following pages. ▸

glasstec 2022 welcomed visitors from 119 countries for an in-depth exchange of knowledge and industry experience on a global level. Photo: Messe Düsseldorf/ctillmann.

Nine halls in Messe Düsseldorf were packed full of products and innovations from 936 exhibitors, along with an accompanying programme of special shows and conferences. Photo: Messe Düsseldorf/ctillmann.

An essential experience

"glasstec 2022 came at precisely the right point in time to provide the glass industry with orientation again after the pandemic-induced changes and in a difficult economic climate," stated Erhard Wienkamp, Managing Director at Messe Düsseldorf. "Participants' feedback has been unambiguous here: as a face-to-face trade fair glasstec allows in-depth exchange of experience and knowledge transfer on a global level in a uniquely concentrated form as well as offering an unparalleled, packed line-up of innovations and solutions."

This impression was also shared by Egbert Wenninger, CCO and board member at Grenzebach Maschinenbau, Chairman of VDMA's Glass Technology Forum as well as Chairman of the Exhibitors' Advisory Board at glasstec: "We are very happy with the way the fair went! It was absolutely the right decision to participate in glasstec. We notice the positive mood in the teams, among customers and new contacts. Personal meetings and the opportunity to see innovations on the machines on site [is] an essential experience that was simply missing in the last few years. Now you really realise the importance of a trade fair like glasstec, and we are already looking forward to the next event in two years."

Compelling conference programme

In addition to the broad-based ranges displayed by exhibitors, visitors noted glasstec's high-calibre accompanying programme of special shows and conferences, the combined offering providing a comprehensive platform for knowledge transfer and covering all target groups – from skilled trades to architects' offices, from glass processors to producers and from upstream suppliers to the industry and technology vendors – with innovations and solutions for their respective demands.

The glasstec conference programme operated as a think tank for its avid audiences, combining industry know-how from theory and practice in the context of the five global trend topics. Each day, glasstec visitors were informed about current developments and trends via lectures on glass production, glass processing and finishing as well as glass products and applications. In addition, the conference was streamed on the glasstec website.

Next in glass

As well as established industry names, 11 young and innovative companies gained a platform for networking and professional exchange with top decision-makers in the glasstec START-UP ZONE, while visitors reaped the benefits of new and innovative applications and solutions.

Centre-stage in Hall 11 was the Glass Technology Live innovation show organised by a network of the four technical universities: Darmstadt, Delft, Dortmund and Dresden. Under the heading NEXT IN GLASS some spectacular exhibits and installations reflected the latest trends and results of scientific research, providing insights and outlooks on the performance of the sector.

Also forming a traditional part of the line-up of side events was the International Architecture Congress, focusing on sustainable architecture with glass. Eight representatives from renowned architects' and engineering offices – pioneers in planning and building with glass – presented exciting projects to approx. 100 participants. Discussions also revolved around the contribution that glass facades can make to moving away from fossil fuel dependence, improving human well-being in increasingly warmer climates and highlighted the technical and design potential glass holds for architecture today.

Hall 10 provided the venue for CRAFTS LIVE, where tradition meets progress, and hosted WorldSkills Germany@glasstec, where young glaziers from throughout Germany competed to qualify for EuroSkills 2023 in Poland. There was also a glass art exhibition featuring a number of creative and intriguing works showcasing the material as a means of artistic expression.

Welcome to the Glass Age

Chair of the UN International Year of Glass (IYOG) 2022 Professor Alicia Durán spoke at the glasstec conference on 22 September to provide a re-cap of the efforts to secure the United Nations' recognition, a summary of the many successful IYOG events held this year, and share details of the Closing Congress in Japan (8–9 December) and the IYOG2022 Debriefing in New York on 14 December. Legacy projects will continue to reinforce and increase networks created in 2022, encompassing science, technology and industry, education and art, she assured the audience.

Prof. Durán was followed by possibly the youngest and (most splendidly nonchalant) glasstec participant: 14-year-old Georgina Hobbs who was honoured as runner-up in a IYOG prizegiving ceremony for a short videos promoting glass. First prize was awarded to Chiara Werner (18) who filmed a yoga enthusiast exercising in a glass-windowed studio and accepting a glass of water in a position most of us would find impossible...

This triumvirate of female talent was completed by a fascinating presentation on 'Glass in regenerative medicine: from bones to wound healing' by Marcela Arango-Ospina, a PhD student from the University of Erlangen-Nürnberg.

L–R Marcela Arango-Ospina, Prof. Alicia Duran, Georgina Hobbs and Chiara Werner with conference hosts Dr. Thomas Jüngling and Petra Cullmann. Photo: Messe Düsseldorf/ctillmann.

decarbXpo

Held concurrently over three days in Hall 9, the decarbXpo trade fair for industrial and commercial decarbonisation demonstrated both investors' and industrial users' need for an intensive exchange of information on new technologies and cooperation for climate protection. Production companies from the glass industry visited to discuss reducing energy costs and CO_2 emissions as well as energy storage.

The next glasstec will be held in line with its two-year cycle from 22–25 October 2024 in Düsseldorf.

Further information:
web: www.glasstec-online.com

Advanced Energy

www.advancedenergy.com

AIGMF

www.aigmf.com

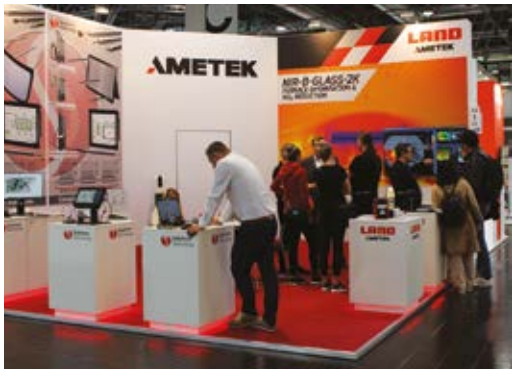
AGC

AGC Ceramics Co., Ltd.

www.agcc.jp

LAND AMETEK

www.ametek-land.com



Agr

www.agrintl.com

ANTONINI FLORENCE ITALY

www.antoninisrl.com

This selection of exhibitors ordered and provided their stand photos in this gallery.
For a full list of exhibitors, visit www.glasstec-online.com

glasstec exhibitors in focus

An array of international companies presented the latest technology at glasstec 2022, including the following selection from the manufacturing and processing sectors (for a full list of exhibitors, visit www.glasstec-online.com).

ACMOS Chemie showed its range of release agents, coatings and shear blade lubricants. The portfolio of innovative process aids presented included cooling lubricants for shear blades, high-temperature resistant coatings for blank and finished moulds, neck rings and delivery system (trough and deflector), release agents for blank and finished moulds as well as neck rings, sliding agents for conveyor belts HE and CE and coatings for rotary blow production.

Adelio Lattuada promoted a series of flat glass processing innovations, including robotic solutions (CNCs, double-edgers, cutting, tempering or IG lines etc).

Advanced Energy Industries displayed its latest temperature measurement and plasma power supplies for the production and coating of flat glass, solar glass, container glassware, utility glassware and technical glass products. Visitors saw how the company's non-contact thermometers, power controllers and DC plasma power systems have been tailored to the specific needs of the glass industry. Among the power technologies exhibited were advanced RF, pulsed-DC, and bipolar pulsed-DC power supplies featuring sophisticated arc management capabilities and digital SCR power controllers that increase performance control accuracy. Thermal monitoring demonstrations featured non-contact thermal imaging and flexible pyrometry platforms for the robust and precise temperature measurement that is critical for efficient and cost-effective melting, glass viscosity control, heat zone adjustment, annealing and stress reduction.

AGC Ceramics exhibited as a recognised refractory manufacturer with over 100 years' experience and a proven supplier of complete furnace engineering services. AGCC proposed to visitors an excellent furnace concept in terms of energy saving and environmental-friendliness, with reasonable and workable refractory selection. The fusion of material technology and engineering knowledge helps AGCC to support customers in various furnace life situations.

AGC Glass Europe promoted the flat glass it produces, processes and distributes for the construction, automotive and solar sectors. The manufacturer highlighted its Planibel coloured float glass available in dark grey, bronze, grey and green, as well as three blue tinted shades: PrivaBlue, Dark Blue and Azur, and explained how a special chemical composition gives the architectural glass a softer or more intense colour tint, depending on the thickness. Also featured for interior use was AGC's ecologically-produced Mirox MNGE range, and Mirold Morena: mirrored glass with a distinctive antique look achieved by selective oxidation of the silver coating. AGC held a press conference at Messe Düsseldorf to announce that by the end of 2022 it will produce a float glass range featuring a significantly reduced carbon footprint of less than 7kg of CO_2 per m^2 for clear glass (4mm thick). This move will enable AGC to reduce the carbon emissions generated during the production of this float glass by more than 40%. The group is taking a "holistic" approach to its low-carbon glass production, incorporating sustainable sourcing of raw materials, highly efficient melting furnaces, green energy sources and increased use of cullet, as well as optimising transport between Group sites for finishing processes, and optimising the transport for finished products. AGC Glass Europe's production plant in Moustier, Belgium, will be the first site to produce low-carbon glass, as it has already been successfully converted to meet the strict conditions required.

Agr used glasstec to unveil the ThicknessPen, its new portable thickness gauge for accurate, non-destructive measuring of glass containers and sheet materials. Featuring patent-pending dual measurement mode technology, the app-based device gives users the option to measure using either a magnetic or capacitance mode, whichever is most appropriate for the application. Agr's stand also highlighted its Gawis4Glass dimensional measurement system for glass containers. Designed to streamline laboratory measurement operations by performing a multitude of critical dimensional measurements in one simple procedure, the system can be used for a wide range of glass containers and offers ▸

ANTARES VISION GROUP

www.appliedvision.com

AREA IMPIANTI

www.areaimpianti.it

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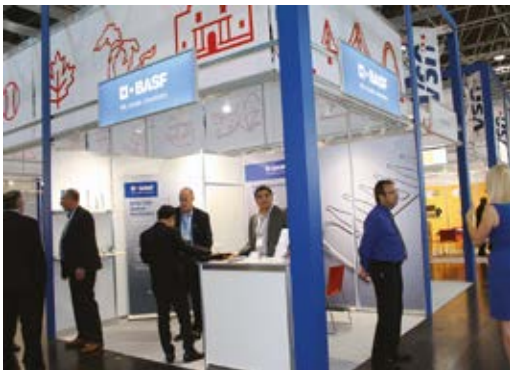
BASF
We create chemistry

www.catalysts.basf.com/glass



BOTTERO

www.bottero.com

BDF industries
The future we see through

www.bdfindustriesgroup.com

BUCHER
emhart glass

www.emhartglass.com

Bock

www.bock-energietec.de

BÜRKLE

www.burkle.tech

This selection of exhibitors ordered and provided their stand photos in this gallery.
For a full list of exhibitors, visit www.glasstec-online.com

"unmatched" accuracy, repeatability and operational throughput. Another new development on display was the RPT3 pressure testing system for glass containers which has the ability to test two bottles simultaneously via dual pressure generators. Pressure tests up to 69.8 bar can be performed on high-strength bottles as well as on low-pressure ware with accurate detection of low-level breaks as low as 1.4 bar.

All Glass proposed flexible and innovative depalletising, conveying and palletising solutions.

The All India Glass Manufacturers' Federation (AIGMF) shared a stand with preferred partner, *Glass Worldwide*. Manned by General Secretary Vinit Kapur, the stand was visited by many figureheads from the Indian glass industry, including a number of AIGMF committee members. Founded in 1944, AIGMF is the sole representative body for all segments of the Indian glass industry, consisting of large, medium and small-scale manufacturers.

AMETEK Land showcased a wide range of temperature measurement technologies for use in a variety of glass applications, from melting to annealing. Highlights included the NIR-Borescope-2K-Glass (NIR-B-2K-Glass), a short-wavelength radiometric infrared borescope imaging camera, designed to produce high definition (1,968 x 1,476 pixels) thermal images, along with providing accurate temperature measurements from any of the three million temperature points in the image. The camera measures temperatures in the range 1,000–1,800°C (1,832 to 3,272°F) and is suitable for float glass, container glass, borosilicate glass and fibre glass melt furnaces.

Antonini displayed a full range of annealing and decorator lehrs, together with lehrs for glass blocks, lehrs for HV insulators, mould preheating kilns, cold end spray systems, upgrade and overhaul services. The success achieved throughout the company's existence is born from a tradition in which the search for technological improvement is founded on reliability, efficiency and a willingness to listen to the demands of customers.

Applied Vision, a member of the Antares Vision Group, invited showgoers to learn more about its soon-to-be launched Volcano Check system, which will join its Volcano Sidewall (SW) and Volcano Sealing Surface & Base (SSB) inspection solutions for glass containers. Volcano Check is designed to completely change the way plants look for and detect even the most problematic checks while greatly reducing set-up time, machine operator burden and unplanned downtime. Using just two multi-axis imaging stations, each built around patented illumination and optics, the new system eliminates both the need for machine operators to manually align multiple sensors, and for container-specific tooling required for rotation. To support ease of use, a finish-specific tool provides the ability to make pass/fail decisions, while requiring no machine training or calibration (instead, a simple setting adjustment for the bottle being inspected allows for fast job changeover). Volcano Check also features a self-learning AI-based tool that users can 'train' to automatically start inspecting. Volcano Check, SW, and SSB are designed as standalone or electronically coupled solutions. Installed together, the machines can provide mould-correlated statistics as well as image maps of check locations to give users a broader view of the container being inspected and a better idea of where manufacturing process problems may exist.

