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Welcome



I can't speak for anyone else but I'll be pleased to see the back of 2020. While the Covid-19 pandemic has provided opportunities for some, the challenges created for everyone have by far outweighed them. I'm not quite naive enough to believe that a simple change of year will miraculously provide a magic bullet solution, with everything instantly returning

to 'normal' but at least it's an opportunity to refresh the positivity reserves and look forward to 2021 with renewed optimism.

Throughout the year, the *Glass Worldwide* team has endeavoured to identify and publish editorial information that delivers maximum value for readers and advertisers. This includes an on-line extension of the latest Hot Topics industry news and a specialist Suppliers in the News section at www.glassworldwide.co.uk, together with a digital archive and events calendar. There is also a regularly updated on-line Virtual Marketplace, showcasing the latest innovations from glassmakers and their suppliers. I would like to commend my colleagues for their willingness and ability to deliver versatile media platforms that go some way to satisfying the diverse information exchange interests of the flat, hollow and specialist glass manufacturing and processing sectors around the world.

The latest issue of *Glass Worldwide* looks forward to the imminent completion of important greenfield glass factory projects in Uzbekistan and Myanmar. Despite the Covid-19-related complexities of bringing expert international engineers to site, Uzbekistan's first flat glass plant for Zarafshon Oyna LLC and the Myanmar Golden Eagle glass container project are both on track for completion in the first half of 2021. Recent progress made with both installations are discussed.

In exclusive interviews, Chief Sustainability Officer John Sadlier highlights the sustainability agenda for diversified glass and metal packaging specialist Ardagh Group, while Steklarna Hraštnik CEO Peter Čas describes a series of high profile investment projects to support the Slovenian company's decision to concentrate exclusive on satisfying the high quality glass packaging needs of the international spirits and perfumery sectors.

Guardian Glass Executive Vice President for Europe, Russia, Asia, India and the Middle East, Guus Boekhoudt is the subject of an On the Spot interview, explaining the company's revised management structure, examples of recent investment priorities and opportunities for the business.

Separately, Carletta Heinz, who recently took over as CEO of the Heinz-Glas Group, speaks exclusively to *Glass Worldwide* about maintaining the family company's 400 year traditions in glassmaking and her goals to build on the global success created by her father.

The *Glass Worldwide* team would like to thank advertisers, subscribers and partner organisations for their continued support and encouragement during a very challenging 2020. We look forward to monitoring the international glass industry's progress throughout 2021.

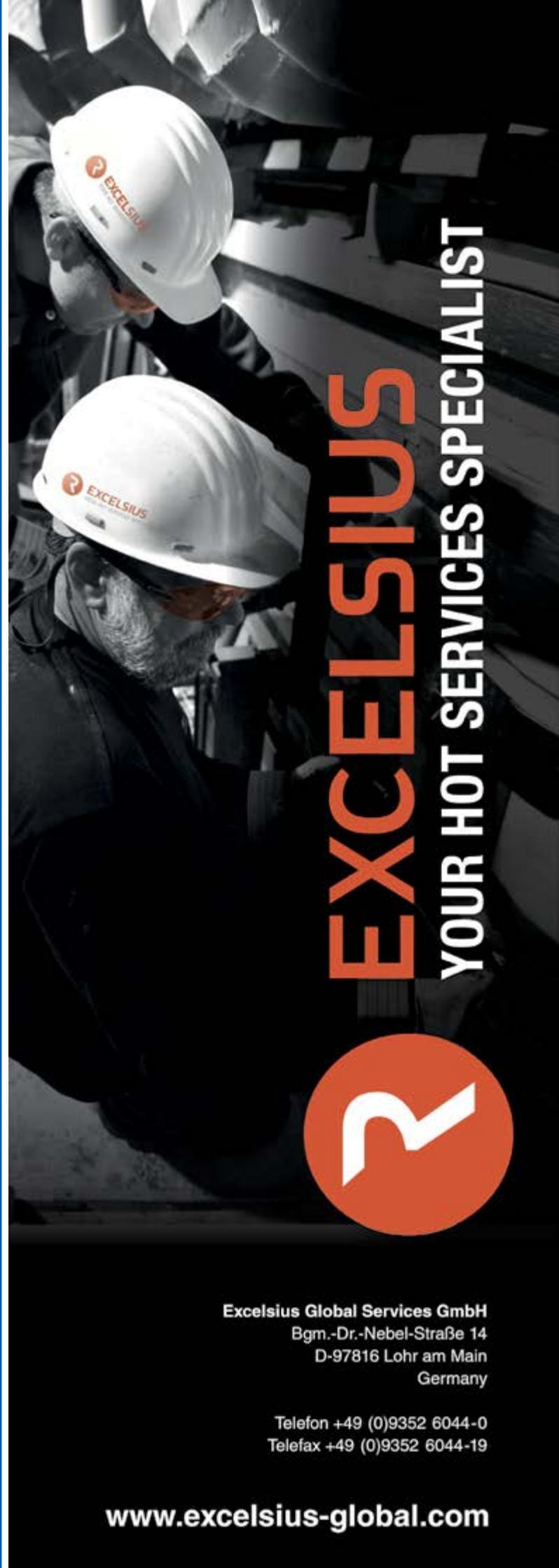
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www.glassworldwide.co.uk



JOHN WALLIS
Editorial Consultant
Email: johnwallis@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
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DAVE FORDHAM
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SAM DUNMORE
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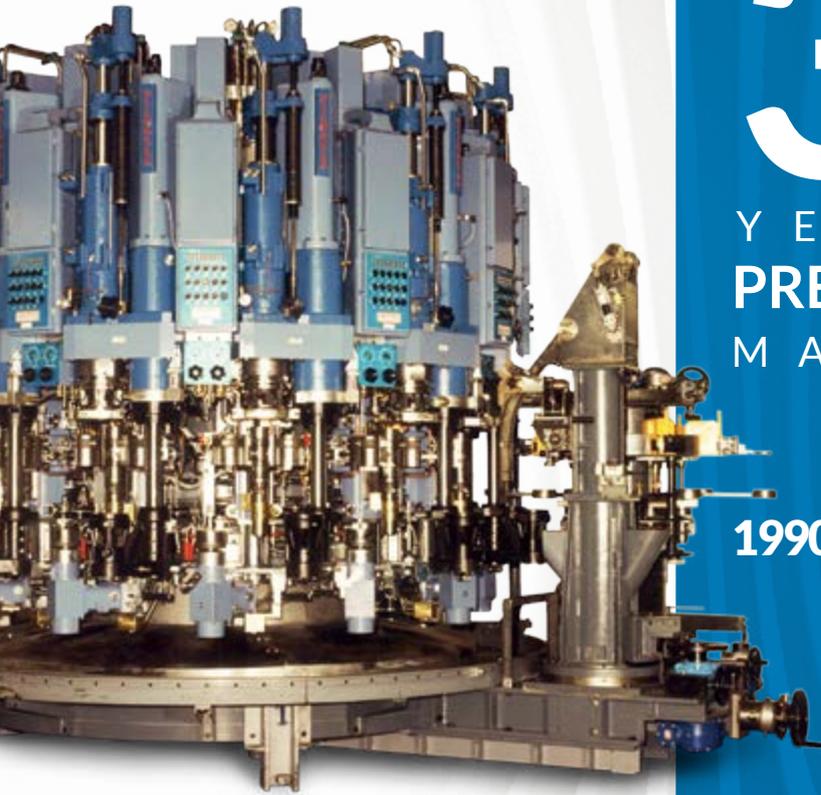
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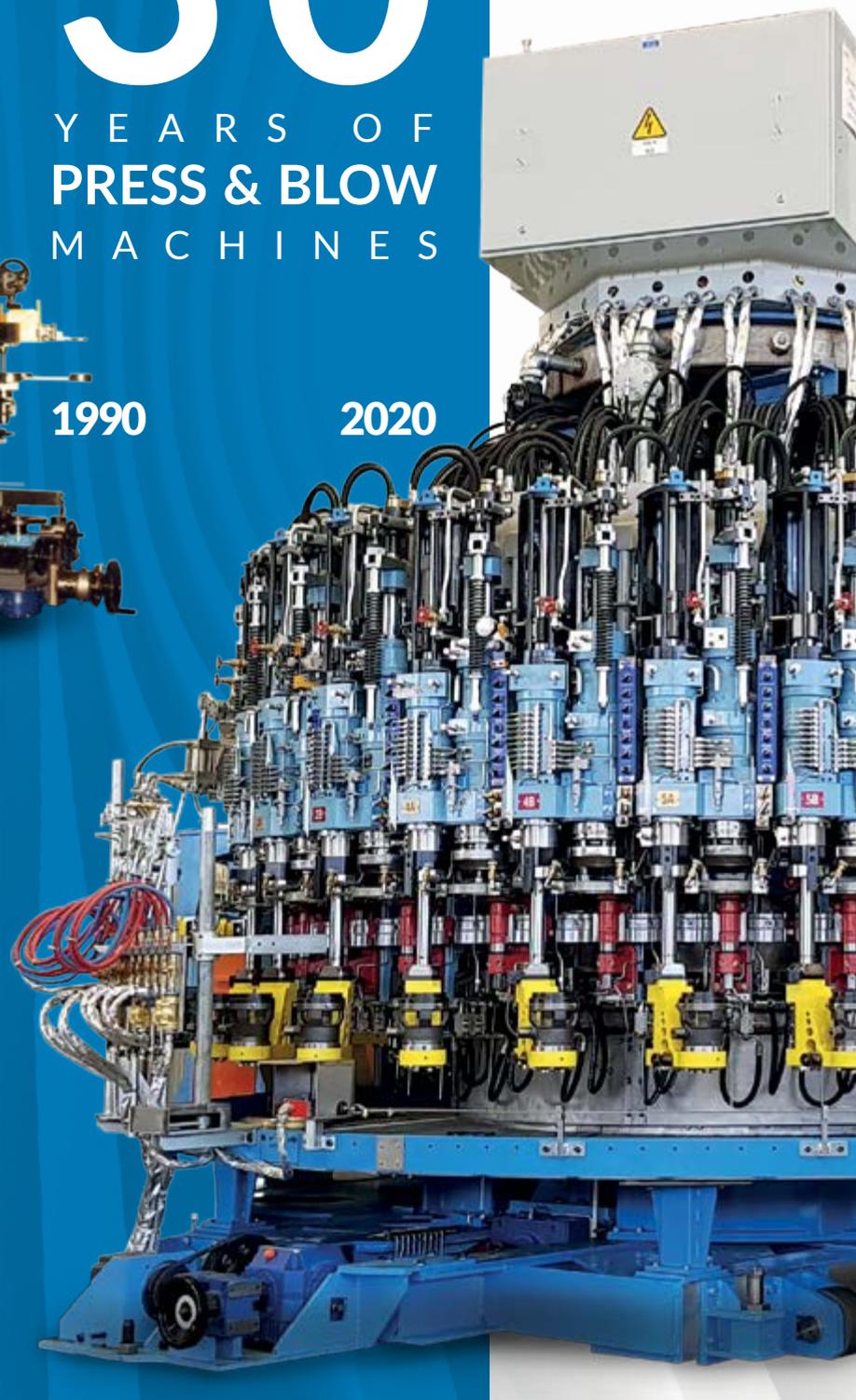
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Developing the world's most environmentally-friendly glass bottle

Leading glass container manufacturer, Encirc and industry research and technology organisation, Glass Futures are partnering on a ground-breaking project to create what should be the world's most sustainable glass bottle. In the first quarter of 2021, Encirc's Derrylin plant in Northern Ireland will be pioneering the use of bio-fuel on one of its furnaces, hoping to pave the way for an industry-wide reduction in carbon emissions.

Made out of plant materials, bio-fuel is a renewable and much more sustainable fuel source than those traditionally used by the glass sector. It is thought to be able to reduce carbon emissions by up to 90% when compared to fossil fuels. Alongside this trial, Encirc will be using up to 96% recycled glass to create the new bottles, further reducing the carbon footprint of its products.

The UK trial will be the world's first and the results will feed into UK Government policy around decarbonisation. The project forms part of the Department for Business, Energy and Industrial Strategy (BEIS) Energy Innovation Programme, within which Glass Futures is leading a £7.1 million project to help determine the most effective route to switch the glass sector to low carbon fuels.

A key focus for Glass Futures - and the bio-fuel project - is further reducing the sector's carbon footprint and the impact of glass manufacturing in the UK, futureproofing an industry directly employing 23,000 people.

"Bio-fuel is just one part of the decarbonisation puzzle but an incredibly important and exciting one" Fiacre O'Donnell, Director of Sustainability, Vidrala (Encirc's parent company) explains. "We're also looking into the development of hydrogen and advancements in electric melting to truly discover the future of glass production."

According to Mr O'Donnell, a huge level of interest has already been seen from beverage suppliers in attaining the ultra-low-CO₂ containers that will be made during the trial, which further suggests how united the industry is in its quest for total sustainability.

"Glass is already a wonder material in terms of sustainability, able to be recycled a limitless number of times, without losing any quality. However, as with any manufacturing process, it is still an energy-intensive sector. By working with Glass Futures, we can help pioneer the development of a glass bottle which will truly have no negative impact on the environment."

Rob Turvey, Sales and Marketing Director at Encirc added: "This has never been attempted before and is a massively exciting innovation opportunity for us at Encirc, our customers and of course, their consumers. The trial will help us support our customers in our joint ambitions to decarbonise the container glass supply chains and further demonstrate why glass is the most environmentally beneficial packaging format for the world's leading food and beverage brands."

Alongside the 30 day trial, Encirc also has aspirations to boost the sustainability of its logistics operations, switching out their fuel sources for bio-fuel.

"We are proud to be a part of a trial that both BEIS and Encirc have made possible" commented Aston Fuller, General Manager at Glass Futures. "Encirc has taken a pragmatic approach and is pushing the innovation boundaries with a full-scale trial of a new alternative fuel. It is great to see the whole supply chain collaborate to explore what is possible within the industry."

www.encirc360.com /
www.glass-futures.org

Industry reacts to EU 2030 climate target plan

Reacting to the European Commission's plan to reduce EU greenhouse gas emissions by at least 55% by 2030 and to put the EU on a path to become climate neutral by 2050, Bertrand Cazes, Secretary General of Glass for Europe has called for concrete actions to take place, particularly when it comes to renovating Europe's ageing buildings. "Huge efforts will have to be made to cut CO₂ emissions from buildings" he says. "The European Commission has said so for many years now and it's positive this direction is confirmed. But more than a confirmation, what the climate needs now are decisive acts."

According to Glass for Europe, building renovation is key to achieve climate neutrality and relaunch the EU economy, saying it is time for bold and effective policies to be developed and implemented to allow the European flat glass industry to prosper and deliver the essential material the EU needs to decarbonise the building sector.

The assessment of Member States' National Energy and Climate Plans already shows that the EU will not be able to achieve the 32.5% energy efficiency target set for 2030. "Without actions supporting the energy renovation of the EU building stock, the new 2030 climate target plan will end up being an inevitable failure" says Bertrand Cazes.

www.glassforeurope.com

Strong support for Covid-19 vaccine projects

Schott is delivering vials to three out of every four Covid-19 vaccine projects undergoing phase I, II and III testing (source: Global Data). Already, the company has delivered millions of glass vials to SARS-CoV-2 programmes including partners of Operation Warp Speed in the USA.

The vast majority of all Covid-19 vaccines will be stored in and applied from a borosilicate glass container, the world's most widely used material to package vaccines. Relying on existing and proven infrastructures and materials enables the pharma industry to save time, simply because they have been processing these vials on their lines for decades.

"We are proud and happy to serve leading vaccine projects and will continue to contribute our utmost to the fight against Covid-19" said Frank Heinrich, CEO of Schott AG. The company already deploys a global validated production network with 20 plants and over 600 production lines for pharma glass and packaging and stands ready to supply the industry. "Our \$1 billion investment, which started before the pandemic to meet global demand for high quality glass packaging, allowed us to ramp up production to quickly address this unprecedented global public health challenge" Mr Heinrich added.

www.schott.com



Schott operates 20 plants and over 600 production lines for pharma glass and packaging.

French float furnace closure

AGC Glass Europe plans to close one of two float furnaces at its Bousois site in France. This measure forms part of an overall plan aimed at restoring competitiveness.

The closure will lead to a loss of 90 jobs. The Bousois management will act in concert with the personnel representatives to consider all the most socially acceptable solutions for putting this plan into practice.

www.agc-glass.eu



Float glass production at Bousois (image: AGC Glass Europe).

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Building furnaces safely through a global crisis

The SORG Group has recently commissioned a melting system at Wiegand-Glas in Schleusingen, Germany, a project made more challenging by the fact that it was carried out and completed in the middle of the global Covid-19 pandemic. The project required a flexible approach that gave careful consideration to the health and safety of many different companies working within the bustling construction site at every stage.

A regenerative end-fired furnace for clear glass, featuring a working end and forehearths was specially optimised to the customer's requirements. Two completely sealed dog houses were also built utilising EME-NEND technology.

www.sorg.de



A working end and forehearths were specially optimised to the customer's requirements.

World's largest glass container furnace commissioned

UK-based Encirc has lit its £100 million furnace in Elton, Cheshire, an installation that can process up to 900 tonnes/day and is the world's largest.

It is expected that this major investment by Encirc's parent company Vidrala Group will significantly boost its manufacturing capacity and safeguard the company's existing 1500 jobs. The company currently produces some four billion glass containers every year.

Throughout the Covid-19 pandemic, Encirc's business has remained undeterred, with Vidrala continually investing millions in clean fuel development, robotic production lines and its new furnace.

Speaking at the launch of the furnace in Elton, Encirc Managing Director, Adrian Curry commented: "This is a monumental day for Encirc, our parent company Vidrala and the wider glass container sector as a whole. Today's lighting of our 900 tonne furnace will significantly increase our capability to meet market demand, as well as support our journey towards becoming the most sustainable beverage supply chain business in the world."

www.encirc360.com



Celebrating lighting the world's largest glass container furnace at Elton, Cheshire.

South East Asia project successes

Italy's Revimac has been involved in a number of projects in the ASEAN region in recent months, co-operating with several major players, primarily in Thailand and Indonesia. In Thailand, for example, complete IS machines have been installed and commissioned for the Siam Glass Industry subsidiary of Osotspa.

During the execution of this project, Revimac also tendered for the supply of complete IS machines and feeders for an associated glass container plant in Myanmar. The configuration and equipment will allow the production of bottles in double and triple gob. The machines will be commissioned during the first quarter of 2021 by Revimac personnel. See Pages 34-40 for a profile of the factory.

www.revimac.com



Revimac IS machines for installation in Myanmar.





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Webinar programme unveiled

Addressing the cancellation of on-site events, GlassTrend is staging a regular series of TEDx-like webinars for its members this autumn, focusing on the future of the glass industry after the Covid-19 pandemic and before facing an even more severe crisis, the global climate change.

With the duration of each webinar set at approximately 40 minutes, fluent speakers have been invited with a helicopter view on such topics as CO₂-free glass production, glass as an enabling material for renewable energy and as a material contributing to a more sustainable world.

For example, recent speakers in the series have included Johan Knijp from DNV-GL (Netherlands) and Manoj Choudhary, past



Aston Fuller of Glass Futures, pictured here at the Glass Futures Industry Conference in 2018.

President of the International Commission on Glass, who gave a speech on the vital role of glass as an enabler of sustainable growth and Bahar Güclüsoy, Sustainability Director at the Sisecam Group who presented Sisecam's sustainability pathway 'Care for Next'. A Glass Futures presentation by Aston Fuller also addressed 'Technical collaboration, the route to decarbonising the glass industry in the 21st Century'.

Future webinars will include a BV Glas presentation on environmental challenges from the viewpoint of the German glass industry by Dr Johann Overath and a nuclear energy and waste vitrification presentation by Sophie Schuller from CEA (Commissariat à l'Energie Atomique et aux énergies alternatives).

Up-to-date information on the webinar series and registration for GlassTrend members can be found on the website.

With *Glass Worldwide* as preferred journal, GlassTrend is a consortium of worldwide operating industries and institutes working in the field of glass and glass production. The association aims to co-ordinate research and development



Dr Johann Overath of BV Glas, shown here at glasstec 2018. (image: Messe Düsseldorf/ctillmann).

activities to improve the competitive strength of glass industries, their suppliers and customers.

www.glasstrend.nl



GlassTrend is staging a regular series of TEDx-like webinars for members this autumn.

Coating line commissioned in Poland

In early July, after two years' work, the Saint-Gobain Glass plant in Poland started up a replacement jumbo coating line. More than €30 million has been invested in the magnetron (coater) to manufacture coated glass for high performance and high added value solutions for the residential and non-residential construction industry.

With two floats, a coater, a mirror line, a laminated glass line and three cutting lines, the Dąbrowa Gornicza plant is one of the largest glassmaking complexes in Poland, boasting an annual flat glass production capacity of 27.4 million m². In particular, the plant produces SGG PLANITHERM XN, a low-emissivity glass that maximises the energy efficiency of double and triple-glazed windows.

www.saint-gobain.com

Tableware made from 100% recycled glass

Turkish glassware brand Pasabahce has launched the Aware Collection, made from 100% recycled glass and combining sustainability with style and aesthetics, while reducing its carbon footprint and industrial waste.



Pasabahce's Aware Collection is made from 100% recycled glass.

Through its eco-friendly Aware Collection, the company contributes to environmental protection by collecting and recycling glass that was previously used at least once. Pasabahce designed its Aware collection with the inspiration of the turquoise of the Bosphorus. The collection features two glass mugs and two tumblers. Pasabahce collects used glass products from recycling containers and separates them according to size and characteristics. Used glass products that undergo the necessary processes are revived through this collection.

www.sisecam.com



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Greener glass manufacturing technologies

International engineering group Fives has launched a subfolder 'Glass' site, www.fivesgroup.com/glass, devoted to the group's strategy to focus on greener glass manufacturing technologies. The website is structured around four main axes that aim to increase energy efficiency, reduce emissions and enhance operating life, as well as minimise downtime and maintenance costs:

- Melting: Electric melting and boosting systems, oxy-fuel and hybrid furnaces.
- Conditioning: Glass conditioning systems, including working ends and forehearth.