Ardakan Float Glass Co from Iran discussed with visitors the products it exports to over 68 countries and explained why the company is renowned for the glass it manufactures for the overseas racket sport 'padel', which is played in 20m x 10m courts requiring strong glass walls as balls can be played off them in a similar manner to squash.

Area Impianti, supplier of flue gas treatment systems throughout the world, offered visitors know-how and advanced technology to treat the polluting gases produced by industrial processes of flat, container, tableware, artistic, borosilicate and lighting glasses, as well as glass wool. Highlights from solutions on show included flue gas treatment – DeNOx SCR and heat recovery for thermal and/or ORC electric production.

Arkema exhibited as a glass coating market and technology leader, supplying coatings and systems for value-added products used in the flat and container sectors.

Avacon promoted a wide range of advanced products and innovative solutions to visitors from the hollow glass industry, especially in the field of process automation and improvement. Innovations developed for the IS machine include a standalone servo pusher, servo invert, servo take out and proportional valves control, among other solutions. In addition, Avacon promoted vision systems such as GobScan 2D, GobScan 3D and the IS machine surveillance system, Sentinel.

Quality control and production technologies specialist **Ayrox** welcomed glass processors to its stand, offering equipment and solutions including QC equipment and services, non-destructive optical control equipment, training, PVB treatment, PVB wiring machinery and production accessories.

BASF showcased high-quality optical pyrometers, thermocouples, and calibration services to provide temperature insights that can enable higher yields and assist customers with attaining increased profit, including the EXACTUS instruments to supply accurate temperature readings. Other innovations included Fibro platinum to Platinel thermocouple wire.

Bavelloni, historic manufacturer of machinery and tools for flat glass processing and Techni Waterjet, one of the oldest and most experienced waterjet manufacturers in the world welcomed visitors and offered them the opportunity to experience first-hand their complementary glass processing solutions, to watch live demos and meet the companies' experts.

BDF Industries was present as leader in glass engineering, renewable energy and industrial automation. Visitors were presented with the innovation, technology and versatility benefits that make BDF IS Machines ideal solutions for high productivity, low maintenance effort and considerable energy saving. Highlights on show included the new Servo Baffle and Servo Blowhead Mechanisms, promoted by BDF as a 'revolution' not only because of being fully electric but also due to their retrofit action as they can be applied to every single machine. Nicolas Trentin, Marketing Manager, told *Glass Worldwide*: "After four years without glasstec, it was great to see such an active community and was important for us to meet customers and suppliers, finalising many projects. Many people visited us and with an always fully crowded booth, for us [this] was an important signal since we get the confirmation that we are a strong point of reference in the industry. We take the opportunity to present ourselves in a completely different way, launching our brand new logo and website and bringing [to] the trade show floor a representation of the process of a glass container creation, revised in a conceptual way and creating an immersive experience for guests who visited our booth."

Bernard et Bonnefond promoted ways to save money for electric furnaces and electric boosting with its variable voltage transformer.

Bertram Elektrotechnik exhibited as a specialist with in-line control and automation systems for the cold end of the glass container manufacturing process.

Biesse displayed a selection of solutions for machining glass including: a robotic island for automatic loading and unloading, a machining centre with innovative MTS system, an integrated cutting line with storage and handling systems, an integrated double-edging grinding line with boring-milling machine, and an integrated flexible double-edging grinding line with boring-milling machine and storage device for optimising the glass flow.

Binder+Co presented CLARITY, the company's development for sorting glass efficiently, starting at a size of 1mm. CLARITY turns glass cullet into a valuable resource, free from contaminations, glass ceramics and lead glass.

Bock Energietechnik was present as specialist in electrical heating systems for the glass industry. With extensive experience in electrical melting and glass ▸

www.carmetspa.it

www.cortexglass.com

www.celsian.nl

www.deltathermique.com

www.cmprojecting.de

www.optical-inspections.com

This selection of exhibitors ordered and provided their stand photos in this gallery.
For a full list of exhibitors, visit www.glasstec-online.com

processing, the company is active in many areas of the glass industry, such as container glass, flat glass, glass fibre and wool, and household glass. In these industries, Bock delivers melting furnaces and feeders, especially for special applications.

Bottero Glass Technologies designs and manufactures machinery to process flat and hollow glass as well as entire production lines for laminated and float sheets. Visitors to the flat glass, hollow glass and engineering sectors of the Bottero stand were offered extensive and transversal know-how in the world of glass, all to the benefit of the quality of the solutions offered and the service to customers.

Thankful for the "return to normality", **Bucher Emhart Glass**, a division of Bucher Industries AG, was back to exhibiting as a supplier of forming machines, inspection machines, controls, and parts to the glass container industry. The company shared with visitors the end to end advancements that have helped to maintain its single source proposition for glass plant technology and support, and underlined how it is continuously seeking for ways to increase automation and stabilise the manufacturing process. Also on the Bucher Emhart stand to talk with customers and answer any questions were representatives from Ergon Meccanica, a specialist in the field of IS machine overhaul, installation and maintenance that has focused increasingly on Emhart Glass products in recent years. The two companies are strengthening their co-operation on high quality repairs and overhauls of glass forming machines, and explained how facilitating Ergon Meccanica's access to technical information and specialists from Emhart Glass will afford customers even better results.

Bühler Leybold Optics exhibited as a provider of leading glass coating technology, with in-depth expertise in coating processes and deposition systems in the field of vacuum thin film coating.

As the central organisation for the German glass industry, **Bundesverband Glasindustrie eV (BV Glas)** exhibited as a representative of the environmental, economic and energy policy interests of around 80% of German glass manufacturing enterprises. *Glass Worldwide* is a preferred journal of BV Glas.

Bürkle was present as a specialist in the development and manufacture of lamination and coating systems for the production of technical glass, in particular functional and laminated glass. Visitors were shown that the technology is characterised by energy-efficient and flexible properties that enable a cost-effective and modern production. The range of capacity comprises designing, planning, manufacturing and commissioning, from the individual machine to the complete system solution. Electronic control and visualisation systems ensure a flexible and fully automatic production flow for the manufacture of high-quality products. Innovations showcased included the Glass Laminator IFL.

Cairo Glass exhibited as a manufacturer of patterned glass in the Middle East region. The company discussed its portfolio of clear and coloured glass sheets that are made on its three main production lines in Egypt.

Candela promoted solutions for article inspection.

Car-Met greeted visitors to discuss the company's range of annealing, decoration and toughening lehrs and lehrs for special uses, stackers, cross conveyors, hot glass scrapers and mould preheating ovens.

CelSian Glass & Solar displayed products and services aimed at delivering value to the glass manufacturing chain in the areas of furnace support, process optimisation and knowledge transfer. The furnace support team offered solutions for multiple challenges faced by glass furnace operations such as energy and CO_2 reduction, emission reduction and increasing furnace lifetime. CelSian showcased a number of models frequently used in its CFD software, especially NOx modelling. For process optimisation, visitors benefitted from 30+ years' history of research within glass science and technology, while leading experts in research projects and training courses covered the challenges of today's glass production. Details on the CelSian Academy's Glass Technology training courses in 2023 were also released at glasstec.

cericom showcased possibilities for glass processing with laser, including cutting, drilling, de-coating, marking, structuring, edge deletion and increasing mobile phone transmission.

Changshu Jianhua Mould Technology Co was present as a leading glass mould manufacturer in China, mainly producing glass container and tableware moulds.

Operating under the **Chemetall** brand, the Surface Treatment global business unit of BASF's Coatings Division exhibited as a leading supplier of applied surface treatments and services for glass substrates.

Chpolansky SAS promoted its innovations in laser cladding.

cm.project.ing exhibited as an independent glass industry consultant, offering visitors support in implementing their major industrial projects in the fields of project management and engineering.

CMS Glass Technology is a leader in the field of curved and flat glass working; the company's technologically-advanced solutions offered to visitors included numerically-controlled machining centres, cutting ▸

www.dsf.co.uk

www.duratemp.com

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For a full list of exhibitors, visit www.glasstec-online.com

ELECTROGLASS

www.electroglass.co.uk

Eurotherm®

www.eurotherm.com/glass

EME

www.eme.de

EXCELSIUS
YOUR HOT SERVICES SPECIALIST

www.excelsius-global.com

ESMA
Driving Print Excellence

GLASSPrint CONFERENCE

www.esma.com www.glassprint.org

Extris
Italian performance fabrics

www.extris.eu

This selection of exhibitors ordered and provided their stand photos in this gallery.
For a full list of exhibitors, visit www.glasstec-online.com

tables and water-jet cutting systems.

Commersald Impianti showcased its hardfacing solutions including robot systems, innovative nozzles and remote assistance.

Condat presented a complete range of lubricants dedicated to the flat and container glass industries.

Corning Laser Technologies showcased its latest capabilities at glasstec, including demonstrations of its new glass-wafer dicing solution – a laser modification process for its CLT 400S-WD glass wafer dicing tool that can be used for small die/narrow street applications where mechanical breaking is required, and can handle up to 300mm wafers. Representatives from the company explained how CLT's nanoPerforation process induces localised material modification rather than material removal, resulting in high-quality laser cuts suitable for fast, free-form laser cutting of complex shapes required for consumer electronics, the automotive industry and for the semiconductor/micro-fabrication sector. Corning also detailed its CLT 80G laser system which uses ultra-short laser pulses to cut glass substrates up to 2300mm x 2500mm by material separation instead of ablation, resulting in low surface roughness, higher throughput and greater break strength of the cut parts. In addition, the company highlighted its CLT 66G is a laser system for cutting and drilling tempered glass and other brittle materials. Employing axes driven by linear motors, the machine is built on a solid granite platform to ensure high stability and precision.

Cortex Glass develops and sells innovative hot end inspection, monitoring and control systems for the glass container, pharmaceutical, flaconnage and tableware industries. The company promoted its GobWatch, ISWatch, TopWatch and BlankWatch systems. The BlankWatch system measures blank side temperatures and/or gob loading parameters. The measurements are very precise and exactly timed with the IS-machine.

CTA Division Delta Thermique showcased its decorating lehrs, mainly dedicated to glass bottles printed with ceramic inks. The company's electric lehrs offer a fine and homogeneous curing of the glass artwork over the entire width of the conveyor thanks to an efficient air circulation system and control of temperature profiles.

Cugher promoted its complete turnkey systems for screen printing on glass, including process automation and control, IR and UV dryers, automatic vision and quality control systems, handling and storage equipment. The new line configurator EVA (Extra Vision Application) was promoted.

Decorative and satin glass manufacturer **Dekor Glass** highlighted its acid-etched designs, including Bamboo, Harmony and Spica.

DK Holdings presented its innovative range of diamond tooling solutions, including the Flexible Diamond Belt and the Electroflex product rang. DK Holdings continuously seeks to innovate and develop Flexible Diamond products to meet customers' evolving demands such as reduction in production downtime as well as the increasing importance of reducing environmental impacts during the manufacturing process.

Dow launched carbon-neutral silicones for building facades verified to PAS 2060. This carbon-neutrality service can support green building designs, enhance facade sustainability and improve green building ratings.

Dr Günther Inspections presented a selection of innovative modules. These included a new optional camera that allows the detection of glass splinters in the bottom of a piece of tableware and the software logic to separate them from dirt and dust, etc. Another option available is for the inspection of even the smallest defects on the mouth rim. For certain articles, a precise measuring of the stress level of specific areas in the glass is important. This newly-designed software recognises higher or lower stress levels, depending on the quality requirements.

DROP AG by Hans Lüscher was present on the ESMA pavilion promoting the DROP Phoenix CtS UV-LED direct image setter that produces high-quality printing plates and offers future-proof and highly efficient imaging solutions.

DSF Refractories and Minerals was celebrating its 130th anniversary and presented visitors with developments including new refractory materials for hybrid melting and hydrogen firing, plus samples of hydrogen-fired mullite brick. DSF's specific areas of expertise and supply are zoned mullite regenerators, forehearth shapes including colourant forehearths, large and complex blocks and refractories for the tin bath. The portfolio of materials includes high-fired andalusite, mullite, fused mullite, pure alumina, bonded AZS, zircon, calcium aluminate and mag-alumina spinel.

Dura Temp exhibited as a leading supplier of hot glass handling materials and quick-change parts and assemblies, providing a variety of ware handling solutions for glass containers and tableware, as well as bending and tempering applications. The company's high temperature products virtually eliminate damage to glass on account of thermal stress, oil absorption and abrasion. Leading-edge materials technology is combined with a systems approach to apply the correct materials to the right applications.

Electroglass specialises in electric glass melting and conditioning. Senior technical staff were on hand at glasstec to meet existing customers and to introduce the company's technology, equipment and latest developments to others. Core activities include the development, design, engineering and supply of electric glass melting and conditioning systems and related equipment.

EME GmbH reinforced its position as a leading manufacturer and supplier of batch and cullet handling equipment for the glass industry, showcasing innovations purpose-built to provide greater reliability, quality, flexibility and longevity. Offered solutions 'Engineered for Endurance', visitors learnt that the reliability and efficiency of EME systems and equipment are well established in the container, flat and special glass sectors worldwide and that working together with EME's partners in the SORG Group, the company can develop comprehensive solutions for the glass manufacturing process, from the delivery of raw materials through to the start of the forming process.

Emirates Float Glass promoted its output of float glass for architectural and automotive applications. The Abu Dhabi-based company highlighted its new Vision Cool Series, which "generated great interest", in addition to its clear and tinted Vitralite glass; pyrolytic reflective glasses Vitracool and Vistasol; and its Emicool ST coated products for solar control.

EMS Group showcased a range including palletisers, depalletisers, robotic systems, labellers, tray formers, bottle and pallet conveyors.

Entegris featured glass handling take-out solutions, mould-top inserts and Glassmate graphite materials. Also on display was the company's glass forming GF graphite.

Ergon Meccanica is a leader in the installation and repair of IS machines and co-exhibited with Bucher Emhart Glass.

ESMA, the European Specialist Printing Manufacturers Association, exhibited together with member companies. Their presence was marked by a showcase of the best in functional and decorative glass printing with the latest screen and digital decoration technologies. ESMA organised its glasstec pavilion for the sixth time and companies featured included Drop, Fimor, Gallus, Global Inkjet Systems, Pröll, RUCOINX, SPS Technoscreen and Sun Chemical. Copies of *Glass Worldwide's* Annual ESMA Glass Decoration 2022 publication were distributed. Visitors to the stands of ESMA and *Glass Worldwide* (preferred partner of ESMA and co-organiser of GlassPrint), registered their interest in the upcoming GlassPrint 2023 event, the only conference dedicated to glass decoration. The ninth edition of this renowned educational and networking event will take place on 25–26 April 2023 in Düsseldorf.

Euromatic showcased automatic glass tubing converting equipment for ampoules, vials, cartridges and syringes.

Eurostar Concrete Technology promoted the GTM series planetary mixer.

Eurotherm promoted its power and process control ▸

FENZI

www.fenzigroup.com

Fimor SERIGRAPHY

www.fimor-serigraphy.com

FERMAC DIGITAL PRINTING

www.fermac.it

FlokOntrol

www.flokontrol.com

F.I.C. (UK) LIMITED

Tomorrow's Technology Today

www.fic-uk.com

FORMA GLAS machines + engineering

www.formaglass.com

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solutions for improved sustainability and efficiency, including electrical boosting and melting, redundant DCS process control and turnkey projects, services and support. Eurotherm offered support to all visitors with the transition to electrification.

Excelsius Global Services exhibited as a specialist for the heat-up, drilling and drain of glass furnaces. Services offered to visitors included heat and expansion control (including contraction measurement), controlled cool down, hold hot with and without production continuation capability, cullet fill using blowing or vibrating feeding methods, furnace tap and drain with or without water recycling and cooling, regenerator sulphate melt outs and cleaning, furnace drilling and electrode/bubbler installation and heat-up and melt-out burner/component sales and rental.

EXTRIS exhibited its screen printing mesh for the glass industry, including the SUPREX range of fabrics.

Falorni Tech – Glass Melting Technology exhibited as the industrial division of Falorni Gianfranco Srl, a historical Italian company serving the glass industry since 1958. Visitors learned that the company's experience as a supplier of glass melting furnaces (regenerative, recuperative, oxy-fuel and oxy-fuel/electric type) enables Falorni Tech to operate not only as main contractor for EPC projects but also as a trustworthy consultant for institutional and private investors in the hollow and float glass industries.

FAMA's wide experience in the glass container industry allowed the company to provide solutions to visitors through products and services for IS machines, feeders, glass container handling, variable equipment, maintenance, engineering services and automation.

Fenzi exhibited as a leader in the area of sealants for insulated glass units, decorative enamels for glass, mirror coatings, including those for solar thermal power and machines for digital printing on glass.

Fenzi AGT Advanced Glass Technologies, a global provider of special glass enamels and precious metal paste and now part of the Fenzi Group, promoted solutions for the automotive and industrial sectors. A recognised leader in the supply of high performance materials to the automotive glass, electronic, tableware, advanced ceramics, glass and technical glass markets, AGT launched the new laminating enamel S2-IR at glasstec. Key benefits include the removal of the need for pre-fire process, significant reduction in energy costs and time, improved printability, optical-density achieved at lower layer thickness, reduced risk of transfer S2 to S3 and robustness for simplified processing.

Ferlam promoted a range including swabs, conveyor belts, braids, narrow tapes, felts, sleeves and woven tapes.

Fermac exhibited as a designer, manufacturer and installer of equipment and complete lines for the decoration of hollow glass items and discussed with visitors the latest innovations in screen and digital printing technologies. The product line promoted included semi-automatic and automatic machines for decorating tumblers, bottles, jugs, cups, pots, ashtrays and perfume bottles etc.

Ferro, now part of Vibrantz Technologies with Prince and Chromaflo, promoted value-added solutions for glass applications and creations. Whether coatings for architectural, automotive, container glass, or digital printing machines and inks, visitors were offered a broad array of solutions designed to their applications.

F.I.C. exhibited as a member of the Glass Service group, specialising in electric boosting design and supply. F.I.C. can assist with installing electric (super) boosting that can help to reduce carbon emissions and to maintain a furnace energy supply, should there be a shortage of natural gas in the future. F.I.C. has a very experienced team available for hot drilling and installation, if required. Optimal boost position and amount can be simulated by Glass Service prior to installation.

Fickert + Winterling showcased flat glass rolling machines.

Fima Olimpia Fonderie promoted special cast irons for glass moulds.

Fimor, a world leader in polyurethane squeegees, displayed its Serilor line of products for most screen printing applications including window protection, anti-reflective (varnish) and details. The company also demonstrated a variety of custom-moulded polyurethane technical parts used in the handling and protection of glass products.

Fives presented high-efficiency glass making solutions including melting, forming and conditioning technologies to increase energy efficiency, lower emissions and enhance campaign and operating life. Visitors learned about innovative technologies for greener glass manufacturing from fully electric furnaces to advanced forehearth design, including all electric melting solutions, hybrid solutions, electric forehearths and optimised design.

Flammatec (FT) is part of the Glass Service group and a leading supplier of advanced burner technology for glass furnaces. Innovations on show included the new Hydrogen Carbon Free burner, introduced recently in response to environmental challenges to reduce CO_2 footprints. FT burners are suitable for all types of regenerative furnaces and produce a high luminous flame with under-port and ▸

Fosbel CERAMIC TECHNOLOGIES

www.fosbel.com

LUBRICANTS. TECHNOLOGY. PEOPLE. FUCHS

www.fuchs.com/uk

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www.futronic.de

www.glassservice.it

www.glassglobal.com

www.glassworldwide.co.uk www.glassprint.org

www.gsl.cz

www.glassworkshounsell.co.uk

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side-port installations. They are suitable for oil, gas and dual fuel, creating low NOx through efficient heat transfer, resulting in faster batch melting. FT also provides an oxygen burner and supplies a complete range of advanced combustion equipment.

Flokontrol Industrial Automation offered visitors intimate knowledge and experience of pneumatic, robotic, electromechanical, hydraulic and electric control systems that enable the company to provide tailor-made robotic solutions. Innovations promoted included IS machine swabbing robot, robotic palletising systems, robotic case packaging systems, conveyor and carrying systems, automatic guided vehicles and robotic vision systems. The company's 'BRUSH & SPRAY System Together' was presented as the new generation swabbing robot.

Fonderie Bartalesi highlighted bronze alloys for moulds for the production of glass bottles and jars.

Forglass, a specialist in the design and construction of glass furnaces and batch plants, showcased innovative solutions, inventions and concepts for lowering emissions and energy consumption. As an added attraction, Marek Kaminski (Polish polar explorer, Guinness World Record holder, successful entrepreneur and educator) was present.

Forma Glas exhibited as an innovative manufacturer of glass production machines for stemware, tumblers and press articles from Austria. Visitors learned about Forma's expertise in engineering, construction, research, consulting and know-how in the field of production lines, glass processing machines and cold processing machines.

Fosbel promoted its technology, expertise and materials to increase productivity and extend the life of furnaces in glass and other industries. Its broad range of preventative maintenance and remedial repair services include ceramic welding, Fosbel's innovative refractory repair performed at operating temperature, as well as condition monitoring, inspections, rebricking/rebuilding and other innovative hot repair technologies.

Fuchs showcased its extensive VITROLIS product range covering moulding, shear, synthetic machine oils, delivery lubricants and coatings for the container manufacturing industry, with cutting, grinding and bevelling fluids for the float glass industry and H1-approved lubricants for the vial forming and pharmaceutical industry.

futronic, celebrating its 50th anniversary, showed a selection of innovative products. The focus was on the FMT24S (Flexible Modular Timing System), the high-end control system for all sequences and processes on an IS machine. futronic's experts demonstrated the FMT24S on an FMT Trainer designed to provide essential training and continue professional development – and which also serves as a spare parts container for components. The Swab Cycle Monitoring System (SCMS) was also on display on the training section. The SCMS monitors swab cycles automatically and outputs visual and acoustic warnings indicating when, and on which section, the next cycle is due. futronic's new Vacuum Process Control System (VPC), which makes processes visible in the vacuum cycles by recording pressure curves and errors precisely, also made its debut at glasstec. The system allows manufacturing problems to be detected before they have a chance to occur.

Gallus presented its Screeny C-Line and G-Line, setting standards on cost-effectiveness and production reliability for decorating hollow glass and containers using industrial screen printing. Gallus combines Screeny screen printing plates, a computer-to-screen UV-LED imagesetter, a development system and an ingenious frame system into a unique complete solution, leading to reproducible printing results in just a few simple steps.

GEA presented emission reduction technologies, in particular the capture of carbon dioxide from waste gases through CO_2 scrubbing; solutions that can significantly help plant operators reduce environmentally harmful emissions, improve their energy efficiency and facilitate the path to carbon neutral production. Visitors learned that GEA offers small and medium-sized CO_2 capture plants with great flexibility, allowing customers to produce CO_2 with varying exhaust gas compositions; this includes solutions using carbonates, amines or ammonia.

Giancarlo Perego displayed moulds and mould technology for the glass industry, as well as highlighting how the company has actively invested in machinery and technology in recent years.

GIMAV, the Association of Italian manufacturers and suppliers of machinery, equipment and special products for glass processing was represented at glasstec. An impressive number of member companies participated.

Online since 2000 and counting over 360,000 visitors/month, **glassglobal.com** is the world's largest portal for the international glass industry and preferred partner of *Glass Worldwide.* The group's glass experts were present at glasstec to provide sophisticated services to all segments of glassmaking, covering everything from raw materials to production and processing. Features include a comprehensive database, a trade market for machines and glass, an expert job market, project information from greenfield to repair, together with technical consultancy covering marketing, research and technical trends.

GlassFORM.ai offered visitors quality control combined with automatic machine adjustment, leading to an increase in overall productivity through reduction of wastage, improvement of glass, glass weight reduction and optimisation of the production processes

GlasStress promoted its scattered light polariscopes for stress measurement in architectural glass, automotive glazing and solar panels, as well as its automatic transmission polariscopes for stress measurement in bottles, drinking glasses, tubes and tableware.

Glass Service from the Czech Republic is a specialist in glass melting expertise and advanced laboratory technologies and presented the know-how and simulation software to help manufacturers select the most energy/cost-efficient way to melt glass. This expertise and service is supported by the company's popular GS GFM simulation software. GS' Expert System III (ESIII) has been rolled out worldwide to glass producers. ESIII dynamically controls furnace operation by means of a proven Model-based Predictive Control (MPC) system which utilises the energy source that is most cost-efficient to melt glass. ESIII not only brings down energy costs, it also reduces carbon. Also part of the Glass Service group, F.I.C. and FlammaTec exhibited at glasstec as well.

Experts from Italy's **Glass Service Srl** answered customers' questions about the production of technologically advanced furnaces for neutral borosilicate glass production and were on hand with a long reference list of plants that the company has built. Visitors to the stand heard how Glass Service studies, tests and applies new solutions to its systems, and were informed about the cost-saving advantages of the oxy-gas combustion furnaces and electric boosters that it supplies. Also discussed were mixed melt furnaces: by integrating oxy-gas combustion systems and the extended application of electric booster systems on the bottom of the furnace, Glass Service has created more than 20 mixed melt furnaces for producing hydrolytic class I neutral glass for pharmaceutical applications. Advantages include a very low gas consumption, and consequently, a very low CO_2 footprint, whilst maintaining the high flexibility and production quality guaranteed by cross fired furnaces with oxy-gas combustion. According to members of the team, Glass Service is actively working on channels and distributor interventions to improve energy balance and reduce CO_2 emissions. Glass Service has also started testing H_2–O_2 burners of its own design.