- Float process: Expertise, hot ends, annealing lehrs and standalone equipment.
- Pre-engineering contracts, revamp projects and operational support.

The key message is focused on greener glass manufacturing technologies. The majority of emissions from the glass manufacturing process arise from burning fossil fuels. According to Fives, replacing fossil fuels with green electricity can eliminate these pollutants, creating a sustainable manufacturing process.

Special focus is placed on a flexible hybrid furnace, the Prium Eco-Flex with Heat Recovery Area technology that allows users to achieve up to 80% electric boosting, reducing emissions by up to 60%. The furnace can use up to 80% recycled glass for much greener glass manufacturing.

www.fivesgroup.com/glass ●



Prium E-Boost.



Prium OxyMelt.

Radar-based technology recommended in insurance industry guidelines

FM Global, a leading multi-national commercial insurance company, updated data sheet 7-26, loss prevention guidelines for the glass industry, in July 2020. These updated guidelines include radar-based technology among a list of minimum activities recommended for an asset integrity programme, found in section 2.5.13-D.

PaneraTech reports that SmartMelter is currently the only technology that provides inspections that meet this action.

FM Global publishes exacting standards in the form of loss prevention data sheets for multiple industries to help manufacturers reduce property loss. According to the insurance company's website, these proven engineering guidelines are written and updated based on industry experience and outside input from sources such as manufacturers and standards committees. The purpose of the data sheets is to reduce risk and help make businesses more resilient.

The FM Global Loss Prevention Data Sheet for the Glass Industry provides specific recommendations to supplement its general guidelines. Section 2.5 outlines standards for loss prevention in operations and maintenance. The details of implementing an asset integrity program are listed in sub-section 13: 'At a minimum, include the following maintenance, operating and remaining life assessment activities in the programme... (D) Consider employing emergency technologies to help assess refractory health. Radar-based technologies have been employed successfully for several years to monitor for thinning and/or glass penetration.' To download data sheet 7-26, visit fmglobal.com.

SmartMelter by PaneraTech is a patented radar-based technology for monitoring glass penetration and residual refractory thickness. This technology has been validated in multiple blind trials and used widely across the glass industry since its release in 2017. The company recently surpassed 500,000 measurements and more than 300 furnace inspections.

www.smartmelter.com ●

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Malaysian glassmaker benefits from German production expertise

Advanced hot and cold end technologies from Germany's Heye International are helping Jg Containers (Malaysia) Sdn Bhd to maximise glass container production yields at the customer's Klang glassworks in Selangor. Located close to Kuala Lumpur, Jg Containers has been making clear glass bottles and jars for soft drinks, liquors, foods and pharmaceuticals since 1972.

Operating a single 180 tonnes/day furnace, Jg Containers enjoys a 50% share of the local flint glass market, as well as exporting 35% of output to neighbouring ASEAN countries, Australia, Hong Kong, Mauritius and the Middle East. To serve domestic and international customers, the manufacturing facility is conveniently situated close to Malaysia's major trunk roads network, as well as Port Klang.

Over the years, Jg Containers has regularly modernised its manufacturing operations, adopting proven industry developments in furnace, forming, inspection and packaging technologies, while employing advanced digital methods to improve its products and customer service.

The glassmaker's latest investment calls on the established production expertise of Germany's Heye International. This includes the installation of an 8-section, double gob 5in IS machine that has been specially adapted to accommodate the customer's existing variables. The Heye IS machine is fully prepared for the NNPB process and is equipped with the latest Heye technology such as rotor mechanisms for constant glass homogeneity, dual motor shears and a high speed delivery system. At the cold end, Heye has delivered its Wenspect quality control inspection solution - a combination of Heye SmartLine check detection system, Heye multipoint wall thickness measurement and Iris Evolution sidewall inspection. Since completing this installation, the customer has recorded 93% glass pack efficiencies.

www.hey-international.com ●



A Heye International 8-section, double gob 5in IS machine has been installed at Jg Containers.

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**AIR
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First foam glass gravel plant for the Baltic States

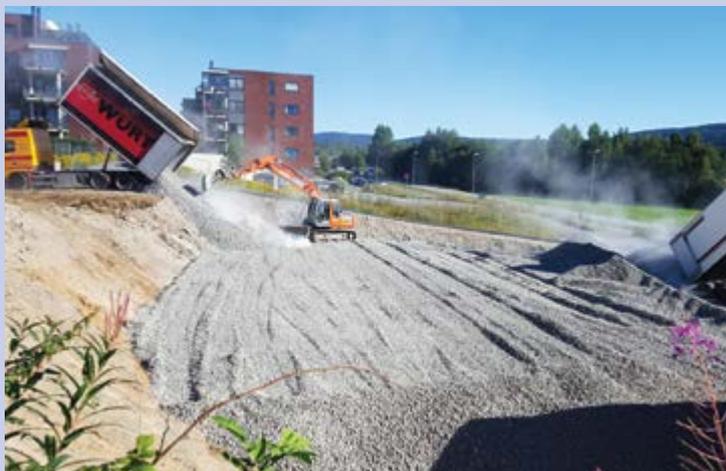
Schaumglas Global Consulting (SGGC) has won a European tender for the construction of a modern foam glass gravel plant in Estonia. The customer is Gravels Investeeringud

OÜ and the plant will be operational by the end 2021 with an annual production capacity of 60,000m³.

Foam glass gravel is a lightweight and sustainable material made from

recycled post-consumer glass. The material is used mainly as insulation and lightweight filling material in the construction sector. This facility will contribute to an increased use of recycled glass in Estonia.

www.sgg-consulting.com



Foam glass in road construction.



Foam glass as a lightweight filler or as soil exchange.



This year's group of apprentices at HORN Glass Industries.

Apprentices join plant construction specialist

Six trainees have joined the workforce of HORN Glass Industries AG this year; two metalworkers, one draughtsman and three electronic technicians. Plößberg, Germany-based HORN currently employs a total of 33 apprentices. During their training, the apprentices learn about the different departments or accompany their colleagues on construction sites and thus get to know the entire company.

"Here, you can create a sound basis for yourselves, in a future profession at a company of the future" commented Stephan Meindl, CEO and Managing Director when welcoming the latest recruits.

www.hornglass.com

Batch plant commissioned remotely

Usually, when commissioning a batch plant, EME engineers travel to site. Due to current international travel restrictions imposed by Covid-19, however, it was impossible for these specialists to travel from Europe to Chile in order to put the latest Cristalchile plant into operation.

Since Cristalchile urgently needed the batch plant, EME worked out a concept to commission the plant via remote control from Germany, without the presence of EME specialists on-site. For this purpose, Cristalchile provided several resources in the field of mechanics and control technology. This team was supported in advance with the necessary process descriptions,

manuals, checklists and additional training by EME specialists via video conferencing.

Remote commissioning of the batch plant was essentially divided into two stages, the cold start-up and the hot commissioning. According to the EME specifications, the first stage, the cold start-up, was carried out independently by Cristalchile, using the detailed information provided by EME. During this stage, all drive systems were checked by the customer, with frequency converters and soft starters parameterised.

For the hot commissioning, EME software engineers connected to Cristalchile's system via secure EME VPN to activate the operating and control software. Simultaneously, video conferences ran parallel to

commissioning. All scales were calibrated remotely.

The six hour time difference to Chile was compensated by flexible working hours at the customer's site and a two shift operation at EME. The complete batch plant was tested and successfully commissioned. Since commissioning, the batch plant has been running continuously without problems.

www.eme.de



Remote commissioning of the Cristalchile batch plant from Germany.



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Industry supports golf fundraiser

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

The day was supported by local glass companies including Allied Glass Containers, Ardagh Glass and Stoelzle Flaconnage, as well as such suppliers as DAS Engineering, Forglass, Gillian & Baines, Graphoidal, Marpak and Sheppee International, plus teams of friends. A team of past sports personalities was also present including Bob Beardsmore and Brian Lockwood, ex-Great Britain rugby league internationals, John McClelland ex-Leeds United and Northern Ireland international footballer and John Helm, TV presenter and sports commentator.

The winning team was captained by Duncan Robertson, with Stoelzle Flaconnage finishing runner up. Stephen Hirst was the individual winner.



John McClelland and Bob Beardsmore.

With the event staged under Government and golf club Covid-19 restrictions, the evening's dinner was a casual affair, with only 54 golfers allowed to attend. A total of £1500 was raised. ●

Equipped to deliver efficient furnace replacement parts

In such a time-critical industry as glassmaking, finding replacement equipment and parts as efficiently as possible during a cold repair can make all the difference to a furnace operation.

Renowned for its engineering and knowledge, SORG is also known for using only certified components of the highest quality.

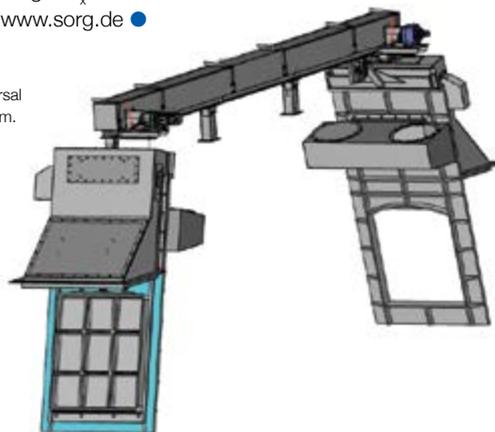
This includes a reversal system with double deck slides, employing proven technology without separate combustion air flap with pneumatic or electric actuators. Also available is a double-winged furnace pressure regulating flap that regulates the exact pressure in the furnace. Stabilising the melting process and saving energy, both wings feature different cross sections, positively influencing the control behaviour.

The SORG near infrared (NIR) camera offers visualisation and thermography at the same time. Available with two aperture angles, almost the entire furnace chamber can be monitored, including the flame burn-out on side-fired furnaces.

With the company's burner holder design, it is possible to adjust the burner easily, without changing the checkpoint on the nozzle. A cast plate connected to the holder seals the burner brick to avoid an air inlet, which is crucial to reducing NO_x emissions.

www.sorg.de ●

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HOT TOPICS

Latest news round-up from *Glass Worldwide*:
www.glassworldwide.co.uk



see page 108

“An ounce of prevention is worth a pound of cure.”

Benjamin Franklin

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People & posts

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Helmut Sorg remembered



Helmut Sorg.

A long-serving managing partner of Beteiligungen Sorg GmbH, Helmut Sorg died unexpectedly earlier this year at the age of 80. Mr Sorg was a member of the fourth generation of the family, still at the helm of the family business, working together with his son Alexander and his brother Karl-Heinz.

As a consequence of post war difficulties in East Germany, Helmut left the family home in Breitenbach, Thuringia at the age of 14 and moved to the west to live with his uncle in Speyer. After graduating from high school, he attended the technical university in Aachen to study industrial furnace and heating technology. He graduated at the age of 24 and began working full-time for Nikolaus SORG in 1964. The company had moved to West Germany in 1950 following the Second World War and was still re-establishing itself.

From the outset, Helmut Sorg's intent was the opening of the world market for plant engineering. He knew that the key to success lay with the application of the most modern technology, the main focus of his life as a dedicated engineer.

In 1978, he initiated the creation of a single technical department within the company and assumed responsibility for, among other things, all technological and development matters. This move formed the basis for the subsequent and lasting success of SORG as one of the world's leading suppliers to the glass industry.

Initially, he focussed on the end-fired regenerative furnace and pushed for the development of increasingly larger furnaces of this type. At the same time, he was able to find customers who were ready to accept the accompanying technical challenges. This led to the industry-wide replacement of antiquated cross-fired furnaces by the modern end-fired technology.

Helmut Sorg's drive resulted in the successful sale of these modern furnaces in Europe, as well as opening up markets in the American and African continents.

In recent years he focussed on the development of forward-looking, low emission melting concepts. In 2012, the first batch preheater was commissioned as part of the new 'Batch3' concept. Under his aegis, the company has developed an innovative, heavily electrically heated, horizontal furnace, now being introduced into the market under the name CLEAN Melter.

Mr Sorg's legacy as a person and as a Managing Partner of the Sorg Group is shown by his close relationship with employees and a company well-placed for the future.

www.sorg.de ●

Driving progress towards industrial excellence

Romain Barral has been named Director of Operations for Verallia Group. He will oversee the group's Technical, R&D, Environment, Health and Safety (EHS), Quality, Industrial Excellence, Supply Chain and Purchasing Departments and is a member of Verallia's Executive Management Committee.

Mr Barral began his career in 1998 as an R&D engineer at Inegi-Cetrib and then worked at Renault. He joined the Delphi automotive group in 2001, where he held various management and executive positions in industrial engineering and operations management in Europe and Asia. In 2019, he was appointed Vice President, Managing Director in charge of the Gas Fuel Systems business at Delphi Technologies.

"Romain's industry experience and his international profile will be invaluable qualities in the deployment of our strategy and the pursuit of our progress in industrial excellence" commented Michel Giannuzzi, Chairman and CEO of Verallia.

www.verallia.com ●

Expanded team focuses on zero defects at higher speeds



Martijn Kamphuis.



Kwintijn Schuurman.



Hans Ploeger.



Eddie Bousema.

XPAR Vision has extended its team in recent months with four appointments, increasing the company's workforce to more than 30. The development team has been extended from 14 to 16, for example, with Martijn Kamphuis joining as a graduate student, who is in the final year of his master degree in Industrial Engineering and Management. At XPAR Vision, Mr Kamphuis is working on his Master design project, researching opportunities and challenges of robotisation in the glass container production industry.

Also joining the development team is Kwintijn Schuurman, who graduated in the field of information science, with

a focus on usability engineering and user experience. Both are specialties he will be using in his role as front-end developer at XPAR. In this role, he builds user interfaces that not only match written criteria but actively empower users in their work.

The XPAR Vision management team has also been expanded. Working alongside Joop Dalstra (CTO) and Paul Schreuders (CEO/CCO), Hans Ploeger has been appointed COO. His main focus will be to optimise business processes within the company and between the company and its business partners.

Separately, in his position as International Account Manager, Eddie Bousema's initial focus will be on the USA market, strengthening and expanding relationships and enabling customers to use the company's hot end technologies to the maximum.

www.xparvision.com ●

US float producer names VP operations



Martin Bracamonte.

Martin Bracamonte has been named Vice President, Operations by Vitro Architectural Glass. He will

oversee operations for four US plants operated by Vitro Glass in Carlisle, Pennsylvania; Wichita Falls, Texas; Fresno, California; and Salem, Oregon. His primary responsibilities will include increasing operational efficiencies, production output, product quality and overall customer satisfaction.

Mr Bracamonte joins Vitro Glass from IGE Glass Technologies, where he served as President and Chief Operating Officer. During his 29 year career in the glass industry, he has held senior management and executive posts at several leading glass manufacturers.

www.vitroglazings.com ● ▶



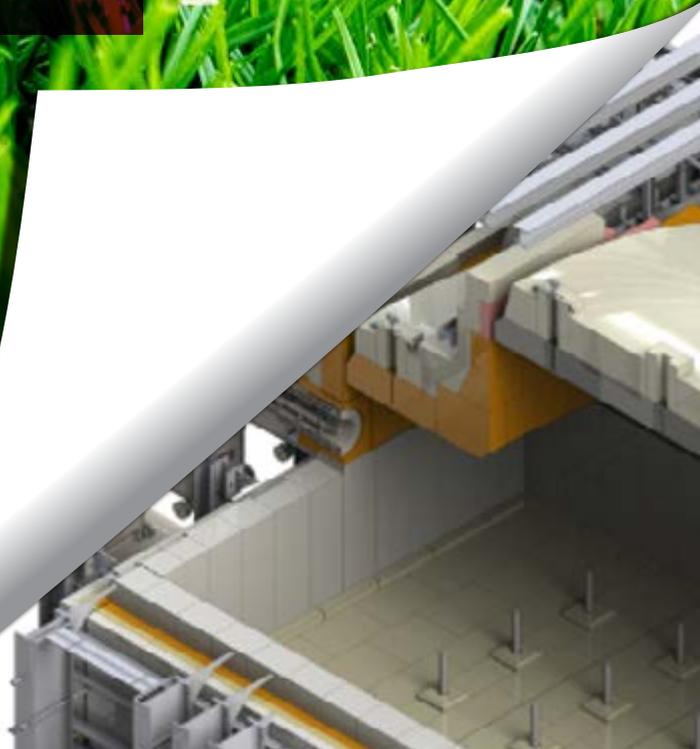
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Industry can do it

For you, it's time to get Greener

From fully electric furnaces to advanced forehearth design,
our leading technologies aim for greener glass manufacturing.
Discover Prium® Eco-Flex, our flexible hybrid furnace.

www.fivesgroup.com



USA container specialist adds to leadership team

Rachel Celiberti has been named Executive Vice President and Chief Financial Officer at USA-based Anchor Glass Container Corp. She replaces Interim Chief Financial Officer Don Leclair, who will remain on the Anchor Glass board.

Prior to joining Anchor Glass, Ms Celiberti was Chief Financial Officer/Corporate Treasurer with Philadelphia Energy Solutions, having spent 17 years with Sunoco Inc in a variety of leadership roles in convenience retail and fuels marketing, chemicals and real estate.

www.anchorglass.com ●

Investment in the customer service experience



Francesco Martinelli.

IRIS Inspection machines has strengthened its management team, maximising the customer service experience for glass container

producers throughout the world.

Service has always been a strategic key of success for IRIS. The inspection solutions specialist has promoted Francesco Martinelli to become Customer Service Manager, with direct responsibility for a dedicated team of 15 engineers located both in Lyon (France) and in various locations worldwide (Russia, UK, Thailand, China, Mexico etc). One of his top priorities has been to successfully maintain the worldwide service provided by IRIS in the current challenging Covid-19 times.

Francesco Martinelli has been part of the IRIS story since 2014, working for five years as a Customer Service Engineer, before becoming a Project Manager and Support Engineer.

Speaking fluent Italian, English and French, his latest appointment will ensure the delivery of high quality service and customer satisfaction. He is responsible for the planning and management of machine installations, as well as recruiting, mentoring and developing customer service agents.

www.iris-im.com ●

South American representation



Thiago Metti.

HORN Glass Brazil Ltda has been established in Sao Paulo and is now the company's contact point for the glass industry throughout South America.

The company is managed by local industry expert Thiago Metti, who already represented HORN's regional activities relating to glass melting furnaces and glass production plants.

www.hornglass.com ●

Chief Technical Officer named



Guido Stebner.

The Board of Directors at Vetropack Holding Ltd has appointed Dr Guido Stebner as group-wide Chief Technical Officer for the Engineering and

Production division from 1 January 2021, succeeding recently retired industry stalwart Günter Lubitz. He will also become a member of the Management Board.

Dr Stebner studied metallurgy at the Clausthal Zellerfeld University of Technology in Germany. After concluding his studies, his professional career path led him to the steel industry, where he held management positions in research, production and technology at what is now the ThyssenKrupp Group, working in Germany, France, Italy and the USA. He was subsequently responsible for production at Outokumpu Stainless USA, before moving to the Swiss Schmolz + Bickenbach Group.

Vetropack's previous CTO Engineering and Production, Günter Lubitz, retired last month. Until his successor takes over on 1 January 2021, Johann Reiter, CEO of Vetropack Group, will manage this division on an interim basis.

www.vetropack.com ●

Sales management responsibility

Lakbira Zanzoune has been named Bavelloni's Sales Area Manager for France and French speaking Switzerland, North and Central Africa, Lebanon, Syria, Jordan and Iraq. She speaks French, Arabic, Italian, English and Spanish.

www.bavelloni.com ●

Membership services focus



Callum Hawksworth.

Callum Hawksworth has joined British Glass as Administrative Assistant within the membership services team. He will work across all membership services to support key British Glass activities such as the library services, events and supporting policy activity, while

he works towards a business management degree apprenticeship with Sheffield Hallam University.



Jenni Richards.

This appointment follows a minor restructure earlier in the year that saw Jenni Richards become Federation Manager, co-ordinating all federation and membership activities.

www.britglass.org.uk ●

Board appointment

An Extraordinary General Meeting at Glaston Corp has decided, in accordance with the proposal of the Shareholders' Nomination Board, to elect Veli-Matti Reinikkala as a member of the Board of Directors, in addition to the current members of the Board of Directors, until closing of the Annual General Meeting 2021.

www.glaston.net ●

Event management role



Marko Mökkönen.

Following the recent retirement of Jorma Vitkala as Chairman of the Glass Performance Days Organising Committee, Marko Mökkönen has joined GPD as Conference Manager. Mr Vitkala will continue to support the GPD team as a consultant Senior Advisor.

www.gpd.fi ●

August-Wilhelm Rust remembered



August-Wilhelm Rust.

With a glass industry association dating back more than 30 years, August-Wilhelm Rust passed away this September.

Working in public relations since the 1960s, August-Wilhelm founded International PR and Media Agency in 1980. Focusing on B2B magazines for Great Britain and the Nordics, he represented glass and metal titles published by FMJ International Publications Ltd and was a regular attendee at glasstec events.

Upon its inception in 2005, August-Wilhelm joined *Glass Worldwide* as German representative and continued in the role until his retirement in 2016.

Dave Fordham, *Glass Worldwide* publisher, commented: "Liaising with a host of German suppliers, August was integral to the success of *Glass Worldwide* and was very popular with clients and colleagues alike. He will be sorely missed and our sincere condolences are with his family and friends." ●

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Driving the sustainability agenda for diversified packaging specialist

As one of the world's leading producers of glass and metal packaging, Ardagh Group is delivering essential materials to customers and final consumers that are fully recyclable. According to Chief Sustainability Officer John Sadler, the group is becoming a benchmark for sustainability throughout the industry, as the following exclusive interview explains.



John Sadler is Ardagh Group's Chief Sustainability Officer, with responsibility for managing all aspects of Ardagh's sustainability agenda.