Glassworks Hounsell exhibited batch charging (including wetting) equipment for all types of glass and furnace types, as well as tin oxide refractory electrodes and relevant connectors for lead and special glass production. With machines supplied throughout the world, the company remains at the forefront of design, manufacture and installation of parts, individual machines and furnace management systems.

Glaston shared some of the latest developments from ▸

www.glaston.net

www.grafotec.com

www.globalcombustion.com

www.graphoidal.com

A NANODIMENSION DIVISION

www.globalinkjetsystems.com

www.grenzebach.com

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its efforts to help shape the sustainable future of glass. To automate the flat glass tempering process the company has devised an online stress calculation solution using measured process data to calculate temperature and stress distribution during quenching. Glaston also introduced its White Haze Scanner – the first AI-based solution to provide a high-quality visual indication of an unacceptable white haze on processed glass and instantly notify users. Visitors to the stand learned about the Glaston ProL flat glass lamination line, and how its convection heating chamber makes switching between glass types and different glass sandwiches even easier. To achieve a higher degree of automation, Glaston's lamination process autopilot enables the furnace to 'learn' the most optimal way to run. glasstec attendees interested in insulating glass benefitted from hearing about the Glaston MULTI'ARRISSER: a 3-in-1 solution for economical glass edge arrissing, flat edge arrissing and corner dubbing that has a maximum arrissing speed of 60m/min, making it the world's fastest single-head machine. Other solutions featured were Glaston's TPS (Thermo Plastic Spacer material) which can be applied directly onto the glass plate, eliminating the need to stock different spacer profiles and connectors; the CHAMP EVO grinding machine for automotive glass pre-processing; the HYPERFEX system for glass edge grinding; and the new Glaston MATRIX EVO automatic bending furnace for perfectly curved automotive windscreens and sunroofs.

Global Combustion Systems promoted NOx reduction by auxiliary injection, as well as burners for all furnace types (gas, oil and oxygen), complete fuel control systems (gas, oil and oxygen), furnace control systems, engineered system solutions and after sales support.

Global Inkjet Systems (GIS) exhibited as a leading developer of industrial inkjet software, drive electronics and ink/fluid delivery system components – including different flow rates as required. GIS production-ready, field-proven products are designed to work reliably 24/7 in industrial settings for key glass industrial printing applications including flat, container, solar and more. Innovations promoted included the advanced Atlas IQ Tools image optimisation software for printing on glass to help improve image quality, including stitching strategies, nozzle-out compensation and rotation correction. GIS also offers a customisable user interface and the company's technology can be implemented in many different system configurations – XY scanning, single pass and custom-configured systems.

Grafotec promoted its high tech innovations for the glass industry as a leading specialist for separator application systems. The company's separator application systems are specifically customised to match perfectly into any existing flat, float or automotive glass production line, anywhere in the world. Innovations included AP TWIN, a high quality nozzle system for two different separator agents during the production process.

Graphoidal Developments is a leading designer and manufacturer of advanced lubrication and coating technology to the glass container and tableware industries. Visitors were offered expertise in precise pumping, control of mixing, dosing and spraying of the lubricants and coatings which form a vital part of the glass production process, both in hot end and cold end areas.

Grenzebach Maschinenbau exhibited as a manufacturer of float glass production equipment. The company presented its new annealing lehr, which offers precisely adapted cooling capacity, a flexible annealing point and significantly reduced energy consumption. Visitors could also preview Grenzebach's innovative dross box with motor-adjustable lift-out curve, optimised atmosphere separation and temperature distribution, as well as intuitive control and improved maintenance options. In addition, the manufacturer showcased its new conveyor technology for optimised glass production with direct drive, a reduced number of components and simpler access to key components. In mid-2022 Grenzebach partnered with SORG for the provision of engineering services related to glass production and the development of turnkey projects. At glasstec the two companies presented their services "shoulder to shoulder" at neighbouring booths. Grenzebach Envelon – the business offshoot brand for solar-active building façades/building-integrated photovoltaic systems exhibited in a separate hall and Vice President Sales and Business Development, Jochen Weick, gave a presentation on "Glass in active building façades" on the opening day of glasstec.

The joint **Grünig-Interscreen AG/SignTronic AG** display re-emphasised the 'Simplify Screen Printing' theme and how automated screen production with higher quality and cost reduction is also a top issue and a great need in the field of screen printing on glass. Visitors learned how automated screen-making equipment can modernise and optimise operations.

Guardian Glass displayed a number of its innovative products and devoted a section of its stand to a 'library' of coated glass samples, which visitors were encouraged to view. Available for European customers was SunGuard eXtraSelective SNX 70, offering "outstanding solar control ▸

www.grunig.ch

www.hegla.com

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www.heye-international.com

www.hotwork.ag

www.hft.com

www.hunprenco.com

www.hornglass.com

IDEAS FOR GLASS
www.ifg-glass.com

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and light transmission approaching 70%." For the Africa & Middle East region, Guardian Glass' SunGuard SuperNeutral SN Carbon 50 T has been developed to answer growing demand for performance glass with a stylish, neutral grey appearance. New for North America is SunGuard SNR 50, designed to help create bright, inviting spaces by combining crisp neutrality on the exterior with reduced 0.25 solar heat gain and 48% light transmission on the interior. The company also introduced its new 0.6% reflectivity Clarity Neutral glass, which offers the highest transparency of any Guardian Glass product to date by reducing glare and bluish reflections to provide truer, more natural views. Appearing "almost invisible", the new glass reduces undesirable light reflection and refraction across more angles and light frequencies, even in low or diffused background light conditions. It also benefits from lower haze and colour shift after being heat treated.

In addition, Guardian announced its new Resource Hub offering both customers and the wider glass community a wealth of technical information, and featuring a new 24/7 Customer Service Portal to streamline ordering and communications.

HarbisonWalker International (HWI) provides the largest refractory manufacturing capacity to the glass industry in North America. Visitors learned that 85 years of research and development in the glass market enable innovative glass solutions.

HEGLA focused its efforts on showing visitors solutions for creating sustainable added value, incorporating an elevated walkway into its stand area to facilitate viewing of its running machines and systems for processing flat glass. The equipment provider explained how its laser diode technology shortens heating time and increases value creation in LSG cutting. There was also a first-showing of its vertical remnant system for reducing glass waste. HEGLA-HANIC provided insight into its redeveloped next-generation ERP [enterprise resource planning] software system, which can integrate a wide range of essential programs as well as offering options for add-ons such as financial bookkeeping or control via a Microsoft platform. HEGLA boraident displayed samples of its bird protection glass, antibacterial panes, heatable glass and RF-transparent IG offerings to illustrate how standard glass can be finished by removing or transforming the functional layer, or via non-destructive printing with its Laserbird technology. Known for its convection technology and closely-controllable heating zones, HEGLA TaiFin detailed the qualities of its tempering furnace and explained how the combined benefits of bed optimisation, automated batch creation and 'de-batching' can increase total throughput and save energy. HEGLA New Technology took visitors though its Shop-Floor app, which provides services such as consolidating machines and systems' maintenance requirements, assigning work to employees, and location-independent product tracking.

Heraeus promoted precious metal compounds and a product range comprising semi-finished products and massive components for glassmaking, as well as precious metal preparations for the decoration of glass.

Heye International was present as one of the foremost suppliers of production technology, high performance equipment and know-how for the container glass industry worldwide. The three brands promoted at glasstec, HiPERFORM, HiSHIELD and HiTRUST, form the Heye Smart Plant portfolio, addressing the glass industry's hot end, cold end and service requirements.

HFT exhibited as a leading, design-build EPC (engineering, procurement, and construction) contractor focused on delivering reliable and transparent single-source project solutions from greenfield, new-build facilities to operational support and maintenance. Headquartered in Pittsburgh, USA – and with regional offices in the UK, China, the Philippines, Singapore and St. Croix – HFT employs engineering and construction professionals and craftsmen around the world. The company has design-built 300+ production lines throughout 47 countries and celebrated its 75th anniversary at glasstec.

HORN Glass Industries promoted innovations such as E-fusion power boosting and a new glass level measurement with radar beams alongside its wide range of experience in the design, manufacture and supply of different furnace types, such as regenerative and recuperative continuous tank furnaces, float furnaces, electrical tanks, pot furnaces, day tanks, electrical tank furnaces for domestic and lighting ware, tableware, containers, technical glassware and sheet glass etc. Utility equipment includes combustion systems, control and safety equipment, electrical boosting and mixing systems. Also offered are forehearth systems, supply stations for oil, gas, oxygen and water, regenerative and recuperative burner systems, combustion equipment, boosting systems and process control systems. Partner company JSJ Jodeit was also present as an expert in all-electrical and specialised furnaces.

Hotwork International exhibited its solutions for combustion technology for air- and oxygen-fired furnaces, preheating of gas and oxygen, high energy efficiency, low NOx and emission control, electric melting technology and furnace draining and heat-up.

Hunprenco highlighted its position as a leading manufacturer of plungers and cooling tubes for the glass container industry. A wide range of machine parts are also manufactured to the highest quality, including adaptors, split collars, Vertiflow plates, mould arm inserts, piston sleeves etc. With a comprehensive range of four- and five-axis CNC milling, drilling and turning machinery, as well as manual equipment, the majority of customer requirements can be satisfied. Constant investment in high technology machinery upholds the company as a leader in this competitive market.

HyGear promoted technologies that could help visitors' businesses by supplying cost-effective and low carbon emission gases through on-site gas generation and recycling.

ICEBEL promoted its mission to study and design, build, assemble and provide automatic cold end line equipment, including palletising, depalletising, handling and palletised loads conveyance.

IfG Glastechnik showcased machinery to apply separating powder and other technical particulates to all types of sheet glass and ultrasonic wet spray glass coating systems.

ilis presented the company's latest developments in the areas of measurement of residual stresses with StrainScope, measurement and control of the glass colour with Chroma and batch calculation and glass development with BatchMaker.

Imaca offered its complete range of products and equipment for the hot end and cold end for glass container manufacture. Products on show included hot end coating chemicals and equipment, cold end chemicals and equipment and lubricants.

Industrie Fonderie Valdelsane specialises in the production of cast iron moulds for the glass industry, developing processes and technology orientated towards the products required.

Inkcups demonstrated the MagiCoat Glass Pre-Treatment System, utilising a flame treatment system along with a spraying system for spray-on primers. This system boasts eight stations that rotate individually while going through the system. Each item is flame-treated to eliminate debris and coatings that inhibit adhesion. The system also offers variable mist settings for a wide range of surfaces. The Helix Digital Cylinder Printer showed its ability to print full-colour, high quality images on drinkware, especially when leveraging Inkcups' specialised helical software for print techniques such as mirror print. At glasstec, the Helix was equipped with Transparent Pin Curing (TPC).

intco promoted its specialist service for glass manufacturing companies, involving the procurement of refractory materials for glass furnaces. The entire process is monitored in detail and key figures are carefully recorded throughout the whole production period.

Interglass exhibited as a leading developer, manufacturer and supplier of specialty lubricants for the global glass industry. Innovations promoted included new ▸

imaca B.V.

www.imaca.nl

interglass

www.interglass.global

INKCUPS EUROPE

www.inkcups.com

INTERMOLDE
MOULDS FOR GLASS INDUSTRY

www.intermolde.pt

intco GmbH
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iPROTec
Innovative Process Technology

www.iprotec-gmbh.com

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swabbing compounds with 'Smart Solid Technology'. The company was founded in 1992 and is part of the Interlub Group, a leading specialty lubrication company that develops and manufactures tribological industrial applications.

Intermolde met clients and friends on its stand, showing moulds and accessories that permit efficient glass production. The full product portfolio was presented, including blow moulds, bottom plates, blank moulds, baffles and baffle inserts, funnels, blow heads and blow head tubes, neck rings, guide rings, thimbles, plungers, coolers, take-out tongs and distributor plates.

IPROTec GmbH exhibited as a young, rising company in the industry of special purpose machine-building with worldwide operations. The firm specialises in the development, construction, planning, manufacture, assembly and commissioning of machines and systems that are designed optimally under holistic consideration of the customer's specific environment and with the greatest possible expertise. Visitors learned that IPROTec's competence lies above all in classical special purpose machine-building.

IRIS Inspection machines introduced two major innovations: the new Evolution NEO AI inspection machine based on artificial intelligence and iBot, the intelligent assistant for optimised productivity. IRIS was present as a leading designer, developer and manufacturer of intelligent inspection solutions for glass containers. glasstec attendees learned about the company's precise and innovative inspection machines with reduced dependence on human factor for increased productivity, quality and efficiency. Innovations include the EVOLUTION machine range with NEO intelligence based on an innovative defect approach that relates to defect identification, as well as the creation of statistics by defect type. Local trend analyses are produced on the machine, with information presented in a user-friendly format.