According to Chief Sustainability Officer John Sadler, sustainability is a strategic imperative at Ardagh and in that context, in 2019 the group created the role of CSO and a Board level Committee to move the agenda forward. Working with the Board Sustainability Committee and his colleagues on the Global Executive, Mr Sadler is responsible for managing all aspects of Ardagh's sustainability agenda, ensuring it is at the core of the group's activities. This includes working closely with a wide range of stakeholders, including colleagues, customers, suppliers, regulators, trade associations and investors. "Sustainability has been a key priority at Ardagh for many years" John Sadler confirms "and we have achieved an incredible amount to date."

To enable the group to focus more significantly on sustainability, it was recognised that a full-time senior resource was needed to drive the agenda. Although metal and glass have different sustainability challenges, the fact that both are permanent, fully recyclable materials makes it

easier to have common sustainability objectives across the group. "We have developed a strategy to maximise the benefits of our materials and make them even more sustainable" Mr Sadler explains. "Having a group-wide strategy gives us the opportunity to maximise the benefits of our materials and production processes."

Challenges and opportunities

As Ardagh works to reduce the amount of CO₂ created in the manufacture of its products, however, some important challenges need to be faced and overcome. This includes the different recycling rates and practices encountered in the various countries ▶

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where the group operates and the different sources of energy used to generate electricity in these countries, as well as different legislation around the installation of renewable energy sources.

With glass, most CO₂ is generated in-house, whereas with metal, it is generated in the supply chain. Notwithstanding this difference, as well as focusing on Ardagh's in-house operations for glass, it is critical for both materials that the team works closely with suppliers, regulators and national recycling efforts to improve recycling quality and quantity and make the organisation's production processes as sustainable as possible.

According to John Sadlier, maintaining a co-ordinated, group-wide approach to resources is critical. "The role of CSO cannot drive this alone but we have the sponsorship of our Board and our Global Executive Team, backed up with resources, to drive the agenda throughout the business."

In addition, Ardagh's participation in wider industry projects is considered equally important in reaching the group's sustainability goals. The hybrid 'Furnace of the Future', for example, is described as a positive example of co-ordinating a Europe-wide sustainability project, where everything learned from the project will eventually be used throughout the world and will help to make glass even more sustainable.

Group-wide implementation

Ardagh's creation of the Board Sustainability Committee and the appointment of a senior executive to the role emphasises the importance of sustainability to the business. The committee gives Board oversight to the sustainability agenda and provides the necessary support to ensure the agenda is implemented throughout the business. Chaired by the COO, it operates group-wide and is designed to better co-ordinate Ardagh's global sustainability work, to accelerate its sustainability programmes and to increase responsiveness.

According to Mr Sadlier, gaining Board approval for Ardagh's 2020 Sustainability Strategy has been a highlight of his first year in office. The group is signing up to the Science Based Target Institute (SBTI), illustrating a commitment to doing its part to restrict global warming to less than 1.5°C by 2050. "This builds on our existing targets" he confirms, while also emphasising that ambitious goals have similarly been set with respect to reducing water usage, NO_x gases (in

glass manufacture), VOCs (in metal) and waste to landfill.

Representing a critical element of Ardagh's sustainability strategy, the social pillar of sustainability has been brought to the fore as a result of the recent Covid-19 pandemic. "Our focus is on giving back to the communities we live and work in via a new emphasis on education and by focusing on our people through initiatives around purpose, employee engagement, diversity and inclusion" John Sadlier explains.

A 2020 Sustainability Strategy has been created with the three main pillars of emissions, ecology and social, with ambitious goals set for each pillar, including signing up to the SBTI. "To achieve our objectives will require lots of work and commitment from our internal stakeholders, as well as our customers, suppliers and industry associations" Mr Sadlier confirms. "We want to become a benchmark for sustainability in the global packaging industry... to be the envy of the industry. We want people who think about Ardagh to think of us as exemplars on sustainability."

External recognition

In recent years, important external validation has been achieved, including gold level rating by EcoVadis, achieved only by the top 3% of companies assessed in the industry, for the fourth consecutive year. Ardagh has also received A-level rating from the Carbon Disclosure Project.

These accreditations complement multiple awards received over many years that recognise the group's innovation in down-gauging and lightweighting metal and



An extensive range of glass bottles is manufactured by Ardagh Group to meet customer requirements.

glass products respectively, as well as reducing energy consumption, while enhancing customer branding.

In 2020, for example, a project to process cullet fines has been selected as one of five finalists in the Pre-commercialised Innovation category of the International Sustainability Awards. Cullet fines are essentially glass dust that cannot be used in glass production and currently goes to aggregate or landfill. The project turns the fines into briquettes for remelting into glass containers.

Elsewhere, Ardagh's sustainable Tesla battery at the Irvine glass facility in Scotland won the 'Sustainable Initiative' award in the International Beverage Awards.

Commitment to share best practice

Production facilities are benchmarked on a wide variety of measures including production efficiency, water use, recycled content and energy use. According to John Sadlier, different regions respond to local challenges and develop their own specific strengths. "Our established culture of sharing best practice means we quickly share great local initiatives across all facilities" he says. "Our glass production facility in Obernkirchen, Germany has been selected to develop the FEVE-led Hybrid Furnace of the Future and will be a key focus over the coming years."

Technological advances are essential for the group to make continued progress. For example, developments in cullet processing technology have reduced the quantity of inclusions and improved the quality of cullet, allowing Ardagh to use more recycled material in its batch recipe. Elsewhere, advances in transit packaging have allowed the group to ▶



Ardagh Group's glass facility at Gostyn, Poland.



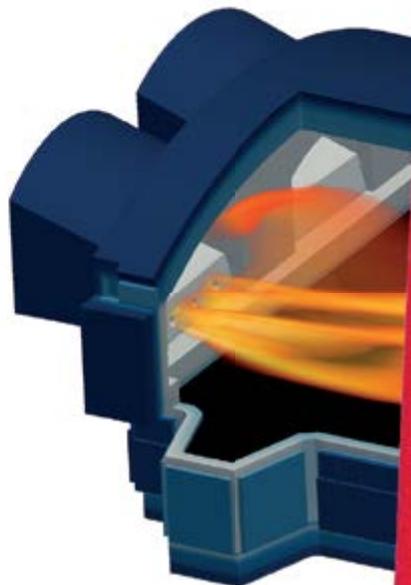
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Solar installation at the Bridgeton glassworks in New Jersey, USA.

reduce the amount of materials used and to increase the amount of reusable packaging.

“In terms of energy production, we have capitalised on technological advances that have reduced the cost of renewable energy, making it comparable in cost to fossil fuel-generated electricity” Mr Sadlier explains. “We have a solar installation next to our Bridgeton facility in New Jersey, USA and are working on several other installations across the group. We also work with our capital equipment suppliers to take advantage of their energy-reducing innovations.”

As mentioned previously, Ardagh is a founder member of FEVE’s ‘Furnace of the Future’ project, which is described as a potentially pivotal project for the international glass packaging community. “It will take a large, dedicated team and I’m proud to be a member of that team” says John Sadlier. “It will be extremely influential and a game changer in terms of sustainability... we aim to demonstrate the viability of electric melting on a commercial scale, which would revolutionise the consumer glass packaging market. It represents a step change opportunity for the industry to produce glass packaging by replacing current fossil fuel energy sources and cutting CO₂ emissions by as much as 60%. The new technology will enable the industry to produce more than 300 tonnes per furnace of any glass colour, per day, using high levels of recycled glass.”

Similarly, the FEVE-led ‘Close the Glass Loop’ platform, which will unite the glass collection and recycling value chain, is recognised for its fundamental importance to the glass packaging

industry. Their goal is to achieve a 90% average EU collection rate of used glass packaging by 2030 (from the current average of 76%) and better quality of recycled glass, so more recycled content can be used in production.

Ardagh Group is actively supporting various pilot projects to increase the quality and quantity of recycling in the key regions where it operates. To achieve 90% collection rates, broad scale co-ordination of larger initiatives will be needed across Europe, together with a series of smaller scale local initiatives. Via its previously mentioned cullet fines processing project, for example, Ardagh is developing another source of cullet that will return the same benefits as normal cullet in terms of reduced energy costs, reductions in CO₂ emission and reducing the use of raw materials.

Separately, the group has recently conducted research into the recycling habits of 2100 households across Europe during lockdown. Its findings show a significant behaviour change where, on average, 34% of consumers are recycling more glass packaging through domestic recycling streams during a difficult and challenging time.

Industry-wide co-operation

Having recently joined the FEVE Board, John Sadlier is encouraged to see the level of co-operation among members on key sustainability initiatives. “With the challenges we face as an industry, this co-operation on sustainability is critical to our success and I’ve no doubt that, with FEVE’s stewardship, this will deliver long-term benefits for the industry.”

As well as working closely with customers to drive forward key sustainability issues, the Ardagh Group’s Chief Sustainability Officer is highly encouraged by the results of a 2020 FEVE/Friends of Glass consumer survey, revealing that people are buying more glass than ever before. “Nine in ten would recommend glass as the best packaging material to friends and family and two in five consumers actively choose glass as they see it as more recyclable than other packaging materials” Mr Sadlier reports. “When buying food and drink, consumers are considering the environmental impact of packaging as an important part of the decision-making process. Glass is overwhelmingly the preferred consumer packaging choice in terms of avoiding littering, packaging waste and addressing climate change. The fact that consumers are actively choosing to buy more glass packaging due to its sustainable properties is extremely

encouraging for Ardagh and the glass industry.”

In North America, Ardagh is also leveraging involvement with industry associations to strengthen glass’ environmental footprint and drive understanding across stakeholders that glass is a model of sustainability. Ardagh’s President and CEO of Glass – North America, Bertrand Paulet, is Chairman of the US-based Glass Packaging Institute (GPI), the main association representing glass manufacturers across the country. GPI is actively articulating the environmental advantages of glass across the media and of great importance these days, to legislators, as they create packaging policy at state and federal levels. The association is also targeting improvement of glass recycling and content rates and is directly investing in local recycling programmes while currently creating an industry-wide strategy to raise rates substantially over the next few years.

Social responsibility

The social pillar of Ardagh’s Corporate Social Responsibility (CSR) policy is all about relationships with stakeholders. As a result, the group’s CSR policy and the social aspects of its sustainability strategy are one and the same.

“In terms of giving back to our communities, going forward, we want to focus on education” John Sadlier confirms. “Having an active relationship within the communities in which we operate is really important to us and has been for many years. We aim to have at least one meaningful community involvement project at each of our facilities as part of our long-term sustainability targets. Having community projects in place comes naturally to our production facilities and helps us to engage with the local communities. It also allows us to inform people about our products, processes and recycling.”

Throughout the global Covid-19 pandemic, many employees have volunteered in their communities and donated time, supplies and funds to local charities. Inspired by its people, Ardagh created a \$2 million fund to support those most affected by Covid-19 in the communities in which the group operates. The fund was

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Construction underway for Uzbekistan's first float project



Siemens Solution Partner HORN Glass is responsible for all technological equipment required for the construction of Uzbekistan's first float glass plant. Fully automated production is expected to begin in the summer of 2021. As Madgi El-Awdan reports, the real net output ratio for this project was the turnkey specialist's highest ever.

Extraordinary times call for extraordinary commitment. Many employees of HORN Glass, which is based in the Bavarian city of Plössberg, are currently stationed more than 5000km from their original workplace – in Uzbekistan, or more precisely, in the city of Zarafshan, about 670km west of the capital city of Tashkent. Most of them had never heard of the city before but what even experts in the international glass industry do not know is that the Central Asian country currently has no float glass production of its own. It imports glass sheets from abroad, a situation that will soon change.

Since May, HORN Glass has been equipping the country's first float glass plant on behalf of Zarafshon Oyna LLC. "We're extremely proud to be implementing this major project as a turnkey solution" says Markus Frank, Deputy Director, Glass Plant Technology at HORN Glass. The medium-sized enterprise is in charge of planning, delivering and commissioning all technological equipment in the plant, which will be handed over to the customer on a turnkey basis in the summer of 2021. "Our real net output ratio is higher than it's ever been for comparable projects" Mr Frank confirms.

Impressive scope of supply

Before the float glass plant begins delivering its planned daily capacity of 250 tons, HORN Glass will have provided an impressive scope of supply, including planning the melting

tank, tin bath and annealing lehr and delivering all the refractory material, the firing system for natural gas and diesel oil, batch and cullet chargers, stirrers, coolers and measuring and control

technology. The company will also supply the tin bath with its associated technological equipment, which includes a shielding gas mixing station. These will be accompanied by the ▶



The accompanying images show construction work underway at Zarafshan, about 670km west of the capital city of Tashkent, Uzbekistan. All images courtesy of HORN Glass.

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entire annealing lehr and automation system for the hot end.

As a Siemens Solution Partner, HORN Glass once again opted for the Simatic PCS 7 process control system, this time Version 9.0. The process automation architecture is designed for maximum flexibility, thanks to a redundant client-server structure. Process optimisation is provided by the powerful Simatic PCS 7 Process Historian archive and reporting system and a remote VPN service. The plant sections are integrated in the process structure by three AS 410 single station automation systems. SCALANCE communication modules and Simatic ET 200 I/O modules are used in the network.

Functional security for the industrial thermo-processing technology was implemented using fail-safe Simatic ET 200SP-F I/O modules. The Simatic PCS 7 process control system with its modular system platform is ideal for this plant.

Collaboration with European technology experts

As general contractor for the project, HORN Glass has collaborated with leading European companies that are all specialists in their fields. For example, the batch house was provided by ZIPPE, the cutting machine with glass stackers by



Bottero, the compressor plant by Kaeser and the equipment for producing hydrogen by Hydrogenics.

High quality Siemens products include an NXAir air-insulated medium voltage switchgear (10 kV), a Sivacon S8 low voltage switchboard (0.4 kV), Sinamics frequency converters and low voltage motors. The Simatic PCS 7 process control system demonstrates

its strengths as a technological bracket around plant-wide automation. Even the auxiliary installations are integrated!

"Total automation is an important factor, because the personnel who will work on-site later are often less qualified than we've come to expect in high-tech countries" Markus Frank explains. This is why HORN Glass also decided to develop a special concept for the top rollers that allows the tin baths to be integrated in the process control system. The customer in Uzbekistan will be using the HTRM-S (suspended) top roller.

HORN Glass also relies on Siemens products for all the machine technology. The drive system comprises Sinamics S120 motors and controllers and control tasks and functional security are handled by Simatic ET 200SP components. These machines are always used in pairs. All the plant sections communicate via Profinet. As a special feature, a Mobile Panel is used in addition to the Simatic HMI TP900 Panels, making the performance of maintenance and setting tasks especially user-friendly.

Already thinking about the future

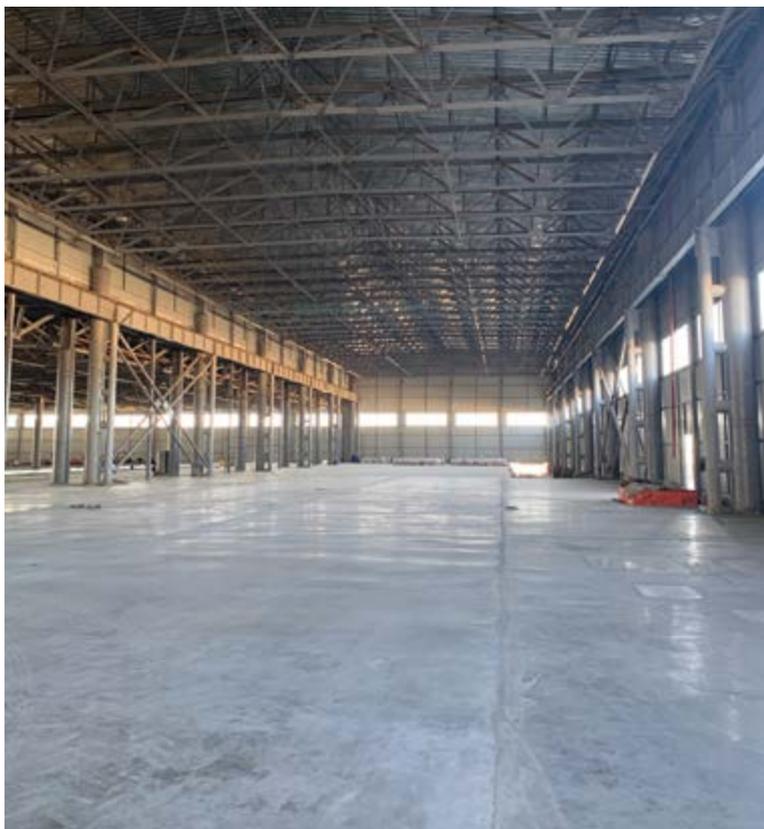
The experts at HORN Glass are already thinking several steps ahead. When the production plant enters operation in the middle of next year, plans for the processing plants will be gradually introduced. "We're recommending an expansion on the same premises so that processing and finishing can also be performed in Uzbekistan" says Markus Frank. This will allow the customer to market architectural and automotive glass directly from the factory, both at home and abroad and consistently promote the 'Made in Uzbekistan' image for float glass products as well. ●

About the author:

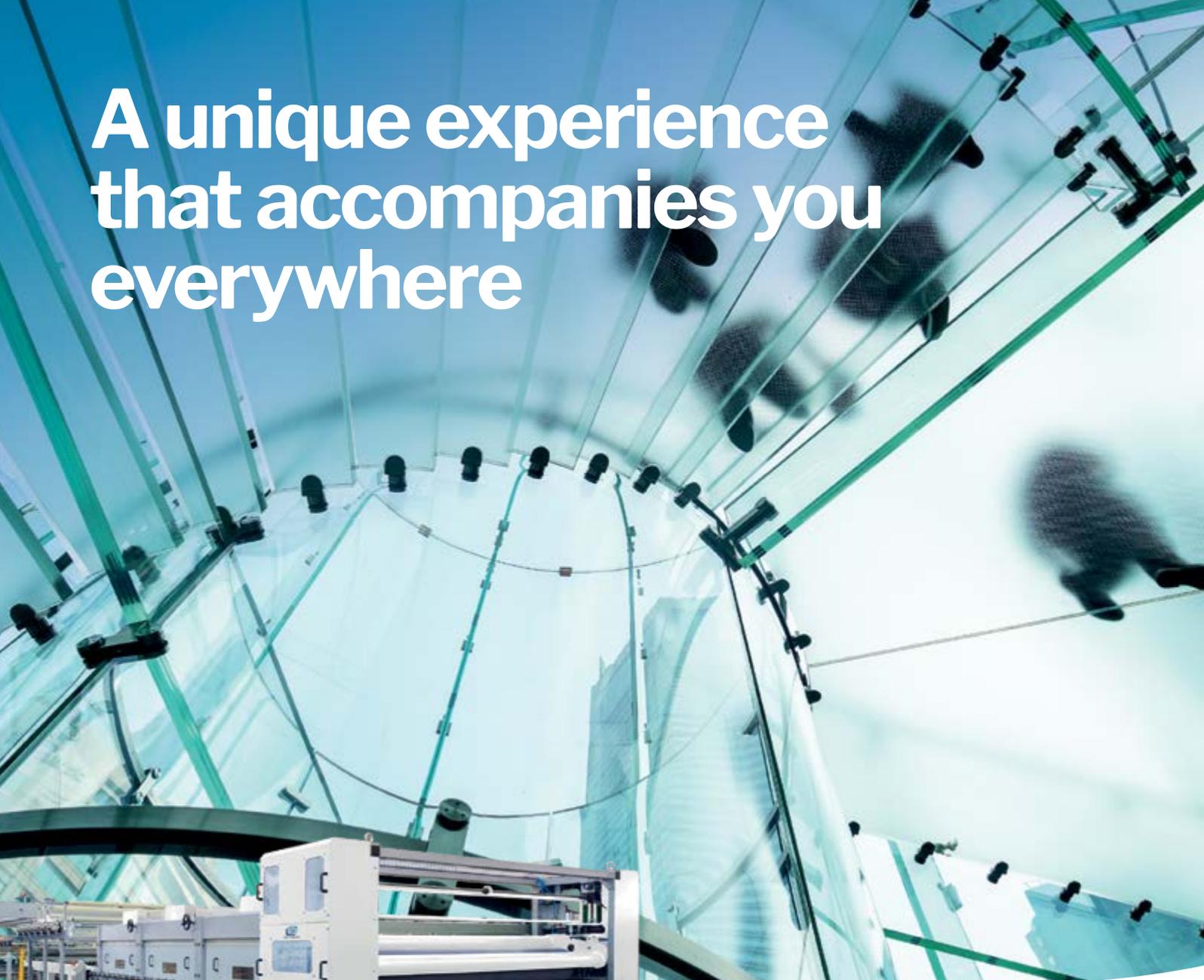
Madgi El-Awdan is Senior Manager in the Glass and Solar industry at Siemens

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Construction work at the Myanmar Golden Eagle glass container plant is scheduled for completion by the end of 2020.

Myanmar glass container project set for early 2021 start-up

As the construction phase for Myanmar's first glass container project in a number of years nears completion, *Glass Worldwide* spoke exclusively to Deputy Managing Director, Ei Shwesin about the plant and its goals.



Ei Shwesin is Deputy Managing Director of Myanmar Golden Eagle Co Ltd.

A pioneering joint venture involving local Myanmar investors and a subsidiary of Thailand's Osotspa Group, the Myanmar Golden Eagle Co Ltd Thanlyin Glass Factory is expected to complete and commission in March 2021.

According to Deputy Managing Director Ei Shwesin, with no glass packaging production currently undertaken in Myanmar, the project will provide a valuable opportunity for import substitution. "Myanmar is still a developing country, with a constantly growing beverage sector" Ei Shwesin confirms. Some 100,000 tonnes of glass packaging are imported to the country annually via sea freight alone, plus significant imports by road from China and Thailand. Market demand is growing steadily, requiring local fillers to reuse existing

bottles as much as possible. "In addition, we anticipate growing demand for bottles as global beverage brands are increasingly active in Myanmar" Ms Shwesin explains.