ISIMAT, a subsidiary of the KURZ Group, shared with visitors innovative decoration solutions with metallic effects and brilliant colours for glasses, bottles, and flacons under the motto 'Making your glass first class.' Innovations included ISIMAT's I-Series machine portfolio, offering the ability to combine different decoration technologies such as screen printing, digital printing and different kinds of foiling solutions in one machine pass, thereby extending the flexibility of a hybrid decoration approach. Within the I-Series ISIMAT offers users metallisation technologies such as inLINE FOILING, hot-stamping or precious metal inks for finishing and upgrading end products.

ISRA VISION demonstrated its unique, innovative and comprehensive portfolio of products for optical inspection of glass products, suited for almost all production steps in the glass industry, from inspecting the glass ribbon through to the thinnest display glass and from processing sheet glass to business intelligence.

Italcarrelli presented its most recent self-propelled transporters for the flat glass industry and numerous other projects developed, including some prestigious AGVs already in operation in many glass manufacturing and processing facilities around the world. Visitors had the opportunity to see a demo of an AGV transporter for the handling of flat glass on racks, focusing on the loading / unloading of a rack between different stations fully autonomously.

JUMO presented innovations in the field of industrial sensor and automation technology, including the pressure transmitter JUMO TAROS S47 P; JUMO flowTRANS US W, the new ultrasonic flowmeter series; and JUMO smartWARE Evaluation for the analysis and visualisation of measurement data.

Keraglass displayed high-tech solutions for tempering, lamination and decoration on glass.

Kissel + Wolf highlighted screen-making chemicals, flock adhesives, resists and coatings for surface finishing by KIWO. Products on show included quality emulsions, sputter resists, etching resists, flock adhesives, sandblasting resists and liquid protection films. The selective sputter coating for decorative and functional applications on architectural glass attracted great interest.

Koenig & Bauer Kammann GmbH presented a wide range of machine solutions for screen and digital printing. Visitors to the stand learnt that the addition of digital alongside screen technology in the same portfolio allows Koenig & Bauer Kammann to offer more solutions to customers who recognise the possibilities of combined machines and equipment that can be used for screen and digital decoration.

KTG Engineering, part of the TECO Group, promoted such products and services as electrode holders, boost, bubbler, level control and controllable drain systems, spy hole covers, screw batch chargers, molybdenum/tin oxide electrodes and installation services.

Lahti Glass Technology took the theme 'Throw us your challenge' and promoted its compact and reliable batch plants that incorporate field industry proven machinery, the latest technology and automation solutions.

LAT Maschinen- und Antriebstechnik GmbH & Co.KG (Himmel technologies) promoted the benefits of ▸

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www.kiwo.de

www.lisec.com

www.kammann.de

www.luescher.com

www.lahti-glass.fi

www.lwn-lufttechnik.de

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the new Servoelectric Stacker ES854, including all three axes operating in a closed-loop 'Speed- and Position Control-Circuit'; automatic synchronisation of the cross travel speed to cross conveyor; sensible interlocking in software (programmable) between all three axes; infinitely adjustable travel speeds and positions; infinite programming of accelerating and slowing down ramps for all three axes; up to 20 cycles per minute; efficient and reliable cooling with heat exchanger; and selectable staggered stacking also in home position.

Lattimer exhibited as a market leader in the design and manufacture of high quality IS variable equipment for the glass container forming industry.

LiSEC exhibited as a producer of machines for flat glass processing and finishing. The company's sales team and product specialists promoted its motto 'all.in.one:solutions' and demonstrated the Austrian-manufactured machines, as well as taking visitors through LiSEC's latest technical innovations, software solutions and services. Innovations at glasstec included the KSD – vertical edge seaming and grinding machine with LiTEC slider technology, the DSC-A high performance machine for cutting flat glass automatically and the RHV automatic vertical loading and unloading via robot.

Lizmontagens Group promoted its complete scope of services for the glass industry, including the construction and repair of industrial furnaces, total refractory installation, steelwork installation and manufacturing, project management of turnkey projects, procurement and supply of refractory and insulating materials, furnace cool down control, hot sealing and insulation installation and technical appraisals.

Luben Glass promoted mechanical components, plants and chemical products for the hollow glass industry.

Lüscher Technologies demonstrated its ultra-compact 'JetScreen! CS' computer-to-screen system for the high-end production of screen printing stencils. The company showed how, combined with its in-house X!Tend software – which adjusts the size of graphic elements in screen emulsions, capillary films and photoresists (positive or negative) to compensate for light diffusion, diffraction and other physical phenomena – optimal image results can be achieved from processing TIFF data.

LWN Lufttechnik used glasstec to celebrate 25 years as a leading supplier of innovative cooling systems for the glass industry. Highlights included cooling systems for IS machines, glass furnaces and glass processing, as well as system components and automatic control systems. The team offered expertise in consultation and needs analysis, planning, preparation, production and assembly.

Magneco/Metrel's unique colloidal silica-bonded monolithic refractory products offered visitors an alternative to traditional refractory technology used in the glass furnace. Metpump-brand products can be used in different applications for cold and hot repairs, in emergencies and for scheduled repair projects.

manufactIS GmbH, a ROSS subsidiary, promoted complete IS machine support service, taking care of consulting, development, design, spare parts, and on-site service.

Mappi, a designer and manufacturer of high quality tempering systems, presented the MTH, a new furnace designed for those who have to manage large load volumes and process very large slabs without sacrificing quality, flexibility or energy savings.

Ink manufacturer **Marabu** introduced its new offering for digitally-printing three-dimensional effects on glass: Mara Shape DUV-HBV High Build Varnish. The company explained how, by enabling multi-layered and consistently sharp reliefs to be produced, the process is suitable for printing ultrafine haptic details, even on convex or concave geometries as well as higher and thicker graphic elements. As a bonus the varnish is recyclable – oxidising without any residue. Marabu also promoted its UV-curable Ultra Glass UVGL screen printing ink system for creating haptic effects and, when combined with hot foil embossing, high-gloss metallic finishes. Offering visitors myriad options for digital-/screen-/pad-printing on glass, and displaying numerous examples of printed products, Marabu continued to champion its organic UV-curable inks as an effective and energy-efficient alternative to ceramic glass printing inks.

Marposs showed a wide range of gauging solutions for dimensional and geometric inspection of glass products. Highlights included the flexible Visiquick machine for dimensional and geometric inspection of glass containers on a sample basis. A new way of shaped glass non-contact assessment was also presented. The displayed demo bench showed a robotised system of measuring curved glass thanks to two different technologies built-in: laser beam for borders evaluation and chromatic confocal for surfaces, even multilayer, inspection (thickness, roughness, shaping). The arm moves the sensor's head which collects continuously measurements along its path without any stop. The analysing central unit gathers data and matches the measurements with the thresholds set in the recipe punctually, to provide the final total qualitative evaluation. The strengths of this innovative system are oriented to increasing productivity, flexibility and speed, without compromising the accuracy traditionally identified with Marposs' solutions.

The new technical approach is dedicated to small parts as well as to large parts (such as windshields) and is made available as turnkey automation or just equipment of measuring to be implemented in a third machine. Industries that take advantage of this cutting-edge technology are those manufacturing or processing complex shape glasses, such as automotive, avionics, furnishing and medical.

Merkle International, a leading supplier of suspended refractory systems and related furnace equipment, promoted suspended backwalls, tin bath roofs and other furnace components, as well as blanket batch chargers.

Mersen offered proven solutions for hot glass handling in graphite and carbon/carbon composites. Under the Cerberite brand, the company has developed a complete range of systems and solutions dedicated to hollow glass production lines.

Monofrax promoted its diversified line of fused cast refractories.

Motim Fused Cast Refractories was present as a leading producer of fused cast AZS and alumina refractories and refractory castables. In the glass industry, the company's blocks are used in all melting furnace types for container, float, tableware and special glass production.

MSK Covertech Group exhibited as a market leader in the field of cold end equipment. With innovative solutions for conveying systems and palletising systems up to packaging systems, the company offered visitors a variety of complete, fully automatic systems covering cold end technology, bottle conveying, palletising, packaging, handling and software. A highlight at glasstec was experiencing MSK technology in virtual reality.

MT Forni Industriali demonstrated its specialisation in glass melting furnaces, annealing and decoration lehrs and bending furnaces.

Neptun offered solutions including washers and edgers, vertical CN and robotic automation systems.

Nirox Optoelectrics showcased optical measurement sensors and systems for glass pharmaceutical primary packaging.

NOGRID promoted its meshless flow simulation software, support and service. Technology includes CFD (computational fluid dynamics) software for the simulation of flows, NOGRID points and a second innovative CFD software product on the market, NOGRID pointsBlow, which is the only software worldwide that is able to simulate the process of container glass forming in a completely professional way by showing the results in full 3D. In addition to software products, NOGRID offers a variety of services in the area of modelling for the simulation of flows.

Novaxion offered leading equipment and software in ▸

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www.mappi.it

MSK
COVERTECH GROUP

www.mskcovertech.com

Marabu

www.marabu-inks.com

NOVAXION
we swab smart

www.novaxion.fr

MARPOSS

www.marposs.com

OCMI

www.ocmigroup.com

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the field of automatic glass production and machine swabbing. Visitors discovered the new NX-VR-300 swabbing robot that mounts on the valve blocks of all IS machines and provides mould closed and neck ring automatic swabbing within the same section cycle.

NTE-Process showcased conveying, mixing, dosing and automation systems. Innovations include a blender transporter, baghouse and ESP dust handling and raw material handling.

Obeikan Glass Company exhibited as the manufacturer of 'NOVA FLOAT' flat glass and 'NOVA LAM' laminated glass, produced at its facility in Western Saudi Arabia.

The **OCMI Group** produces and supplies solutions for the production of tubular glass pharmaceutical and cosmetic containers. Innovations on show included the new FLA18-9 machine, engineered and manufactured to produce parental glass containers. Visitors learned that cutting edge technology, innovation, quality and the machine's features are making the FLA18-19 a new point of reference in the panorama of the pharmaceutical industry.

Olimerk, a sister company of Olivotto Glass Technologies, promoted quality moulds and equipment for tableware production, including press blow, press, stemware, spinning and twin table.

Olivotto Glass Technologies presented its machinery, systems and solutions to visitors, including landmarks in press and blow production. Innovations promoted included machine sections available in pneumatic or servo configuration with speed range up to 170 pieces per minute, high repeatability heads mechanism movements, easy and quick job change and energy-saving configurations. OGT also promoted its 'Earth Value' project dedicated to environmental protection.

OMCO promoted a complete range of mould parts for glass container production. Visitors were offered equipment for any shape in a wide variety of quality cast irons or aluminium bronze, using various welding techniques to increase mould life.

OMS Group (Officina Meccanica Sestese) displayed its complete range of end of the line packaging machines, including strapping, stretch and shrink hooding.

OMSO showcased the SB021 screen printing machine alongside a complete range of decorating machines. SB021 fulfils the market need for modern machines that are easy to use and attentive to today's hot topics: reduced energy consumption and lowered emissions. The machine is equipped with a high-efficiency motor that reduces the energy requirement for its operation by 70%. Other innovations included Servobottle, the automatic screen printing machine for printing up to 10 colours on glass containers; NovaxM, an automatic single-station modular screen printing machine for decorating bottles; Imprex, an automatic screen printing machine for printing 2–6 colours on cylindrical, elliptic and flat containers; the compact Servobottle8 which offers a maximum of four screen-printed colours with the same qualities as Servobottle but at a lower cost; and the Servojet solution for digitally-printing up to seven colours on bottles, containers and jars.

Optris GmbH exhibited its wide range of non-contact temperature measurement through infrared radiation including the Optris Bottom up glass inspection system for glass tempering plants that offers a new approach to temperature measurement in the production of low-e glass. Low emissivity glass poses a major challenge for infrared devices which traditionally measure the glass temperature from above when the panes are moved out of the furnace during production. The new Bottom up glass inspection system solves this problem by having two infrared imagers installed underneath the tempering line to measure the temperature on the non-coated high emissivity side of the glass.

Ormo Print presented sol-gel coatings for surface finishing and various inks for digital printing.

PaneraTech revealed the new Digital Furnace Monitoring (DFM) programme to monitor and nurture furnaces from the cradle to grave for the longest campaign life they can experience. Other solutions promoted included SmartMelter, proven as an accurate method of refractory inspection and overall furnace health management. Using real data from sensors that measure actual wall thickness, PaneraTech's complete furnace management solution provides valuable insights for furnace life optimisation. Visitors learned about SmartMelter features such as mapping wall thickness below the glass level; detecting glass infiltration into the insulation to eliminate glass leak risk; determining the pace of erosion for optimal overcoat, minor and major rebuilds; keeping comprehensive furnace maintenance records including other inspection records, endoscopic images and pictures; lowering insurance premiums; and enabling implementation of standard inspection and furnace management policies across multiple plants.