Ei Shwesin brings more than 16 years of international experience in finance and banking to the initiative, having worked for more than a decade at Bank of America and Merrill Lynch in the USA. Prior to joining Myanmar Golden Eagle Co Ltd (MGE) as Deputy Managing Director in 2019, she worked as Commercial Sales Director for a Myanmar-based conglomerate, whose extensive business interests include a float glass factory.

Partnership of equals

Myanmar Golden Eagle's joint venture with Thailand's Osotspa Group is described as a partnership of equals, both parties believing in the partnership's synergy and its potential for the creation of a long-term working relationship.

The origins of the family-owned Osotspa Group date back to 1891 in Bangkok's Chinatown and today, the company is well known globally for its non-alcoholic beverages, including energy drinks, functional drinks and sports drinks portfolio. Osotspa is successfully growing its brands in ►

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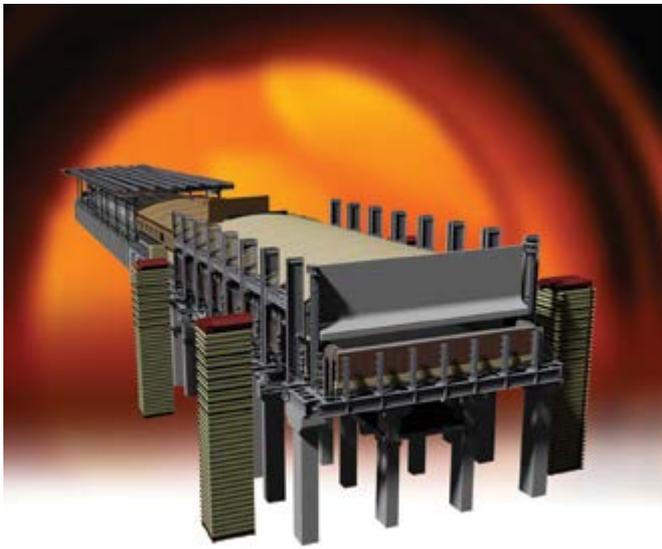
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Factory Spotlight



The Myanmar Golden Eagle Co Ltd site at Yanking Township, Yangon.

Thailand and internationally, implementing targeted approaches to ensure their popularity by reflecting consumption behaviour and meeting constantly changing consumer needs. Its main international markets are neighbouring Myanmar, Cambodia and Laos, followed by Indonesia and Vietnam. In addition, distributors are located in 25 different countries worldwide, including a strong presence in Asia, Africa, Eastern Europe, North and South America.

The first glassmaking subsidiary of Osotspa was established in 1977 and is Thailand's third largest glass container producer, with three factories and an annual output of approximately 436,000 tonnes. Glass bottles are produced on 17 production lines and in sizes from 15ml to 750ml. The glassmaker's recent expansion initiatives have closely followed those of its parent company.

According to Ei Shwesin, Osotspa brings a proven, end-to-end track record in project management and the commercial aspects of the glass container business. "The organisation also brings a top-rated financial background as a listed entity on the SET (Stock Exchange of Thailand)."

Myanmar Golden Eagle (MGE) Co Ltd is managed jointly by the Osotspa team and the local partners in Myanmar. Viwat Supatham, Managing Director of MGE is an accomplished glass industry professional, with vast industry experience, including his current work at Osotspa. ▶



Construction work at the Yangon site has been largely unaffected by the global Covid-19 pandemic.

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Factory Spotlight

The new glassworks provides some 300 employment opportunities, as well as creating more than 1000 jobs in the local community. Initially, the necessary international glassmaking knowhow will be introduced from Thailand but once local employees have been fully trained to international standards, it is hoped to make the Myanmar operation self-supporting. The dedicated Siam Glass training centre in Thailand is crucial to the provision of essential production training, as is the role of expatriate Thai experts on-site in Myanmar.

Project approaches completion

Construction of the greenfield MGE glassworks is on track for completion by the end of the year, with commissioning scheduled for March 2021. So far, the global Covid-19 pandemic has not impacted construction work, although future project delays are dependant on whether international technicians are able to travel safely to the site from overseas.

The factory site in Thanlyin Township, Yangon was selected in close co-ordination with Myanmar government authorities, in particular with regard to easy access to essential raw materials. The glassworks is targeting local alcoholic and non-alcoholic beverage producers with ware sizes ranging from 100ml to 750ml in amber, green and flint colours. The joint-venture's immediate goal is to deliver output that meets international standards but at a lower cost than imported glassware, while also paying close attention to the opportunity for capacity expansions in the future.

Using the extensive experience gained by Siam Glass over several decades, the glassworks is employing the equipment and services of some well-known international suppliers to support its arrival in the glass packaging business. Japan's AGC Ceramics is responsible for designing and building the melting furnace and forehearths, for example, while China's Shanghai Precision was awarded the batch plant contract.

Forming equipment has been sourced from sister companies Bottero and Revimac, while fellow Italian enterprise Antonini is responsible for delivering the annealing lehrs. At the cold end, ▶



When completed, the first phase of the glassworks will produce 300 tonnes/day of glass packaging.

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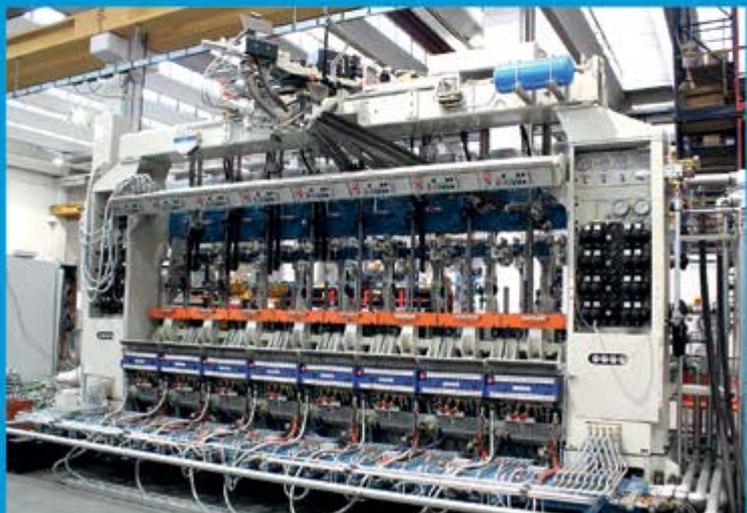
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Factory Spotlight

specialist inspection equipment has been sourced from IRIS Inspection machines and Tiama, while Ruitai Technology (China) has been contracted to build and install the cold

end handling and palletising equipment.

Although some automation has been incorporated within the glassworks design, greater use of automated technologies will be adopted once the production team has gained greater experience.

Similarly, once production reaches the company's targeted efficiency levels, the decision will be made whether to build a second production shop. Deputy Managing Director Ei Shwesin is confident that projected demand will be significantly higher than the plant's initial design capacity, so a follow-up investment is definitely on the cards. "It is extremely important that MGE's glass manufacturing facility matches international standards and becomes Myanmar's champion in the glass container industry" she concludes, while also emphasising that as soon as a formal national glass association can be created for Myanmar, the organisation is likely to become a key part of the regional industry via the ASEAN Federation of Glass Manufacturers. ●



Myanmar Golden Eagle (MGE) Co Ltd is managed jointly by the Osotspa/Siam Glass team and their local partners in Myanmar.

Further information:

Myanmar Golden Eagle Co Ltd,
Yanking Township, Yangon,
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tel: +95 99 699 50843
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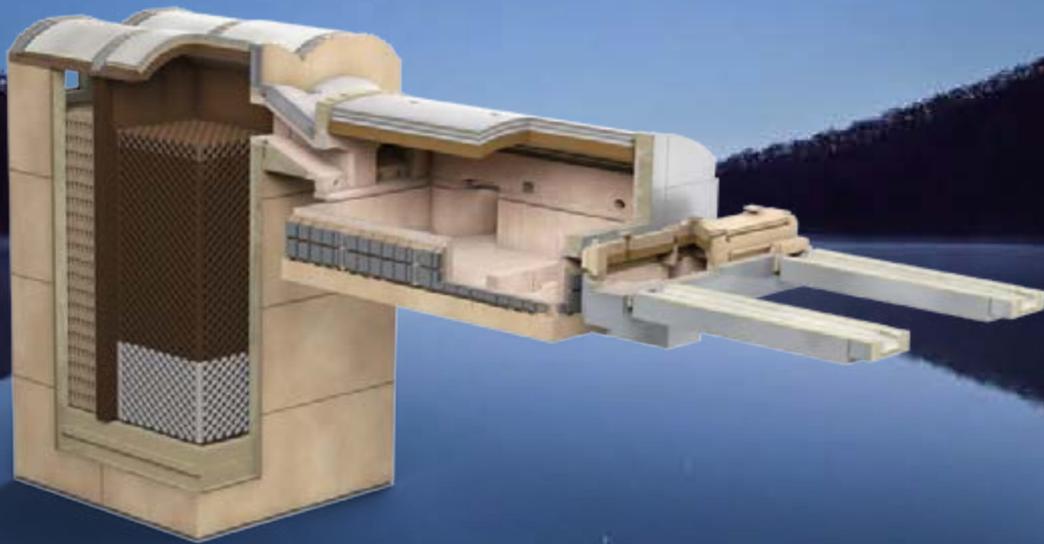
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View inside the recently completed Czestochowa float furnace in Poland.



On the Spot... Guus Boekhoudt

Previously responsible for Guardian Glass operations in Europe, Russia and Asia, Guus Boekhoudt has also recently assumed responsibility for India, the Middle East and Africa. In an exclusive On the Spot interview, the Executive Vice President outlines the company's revised management structure, examples of its recent investment priorities, market conditions, some of the challenges faced, as well as opportunities for the business.

GW: Congratulations on your recent promotion to Executive Vice President for Guardian Glass. With operations in India, the Middle East and Africa added to your existing responsibilities in Europe and Asia, please describe the new management structure.

Thank you. With effect from July this year, Ron Vaupel, President and CEO of Guardian Industries has assumed leadership of the company's glass business following the departure of Kevin Baird, formerly President and CEO of Guardian Glass. At the senior leadership level, Rick Zoulek and I have been named Executive Vice Presidents for Guardian Glass. While Rick manages the Americas, I have added Guardian Glass operations in India, the Middle East and Africa to my previous responsibilities in Europe, Russia and Asia.

GW: What does it mean to take on such increased responsibility within the organisation?

I am excited for this opportunity and the increased responsibilities and confident that together, this expanded region will work as one team to create preferred partnerships and virtuous cycles of mutual benefit. We have an

opportunity to better leverage our capabilities across Guardian Industries and Koch Industries to create long-

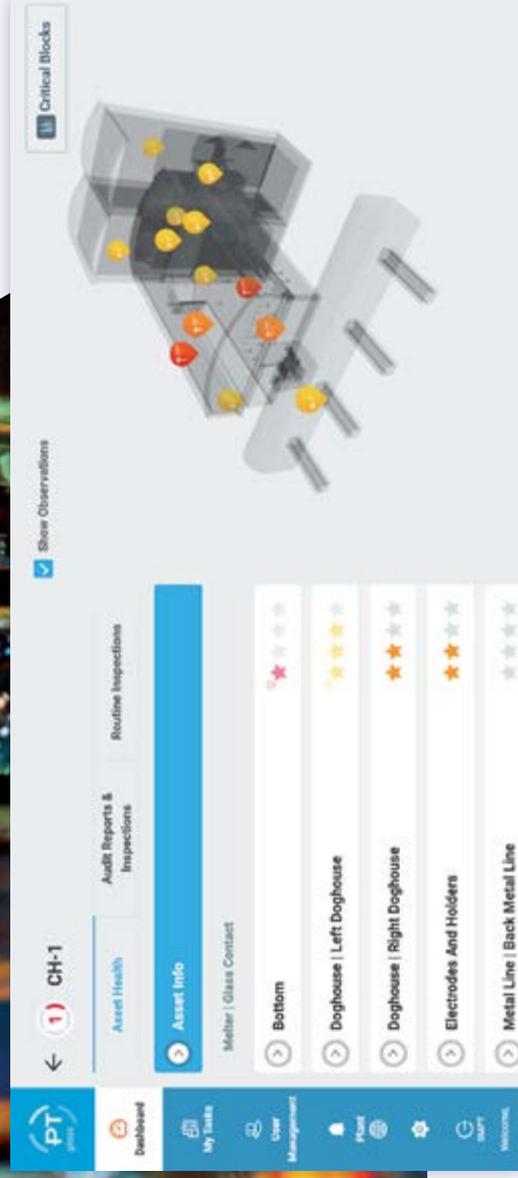
term value for our customers and investable returns for our company and its employees. ▶



The Guardian Glass float plant at Oroshaza, Hungary.

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GW: What are your hopes and expectations for the role?

These changes will increase the momentum of the company's ongoing operational transformation to ensure that Guardian Glass remains the preferred global supplier of architectural glass solutions. The business environment today varies from region to region. The needs of our customers and the economic

environment combine to create continuous change to which we must anticipate and adjust. Therefore, it's imperative that we understand the complex requirements of our customers and provide the products and services that they value. It is my intention to work with our teams to manage, nurture and maintain our customer and partner relationships to create preferred partnerships.

GW: How will the new structure benefit internal and external operations?

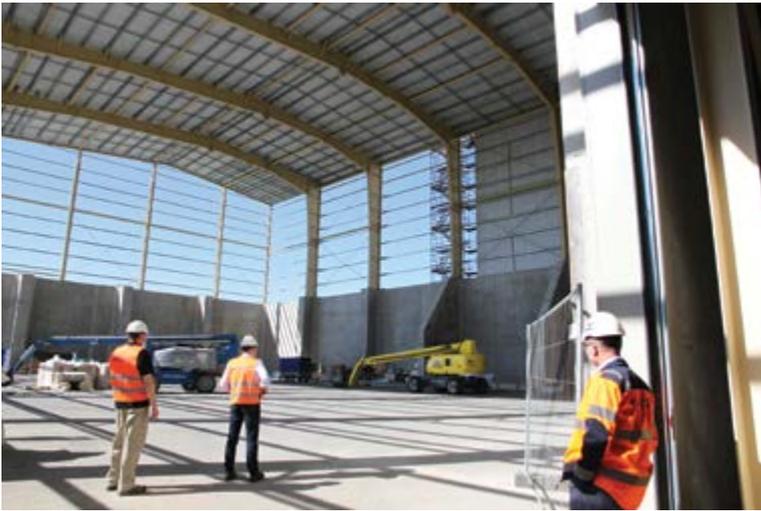
This new structure is enabling us to better communicate, share knowledge and leverage our capabilities across the different regions to create competitive advantages. Guardian already benefits by having a large global footprint, so we are able to navigate economic and other challenges that can escalate from country to country and region to region. We've seen this during the Covid-19 pandemic, as we had and continue to have certain regions impacted at different times.

GW: Following the recent announcement about your Polish operation, please summarise what activities are undertaken at the Czestochowa glass plant. Also, who are the factory's main customers and how will the recent investment benefit them?

This second float and coated glass manufacturing plant focusing on residential products, adjacent to our existing Czestochowa plant, will allow Guardian Glass to continue to serve customers in Poland and meet growing demand for high performance coated and fabricated glass products in Eastern Europe. This investment underlines Guardian's long-term commitment to its customers to be the preferred supplier of glass solutions.

GW: In general, what are your hopes and expectations for the Czestochowa glass plant in the short, medium and long-term?

We're very excited about the growth we've seen in Eastern Europe and are confident that the Czestochowa location



Raw materials storage at the Czestochowa float plant in Poland.



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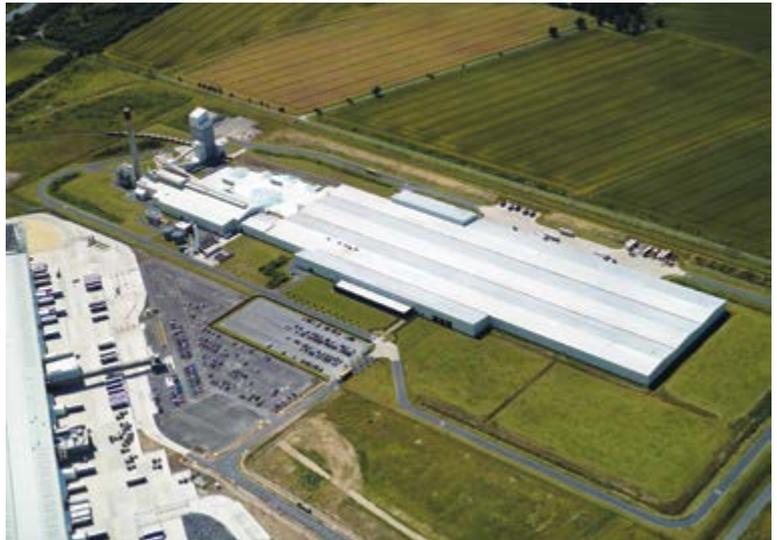
is well-positioned to meet our customers' needs in the region. Further evidence of our confidence in the growth of demand is that our existing float line in Czestochowa just went through a repair, which increased its production capacity by approximately 25%. With both furnaces, we are tripling production. To give you an idea of the sheer size of this project, in the future, we will be able to produce 60km of glass every day.

GW: Please describe the features and benefits of the new float line and coater.

The second float and coater line in Czestochowa represents the biggest greenfield capital investment in Guardian Glass history. It is the company's most efficient and operationally effective plant and houses our largest furnace and largest coater. The new float line has a nominal capacity of 1000 tonnes of glass per day, while the new coater represents the latest in technology for Guardian and we believe, for the market.

GW: How did you partner with technology suppliers to assist with this investment?

We carefully selected preferred suppliers based on their ability to provide the latest technology. These partners are well known to Guardian because of their ability to deliver creative, high quality solutions. Through these preferred partnerships, we specifically installed new technology related to glass cleaning and washing, along with environmentally-friendly vacuum pumps. Robotics and automated glass handling minimise opportunities for human error in the process.



Aerial view of the Guardian Glass float plant at Goole in the UK.

GW: How does Guardian differentiate itself from other glass manufacturers in the region?

We believe our culture and our business philosophy sets us apart. Market-Based Management is the business philosophy and framework that we apply to innovate, improve and transform ourselves and the company in order to create greater

value and find fulfilment. Our MBM Guiding Principles are who we are as a company and they guide everything we do. Our vision is to become the preferred partner for customers for architectural glass solutions. We continuously innovate and develop solutions that create real value for customers. The needs of our customers are continuously changing ▶



The DSV office in Warsaw features SunGuard SN 70S HT glass. Image: Maciej Lulko/FLYPR.

and becoming more complex. We are trying to stay nimble and focused on serving these needs in the most efficient and effective way.

GW: What did it mean for Guardian Glass Europe to attain Bronze level Cradle to Cradle certification for float, coated and laminated glass products manufactured at eight of your European plants earlier this year?

Achieving Bronze level certification for our float, coated and laminated glass products was a significant step to align our products and manufacturing processes with our vision of ‘helping people improve their lives by providing products and services they value more highly than their alternatives and do so responsibly while consuming fewer resources’. This vision involves producing glass products that help reduce energy usage and increase occupant comfort in buildings.

This is a great achievement by the team involved. Over a period of 12 months, eight of our European production plants – Czestochowa included – and some 60 employees across more than 15 capabilities were involved in the C2C certification process. Attaining Bronze level certification validates Guardian’s ongoing commitment and investment as a global leader in the responsible manufacturing of sustainable glass products.

GW: Please summarise market conditions and opportunities for architectural and automotive glass in Eastern and Central Europe.

Because of the global pandemic, there is still a lot of uncertainty in the market because our customers have limited visibility on the medium- and long-term. The construction market is recovering well in the region, possibly better than expected but the situation remains fluid and we don’t expect demand to return to pre-Covid-19 levels until the end of 2021.

We will also have to wait and see what new trends will emerge as a result of the pandemic. What will happen to office space going forward, with regard to remote working and the requirements for a safe and healthy work environment for office workers? We can expect less open space development, more interior partitions and

greater focus on the cost of office maintenance. All of which will create new opportunities for glass that is easy to clean and has good anti-bacterial performance.

Recovery in the architectural sector will also be driven by new energy efficiency regulation, meaning that investors and architects pay far more attention to the type of glass used on facades and for instance, how it can contribute to Nearly Zero Energy Building (NZEB) regulations. This will not only increase triple silver glass specification but will open the door for new energy generation technologies such as building-integrated photovoltaics (BIPV), where we have recently announced a strategic partnership agreement with ML Systems SA.

In the residential sector, we are seeing a strong rebound in demand – most likely driven by the fact that more people are spending more time at home and therefore, more investment in home refurbishment. Trends here remain the momentum to move from double to triple glazing for greater energy efficiency and the general trend to increase natural light to improve health and wellbeing.

The automotive industry in the region and indeed, worldwide, was of course seriously impacted by Covid-19 during the first half of the year. A potential consequence of its economic impact could be the resurgence of the used car market, as well as new forms of ownership, including subscription models. Nonetheless, current demand is better than feared during the height of the pandemic and we are cautiously optimistic about the situation.

GW: And in Asia, India, the Middle East and Africa?

They have fared no differently than Europe, demonstrating the truly global impact of the pandemic. Construction around the world slowed during the first half of 2020 but we are starting to see a gradual return to normality and remain optimistic about growth in these regions. Opportunities include the adoption of more stringent green building codes, where glass continues to be a major part of an integrated facade solution, coupled with government-backed initiatives aimed at dealing with the new economic reality, or the demands of a burgeoning urban population. In Saudi Arabia, for instance, there is a strategic framework, known as Vision 2030, to reduce Saudi Arabia’s ▶



Czestochowa is the company’s most efficient and operationally effective plant, housing its largest furnace and biggest coater.