Parkinson-Spencer Refractories combines refractory manufacturing with engineered solutions and offered visitors the complete solution to the glass conditioning process.▸

OGT OLIVOTTO GLASS TECHNOLOGIES
MACHINERIES • SYSTEMS • SOLUTIONS
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OMCO
www.omcomould.com

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www.omso.it

www.parkinson-spencer.co.uk

www.optris.global

www.pennekamp.de

www.smartmelter.com

www.pennine.org

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PSR is a leading supplier of feeder expendables and forehearth and distributor refractories. The company's expendable refractories provide the confidence and reliability required for modern container glass manufacturing. Innovations promoted included channel blocks, the PSR System 500 forehearth and PSR's Cord Dispersal Stirrer System. The company promoted its design and supply of refractories and engineered equipment for the glass conditioning process.

PD Refractories offered visitors a broad, high-quality and innovative product portfolio, encompassing the entire range of hydraulically and isostatically pressed, hand-shaped, vibration, slip or melt-cast refractory materials as well as unshaped refractory products.

Pennekamp is a leading manufacturer of hot end automation systems, lehrs and cold end coating equipment. Included in the product range promoted at glasstec were high performance ware transfers; special cross conveyors, also available in water-cooled versions; various types of servo lehr stackers (with one, two, three and four axes); energy-saving lehrs, including annealing lehrs for containers and tableware; decorating and toughening lehrs; flat glass lehrs for automotive and architectural float glasses, display TFT glass, patterned and solar glass; specialty lehrs; and cold end coating and dosing units.

Pennine Industrial Equipment showcased inverted tooth silent chain for conveying applications within the glass industry. Visitors were presented with a patent pending skeleton link chain. The original range of single pin chains is offered with the largest selection of pinhead protectors including the first and original head protector, all-steel options and the new Swift-Link. To complement this range, Pennine also offers Calibre 2 Pin chain in both ½in and 1in pitch, a solution to rapid chain elongation on modern high speed production lines. Pennine can also offer chains in stainless steel to help prevent bottom defects caused by oxidisation or thermal shock; and castle link, which provides a smaller contact area. Custom chains can be designed and made for the most demanding applications.

Manufacturing glass under the **Pilkington** brand, **NSG Group's** stand was frequently visited by glasstec attendees photographing its striking optical illusion-esque colour-change display of Pilkington Optiwhite. Also eye-catching was the example of 'ElectroglaZ' created especially for the stand by UK touchscreen and glass processing specialist Zytronic, using Power-Tap (P-Tap) wireless power technology from product design studio Cohda in conjunction with NSG TEC electrically-conductive glass. The minimalist 'floating' audio speakers provided ample sound and wouldn't look amiss in a luxury tech-focused residence. Other well-curated exhibits included Pilkington AviSafe, featuring a just-visible patterned UV-enhanced coating that deters birdstrikes by disrupting reflections and appearing as a dense barrier to avian eyesight; SenseComfort – an insulating glass exhibited in a unit with a special sensor developed by Netherlands-based start-up company PHYSEE that measures incoming light intensity and solar radiation, and was shown with a fitted blind that opens/closes accordingly. There were blue, grey and bronze examples of Pilkington Mirropane Chrome Plus corrosion-resistant mirrors – the colour comes from the glass, not a coating – and the unveiling of HeatComfort glass, which emitted pleasing warmth to chilly hands when voltage was applied to its electrically-conductive NSG TEC coating. When incorporated into an insulating glass unit, the heat flow can be directed into the living space, and the technology can even be employed so that windows become the sole source of heat for a building, *Glass Worldwide* was told. NSG also previewed Pilkington OptiView anti-reflective glass ("We are going to think about a 'more cool' name [...] as the product doesn't exist yet," confided Jolanta Lessig from NSG Group), which employs an anti-reflective coating on surface one, in combination with an extra clear low iron substrate, to improve the appearance of a digitally printed picture on surface two of the glass. The product was illustrated on NSG's stand as the glass case for a museum exhibit.

Pietro Bonaiti exhibited as a specialist in the production of conveyor belts for annealing and decorating.

Pneumofore, a leading supplier of centralised vacuum and compressed air systems for the glass industry, presented itself with a new open-view booth concept that welcomed visitors and encouraged them to discover the core of Pneumofore Rotary Vane technology, products and the company's underlying values. With the support of a highly qualified team, visitors enjoyed high-level conversations on how to achieve high energy savings, constant performance and the lowest life cycle cost on the market. The spotlight was on the UV24 VS vacuum pump – presented at glasstec in its Variable Speed version – which generated great interest.

Precitec Optronik GmbH, a German manufacturer of highly innovative sensors and optical probes, promoted its CHRocodile product line for contact-free thickness and distance measurements. Precitec's contact-free sensor systems can measure the thickness and topography of any colour or surface, e.g. container glass in stop-and-rotate machines; wall thickness of hot quartz pipes; circular deviations of bottles; and PVB foils found in HUD windshield films. The products deliver in process, inline and offline measurements with high precision and ultra-fast measuring speed on all materials and measurement ranges from micro- to centimetres.

Pro-Sight Vision highlighted its position as a designer and manufacturer of inspection machines and glass container handling equipment. New innovations included the Sink and Bulge machine which uses cameras to measure the flatness of a label panel area. The new Universal Finish Inspector System was also presented as a powerful offline quality control machine which is able to measure a wide range of critical dimensions and angles from the neck line up to the sealing surface, along with the new feature of guide plate seam defect inspection and measurement. Pro-Sight has also developed the Dimensional Gauging Machine, a semi-offline machine that uses mould number reading to remove one of each mould number from the cold end production line every hour.

Pröll exhibited its range of custom-made chemical products for coating and decorating glass. Visitors could learn more about NoriGlass OR (outdoor resistant), a new glossy silicone-free two-component glass screen printing enamel ink developed for the second surface decoration of glass, particularly for backlit displays of vending or ticket machines. Also featured was NoriGlass TP: an organic enamel screen printing ink suitable for touch switches and the backlit displays of smart phones and tablet displays; Aqua-Temp SIG: a water-based stoving lacquer that can be used for decorating the displays of household appliances; and Protective Lacquer L 68742: a final overprinting lacquer that shows excellent scratch resistance. In addition, Pröll showcased its TF-QuickChange Screen System for printing thermo plastic inks on glass hollowware.

Pyrotek's glass solutions team offered visitors ideas to enhance manufacturing operations and improve overall performance. The company offers an entire line of custom-made products.

PVAG water systems GmbH was present as an innovative and reliable partner for dosing technology and water treatment in the glass industry. Services promoted included supply and engineer dosing systems in the fields of shear and scoop spray, machine lubrication and cold/hot end tempering. Visitors were informed about closed loop, customised programming solutions via digital twin, water system design, predictive maintenance measures and optimisation of process controls.

Quantum Engineered Products, part of the **Rondot Group**, attended glasstec 2022 to reinforce its commitment to the intelligent engineering of glass container forming systems. Quantum has been providing forming solutions to the worldwide glass container industry since 1976. The company's forming system offers a combination of hardware and software across all forming processes. Quantum's area ▸

Pneumofore www.pneumofore.com

Quantum

www.quantumforming.com

Innovative Inks & Functional Lacquers

Pröll

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Ramsey Products CORPORATION

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of expertise is the Blank Side Forming Processes and related hardware and software, such as Quantum's TOTAL FORMING ANALYSIS – (TFA) process monitoring and gob weight control. Using the Cylinder Performance Monitoring System (CPMS) feature of the TWT allows the operator to see inside the initial forming cycle of the container manufacturing process along with a variety of production benefits.

Rogerio Galante, Sales and Marketing Director, commented: "We would like to thank all of those who gave us an opportunity to introduce ourselves and our company in our new capacity as members of Rondot Group. Making new contacts and working with new people gives us inspiration to continually improve. Quantum appreciates the opportunity the glasstec exhibition provides to meet with current customers, explore new relationships and share ideas with fellow suppliers."

Ramsey Products Corp, preparing to celebrate its 100th anniversary in 2023, exhibited as a leading supplier of silent chain-based solutions. The company offers an extensive range of silent chains, sprockets, chain-driven speed reducers, transmissions and couplings, all backed by its commitment to customer service and support.

RATH exhibited as a manufacturer and supplier of refractory materials, and presented a new, innovative feeder expendable series. The further development of refractory compositions is a challenge that Rath is taking on with great commitment. After an intensive five-year research and development process, the new FOURATH 4xx feeder expendable series was ready for introduction at the glasstec. This product line is based on an innovative formulation which has been exclusively developed and produced by Rath. The feeder has been put through its paces in the Rath laboratories and has successfully passed initial glass factory trials in the last 1.5 to 2 years.

Reckmann is a leading manufacturer of temperature sensors and components, specialising in the production of thermocouples for the glass industry. Innovations presented included thermocouple assemblies, sheathed thermocouple assemblies and resistance thermometers.

Refel promoted its range of fused cast AZS refractories. Innovation showcased included REFEL 1532, REFEL 1334S, REFEL 1240, REFEL 1334SC, REFEL 1616ULX and REFEL, 1240 FVMo.

Refmon exhibited its range of refractories for the melting tank, regenerator and working end.

Regina Chain offered conveying solutions for cold end lines.

Renold promoted its range of inverted tooth chains for tough drive and transport tasks. Visitors to the stand found Renold continuously advancing products and systems that comply with rising demands for higher production speeds, a larger PTM net yield and longer service lives. Renold inverted tooth chains not only fulfil today's requirements but are also described as a future-oriented investment in a technology with distinct advantages and high productivity levels.

Retorte exhibited as a leading supplier of selenium products to glass manufacturers worldwide. Selenium metal powder, selenium metal pellets, zinc selenite, or sodium selenite are required for the most diverse manufacturing processes in the glass industry. Selenium is an essential component in the recycling of glass, as it serves to decolourise the glass mass. Retorte also provide selenium compounds in a purity grade of at least 99.5% up to 99.95%, suitable for technical applications such as the production of optically highly-reflective surfaces for windows.

Revimac promoted its expertise in hollow glass forming machinery and allied ancillary equipment.

RHI Magnesita presented its technologically innovative, extensive high-quality portfolio to visitors from the flat glass, container glass and special glass segments, covering the entire range of unshaped products and ceramically-bonded bricks used in the melting process for various glass types. Silica, alumina-silica, alumina, zircon and chrome-containing high-performance refractory solutions were offered to meet the requirements of all glass industry furnaces.

Rider promoted its abilities to supply customers around the world with its float glass, reflective glass, patterned glass and deep-processed products such as mirrors, tempered, laminated and insulated glass.

A & L Rondot, part of Group Rondot, exhibited a wide range of innovative products for the hot end, including all mechanical delivery parts, measuring instruments, lubricants and variable equipment.

Visitors to the **Rosario c2c** stand were presented with a complete line of reliable, eco-friendly, cost-effective and flexible direct-on-glass decoration, palletising and inspection machinery. In close co-operation with Rosario c2c bv, co-exhibitor Curvink offered digital inkjet technology solutions.

Ross Europa offered a range of services including support in the rationalisation and modernisation of machinery, assembly and system integration of the ROSS 21-Valve-Block, economical solutions to customer-specific logistics challenges and conversion of conventional pneumatics to 'plug-and-play' proportional technology.

RUCOINX presented innovative solutions for glass ▸

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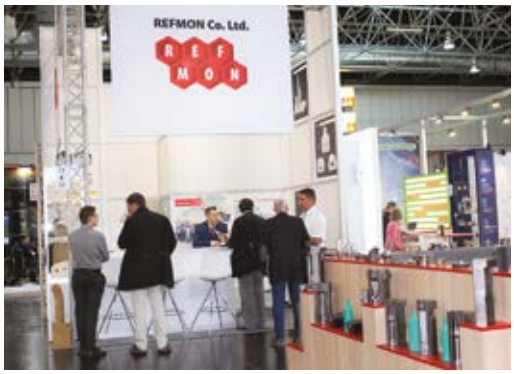

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RHI MAGNESITA

www.rhimagnesita.com

SEFAR

www.sefar.com

ROSARIO C2C

High speed bottle screen printing machines & palletizing equipment

CURVINK

Full colour inkjet printing on glass bottles

www.rosarioc2c.com www.curvink.com

SEFPRO

www.sefpro.com

RUCOINX

www.ruco-inks.com

PRECISION

www.shpws.com

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decoration, including special ink systems that ensure enhanced performance, stability and colour brilliance. The company focused on its innovative 937LED screen printing ink series, which is suitable for curing both by means of LED technology and conventional UV systems. These inks are becoming increasingly popular with customers associated with the decoration of hollow and flat glass.

Saati offered visitors a pre-press package including screen fabrics, chemicals, stencil materials and equipment.

Safina showcased premium precious metals products. Visitors were offered bushings, labware, thermocouples, tubes and thimbles, coatings, homogenisers, outflow bowls and sheets.