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The Nobu Hotel in Warsaw, Poland, part of the Nobu hotel chain owned by Robert De Niro, features SunGuard SN 70S HT glass. Image: STUDIOPIOTRKRAJEWSKI.

dependence on oil, diversify its economy and develop public service sectors such as health, education, infrastructure, recreation and tourism. Similarly, in India, the Smart Cities Mission is an urban renewal and retrofitting programme by the India government, with the objective of developing smart cities across the country, making them citizen-friendly and sustainable. It is in examples such as these that we see the biggest opportunities for glass.

GW: What are the main challenges and opportunities you face in the months ahead?

Rapid changes in our industry include more complex customer requirements, digital transformation disrupting supply chains, cost structures and business models with intensifying regulatory and sustainability expectations. We are challenging ourselves to transform faster, while maintaining the business fundamentals of safety, compliance, service and quality.



The Gujarat Guardian glass plant in India.

Examples of where we see opportunity include:

- **Sustainability:** We are committed to sustainability and social responsibility and we continue to work to make impact at our facilities by using fewer resources. We're also committed to continuous transformation and innovation in the energy efficiency of our products and helping customers understand opportunities through services such as our Sustainability Calculator and illustrating how Guardian products can help projects earn credits for LEED, BREEAM, WELL and other building certifications.
- **eCommerce:** Our team has made a great effort in the last 12 months to improve our digital engagement and we are working towards improving this capability, while recognising this is not a process that can be done in a few weeks. We're excited to talk about these advances in the future.
- **Preferred partnerships with our customers:** We do this by cementing relationships with key customers and by being nimble to make further inroads with other customers. This includes ways to reach customers more effectively with virtual solutions, so this works hand-in-hand with our digital efforts.

GW: Are the media reports accurate that Guardian Glass will close the Dudelange site and transfer production to the Bascharage plant in Luxembourg? If so, what were the determining factors for this development?

There have been challenges

around demand at our facilities in Luxembourg, with an oversupply of glass in Western Europe, combined with underutilised capacity of our assets. This was the case before and was further exacerbated by the pandemic. We therefore recently completed the cooldown of the Dudelange furnace and are moving to a one float, coater and lamination line system in Luxembourg.

GW: What are the highlights of other investments planned across your plants in the regions within your responsibility?

While the situation surrounding Covid-19 remains fluid and the demand we see is below pre-pandemic levels, we are pleased to see some recent increase in customer demand in certain regions. This has given us the confidence to restart preparation for the Goole and Oroshaza cold tank repairs in the UK and Hungary respectively.

GW: How is Guardian Glass planning for Brexit?

As a company, we support open and free trade. We have a float glass manufacturing plant in Goole, in the UK, which largely serves customers in the UK and Ireland. Moreover, our diverse footprint in Europe gives us flexibility to adjust to any changes. We will continue to focus on the needs of our customers wherever they are. ●

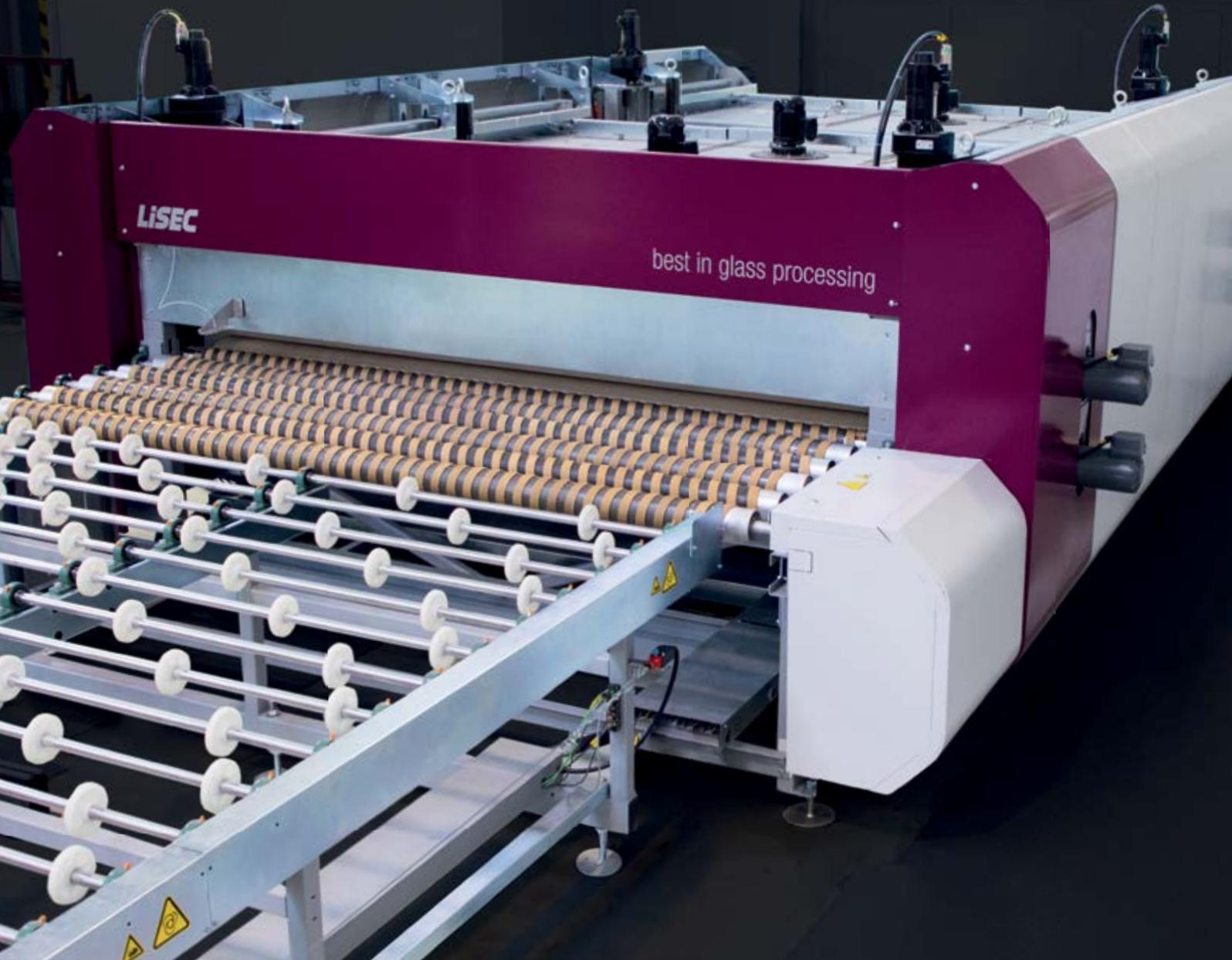
Further information:

Guardian Glass Europe,
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With the addition of a second float line, Guardian Glass is tripling production at the Czeszochowa site.

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Steklarna Hrastnik has refocused its activities entirely on premium quality spirits and perfumery glass packaging manufacture.

Boosting efficiency and environmentally-friendly production

Earlier this year, Slovenia's Steklarna Hrastnik stopped making glass tableware to concentrate exclusively on satisfying the high quality glass packaging needs of the international spirits and perfumery sectors. As Chief Executive Officer Peter Čas explains, the decision to refocus on these premium markets has stimulated a series of high profile investment projects in recent years, including commissioning the company's new oxygen-fired furnace this November.



Peter Čas took over the management of Steklarna Hrastnik in 2017.

Steklarna Hrastnik's decision to refocus its activities entirely on premium quality spirits and perfumery glass packaging manufacture has not been taken lightly. It is the culmination of a detailed three year investment programme that helps the company to focus on its core strengths of operational excellence and environmental responsibility. "Our strategic goal is that we are positioned in the niche premium quality segment of spirits and perfumery and to capitalise on our main strengths, namely the exceptional quality of our glass, the knowhow of our employees to produce the technically most demanding products, together with our flexibility and agility" Peter Čas, CEO confirms.

Mr Čas took over the management of Steklarna Hrastnik in 2017, drawing on his previous experience of leading other production-based companies, where one of the key strategic goals was achieving operational excellence and EBITDA margin improvements.

A subsidiary of Switzerland-based GlobalGlass holding, Steklarna Hrastnik calls on a rich tradition of glassmaking expertise, dating back 160 years. This knowhow, combined with the company's highly experienced 550-strong workforce, has created an essential platform for the consistent delivery of innovation in the areas of product development and manufacturing expertise. A flat management structure is operated at the Hrastnik glassworks, involving just eight managers plus line managers, covering all main production areas. This approach gives improved flexibility and agility between processes. ▶

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Factory Spotlight

The glassmaker's transition away from tableware and its concentration on premium packaging manufacture has created conditions for the implementation of even more capable and efficient production. In the long-term, this positions the business to be highly competitive in the global perfumery and spirits sectors. The French, Italian, UK and US markets are key strategic targets, where the most important customers are high end brand owners and glass packaging distributors.

Latest production shop

This August, Steklarna Hrastrnik initiated its biggest production-related investment in more than a decade, specifically the investment of €18.5 million in a new oxygen-fired furnace and associated technologies for the production of premium glass packaging. In addition to the establishment of G furnace, the project called for the purchase of new IS machines and the automation of complementary production processes.

The latter includes setting up the factory's own oxygen production, upgrading the batch plant, transport automation of batch and cullet etc. The project is scheduled for start-up in November 2020.

"Of course, this investment plays a key role in achieving our strategic goal regarding the increase of the market share in the high end segment both in the spirits and perfume markets" says Peter Čas. "It will enable us to incorporate the latest and cleanest technologies and innovative approaches into our production. For example, the new G furnace is a good example of clean technology, because it will run with the joint use of oxygen, electricity and natural gas. Additionally, it will enable us to produce even more complex glass containers and to win the most prestigious projects."

According to Mr Čas, compared to the site's existing



Last year, Steklarna Hrastrnik began the DEKOR pilot demonstration project for smart decoration and functionalisation of glass products.

furnace, the new G furnace will also be more effective, as the use of best available technology and future upgrades will enable even higher capacities. The investment has been planned with a strategic view of the future in mind. The furnace will be prepared for the implementation of

innovative technologies that also allows for the use of hydrogen as a fuel source.

It also provides an additional, separate production facility that will be used exclusively for the production of glass packaging, bringing additional security for customers. ▶



Steklarna Hrastrnik has initiated its biggest production-related investment in more than a decade.



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Factory Spotlight

More efficient than the factory's existing furnace, G furnace will deliver 120 tons/day. This raises the site's total production capacity to 285 tons/day. The main supplier for furnace technology and engineering is SORG, while the company's nominated supplier of IS machines is Bucher Emhart Glass. Batch and cullet systems have been sourced from EME and the annealing lehrs have been acquired from Antonini.

Other suppliers involved in the project extend from well-known European companies in the glass industry to local suppliers in installations, service and engineering. An on-site cryogenic oxygen plant will be installed in 2020/2021 that will deliver pure and sustainable oxygen. This technology will be delivered by Messer Engineering.

Automation and digitisation

A series of key projects will also be undertaken in the areas of digitalisation, automation and robotisation in the coming months. These investments will include the purchase of advanced inspection lines with inspection machines, automatic palletisers and automation in logistics (AGV), as well as other logistic solutions and technologies. The Steklarna Hrastnik investment team is already engaged in the intensive development of these project.

Together with Siemens, the glassmaker had previously developed a customised digitalisation road map for the five years to 2023 that includes scheduled technology recommendations and return-on-investment data. According to Peter Čas, this document is extremely important for the company's transformation into Industry 4.0. "With smart transformation, we will be able to additionally upgrade our ability to produce the most technically complex shapes and achieve even greater precision in our production. It will enable us to further increase quality, productivity and efficiency, which will radically shorten the time to market."

Smart decoration

Another important investment project is linked to decoration. Last year, Steklarna Hrastnik began the DEKOR pilot demonstration project for smart decoration and functionalisation of glass products. A major aspect of the project involves eco design.

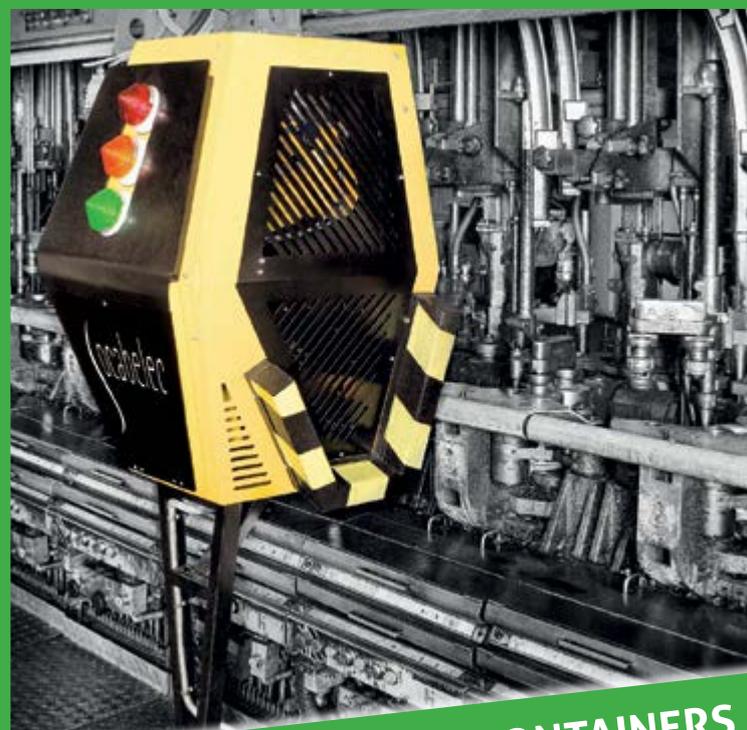
"We aim to use only colours that do not contain heavy metals, as well as to introduce so-called bio additives into classic colours, thus making them even more sustainable" Peter Čas explains. "We will be monitoring this aspect through the platform."

The project will include the installation of a new automated decoration and finishing line. Using AI and augmented reality, it will be possible to monitor all processes more precisely, thus optimising the consumption of raw materials such as colours and solvents, as well as energy. Both will contribute to increasing the use of environmentally-friendly processes. This project will be completed over the next two years.

Hydrogen technology

A further project involves bringing hydrogen-based glass melting technology to an industrial level and represents one of the glass industry's largest sustainability-oriented projects. Having recently completed the pilot stage of this innovative technology, this project enables the replacement of a part of fossil fuel energy (natural gas) with hydrogen, thereby reducing the carbon footprint. Potentially, its main benefit lies in the option of implementing the system with existing furnace technologies that are fuelled by natural gas, as well as the system's flexibility, as it enables decarbonisation by using hydrogen at any stage, subject to available renewable energy sources. "This means that we can set, during the very process itself (mid-process) how much hydrogen and how much natural gas we will use" says Peter Čas.

As previously mentioned, G furnace will include everything necessary for the implementation of this innovative hydrogen ►



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technology. The project focuses on an alternative technological procedure for hydrogen production. Within the scope of the pilot project, green hydrogen is extracted from water using electrolysis and energy from renewable sources (solar power plant). “We will extract hydrogen without a carbon footprint on an industrial scale using water electrolysis and green electricity as an energy source.” It is planned to reduce CO₂ emission on an industrial scale by 20% over the next five years.

In these and other areas of the production process, the industry’s suppliers are widely encouraged to achieve and deploy new technologies and solutions. “We are a unique glass producer due to having the highest requirements in terms of product quality, a very high level of versatility (range of portfolio), very demanding shapes in the portfolio and high demands for sustainability” Mr Čas confirms. “As a result, we require suppliers that are flexible with solutions and very often at Steklarna Hrastnik, an opportunity is afforded to test technology, as we are often a ‘pioneer’ in advanced technologies. Together, we can therefore exploit this potential as a win-win situation.”

Recruitment success

Investments also bring changes to the profiles and numbers of employees and within the last three years, Steklarna Hrastnik has been gradually but sympathetically reducing these numbers, especially in positions that have been replaced by machines.



A series of key projects will be undertaken in the areas of digitalisation, automation and robotisation in the coming months.

At the same time, the glassmaker is attracting high quality, highly educated staff to Hrastnik. This challenge was tackled both in-house and externally by building ‘Employer Branding’, which is in charge of the Human Resources Department and has a strategic role within the company.

“In-house, we devote special attention to the new associate onboarding procedure, which has also been overhauled” Peter Čas explains. “All new employees receive a welcome pack and a mentor and internal coaches make sure that new arrivals become accustomed to their new environment as easily and quickly as possible.”

Coaches play more of an informal role. They are tasked with making sure that the first day at work is pleasant and well-structured but also with instilling the candidate’s confidence in the organisation. Circulation, onboarding and education, an approachable and professional mentor and comprehensive feedback from the manager or line manager ensure that onboarding is effective and pleasant. “Feedback is positive and new hires consequently recommend Steklarna Hrastnik as an excellent employer” Mr Čas confirms. “We have also designated internal ambassadors from various professional fields who represent Steklarna Hrastnik at events and on social networks and act as the face of the company.”

The glassmaker’s collaboration with secondary school education centres has been intensified, as well as engaging in various HR projects aimed at serving as a meeting point with potential new employees. The goal is to communicate a comprehensive image of an attractive employer through media and social networks. “All of this helps us attract people with specific knowledge that are needed for our transformation. These are electrical and mechanical engineers, mechatronics engineers, IT specialists and database professionals. Awards in the area of HRM also contribute to this goal. This year, our HR Director received the award for best HR manager in Slovenia.”

Challenges and opportunities

According to Peter Čas, there are many challenges to be faced, including a volatile economic environment. However, Mr Čas emphasises Steklarna Hrastnik’s goal to position itself in the premium quality niche segment of spirits and perfumery and becoming a leader in the field of trends and pioneering approaches to reducing the carbon footprint in the glass industry. “We are here to stay, to be positioned among the best in the world and our processes, investments and decisions are dedicated to these goals.” ●

Further information:

Steklarna Hrastnik d o o, Hrastnik, Slovenia
tel: +386 3 56 54 600
email: info@hrastnik1860.com
web: www.hrastnik1860.com



According to Peter Čas, this year’s investment plays a key role in achieving the Steklarna Hrastnik strategic goal of increasing market share in the high end spirits and perfume markets.

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German glassmakers back on track for economic growth



The BV Glas report on the economic situation of the German glass industry is a regular feature of *Glass Worldwide's* Focus Germany feature. This year's contribution by Dorothee Richardt includes business data and focal issues in a crisis situation triggered by the unprecedented Covid-19 pandemic. The challenges are more severe than those associated with the 2008 economic crisis because Covid-19 brought the economies of many countries around the world to an almost complete standstill.

It is appropriate to look back at 2019 before turning attention to 2020. There was already a cloud on the glass industry's horizon in 2019 as a result of a 2.4% downturn in total revenue, which can be attributed to an 8.5% decline in foreign revenue.

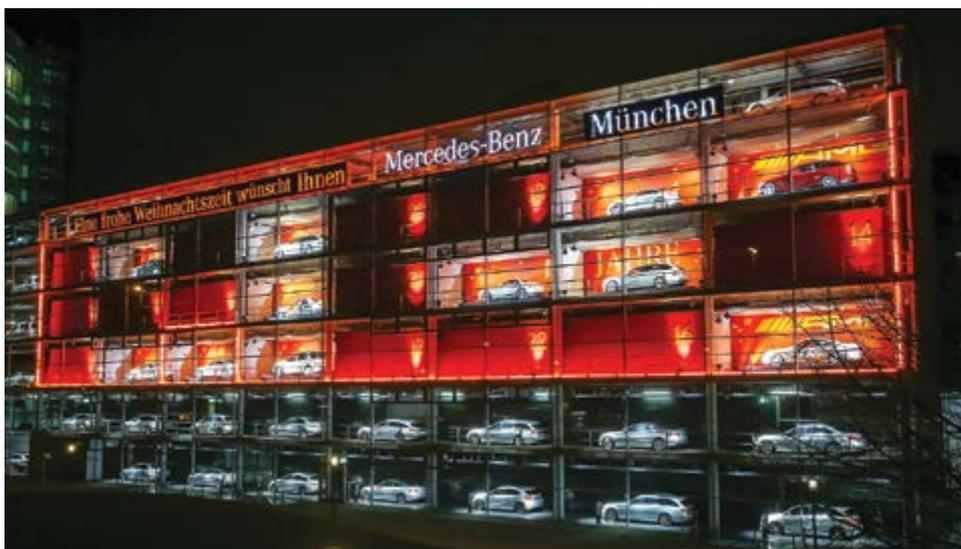
Revenue shrinkage was evident across most sectors of the glass industry, with the exception of flat glass finishing and container glass manufacturing. The latter experienced a surge in demand, driven by the plastic waste debate and the resulting consumer reluctance to use plastic packaging.

The number of employees in the glass industry remained more or less constant at around 56,000 in 2019.

Sectors affected differently by the crisis

The early 2020 business outlook predicted a moderate upswing, until the Covid-19 pandemic arrived in Germany in March, imposing severe constraints on many sectors of industry. The majority of retailers and trades businesses, as well as the entire hospitality and food service sector, remained closed for several weeks.

Manufacturing industries, such as the glass industry, were able to continue production operations because politicians and economists agreed that the entire industry and not just specific sectors, was 'system



As a supplier to the car manufacturing industry, the flat glass industry has been directly impacted by widespread car production stoppages.

relevant'. Nevertheless, the lockdown did impact the glass industry as a supply industry, closing the first six months of the year with a 4.1% decline in total revenue and a 1.3% decrease in the number of employees as a result.

Divergent glass sector development

Production output remained constant in the container glass sector, especially for manufacturers of food and beverage packaging products. The production of jars for household preserves and bottles was ramped up to meet additional demand during lockdown, when more people were eating at home. Although restaurant and bar closures were expected to have a major impact on the container glass sector, the concerns proved to be unfounded because, for example, restaurant beer deliveries are generally made in barrels and bottled beer consumption in the home increased.

The home working trend also drove up consumption of preserves because many more people were cooking in their

own kitchens. The business expectations of pharmaceutical packaging manufacturers have also improved because when the Covid-19 vaccine is ready, millions of doses will have to be packaged in individual glass vials.

However, cosmetic packaging manufacturers have been negatively affected by the crisis. This sector was hit particularly hard by the closure of international airports and retailers because it brought sales of cosmetics in duty-free shops and local sales via drug stores to a standstill. The resumption of flights and the re-opening of shops are likely to bring about some improvements to this industry's situation during the second half of 2020.

Despite the Covid-19 crisis, the container glass sector's



Although restaurant and bar closures were expected to have a major impact on the glass container sector, the concerns proved to be unfounded.



production output increased by 8.5% in the first six months of 2020.

The flat glass manufacturing sector faces a different scenario. As a supplier to the car manufacturing industry, it was directly impacted by the widespread car production stoppages, with revenue declining by 15% during H1 2020 versus H1 2019. Flat glass processing companies have also been affected by the crisis and they, too, recorded a 6.7% decline in revenue during the first six months of 2020. Both sectors have noticed a distinct slump in both domestic and foreign sales.

A different picture has emerged in the speciality glass and glass fibre sectors. Both have reported growth in revenue during the first six months of 2020. Although growth in the glass fibre sector was only moderate (0.9%), the speciality glass industry recorded a strong increase of 5.1%. Both sectors have a high level of foreign sales and there was particularly strong revenue growth of 15% in the speciality glass sector.

Positive business climate index

Although many sectors of industry have experienced a strong slump in business, the German glass industry is already on the road to recovery. The ifo Business Climate Index, which measures changes in business confidence and is a leading indicator of future business activity based on glass company projections, began to pick up again in some sectors this August.

Hollow and technical glass manufacturers and flat glass finishing companies, in particular, now have positive business outlooks again.

Decarbonisation top of the agenda

In the first six months of 2020, the glass industry focused on dealing with the economic consequences of the pandemic. Now it is turning its attention back to other issues. The decarbonisation of the glass industry (and other industries) is still high up on the agenda because it has the strong support of both European and German legislators. And glass industry customers are increasingly concerned about the carbon neutrality of the products.

As a result, calls for carbon neutral glass production are gaining momentum in the container glass industries and other sectors. BV Glas is involved in a number of projects conducting research into alternative energies for the glass melting process. The most recent, HyGlass, is investigating the use of hydrogen in the glass industry, with the objective of reducing carbon emissions in the glass melting process. The project is being jointly implemented by BV Glas and Gas- und Wärme-Institut Essen eV. It is subsidised by the state of North Rhine-Westphalia.

National level research is also being conducted into alternative energies for melting glass. BV Glas has made considerable efforts to be included as one of the eight focus sectors in the Federal Ministry for Economic Affairs and Energy's 'Industrial energy transition: Potentials, costs and interactions with the energy sector' project, which was launched in 2019.

On the whole, society, the economy and the glass industry have coped remarkably well with the Covid-19 pandemic up to now and industry is getting back on track for economic growth. The government's intention to avoid another lockdown at all costs has made an important contribution to the more positive business outlooks of many sectors, including the glass industry. ●

About the author:

Dorothee Richardt is Press and PR Advisor at BV Glas

Further information:

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Building on family-owned heritage at global flaconnage specialist

In July this year, management of one of the world's leading family-owned flaconnage producers transferred to the 13th generation. Having successfully expanded the international focus of the Heinz-Glas Group in the past 43 years, Carl-August Heinz has passed on the responsibility of Owner and CEO to his daughter, Carletta Heinz, a position she is proud to assume. Carletta Heinz spoke exclusively to *Glass Worldwide* about maintaining the family company's 400 year traditions in glassmaking and her goals to build on the global success created by her father.

A worldwide player with 17 locations across 13 different countries, the Heinz-Glas Group combines the modern day strengths of a successful international business with the centuries old traditions of a family-owned and operated glassmaking enterprise.

With glassmaking in the family genes as far back as 1523, the group is among the world's leading specialist manufacturers of glass containers and caps for the perfume and cosmetics industry. Headquartered in Kleintettau, Germany, Heinz-Glas currently operates five international glass production sites, five furnaces and 22 manufacturing lines, producing some 485 tonnes of glass packaging every day. In addition, 475 million units are decorated annually at the company's specialist decoration facilities. This portfolio is further enhanced by an extensive range of plastic caps, closures and accessories from Heinz-Plastics.

Entrepreneurial vision and well-targeted investments have contributed

to the group's success in the international packaging market, with complete packaging solutions delivered to customers throughout the world. Some 3200 people are employed, many of whom possess extensive and highly valuable glassmaking expertise. Collectively, they generate annual sales of more than €300 million, producing in excess of ca 750 million pieces per year.

Maintaining a rich tradition

"My family has been working in the glass business for over 500 years and our family company was founded almost 400 years ago" Carletta Heinz confirms, mindful of the impressive tradition she upholds. "Many companies ▶

The Heinz-Glas Group's senior management team comprises Carletta Heinz (right), Virginia Elliott and Frank Martin.





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in our industry are very old but only a few are still 100% family-owned and continue to operate from their original locations. Over the centuries, we have constantly developed and have always thought in terms of generations, an approach that has enabled us to remain successful in the market for so long."

It is widely acknowledged that Carletta's father, Carl-August Heinz was responsible for making the greatest progress in the company's history. "He drove forward internationalisation and the refinement of our products, which is so important for us today. I am very proud of his life's work and the development he has achieved" Ms Heinz explains. "The values that have always been important to us are still important today - for the

company as well as for me personally. We think sustainably and long-term and strive for stable corporate development. As in the past 400 years, we are constantly improving, as well as being innovative and customer-oriented, learning from our long past in order to shape our future in the best possible way."

Born in 1984 and raised in the ancestral home of Kleintettau, Carletta Heinz completed her studies with a diploma in business administration at the Friedrich-Alexander-University in nearby Nuremberg in 2012. She has worked for the Heinz-Glas Group since 2013, experiencing different departments to gain a thorough understanding of the company and its activities. Step-by-step, she took on greater responsibility, before joining the management board as CIO in 2017. In July 2020, Carletta Heinz was named CEO of the Heinz-Glas Group.

"It makes me proud to be able to continue the life's work of my ancestors and my father" Carletta Heinz confirms. "Of course, the current Covid-19-related time is not easy and many challenges lie ahead but I am convinced that these can be overcome if we make the correct decisions and stick together as a team."

As well as taking on the role of CEO, Carletta Heinz is also the group's COO for an interim period, following the Technical Manager's decision to pursue other interests elsewhere. This important position will be filled as soon as a suitable replacement has been identified. Other key members of the group's senior management team are Virginia Elliott, Chief Sales Officer and Frank Martin, Chief Financial Officer. Mr Martin has worked for the organisation for more than three decades, while Mrs Elliot joined recently from the fashion industry and provides valuable knowledge of this important and complementary industry.

"There is a saying that 'you should honour what you inherit' and I want to preserve what was passed on to me" says Carletta Heinz. "But I also want to develop the business further, to promote the internationalisation of our company and to open up new markets."

She is also striving for improvements in productivity, for example and would like to further strengthen the 'we' feeling within the workforce. "I feel obliged to be there for people, which is why I also started active service in the Kleintettau fire brigade. I also think that getting involved in local politics and in the fire brigade brings synergies from which the community, our associations and the company can benefit. Kleintettau and Heinz-Glas have belonged together for centuries and it should stay that way!"

Global coverage

Two of the company's specialist glassmaking and decoration factories are located in Germany, namely the original Heinz-Glas site in Kleintettau, Franconia and a separate plant in Piesau, ▶



Carletta Heinz has recently taken over as the Heinz-Glass Group's Owner and CEO from a glass industry legend, her father Carl-August Heinz.



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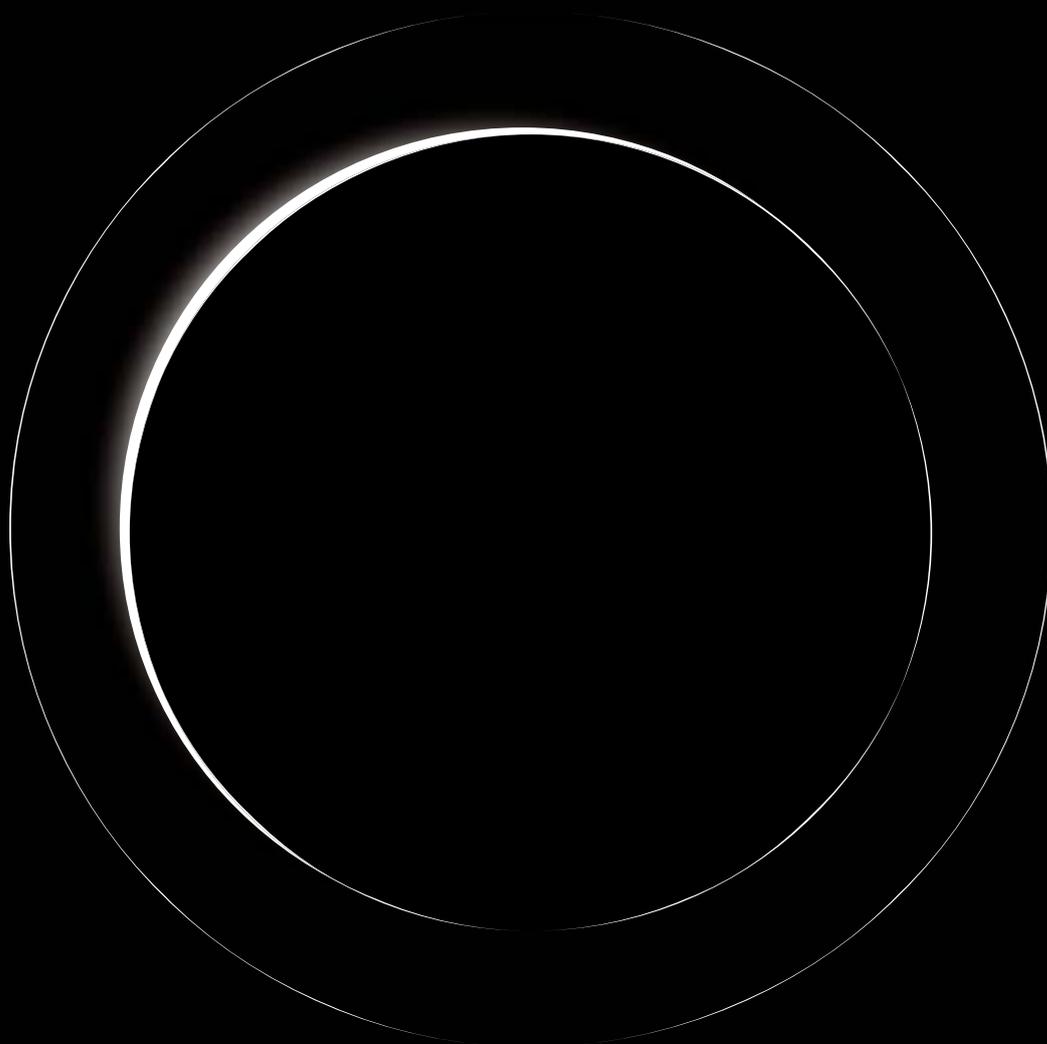
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Premium quality clear, opal and coloured (feeder) glasses are manufactured to accommodate a diversity of customer requirements, primarily in the perfumery and cosmetics sectors.

Thuringia. Other factories are sited in Dzialdowo, Poland and Lima, Peru, with a fifth glassworks (a joint venture) in Kosamba, India.

At the end of 2018, leading French glassmaker Saverglass agreed to transfer its flaconnage business to Heinz-Glas, a significant move that brought together two of Europe's leading players in the flaconnage market. In addition, a six hectare plot of land was acquired at the end of 2018 on an industrial park near Shanghai, China, with plans in place to build a new glassworks on the site in 2021.

Recent investment projects include a major furnace rebuild in Poland in 2019, with a special electric glass furnace scheduled for installation at the Heinz-Glas German headquarters in early 2021. This is described as a highly flexible, eco-friendly and energy efficient installation thanks to its use of CO₂-free electricity.

Among the specialist decoration services provided are pad printing, screen printing, digital printing, galvanic and heat transfer labelling, the application of forehearth colours, lasering, internal decoration, colour

and glitter spraying, metallisation, flocking and sputtering and environmentally-friendly frosting. As well as decorating glassware at the Kleintettau, Dzialdowo, Lima and Kosamba glassworks, Heinz-Glas also operates dedicated facilities in Spechtsbrunn (Germany), Hranice (Czech Republic) and Mumbai (India).

The group maintains its own Development, R&D and Design Departments, as well as an international engineering team that supports Heinz-Glas locations throughout the world when purchasing new furnaces and machines, as well as performing modifications.

Premium quality clear, opal and coloured (feeder) glasses are manufactured to accommodate a diversity of customer requirements, primarily in the perfumery and cosmetics sectors, while also serving the interests increasingly of high quality spirits bottlers as well.

"We manufacture customised developments in terms of design and decoration with the highest support for our customers, as well as stock items for complete packaging (mainly in Poland) and also create our own innovative glass designs and concepts" says Carletta Heinz. "Furthermore, it is our aim to make our products increasingly sustainable. These efforts were rewarded in 2019 with a German Packaging Award in the sustainability category and a WorldStar Packaging Award in 2020 for our Victor light flacon."

The value of maintaining solid customer relationships is emphasised, with positive communication at eye level and a good basis of confidence. "It is important to provide good service during the entire sales and development process and also afterwards, as well as transparency of the processes." ▶



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Sustainability, culture and lifestyle

The Heinz-Glas Group is constantly evaluating and investing in opportunities that could help to protect the planet. This includes compliance with EcoVadis environmental and social practices. "Their goal is to facilitate the integration of sustainability criteria in customer/supplier relationships, with our performance rated in terms of environment, social, ethics and supply chain activities."

Furthermore, the glassmaker's environmental management practices are certified in line with ISO 14001 and its energy management system according to ISO 50001.

Heinz-Glas has operated electric melting furnaces since 1972 and is running the factory in Kleintettau with CO₂-free energy since 2016. Subsequently, renewable energy has been utilised at the company's Peru and Poland production facilities.

A combination of using higher volumes of PCR and in-house cullet, together with the introduction of lightweighting technology, has contributed to carbon footprint reductions of up to 45%, with Heinz-Glas sustainability solutions coming together as part of the company's MULTIGEN modular system. The glassmaker measures and calculates the carbon footprint of its products by using a recently implemented lifecycle assessment tool. This helps to define energy-intensive production steps and the implementation of action plans for emission reduction.

"Our corporate carbon footprint has been verified by TÜV Süd according to ISO 14064 in 08/2020" Carletta Heinz explains, "our investments and efforts helping us to win the German Sustainability Award in 2018, the German Packaging Award 2019 and the WorldStar Packaging Award 2020."

Maintaining its position as an independent family business, Heinz-Glas is both customer- and employee-oriented. The company's long-term commitment to both is emphasised by its decision to reinvest 13.1% of turnover throughout the past decade.



Heinz-Glas currently operates five international glass production sites, five furnaces and 22 manufacturing lines.

Staff training and education is another important priority, as is a commitment to work closely with local communities and government authorities to promote and protect their interests.

As part of the SPICE Initiative, the glassmaker is helping to shape the future of sustainable packaging together with organisations in the cosmetics industry. The SPICE Initiative defines common guidelines to lead the cosmetics industry to products that are not only produced with a lower carbon footprint but are made for recycling to improve the efficiency of recycling streams.

Evolving business conditions

Although the ongoing global Covid-19 pandemic has impacted sales markets, Heinz-Glas is working closely with customers to further improve and expand its portfolio of standard articles and stock items. "Our product portfolio has been changing for 400 years, depending on the needs and opportunities in the glass packaging market" says Carletta Heinz "and that will continue to be the case. Because one thing is clear, requirements change and so do the products. We remain innovative, recognise customer needs and react to market requirements as quickly as possible."

As an independent, family-owned and run business, Heinz-Glas is well-placed to plan its long-term future, while remaining fast and flexible in terms of its decision-making processes. "We also have a very well trained team, with a great knowledge of our products, the market and the environment" Carletta Heinz concludes. "We trust our employees and can rely on the team." ●



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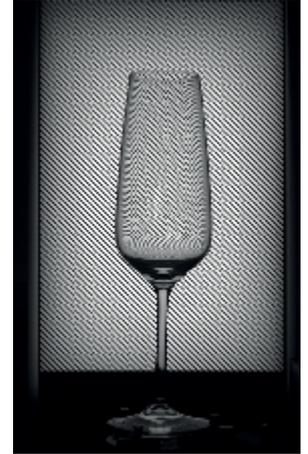


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Engineering technology focus for glass industry suppliers



Gesine Bergmann highlights the activities and focus of attention for Glass Technology Forum members at the VDMA, representative body of the mechanical engineering industry.

The Glass Technology Forum is an industry section of the VDMA, with 65 member companies. The VDMA represents approximately 3300 German and European companies in the mechanical engineering industry. The industry stands for innovation, export orientation, medium-sized companies and employs some four million people in Europe, more than one million of them in Germany. Glass

Technology Forum members supply engineering technology for producing, processing and refining flat glass, hollow glass and special glass and of course, for quality control. The forum represents the industry and provides such services as general consultancy and promotion.

The focus of the work is in the technical area. On a national and European level, the revisions of

standards for glass machinery engineering are actively supported. The main focus of this work is to keep the safety standards up-to-date, based on further technical developments and to harmonise them with the Machinery Directive. For example, two standards of the EN 13035 series are currently in the final stage of revision and the revision of one standard of the EN 13042 series started this year. It is already certain that stakeholders involved at a European level will propose new projects for 2021.

In 2019, a Joint Working Group was formed together with the OPC Foundation. The aim of this group is to define

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similar interfaces between machines and higher level systems and between machines on one level, regardless of the machine manufacturer. The first draft of a Companion Specification will be published within the next few weeks. This is a decisive step from 'Plug & Pray to Plug & Play'.

Twice a year, the 'Research and Technology' industrial working group meets. This year, for example, the main topics discussed were 'additive manufacturing', 'recycling of glass elements' and 'shop floor logistics'. Customers and suppliers of member companies are welcome at these events.

The Glass Technology Forum is also a conceptual sponsor of glasstec, the international trade show for the glass, glass engineering and glass handicraft industry. Additionally, German pavilions are initiated to support the development of new markets.

Every month, a newsletter provides the most important news, together with the results of a quarterly internal survey about market and performance, reports from working groups, press releases and more. A separate article from the Glass Technology Forum, devoted to inspection, can be found on Page 118. ●

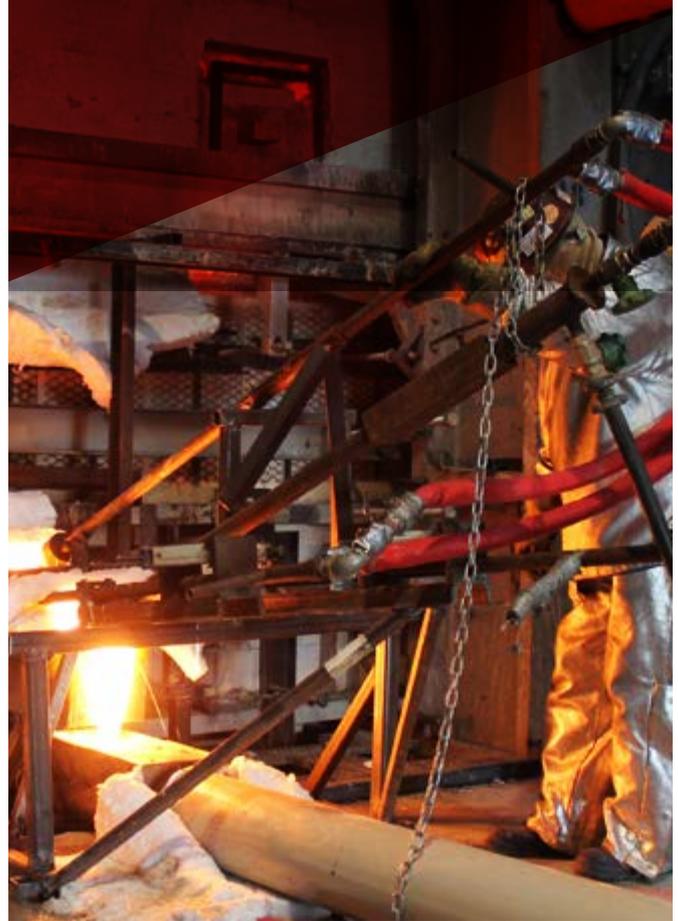
About the author:

Gesine Bergmann is responsible for the VDMA – Glass Technology Forum

Further information:

Glass Technology Forum, VDMA eV, Frankfurt, Germany
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German glassmaking sector recovers steadily from pandemic

The German glassmaking sector is steadily recovering from the pandemic and its consequences, which is reflected by the ever growing demand for glass in the country and the resuming implementation of many investment projects by local investors that were suspended earlier this year. Independent correspondent Eugene Gerden spoke to some leading players and reviewed recent statements from other glassmakers and analysts in Germany.

The negative effects of the pandemic on the local market have been confirmed recently by analysts at the Federal Association of the German Glass Industry, BV Glas (see dedicated BV Glas market report on Page 58).

“Production in the German glass industry declined by 4.3% in 2020 compared to 2019, with the same for revenue (-4.1%)” Dorothee Richardt, PR advisor for BV Glas, told the author. “The foreign trade value (imports and exports) of all glass sectors shrank, except for imports of the container glass sector, where the value of imports increased by 4.5%. We stated that all glass sectors depending on export are affected by the Covid-19 crisis.”

In terms of market structure, the hollow and flat glass sectors will continue to dominate in the German glassmaking sector, with their combined market share being estimated currently at 91%. Stagnation in the market is also confirmed by recent statements made by the majority of local glassmakers and global producers interviewed, all of whom are operating in the German market but many of which expressed their hopes for at least a partial recovery of the market by the end of the current year.