Visitors could be forgiven for thinking they'd stumbled on the launch party for *Avatar 2* over at the **Saint Gobain Glass** booth, which featured an illuminated waterfall and a tree with myriad dangling glass 'leaves'. Marrying advanced technology with the natural world, the installation – along with a prominent tagline: "Making the world a better home" – reinforced glasstec's themes of sustainability and decarbonisation, and provided a fitting backdrop for the launch of ORAÉ, Saint Gobain's new glass substrate with the world's lowest carbon footprint. Thanks to a high recycled content (70% of cullet, out of which 55% is external) and renewable energy, ORAÉ has an estimated carbon footprint of 7kg CO_2 eq/m^2 (for a 4mm substrate), a reduction of approximately 40% compared to Saint-Gobain Glass' European baseline clear glass. ORAÉ is available now in combination with the company's COOL-LITE XTREME solar control coating range for building façades – a complementary pairing for reduced operational and embodied carbon levels. The large stand also featured iWin, Saint Gobain's insulating glass with RFID [radio frequency identification] enabling it to act as a data carrier: each insulating unit is equipped with an individually-numbered RFID transponder. Customers can identify and track the glazing unit – and thus the façade element enclosing it – before delivery, on the construction site and after installation. 4BIRD, Saint Gobain's solution for effective bird protection was presented in different versions: 4BIRD Frit (screen printing) and 4Bird Etch (acid-etched solutions). The versatility of COOL-LITE SKN 183 II solar control glass is opening new possibilities and flexible options with 4BIRD, the company explained. Other products highlighted included lightweight triple insulating glass from the CLIMATOP EXTRA LIGHT range, and TIMELESS – a special glass for shower applications with a "practically invisible" coating. Saint Gobain also demonstrated Calumen, its digital tool for calculating technical parameters on glass, and GlassPro Live, an interactive app that enables users to visualise standard coated products (single, double or triple glazing units) on preset facades.

Schiatti Angelo exhibited a wide range of glass processing machines, including a straight grinding machine, double edging grinding machines, corner chamfering machines, straight bevelling machines, horizontal double-head drilling machines, vertical drilling machines, glass loaders/unloaders and complete grinding lines. Innovations on show included the BFP35 double edging machine line, offering customers the opportunity to speed up some of the steps of their workflow, minimise errors/downtime and ultimately increase profitability of their processes – and thus profit margins.

With its tagline of "Finding the perfect solution" **SCHOTT's** stand highlighted the glass manufacturer's emphasis on client consultancy, while the 'people' factor was reinforced by graphics featuring products displayed by actual employees from the company. Innovations exhibited on the booth included DURAN Tough borosilicate glass, showcased via the colourful 'Schott Mikado Tower' sculpture to demonstrate the tubes' ability to bear compressive force whilst diffusing the interior LEDs for a soft and even light effect; and the profiled CONTURAX Tough, widely used for partition walls and lighting. Visitors to the stand could explore how an inner surface polymer coating maintains the form and integrity of the glasses in the event of breakage (tested using SEMTEX explosive!), protecting against glass splinters and shards – essential for use in a public or industrial environment. Also highlighted was RIVULETTA, SCHOTT's low-iron content, extra clear structured flat glass suitable for shower doors and partition walls, and its glass-ceramic CERAN cooking surface – recently updated with CERAN Luminoir, a new material formula that allows LED light sources to emit more brilliantly without additional filters and coatings, making smart cooktops accessible to a broader range of consumers. Over on the Glass Technology Live stand, attendees could learn more about SCHOTT's speciality glass and glass-ceramic products for the space industry, where properties such as optimised transmission, reflectance/absorption, a low co-efficient of thermal expansion and protection against harmful UV radiation are utilised for applications in satellites, terminals and rockets.

Schraml Glastechnik, a member of the LiSEC Group, showed the topDRILL G8 for drilling, countersinking and waterjet cutting.

Sefar showcased screen printing meshes with high reproducibility and quality, to facilitate and accelerate the production of stencils and optimise the printing process, precisely tailored to demanding market expectations.

SEFPRO presented high quality refractory solutions and services for the entire production process and beyond. New solutions were presented to support visitors on the transition towards carbon-neutral glassmaking and form the backbone of tomorrow's glass furnace. New innovations on show included ER 1699 RS, SEFPRO's newest sidewall solution for high corrosion resistance in clear glass furnaces and extended furnace lifetime coupled with the SEFPRO Shield solution for real-time block monitoring, as well as XiROC, SEFPRO's new solution against upward drilling corrosion in throat applications, ensuring high glass quality, increased furnace yield and extended furnace lifetime.

Selas exhibited as a specialist in reliable combustion equipment for glass manufacturing from oxy-fired burners for furnace and forehearth, to staged combustion systems and back-up propane gas mixing systems. A wide range of equipment and process systems were presented, all engineered around the unique challenges of glass. Selas has experience with a variety of glass operations including melting, lehrs and ovens, and processing and polishing.

Shanghai Precision Dosing & Weighing System was present as a supplier of glass batch houses, cullet treatment systems, dry mix production lines, control systems and dosing weighing systems. Comprehensive services promoted included plant engineering, installation and start-up service.

Sheppee International exhibited as a leader in total glass ware handling for both the container and tableware industries, supplying innovative and dependable solutions in the field of hot container conveying, transferring, lehr loading and glass contact materials for more than 80 years. Visitors were presented with specialist equipment that has been developed, including a range of two and three-axis servo-driven lehr loaders for all types of production. Most recently, the company has introduced a patented lehr belt tracking feature to eliminate container base defects at the critical cross conveyor to lehr belt transition area. Sheppee promoted its full range of ware transfer units, suitable for handling the smallest pharmaceutical containers up to the largest champagne bottles, including dedicated units for handling flask and non-round containers. An integrated, intermediate conveyor transfer system has been launched for ultra-high-speed production.

Siemens offered visitors the chance to accelerate digital transformation and decarbonisation with an extensive portfolio of industrial software and automation to seamlessly connect the virtual and real worlds for the glass industry – also with cloud-based systems, as appropriate. This allows glass manufacturers, plant and equipment manufacturers to integrate and digitalise their entire value chain – including their suppliers and partners. The Siemens teams combine glass- and industry-specific knowledge, from raw materials ▸

Sheppee

www.sheppee.com

Socabelec

www.socabelec.com

SIGMA GROUP
REFRACTORIES with passion

www.sigmaref.it

SOMEX
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www.somex.ie

SignTronic AG

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SORG

www.sorg.de

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to the finished product, with expertise on the field, automation, and process management levels as well as the corporate leadership level and its specific IT requirements. Siemens recommends a holistic approach for increased transparency in glass production and further processing and, hence, increased availability, higher productivity and improved cost efficiency.

S.I.G.MA. Group, a specialist in the production of refractory materials for the glass industry since 1990, offered its full high quality range of materials including sillimanite, mullite, zircon-mullite, zircon, high alumina, fireclay, fused cast, insulating, magnesite, silica, special cements and concretes.

SignTronic exhibited alongside Grünig-Interscreen as a leading supplier of high quality Computer-to-Screen solutions for the screen printing industry. Visitors learned that perfect screens can be provided in a reproducible and cost-efficient manner and that printing quality can be improved whilst increasing productivity.

Şişecam exhibited an array of products that underlined its manufacturing focus on energy efficiency, effective thermal insulation and solar control. On display was Şişecam Temperable Solar Control Low-E Glass Neutral 63/29, the company's solution for prestige products, which offers maximum solar control and a U value of 1.0 W/m²K without compromising natural daylight. Also shown were: Neutral 70/40, which provides high light transmission and low reflection and is recommended for residences, villas, and retail stores where natural appearance is desired, and Neutral 50/25, which offers effective solar control and excellent thermal insulation for indoor and outdoor projects. Neutral 43/28 and Neutral 40/22 (for warm climates and skylights) were additionally highlighted, along with Şişecam Temperable Solar Control Low-E Glass Green 40/28, which has a coating that creates a green colour effect on the façade when viewed from outside. A striking IYOG-themed (of which Şişecam is a main sponsor) installation created from glassware, glass packaging and flat glass attracted great interest. Visitors were invited to an imaginary underwater scene featuring brilliant green oceanic plants, multi-coloured fish, floating jellyfish and sea urchins that emphasised glass' contribution to a sustainable and healthier world.

Sklostroj Turnov displayed its machines, equipment and technology for the glass container industry, including feeders, IS machines, stackers, pushers, control systems, swabbing robot and process control.

Socabelec promoted the company's swabbing robot that can be customised to different IS machines. Visitors learned that the swabbing robot automates the lubrication process without interrupting the production line and can offer 75% savings on lubrication. On its booth Socabelec also showed the latest way to swab the neck ring far away from the plunger position to guarantee the user no oil on the plunger. Several other improvements were presented such as the mini tank located in the scanner support.

Somex showcased its inspection, testing and quality control equipment. The Flexible Measuring Cell, the latest labour-saving concept for inspection of glass containers, was presented as a configurable layout of integrated testing instruments with fully automated product handling. Other products promoted included the Delta Hi-E glass burst tester, Delta TLT vertical top load tester, automatic pendulum impact tester and automatic pressure tester for glass containers. Somex exhibited opposite Tiama, with whom it shares a strategic partnership.

SONICAM was present as member of the Rondot Group and a specialist in the design and manufacture of the most advanced machinery and equipment for mould manufacturing and mould maintenance in the glass container industry.

SORG exhibited as a leading independent supplier of glass melting furnaces and conditioning technologies. Visitors were offered the opportunity to see how the SORG Group is driving the industry forward with its full portfolio of concept development, planning and engineering, equipment and systems and a full range of services for all sectors of the glass manufacturing industry.

Special Shapes Refractory Co showcased high quality precision precast shapes and refractory solutions. Themes presented to visitors included innovation, customisation, speed, durability, purity and partnership.

Cairo-based **Sphinx Glass** exhibited as a leading float glass manufacturer, known for its superior quality glass, using cutting-edge manufacturing technology and first-rate raw materials – the best silica sand from Sinai. At glasstec the company highlighted its high transmittance Trulite Clear glass; tinted Isolite glass (available in five shades) for solar control and privacy; subtly reflective colour-enriched coated Vistalite glass for transmitting generous levels of visible light and providing colour neutrality; and Solarlite glass, which can be glazed with a reflective coating positioned on either the first or second surface.

SPS Technoscreen showcased screen printing machinery for appliance glass, cover and technical glasses, architecture and automotive.

Stara Glass promoted furnace and heat recovery ▸

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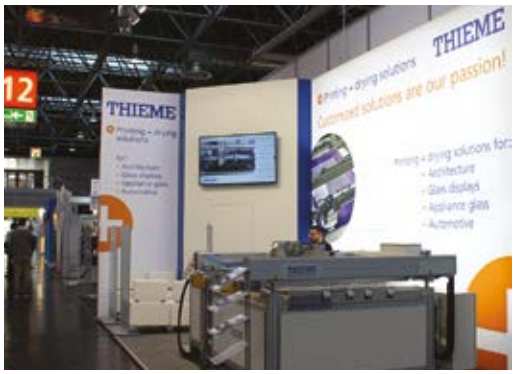

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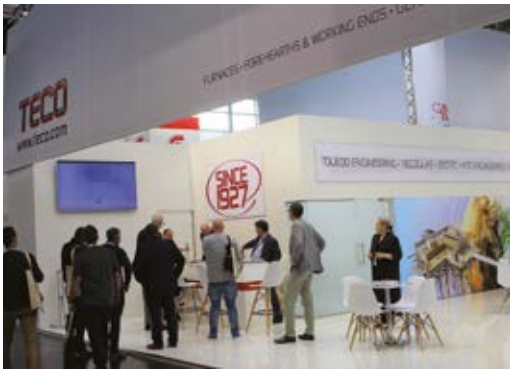

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systems design, services, engineering, equipment and materials for all types of glass and furnace (end port, side port, unit melter, oxy, electric, hybrid – Centauro, Minotauro, Ciclope). Stara Glass was proud to assist visitors in transitioning towards a net zero carbon future and to manufacture sustainable glass. The company also took the opportunity to announce that its collaboration with research organisation SINTEF on the proposal for 'Horizon Europe', an innovation project involving hydrogen combustion and deep automation in the glass industry, beat substantial competition to win €30 million financing from the European Commission. (See *Glass Worldwide* January/February 2023 for an exclusive interview with Ernesto Cattaneo from Stara Glass and Chiara Caccamo from SINTEF.)

Stewart Engineers offered its cutting-edge glass making and coating technology, including Acuracoat CVD coatings, Stewart Float Tin Baths, Eco Melt furnaces and turnkey float factories.

STG Combustion Control showed its latest developments in advanced solutions for glass melting furnaces.

STM MICROTEC innovations on show included BICARMILL, a reliable stand-alone system for grinding and injecting sodium bicarbonate to mitigate pollutants and improve acid emission control for glass furnace, ESP and filters.

Strada displayed moulds for glass containers, finishing moulds, neck rings and accessories.

Strutz International promoted a non-contact optical registration vision system for the Strutz Chainless CLS-175 and CLS-200 decorators. The CLS-200 is a revolutionary design, built for decorating a typical 12oz beverage bottle with high accuracy at speeds of up to 200 bottles/min. The CLS-175 model, while maintaining similar performance characteristics to the CLS-200, was developed for decorating large beverage bottles with a maximum height of 3.75in and a maximum diameter of 3.75in with the same high accuracy. Both designs replace the carrier link system with ultra-precision, continuous motion cams for a more accurate, smoother and faster machine. Also available are tumbler decorators, lehr loading stackers, conveyors and colour dispensing systems.