Patricia Marie, Saint-Gobain’s Corporate Affairs Director, commented in an exclusive interview: “Our automotive glass production activity in Germany has suffered during Q2. However, the main activity, the construction business, was quite stable during the first half of the year in Germany and had no decline effect on the glass business. All construction projects were pursued and are still on a good level. Our Northern Europe region was much less impacted overall. Nordics and Germany held up well with like-for-like sales growth. Germany and Eastern Europe resisted well in Q2, despite the decrease in glass demand. The economy was hardly stopped as in other countries and people took advantage to work at homes.”

Project suspensions averted

According to Saint-Gobain and other producers, the pandemic has not resulted in any major suspensions of their projects in the German glassmaking sector, implementation of which could even be accelerated



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in the second half of the current year.

They also believe the pandemic will not result in any major change of balance in the German glassmaking sector, the situation remaining stable.

In general, the pandemic will not result in weakening positions of the German glass industry in the EU glass sector, its share continuing to be at a level of 20% of the overall volume of glass produced in the EU and 20% in the overall structure of glass sales in the European glass market.

Despite the pandemic, this year the turnover of the German glassmaking industry will probably be comparable to figures from previous years, which were at the level of about €10 billion. Of these, about €3.2 billion (32%) is accounted for by flat glass.

At present, the majority of Germany’s largest glassmaking facilities are located in close proximity to main sources of raw materials, which are used in their manufacturing processes, particularly quartz sand. Among these centres of glass production are such regions as the Cologne-Aachen region (Frechen), the Elbe-Weser region (Duingen) and Upper Franconia.

As in the case of other major EU glass markets, the German flat glass industry is dominated largely by multi-nationals, with Saint-Gobain Glass and NSG-Pilkington among the market leaders, accounting for a substantial share of overall national glass production. In the glass container sector, the list of major players includes Ardagh Group, BA Glass, Gerresheimer, Heinz-Glas, O-I, SGD Pharma, Verallia and Wiegand-Glas.

In addition, Schott AG is a leading player in the special glass sector. Salvatore Ruggiero, Vice President Marketing and Communication at Schott AG confirmed that despite the pandemic, the company has successfully implemented a number of projects in the domestic pharmaceutical, medical and home appliance sectors this year.

However, Mr Ruggiero also acknowledges that the company faced some difficulties in the first half of the current year. “We noticed clear weaknesses in the automotive, aviation and home appliance sectors during the Covid-19 crisis but thanks to our broad portfolio, we have been able to achieve a good economic balance.”

Environmental focus

Analysts and local experts in the field of the glass business, including BV Glas, believe the ongoing shift to the use of environmentally-friendly technologies will become one of the major trends of the German glassmaking sector in years to come.

This is despite the fact that the introduction of these technologies and their use, according to producers, will be associated with the significantly higher production and operating costs for them and will require the use of cheaper energy sources in their manufacturing processes in order to generate profits.

One of the possible options involves more active use of energy



from renewables, taking into account the current status of Germany as one of the global leaders in this field.

In the meantime, according to producers, there are also plans for the more active use of decarbonising technologies in their glass manufacturing processes in the future. To meet the ambitious CO₂ reduction targets of 95% for the German glass sector, the use of CCS/CCU systems for the complete decarbonisation of the glass industry from CO₂ emissions will have a particular importance for local glassmakers in the years to come.

According to analysts' estimates, successful implementation of these plans will raise the competitiveness of German glassmakers, both in their domestic market and in the international arena and will create conditions for the decline of costs for local producers.

In general, at present the German glassmaking sector remains one of the most developed in the EU. This is also due to the number of producers operating in the local market, which is probably the highest, compared with any other EU state, with local producers occupying a significant share of the market.

In terms of production structure of the market, the strongest position



of domestic producers is currently observed in the segment of optics, pharmaceutical packaging, medical equipment and others catering to the needs of the elderly population, the number of which in the country has significantly increased in recent years.

Analysts expect the German glassmaking sector will continue to shift towards more advanced and innovative glass products. The global recession of 2008/09 led to a significant decline of revenue in the industry, which became mainly due to a significant drop of both local and global glass demand. However, due to the support provided by the state and the innovative activities of local producers, the industry was able to completely recover from the crisis and its consequences at the beginning of 2012.

According to recent reports published by industry associations, the German glass industry remains a highly fragmented market, with more than 400 domestic and international players in the market. However, BV Glas' Dorothee Richardt remains optimistic regarding future prospects. "Despite the decline in the first half of the year, an upturn is already apparent: If we compare May 2020 to June 2020, we see an increase in production of 4.7%. And when we look at the business climate index of the glass industry in Germany, which provides an assessment of current and future market development, we see that business expectations in hollow glass, flat glass processing and technical glass are already positive again."

Other analysts interviewed also believe the future of Germany's glass industry to be favourable as the use of glass as a specialised material in various industries has gained continuous momentum.

In addition, it is suggested that the improving economy in Germany and other European countries will lead to an increase in demand for glass from various related industries. This will contribute to further revenue growth for the glassmaking sector in years to come. ●

About the author:

Eugene Gerden is a freelance correspondent



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Does driving an all-electric car relate to running a glassworks?

As the glass industry contemplates the impact of the Paris agreement and how the push towards lower CO₂ emissions from stakeholders and customers will affect the business, a number of questions arise: How can zero carbon emissions be achieved by 2050? What kind of technology needs to be used? Is all-electric melting the way to go, perhaps hydrogen or a combination of both? How are lobbies influencing the industry with information mainly from pro-hydrogen advocates? Are there alternatives? And how can commonsense be separated from the nonsense? René Meuleman considers.



René Meuleman.

It is not easy to have an opinion when all the facts are unknown. During the next 30 years, technology will develop, the business environment will change and politics will alter. But furnace lifetimes of +15 years will still be a challenge, forcing those involved in furnace design technology to think much further ahead than financial decision-makers typically do. Being aware of the many uncertainties will help to find a feasible direction into the future and minimise the issues that could occur while maneuvering through a developing environment.

Regarding the use of electrical power for furnaces compared to hydrogen, the analogy with cars seems to be obvious, at least from an efficiency point of view. Why, for example, are there so many battery-driven cars on the road and why so

few hydrogen energised models? Why do hydrogen cars have fuel cells? And finally, what about emissions?

Consider the first two questions, keeping these two things in mind: How does this relate to glass manufacturing? And the answers will be fluid because, as mentioned earlier, technology will develop, the business environment will change and politics will alter.

A battery-driven car needs electrical power to charge, while a hydrogen car obviously needs hydrogen. The electrical power can come from renewable energy sources, fossil fuel firing and nuclear power. Both renewables and nuclear power are almost carbon-free. And currently, nuclear power is considered to be a sustainable energy source that could, through commercially viable changes in its production, become a renewable in future. Once the electrical power is generated, there are some losses due to the grid, voltage conversion and mechanics but overall, the battery-driven car is very energy efficient.

To produce hydrogen, either natural gas or electrical power from renewables, fossil fuel or nuclear power are needed. Unfortunately, the extra step of converting the natural gas/electricity to hydrogen reduces the energy efficiency. This is due to the hydrogen needing to be either compressed or cooled to achieve an acceptable volume size for storage. Once the highly pressurised hydrogen is available, the energy needs to be converted to power the vehicle on the road and for that, there are two options: Burn it in a combustion engine, or feed it into a fuel cell to convert it to electrical power, then into a power inverter and finally into an electromotor connected via some gears onto the road.

Well ok, why not use the highly sophisticated combustion engine? That technology is well developed and familiar to all. Unfortunately, the combustion engine is not very energy efficient. In fact, compared to the combination of fuel cells and electromotor, it is half as efficient. Therefore, not a good option. And a nasty side effect is that burning hydrogen with air results in NO_x emissions that need special measures to remove.

In answer to the final question, assuming the most cost-effective and energy-efficient solution is used; which is the battery-driven method. Consider the example of a

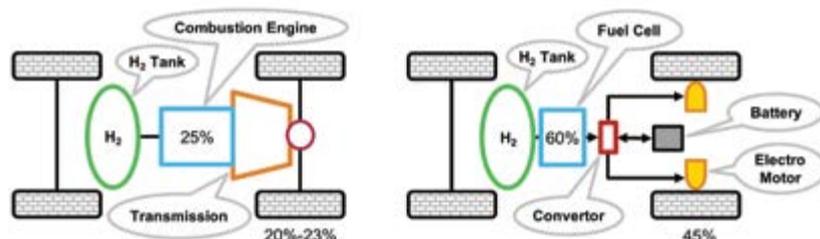
Mercedes-Benz EQC electric vehicle, consuming 20.9 kWh/100 km with a charging efficiency of 89%, which will bring that figure up to around 23.5 kWh/100 km. Compare this to the example of a Citroen C5 diesel model with a fuel consumption of 3.9 l/100 km, equalling 39 kWh/100 km. The electric Mercedes in this case is 40% more energy-efficient.

Compare the two vehicles on a short road trip. The diesel Citroen would emit 103 g/km CO₂ wherever the car is driven. However, considering the amount of CO₂ emitted through the electrical power generation in different regions, the electric Mercedes would emit 138 g/km if driven in the Netherlands, 114 g/km in Germany, 17 g/km in France and 112 g/km in the USA.

Conclusion

Though oversimplified, these calculations show that overall, the combustion of fossil fuels is extremely inefficient. Electrical systems perform much better but it matters how the electrical energy is generated, as well as where it is located. From an energy efficiency and CO₂ emissions point-of-view, there are a lot of analogies between automotive use and glass melting. Therefore, it seems a good place to start to get a better understanding of the issues involved. Opinions are welcome. Do others agree? ●

Approximate efficiency percentages of hydrogen powered vehicles, comparing a hydrogen combustion engine to a hydrogen fuel cell powered car.



About the author:

René Meuleman is Business Leader for Global Glass at Eurotherm

Further information:

Eurotherm Ltd, Worthing,
West Sussex, UK
tel: +44 1903 268500
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Glass versus PET packaging in the Middle East

Like many other regions of the world, the Middle East's glass container industry has faced severe competition from PET and metal packaging in recent decades. Sunder Singh discusses the regional packaging industry and how glassmakers face increasing challenges from PET.

The Gulf Co-operation Council (GCC), the political and economic alliance of six Middle Eastern countries - Saudi Arabia, Kuwait, the United Arab Emirates, Qatar, Bahrain and Oman - is one of the most attractive markets for packaging companies, including manufacturers of glass containers. The food and beverages sector is a major stakeholder, where the threat of substitutes to glass (PET and metal) is at its highest.

The region has seen the consumption of packaged beverages and food products increasing by huge percentage points year after year within the past decade. However, container glass, which previously accounted for the lion's share of packaging demand for beverages and food products has not benefited proportionately.

The UAE and the Kingdom of Saudi Arabia are among the most strategic markets for food and beverage companies in the Gulf region and despite the Covid-19 crisis and a looming economic recession, the market in these countries is projected to register steady growth throughout 2020 and reach \$80 billion. This is according to analysis conducted by research firm Frost & Sullivan entitled the '2020 Outlook of the KSA and UAE F&B Market', which attributes the growth to increased consumer expenditure on food and beverage products.

Frost & Sullivan estimates that overall expenditure on F&B in the UAE will increase by 6.9% year-on-year and will reach \$37 billion in 2020 from \$34.6 billion in 2019. At the same time, the analysis projects overall expenditure on food and beverage products in the Kingdom of Saudi Arabia to witness a 5.4% YoY growth and hit \$50.6 billion. The combined market is therefore expected to surpass the \$80 billion mark this year.

Other countries in the GCC region - Bahrain, Kuwait, Qatar and Oman - have registered steady growth in their consumption of packaged food and beverages. Kuwait, for example, which is the third largest F&B market in the region, is set to witness the fastest expansion. The food and beverage products' sector is characterised by a large presence of international brands, manufactured regionally through local factories.

Middle East glass container industry overview

Currently, there are eight glass container production facilities for food and beverage industries (plus two dedicated

Company	Country	Installed capacity
Jabel Ali Container Glass Factory	UAE	320 tonnes/day
Saverglass	UAE	160 million bottles/year
Gulf Glass Manufacturing Co	Kuwait	310 tonnes/day
Majan Glass	Oman	300 tonnes/day
Pragati Glass	Oman	135 tonnes/day
Mahmood Saeed Glass Industry Co	Saudi Arabia	360 tonnes/day
National Company for Glass Industries	Saudi Arabia	240 tonnes/day
Saudi Arabian Glass Co Ltd	Saudi Arabia	1000 tonnes/day

Table 1: Glass container producers for food and beverage industries in the Middle East.



Majan Glass is one of two glass container producers in the Sultanate of Oman.

pharmaceutical glass producers) in the GCC region (table 1). In addition, another 18 factories operate in the broader MENA region.

Saudi Arabian Glass Co, the Middle East's largest glass container producer, serves most beverage and food companies in the region. Some 35 years after entering commercial production with a single 60 tonnes capacity furnace, the company now operates five furnaces with a daily capacity of 1000 tonnes and 13 production lines. SAGCO's factory, located in the Red Sea port of Jeddah, supplies a wide range of high quality glass containers in five colours - flint, emerald green, amber, Georgia green and super flint - to clients in 39 different countries. Its products are used to package some of the world's best known brands. The company's customised designs are produced within clean room facilities and services available include sleeving and applied ceramic labelling.

Glass versus PET

Traditionally, the local food and beverage packaging industry has been dominated by glass. Many of its properties make glass the ideal packaging material; it is odourless and chemically inert, impermeable to gases

and vapour, insulating and transparent. Glass can be shaped and coloured and it is reusable and recyclable.

By comparison, plastic packaging such as polyethylene terephthalate (PET) can have variable permeability to light and vapours and its reuse and recyclability are not comparable to glass. For example, the typical shelf life of beverages and food products in glass containers is significantly longer than that of these products in PET bottles. However, the concerns of both consumers and producers of food and beverages extend beyond the material's ability to maintain product freshness. In the modern globalised marketplace, cost and affordability play an increasingly significant role.

Since its introduction as a viable packaging material, plastics such as PET has continued to grow in popularity in food and beverage markets. PET is generally much lighter than glass, reducing the cost of product transportation and improving affordability. The costs of raw materials and production processes for PET manufacture are also lower than glass on a per unit basis, giving a further cost advantage.

The glass container industry and government agencies argue that PET tends to leach harmful and toxic ▶



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substances in the hot climatic conditions encountered in Middle East countries. An unnamed key executive at Saudi Arabian Glass commented: “Although PET has some advantages as a beverage and food packaging material over glass, including cost and weight, the impact of using plastics as a packaging material on the environment is getting severe with every passing day. The debate over what is the most appropriate food and beverage packaging material - glass, PET or other alternative materials such as aluminium - is set to intensify in the coming years. As attitudes shift and the pressure intensifies on producers (food and beverage producers) and governments to address the issue of plastic waste, we could see a reversal of trends, with consumers and producers opting for glass over PET packaging.”

According to Harbinder Kathuria, a key executive for the Middle East, Africa and India at Sidel a technology supplier to PET bottle and preform producers, the Middle East and Africa represents a dynamic marketplace, where a 6.5% Compound Annual Growth Rate (CAGR), equivalent to an additional 35 billion units is expected across all beverage categories by 2021. “One of our latest customer successes from the region is linked to Rayyan Water, who opted for a new complete line from Sidel to address steadily growing demand for premium bottled water in glass on the Arabian Peninsula. This came on top of two complete Sidel PET lines Rayyan installed years ago, which are still in operation within the company’s plant. Sidel supported the leading player from bottle qualification to line requirements onto delivery and performance of the solution, lowering total costs of ownership and overall energy consumption.” Mr Kathuria emphasised that sustainability is a major concern for consumers. “To address this situation, increasingly producers are preferring lightweight containers as they want to use less plastic. Also because – from a manufacturing perspective – more plastic means more energy consumption, packaging sizes are becoming smaller.”

Asit Chawla, General Manager at Oman-based Majan Glass commented: “There is no doubt that alternative forms of packaging have been able to take a huge share from the glass container industry in some of the major sub-segments of the food and beverage industry. In the Middle East region, glass packaging represents approximately 13%-14% of the carbonated soft drinks packaging mix for CSD sold for consumers, excluding fountain sales in fast food outlets such as McDonalds. PET and metal packaging account for about 41%-42% of carbonated soft drinks beverages.”

According to Mr Chawla, in other beverage categories such as fruit juices and dairy products, PET dominates. “The share of PET packaging is in the range of 60% to 70% plus, glass around 10% and the balance between Tetrapack and cans. Packaging format choice is determined by many factors such as nature of consumption; on-trade and off-trade and on the go consumption/home use, which is high in GCC. Most of the packaging in GCC in CSD and beverages is single use packaging. The pricing policy adopted by the bottlers also play a major role in the form of packaging. For example, currently 250ml CSD in PET is cheaper than 250ml in glass at the retail level in Oman. This leads to higher consumption of CSD in PET bottles, which has an impact on glass container consumption in the long run. The cost of packaging is dependent on demand and supply of PET resin price, aluminium pricing etc. I expect market shares to remain in the same percentage range in the short- and medium-term.”

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Glass and plastic packaging are in widespread use within the GCC region.

Ernst Pennekamp, Majan Glass is one of two glass container producers in the Sultanate of Oman. The company posted sales revenue of RO10.916 (\$28.38) million in 2019 compared to sales of RO8.823 (\$22.93) million in 2018, representing an increase of 24%. Oman accounted for 15% of the company’s sales in 2019. Other GCC countries accounted for 36% of total sales, while the remaining 49% was exported to other countries.

Winning market share in some sectors

It is not the case that PET is always winning market share from glass containers. A number of product offerings have also come back to glass packaging. Qatar’s largest bottled water producer, Rayaan Water, for example, shifted some of its production from PET to glass bottles recently.

“With our exceptionally high standards in respect to hygienic production and to minimise our environmental footprint, we decided to offer premium water in three different sizes in glass containers” Khalid Al Rabbaan, Chairman of Rayaan Water confirmed. “Our water products in 250ml, 500ml and 750ml glass bottles stand out on shelves due to their attractive design.”

Rayaan Water is not the only packaged water producer to offer its products in glass containers. The UAE’s largest food and beverage company, Agthia Group PJSC also offers its popular water brand Al Bin in glass bottles in 300ml, 500ml and 1000ml sizes. Last year, Agthia Group opened its new packaging technology centre at Al Ain, UAE, with the firm highlighting three key trends currently shaping the sector.

According to Tareq Ahmed Al Wahedi, Agthia Group CEO: “Three major trends are at the heart of the firm’s innovation strategy. Firstly, we want to reduce the amount of packaging that is currently used. One

way of doing that is moving from single use packaging to multi-use. Agthia produces both single and multi-use packaging for water, frozen food, dairy and baked goods etc. Secondly, packaging should extend the shelf life of food and beverage products. And lastly, the packaging should be sustainable. Ultimately, we want to reach 100% recyclable packaging material.”

Other factors

The availability of glass packaging in domestic markets has been another factor for food and beverage companies in the region. Among the GCC countries, Qatar and Bahrain have no glass container manufacturing facilities.

Qatar has seen a huge reduction in the usage of glass by its domestic food and beverage companies. A few years back, UAE was the biggest source of imports and accounted for almost all demand for glass containers in Qatar. UAE was subsequently replaced by Oman as the biggest source as Ali bin Ali, the local bottler for Pepsi in Qatar started sourcing its glass bottle requirements from Oman. However, this has changed again in recent years as Ali bin Ali has stopped using glass bottles for its local bottling facilities.

Gulf Glass Manufacturing Co, Kuwait’s only glass container producer has two furnaces with a total melting capacity of 310 tonnes/day and manufactures glass containers of all shapes and sizes. GGMC serves major customers in the soft drinks industry such as Pepsi, Coca-Cola, Cadbury-Schweppes, Sinalco and Vimto, as well as several customers in the food industry. ●

About the author:

Sunder Singh is a freelance correspondent

Further information:

email: sunder.singh@gmail.com

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Legal regulations for cut-resistant clothing

According to Robert Kaiser, it is truly astounding to see that some manufacturers and suppliers of cut-resistant clothing are still willing to ‘bend the rules’ to ensure healthy profits are made. Willing to neglect even the clearest legal regulations, companies across Europe continue to risk the safety of workers in the glass industry.



Robert Kaiser, CEO of PPSS Group/CutPRO.

It is only a very few weeks ago that the Managing Director of a PPE supply firm said to me: “We sell our clothing as workwear. We don’t need CE marking if we sell it as workwear and our customers are OK with that.”

It is one of those moments when you question if this person is saying that simply due to a lack of knowledge. You wonder if he is just another professional who is frankly unaware of precise European laws, rules and

regulations. But then you also consider that he might be one of those businessmen willing to do wrong in order to impress shareholders.

European law

As a supplier of personal protective equipment (PPE), it is a legal responsibility to ensure that all products sold are compliant with European law and legislation. This is to guarantee the health and safety, as well as the wellbeing of those purchasing and wearing those products.

The supporting law within Europe is ‘Regulation (EU) 2016/425’ and it states that all PPE must be CE certified.

There is no question about it. Not to comply with this law is a direct breach of not only European law but the laws of that member state. The following is a just an abbreviated version to stress some key points:

- All clothing to be worn or held by any end user to offer any type of protection is PPE and as such, must be CE certified for sale in the European Union.
- If your customer is using the clothing for protection and/or to improve the health and safety of the wearer at a workplace, they should be using appropriately CE marked products (if using or selling within the EU).
- You are not allowed to sell anything within the EU that could be defined as PPE without appropriate CE marking.

Change of performance standards

Health and safety professionals overseeing the safety of glass workers will be mindful of the European Standard EN 388:2003

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Infographic highlighting risks involved in the glass industry.

'Protective gloves against mechanical risks'. EN 388:2003 was the standard to go by, simply because 'cut-resistant gloves' have been around for many years and it helped health and safety professionals as well as those charged with making corporate purchases to make an informative decision, comparing performances and prices.

However, many cut-resistant clothing manufacturers seem to have 'simply forgotten' that this standard has already been superseded.

The updated and current EN 388:2016 is a much more stringent standard and offers the consumer much more realistic results. It also highlights clear weaknesses in garments, which may well have received reasonably good test scores within the previous standard.