Sun Chemical presented its portfolio of direct glass printing and decorating solutions for both hollow and flat glass. This included the SunVetro range of glass decoration solutions, including the latest addition to the VTGL ink range which includes a full BPA-free range of inks and effect varnishes: the VTGL-BAF series. Visitors were invited to see how the SunVetro range can be used for direct printing onto both flat and hollow glass across a wide range of products, demonstrating the functionality and quality of the range.

SVA Industrie Fernseh offered visitors thermal imaging solutions.

Tecglass, the Fenzi group's digital branch, showcased its unique turnkey digital printing solutions.

TECHGLASS exhibited as a specialist in furnaces and forehearths, batch charging and furnace equipment, information and control systems as well as services in drainage and heat-up, hot repairs, inspections and furnace performance diagnostics.

TecnoFerrari promoted automatic vehicles and customised, effective and safe solutions for moving systems in the glass industry.

Tecnosens offered visitors advanced inline inspection with benefits including prevention of mislabelling, checking the quality of logos, real-time feedback, measuring residual stress and thickness and 100% production monitoring.

Tecno5 (an affiliate of CERVE) presented machines and accessories for multi-colour printing onto glass items, including the CN5, RX, LT RB, RC and RM series. The RX and CN5 series now offer up to five axis profiles for total contour printing with a colour registration accuracy of up to +/- 0.1mm. The company designs, produces and installs a range of machines, from basic four-colour manual equipment to fully automatic eight-colour machines for direct screen-printing onto glass containers. It also offers complementary equipment such as lehr loaders, feeding tables, ink heating systems, conveyors etc.

Tecoglas exhibited as part of the **TECO Group**. The company designs all types of glass furnaces, as well as offering demolition, construction and commissioning, project management, audits and inspections and troubleshooting/consultancy.

At the **Thieme** stand, visitors could learn more about the company's future generation of glass printing machines. Thieme manufactures modular machinery and system concepts that are ideal for multi-colour screen printing and digital printing on glass.

Thimon was at glasstec as a manufacturer of complete packaging and handling lines.

Tiama was present as a global provider of real-time data and quality controls for the glass packaging industry. Glassmakers were offered expertise on their way to the Smart Factory, including monitoring solutions (technological sensors at the hot end with the 'Tiama HOT systems' range including HOT mass, HOT move, HOT form; Traceability solutions (laser code engraving and readers to trace each bottle)); inspection solutions (vision and carousel technologies such as MCAL4, MULTI4 and MX4 machines hosting all the latest innovations such as WEM (Wire-Edge Measurement), DSM (Dip & Saddle Measurement), BTM (Bottom Thickness Measurement)); intelligent solutions (IT intelligent tools for analysis and management of plant performances with the Tiama IQ range); and a complete range of service activities (customer local support, spare-parts catalogues, training academies, simulators, online courses and audits).

Toledo Engineering (TECO) is a group of companies that serve the global primary glass manufacturing industry. Visitors to the stand saw that the group offers everything from designing, rebuilding, constructing and commissioning glass furnaces to supplying equipment to glass furnaces and total project management.

Producer of pigments and frits **Torrecid** showed visitors how it is able to provide differentiation and maximum added value by offering digital technology and traditional paints solutions for glass decoration in automotive, home appliances, architectural and hollow glass markets.

TotalEnergies exhibited the Kleenmold product line that includes lubricants and coatings for all applications. Kleenmold products are manufactured under strict quality control guidelines to ensure consistent, high quality products. The Kleenmold team offered solutions to visitors to reduce costs, increase productivity and meet the changing demands of the glass container industry.

Tri-Mer was present as a market leader in the field of air pollution control systems for glass furnaces, with experience ranging from float to container, from fibre to tableware and specialty glass. Technologies such as the Catalytic and Non-Catalytic Ceramic Filter System, Stand-alone Selective Catalytic Reduction (SCR) System and Enhanced DSI systems reduce sorbent consumptions, enhance efficiency of existing systems and allow for furnace size increase with minor modifications of existing flue gas treatment systems. Tri-Mer's waste heat recovery systems are suitable for power, compressed air and thermal energy production. Tri-Mer's partnership with K2-CO_2 srl for CO_2 capture systems was also promoted at glasstec.

UAS Messtechnik exhibited its work in the measurement, control and regulation technology field.

VarroTec – DinterS promoted its hot end and cold end coating equipment to glass container and packaging manufacturers.

VCL – Valve Competence Luxembourg promoted its range of valves and dampers, batch chargers and related equipment, combustion air supply systems and special applications.

Forum Glass Technology was present at glasstec as an industry section of the **VDMA Construction Equipment and Building Material Machinery Association.** The Forum is a service provider, industry representative and communicator for over 60 companies, manufacturing engineering technology for the flat, hollow and special glass industries.

Vertech' showed its expertise in information technology and visitors discovered the latest new features of SIL, a ▸

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wide range of products to meet the needs of glassmakers throughout the factory or even at the head office. Each module of the monitoring system has a well-defined role, making all modules complementary. Fresh from signing a Partnership Agreement with Bucher Emhart Glass at glasstec (see news, p17), Ulas Topal, CEO, remarked on the increased amount of traffic at the Vertech' stand: "We've had people from Australia, from Chile, from America, from Cameroon – everywhere! We were totally shocked because before, when we first went to glasstec, [it was] not so intense." Visitors wishing to arrange a meeting at the booth were advised to book, "otherwise we would not be able to get in contact."

Vetromeccanica, thanks to its team of technicians with years of experience in the hollow glass industry, offered visitors options for feasibility studies and the design and manufacturing of customised solutions for handling and palletising glass containers

Video Systems exhibited high-tech sensors, vision and quality control systems.

Vidrimolde showed its moulds and accessories for tableware, crystal, barware, household glass, pharmaceutical and perfumery containers, etc.

Vidromecanica highlighted its skills and experience in the manufacture of thermal equipment (for annealing, decorating and tempering) and equipment for coating treatment (hot end and cold end coating) for the glass industry.

Vimec, a member of the TIAMA group, promoted inspection of pharmaceutical glass packaging, monitoring solutions and data management.

Virtual Reality Machine Training (VRMT) showcased virtual reality software to address numerous challenges in real-world training, fault diagnostics, optimisation and collaborative technical support.

Vitro Architectural Glass' stand housed – literally, inside a smart structure with Critall-style windows – its showcase of architectural, automotive, specialty and container packaging glass products. The manufacturer promoted its wide range of high performance, solar control, low-emissivity Solarban glass, which features some of the highest light-to-solar gain ratios in the industry, and can be produced in jumbo size thanks to Vitro's vacuum-temperable MSVD coater – the largest in North America. Visitors to the stand learned how the Solarban glass can be used with Vitro's low-iron glass substrates, Starphire Ultra-Clear glass and Acuity glass, to optimise clarity and minimise green colour hues. Vitro also demonstrated the concept behind its VitroSphere Digital Glass Simulator design tool, launched last year to assist architects in making product selections. The virtual tool enables users to visualise and compare Solarban glass products' colour, transparency and reflectance on different building types at various times of day, from both the interior and exterior of the building, and during bright and overcast weather conditions.

VMA Gesellschaft für visuelle Messtechnik und Automatisierung highlighted its non-contact measuring and control equipment, particularly non-contact thickness measuring systems for container/hollow glass, float glass, tubular glass and patterned glass as well as a comprehensive range of instruments for the automation of glass tube manufacturing such as defect detection, diameter gauges, sorting and control systems, and measurement systems for automatic quartz resizing. Special emphasis was placed on non-contact thickness measurement systems

VON ARDENNE presented its latest digital solutions for more resource efficiency in glass coating with a focus on products from the VA INDIGO family including resource efficiency in glass coating; VA PROCESSMASTER software for monitoring and controlling complete optical layer stacks in large area coating; VA TIPCOS software to determine and monitor the optimal operating point of the sputtering process; and VA RECIPEMASTER software to enable the automation of the start-up of the coating process as well as the switching between different procedures in production.

Waltec Maschinen was present as a leading manufacturer of fully automated and electronically-controlled production lines, from the feeder up to the annealing lehr including state-of-the-art pressing, blowing, spinning, handling and fire polishing solutions. Innovations highlighted included the S-SERIES Spinning Machine, powered by ESERVO technology and visitors also learnt about process stability with the innovative temperature control system WTRACK dashboard.

WBT presented conveyor belts, shear blades, silent chain and sprockets. Promoting the company's 'can do, will do' attitude were members of the technical production team, which consists of a group of engineers with many years of experience in designing conveyor belts for the hollow glass industry.

D. Widmann GmbH showcased the ultra-high pressure water jet ME 1700, a purification device designed for stationary and mobile operation for different tasks as required. In glass receptacle production, this innovative purification method allows for huge time and cost-savings while cleaning defiled plant components such as gripping pliers and glass scissors. Visitors also learned that the conveyor belt purification has been revolutionised by means of the high-pressure jet device.

Xinyi Glass promoted its range of clear and coloured float glass along with its temperable low-emission coated glass for customers in the automotive and architectural sectors. The company highlighted its SOLACO glass, Solar-X heat-reflective automobile glass, HUD (head-up display) glass, laminated front windshield, tempered glass and heating glass, and the architectural glass that it has supplied for buildings such as the Shanghai World Expo China Pavilion and the Malaysia Four Seasons Hotel.

XPAR Vision exhibited as a leader in the field of sensor and robot solutions for hot end inspection, quality assurance and closed loop automation. Visitors were presented with solutions for making containers and tableware products lighter and stronger, and produced with (almost) zero defects at higher speed and with minimum human dependency.

Yorglass used its stand to promote its experience in the field of industrial glass processing and flat glass production. Offerings from the company's factories in Turkey include clear and extra-clear glass (with a low iron content), as well as non-reflective coated glass, and Yorglass' Satin range of matte, fingerprint-resistant glass products.

Zedtec exhibited as part of the TECO Group and promoted its glass conditioning technology.

Visitors to the **ZIPPE** Industrieanlagen GmbH stand were offered solutions in the areas of melting material preparation, as well as the design, manufacture, installation and commissioning of plants on a turnkey basis. Innovations presented included batch plants, cullet plants, automation, modernisation, engineering, factory cullet recycling, glass recycling, batch charging, glass level controlling, preheating, maintenance and service.

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Further exhibitors that advertised in *Glass Worldwide's* glasstec 2022 preview issue but do not appear with a stand photograph in this section include:

- ACMOS Chemie KG
- Avacon SA
- DK Holdings Ltd
- Falorni Tech
- FAMA Fabricación de Máquinas SA de CV
- Fives
- Gallus Ferd Rüesch AG
- ISIMAT GmbH
- Mersen
- Olimerk San. ve Tic. Ltd. Şti.
- Precitec Optronik GmbH
- PVAG
- RATH AG
- Schiatti Angelo Srl
- Selas Heat Technology Company
- Siemens
- Sklostroj Turnov CZ
- Special Shapes Refractory Company
- Stara Glass SpA
- Vidromecanica Lda

We are very grateful for their support.

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Forthcoming events

NOVEMBER 2022:
17 November: Glass Focus Awards 2022 (Liverpool, UK)
17–18 November: Şişecam 37th International Glass Conference (Istanbul, Turkey)
30 November – 2 December: Glasstech Mexico (México City, Mexico)

DECEMBER 2022
8–9 December: International Year of Glass official closing ceremony (Tokyo, Japan)

FEBRUARY 2023
8–9 February: Glassman Europe (Istanbul, Turkey)
28 February – 3 March: Mir Stekla 2023 (Moscow, Russia)

APRIL 2023
25–26 April: GlassPrint 2023 (Düsseldorf, Germany)

MAY 2023
4–10 May: interpack 2023 (Düsseldorf, Germany)
22- 25 May: USTV-DGG Joint Meeting (Orléans, France)

JUNE 2023
7–8 June: Furnace Solutions Conference (St Helens, UK)
14–16 June: GPD Finland 2023 (Tampere, Finland)
14–16 June: intersolar (Munich, Germany)
21–22 June: 16th International Seminar on Furnace Design – Operation and Process Simulation (Velke Karlovice, Czech Republic)

SEPTEMBER 2023
4–6 September: SGT Conference (Cambridge, UK)
5–8 September: Vitrum 2023 (Milan, Italy)
14–16 September: glasspex INDIA (Mumbai, India)
20–21 September: Glassman Asia (Seoul, South Korea)
26–29 September: 18th Biennial Worldwide Congress on Refractories / UNITECR 2023 (Frankfurt, Germany)

OCTOBER 2023
31 October – 2 November: GlassBuild America 2023 (Atlanta, USA)

OCTOBER 2024
22–25 October: glasstec 2024 (Düsseldorf, Germany)

For up-to-date listings of exhibitions, conferences, webinars and seminars around the glassmaking world, visit www.glassworldwide.co.uk

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