EN 388:2016 requires the test object to be subjected to a circular blade cut (ISO Cut Resistance) as well as a straight blade cut test. The superseded EN 388:2003 standard only required a test using a circular blade.

Circular blade testing is now also carried out for more cycles than previously, which means that it is harder for cut-resistant clothing manufacturers to achieve a higher level of cut resistance than before. A garment's cut resistance level may appear lower in 2016 than it did in 2003.

The tested garments will now receive between a Level A and a Level F, with Level F being the highest level that can be achieved.

Even the abrasion resistance test has been fine-tuned. This test is now carried out using different test paper. As a result, the tested garment may receive a lower score under EN 388:2016 to the score originally awarded under EN 388:2003.

There is no change to the testing procedure of the puncture resistance. It is worth stating, however, how important this specific performance criteria is. There is no guarantee a garment offering a high level of puncture resistance will stop a sharp object but such a garment has a much better chance of preventing or reducing an injury compared to a garment made from a fabric offering a low or no puncture resistance.

I strongly recommend glass producers to request test reports highlighting performances according to the EN 388:2016 version, as the above changes can ultimately help them to further improve the safety of the workforce. ●



CutPRO cut-resistant clothing.

About the author:

Robert Kaiser is CEO at PPSS Group/CutPRO

Further information:

PPSS Group/CutPRO Cut Resistant Clothing, Wetherby, UK
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Ukraine glass industry maintains sustainable operation

Vladislav Vorotnikov highlights recent trends from Ukraine's hollow and flat glass sectors, as well as raw materials supply challenges.

Ukraine's hollow glass plants are operating steadily, meeting domestic demand and developing export opportunities. In 2019, Ukraine produced 3.44 billion units of glass containers, 8.1% up compared to the same period of the previous year, according to Dmytro Oliinyk, President of the Association of the glass industry and Chairman of the Supervisory Board of JSC Vetropack Gostomel Glass Factory. Production has been growing steadily in recent years in all segments, with the notable exception of pharmaceutical containers.

"In the first half of 2020, we evidenced a reduction in the production of coloured bottles, which in the first place is linked with the Coronavirus pandemic, a slump in consumer demand, production shutdowns (in the beverage industry) and a sharp fall of the purchasing power of the population" Mr Oliinyk said. "Ironically, producers of pharmaceutical containers have been doing worse than others. At the beginning of the pandemic, the pharmaceutical industry increased purchases provoking a shortage but from early May, the agiotage disappeared, dragging down sales. Currently, things are improving in all sectors" he added.



The Ukraine government is still committed to restoring the Lysychansk glass plant's production in Lugansk Oblast.

Market issues

The Ukraine hollow glass industry has recently encountered an unusual threat, as a group of politicians in the country's Parliament has proposed a new draft bill allowing the bottling of alcohol-containing liquids in a plastic package. The Association of the glass industry, together with the Federation of Employers of Ukraine, filed an appeal to Parliament and the government asking for this bill not to be signed into law. "This (law) would

cause an ecological disaster and would put humans' health in jeopardy" Dmytro Oliinyk warned.

Ukraine business is questioning this decision, since the use of plastic packaging in the beverage industry is currently being restricted in numerous markets, including the neighbouring European Union, Russia and Belarus.

In the meantime, Ukraine's glass plants are becoming increasingly successful in international markets. During the past decade, exports have tripled, reaching 1.4 billion units in 2019, according to Association of the glass industry estimates. In the first half of 2020, Ukraine plants exported ▶

Hollow glass	Production million units					
	2014 r	2015 r	2016 r	2017 r	2018 r	2019 r
Bottles	2128.9	1957.4	2072.0	2101.7	2211.4	2370.5
Cannery containers (jars)	695.7	551.7	558.5	665.9	679.6	793.3
Perfume containers	23.2	21.5	15.1	24.6	11.8	13.5
Pharmaceutical containers	222.8	268.4	306.9	317.9	279.8	263.7
Total	3070.6	2799.0	2952.5	3110.1	3182.6	3441.0

Hollow glass production in Ukraine.



Kyiv's Silver Breeze shopping mall makes extensive use of glass windows.



In 2019, Ukraine produced 3.44 billion units of glass containers (image courtesy of Kostopil Glass Works PJSC).

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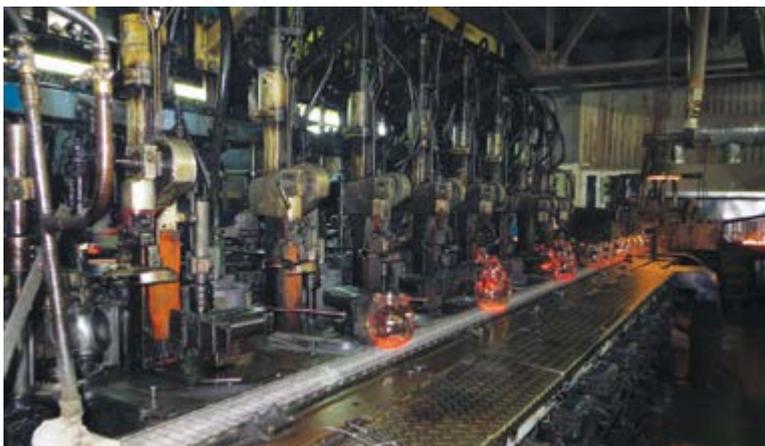
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In the first half of 2020, Ukraine hollow glass plants exported 813.8 million glass containers (image courtesy of Kostopil Glass Works PJSC).

813.8 million glass containers, 20% up compared to the same period of the previous year. Today, Ukraine is exporting more than 40% of all manufactured hollow glass.

Further export growth is linked to the prospects of the global economy and the Covid-19 pandemic. "These days, Ukraine is highly dependent on the global market" Mr Oliinyk confirmed. "If the recession continues around the world, then it will be impossible to expect a rapid economic recovery (in Ukraine) and as a result, on the growth of demand of products in a glass package. If the recovery of the world market proceeds according to an optimistic scenario, we expect that the Ukrainian players will also respond positively."

Primarily, Ukraine exports 0.15 litre bottles. In 2019, they accounted for 34.6% of total exports. The biggest sales markets in this segment in the European Union were Poland (48.3% of total exports), Hungary (27.5%), Italy (7.7%) and Greece (5.7%). The CIS region accounted for 2.3% of supplies, with 2% sent to Belarus and smaller quantities supplied to Azerbaijan and Moldova.

The second biggest ware type involves 0.15 - 0.33 litre bottles, accounting for 33.9% of total exports. In 2018, the largest consumers of Ukrainian glass bottles in this segment were Poland (17.3%), Romania (14.7%), Austria (13.4%), Switzerland (7.4%), Croatia (6.2%) and Belarus (6.2%).

In 2019, the supply of 0.15-0.33 litre bottles to European countries increased by 28.4%, including to Poland (by a factor of four), Georgia (by 2.9 times), Romania (by 2.4 times), Austria (by 1.7 times), Greece (+ 39.3%), Switzerland (+ 28.5%) and Italy (+ 22.7%).

In the segment of 0.33-1 litre bottles, the main sales markets were Poland (32.8%), Germany (10%),

Slovakia (7.4%), Spain (6.3%), Moldova (5.8%), Belarus (5.2%), Austria (5.1%) and Italy (4.5%).

Raw materials spotlight

Today, there are no problems with the supply of raw materials for the glass industry, although there were certain difficulties associated with the annexation of Crimea and the loss of the Crimean soda plant.

Ukraine is currently importing soda ash from Turkey, Poland, Bulgaria and Romania. Some investors are mulling over the construction of production capacities in Ukraine, according to Dmytro Oliinyk. The local glass industry is consuming approximately 200,000 tonnes of soda ash per year. This figure is likely to grow in the near future in case of further growth in output of the hollow glass industry and recovery of float glass production.

Local market players also harbour hopes that they would be able to use more cullet in production, taking advantage of a new waste management system from the Ukraine government. Ukraine's Parliament has already passed first reading of a bill on the new waste management policy. "Ukraine glass plants use on average 35% to 40% of cullet, or 350,000 to 400,000 tonnes per year" Mr Oliinyk confirmed. "The vast majority of glass containers are used repeatedly, primarily in the beer industry, so the new law would allow the increased use of waste glass."

Alcoholic beverage producers in Ukraine have almost completely abandoned reusable containers to battle with counterfeit products" he added. "Some waste glass also needs to be imported, with 63% of supplies coming from Belarus, 21% from Hungary, 13% from Lithuania and 1.5% from Moldova, totalling 47,000 tonnes per year."

Float glass production yet to resume

Reportedly, the Ukraine government is still committed to restoring the Lysychansk glass plant's production in Lugansk Oblast but there is no clarity when this could happen. "The Lysychansk glass plant is not manufacturing float glass, primarily because of the armed conflict and problems that arose" Dmytro Oliinyk explains. "The owners of the plant have submitted a new development programme to the Ministry for Strategic Industries of Ukraine."

Before 2014, the Lysychansk glass plant produced, on average, 25 million square metres of float glass per year but being located virtually on the battle line of the armed conflict in eastern Ukraine, it was severely damaged in 2015 and eventually filed for bankruptcy in October 2017.

The plant suffered massive destruction during the armed conflict, according local government sources. And in recent years, some equipment from the plant has been sold as scrap, a Lysychansk city news outlet 6451 reported.

Demand for float glass in Ukraine is estimated at 37 million square metres per year. This figure is projected to grow in the coming years. "Analysts forecast that demand could rise to 50-55 million square metres by 2025" Mr Oliinyk confirms. "We believe that when the war is over and a large-scale programme for the Donbass (eastern region of Ukraine, where fights have been taking place) restoration is adopted, domestic demand for float glass will rise dramatically."

Dmytro Oliinyk suggested that talks about launching a new float glass plant in Ukraine have been taking place for nearly 10 years. "We are unaware that any direct investment has already been allocated. In the meantime, several companies are considering plans to launch a new float glass production plant." In 2019, for example, Ukraine company, Agromata announced its intention to build a new plant in Borodyanka in the Kyiv region, with the total investment amounting to €300 million. Production capacity is planned to be at 600 tonnes/day and will create 300 jobs. The plant will partly meet domestic market demand and export nearly 30% of manufactured products, the company said. No official timeline for the project has been revealed yet, Ukraine news outlet Delo reported.

A similar project is also planned in Chernigiv Oblast, Ukraine. USA-based Stewart Engineering and Ukraine's P-Build Holding AG have announced plans to launch a float glass plant for \$250 million. The plant's daily design production capacity is expected to be approximately 600 tonnes. A third participant, JSC Sand Industry, will mine quartz sand at a local deposit to secure a sufficient raw materials base for the plant. No further details about the project have been given yet, Ukraine news outlet *Ukrinform* reported. ●

	June		H1 2020	
	2020 r	2019 r	2020 r	2019 r
Glass jars (tonnes)	31,600	23,200	137,100	108,000
Bottles of colourless glass (million units)	116.9	111.6	724.6	706.9
Bottles of coloured glass (million units)	30.3	76.4	363.5	429.6

Ukraine hollow glass production in 2020.

	2020 r		2019 r	
	June	H1 2020	June	H1 2019
Hollow glass export (million units)	157.2	813.8	123.2	674.6
Hollow glass import (million units)	20.4	160.1	23.6	157.5

Ukraine glass export and import in 2020.

About the author:

Vladislav Vorotnikov is an independent international journalist



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Back on track and ramping up glass production in Belarus

Vladislav Vorotnikov assesses the prospects for increasing hollow and flat glass production in Belarus and the opportunities that exist for the industry.

The Belarus government has confirmed plans for a fifth glass plant to be built to meet growing domestic hollow glass demand and gain additional export revenue, primarily from the European Union. According to Dmitry Mikulenok, Architecture and Building Minister, Belarus is self-sufficient in hollow glass, with demand growing worldwide as a reaction to mounting ecological concerns relating to the use of plastic packaging alternatives.

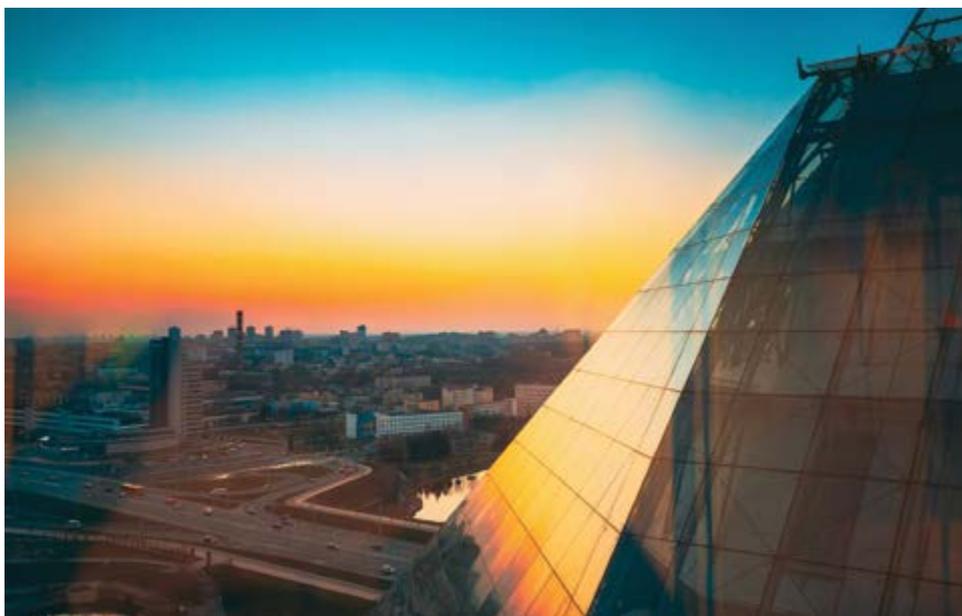
According to the Ministry, domestic demand for glass containers is close to 700 million units per year and this figure is expected to grow steadily in the future. In 2020, Belarus plans to embark on an environmental campaign to cut plastic packaging consumption, replacing plastic with glass and paper.

"It is important that our industry is ready for this transition (from plastic to glass packaging)" Mr Mikulenok commented. "We plan to switch gradually and are planning to run a pilot project on still and sparkling water. We expect that our production capacities will meet the growing demand for glass bottles."

The anti-plastic campaign is fueled by the country's President Alexander Lukashenko, who is on record as saying that plastic packaging is "detrimental to the environment". From 1 January 2021, the Belarus government plans to prohibit the hotel/restaurant/catering sector from using plastic packaging and in 2023, the authorities want to ban the use of one litre capacity and bigger plastic bottles by the brewing industry.

"The Ministry operates four glass plants, Gomelsteklo, Grodno glass plant, Neman glass plant and Belmedsteklo" Oleg Shvetsov, Deputy Architecture and Building Minister confirmed. "In addition, there are other (private) companies, including hollow glass producers, like Belstekloprom and Vedatransit glass plant, as well as big and small companies processing glass."

Historically, glass plants in Belarus have been state-owned but in recent years, the situation has started to



The Minsk National Library makes extensive use of flat glass.

change, with more private investments available to the industry. Soviet-style poor management practices are often blamed for the financial difficulties encountered by the industry in recent times, leading to bankruptcy for some glassworks.

In August of 2020, Alexander Lukashenko ordered all government-owned glass plants to be combined into a single holding company. This step should improve the financial environment, according to an explanatory note relating to the initiative. For example, the Neman and Belmedsteklo glass plants were loss-making in 2019.

EU market focus

According to Vladimir Nachatoy, Manager of the Gomel glass plant, one of the reasons behind the decision to build the new plant stems from growing restrictions to the use of plastic packaging in the European Union. Against this background, in 2019 the company concluded contracts to export 35% of glass containers or nearly 70 million units per year.

"All existing glass plants are highly efficient enterprises" Dmitry Mikulenok said. "They constantly modernise their production capacities to master new

types of products, cut costs and improve competitiveness" he added, emphasising that the new plant will open up broad export opportunities for the Belarus hollow glass industry.

"Now, our companies have to decline offers from foreign buyers to meet the demand of our customers" he confirmed. "The industry has room for growth."

The European Council has approved the implementation of a plastic tax as of 1 January 2021, involving a €0.80 per kg levy on non-recycled plastic packaging waste to be paid by Member States into the European Union budget. The tax has been presented by the European Commission as a "contribution to the EU budget, designed to incentivise Member States to increase recycling from plastic waste."

Belarus's new glassworks is expected to be built in Grodno, according to Yuri Skripko, General Director of the Grodno glass plant. "Demand for hollow glass as an ▶



A production increase is on the cards for Belarus glass plants.



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Belarus is offering incentives to increase the use of cullet at its glassworks.



A fifth hollow glass manufacturing plant is currently under construction.

environmentally-friendly package is growing, both in our domestic and foreign markets” he confirmed. “The new plant will produce a broad range of bottles for beverages, currently packed in plastic.”

The Belarus government has already conducted public hearings about the project. The plant will be designed to produce 240 million glass bottles and will be located in the Aulce industrial zone at Grodno Oblast. Prior to the Covid-19 pandemic, the government was planning to start construction by the end of 2020 and to commission the facility in 2023.

All expansion projects in the Belarus hollow glass industry have an eye on export potential, the Grodno plant having recently become the country’s first to master the production of lightweight NNPB glass containers, for example. “As the (country’s) only company using this method, in the first place we will supply these bottles to our (Belarus) customers but export supplies are also considered since this type of products is in high demand both in the domestic market and abroad” Denis Jurchenko, Director of the Elizovo branch of the Grodno glass plant confirmed.

The Elizovo plant was acquired by the Grodno plant in April 2018. Previously, it was part of ATEC Holding GmbH but was declared bankrupt in 2016. The plant has a contract with Minsk Crystal Group – one of the biggest beverage producers in Belarus – for 20 million glass bottles per year. The full designed production capacity of the new line is between three and four million glass containers per month, although according to Denis Jurchenko, actual performance will depend on demand.

Competition remains

The Belarus glass industry has gone through a major modernisation programme, aimed at cutting production costs and improving competitiveness. “The main problem of

the Belarus glass plants is the strong debt burden, which is a result of huge investment projects in the past” Oleg Shvetsov, Deputy Architecture and Building Minister confirmed.

“The advantages of the Russian glass plants in terms of natural gas costs make the situation even more complicated” he added. “In Russia, natural gas is (up to) three times cheaper than the gas for Belarus plants. Besides, Russian customers pay in their national currency, not in dollars. This creates an unfair competitive environment and hampers the revenues of the Belarus glass plants.”

The local glass plants have been complaining repeatedly about the tough competition with Russian suppliers. In 2016, Belarus imported a record-breaking 168,000 tonnes of glass, which was four times more compared to 2010. This prompted Alexander Lukashenko to approve a bailout package for the domestic glass industry, temporarily exempting plants from paying VAT and offering bonuses for responsible waste management.

“The share of imports in the domestic hollow glass market has been substantial in recent years” Mr Shvetsov confirmed. “In 2018, imports accounted for 55% of domestic sales but in 2019, this figure reduced to 36%, as the industry has gradually recovered.”

In January 2019, the Vedatransit glass plant started production at the former Gomel facility. Production at the site had been stopped since 2015 but current performance is close to 180 million 0.5 litre bottles.

All glass plants in Belarus also need to import raw materials, in particular soda ash. In 2015, it was announced that the Turkish company TEYO planned to build a plant to produce soda ash in Gomel Oblast

with a capacity of one million tonnes per year. This project was expected to meet all local glass industry demand but construction has now been delayed and currently, no further information about the project is available.

Float glass oversupply

Belarus has to compete not only with Russian suppliers but also with new glass producers in the European Union. For example, export supplies from Gomelsteklo have recently been impacted by the decision to commission new float glass production lines in Poland, a country that accounted for nearly 40% of the glassmaker’s export sales.

According to Petr Maximchikov, Director of Gomelsteklo, the company has struggled to identify alternative sales markets and has embarked on a series of cost cutting initiatives. “In 2015, only 7% of glass was produced from processed products, while in 2019 this figure increased to 23%” Mr Maximchikov explained. “This is a product with higher added value, which means an additional profit for us. We now put an emphasis on the further development of the processing sector.”

Production resumed fully in May but was affected again in August, this time by a large-scale strike of workers protesting against the results of the 2020 Presidential elections. The strikes affected the biggest industrial companies in Belarus. The authorities refrain from saying how these strikes could impact production performance. ●

About the author:

Vladislav Vorochnikov is an independent international journalist



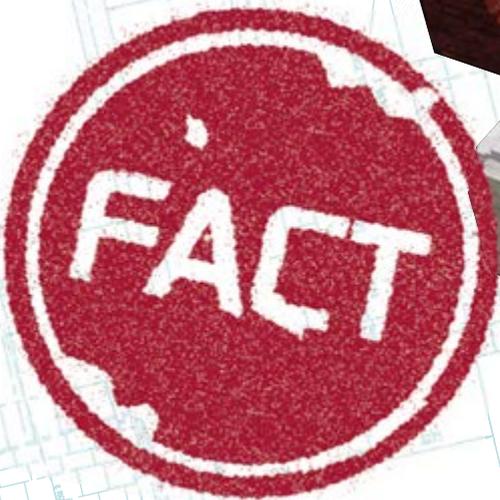
Demand for glass packaging is increasing significantly in Belarus.

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Combining creativity with engineering expertise

According to Piotr Knast, Poland's Forglass is developing some creative technical solutions relating to glass furnace and associated equipment design that could significantly benefit the international glass industry's long-term production flexibility, energy saving and emission reduction goals.

Forglass CEO, Piotr Knast is a long-time admirer of Ed Catmull, whose philosophy of developing and growing Pixar and Disney Animation companies was based largely on embracing creativity as the engine of innovation and seamlessly combining it with technical expertise. "In an integrated company, you can't draw a line between the technical and the creative" Mr Catmull says.

Creativity is not something that is usually associated with engineering, especially in conservative industries like glass production but Mr Knast insists on nurturing and encouraging creativity in his staff. As a result of this

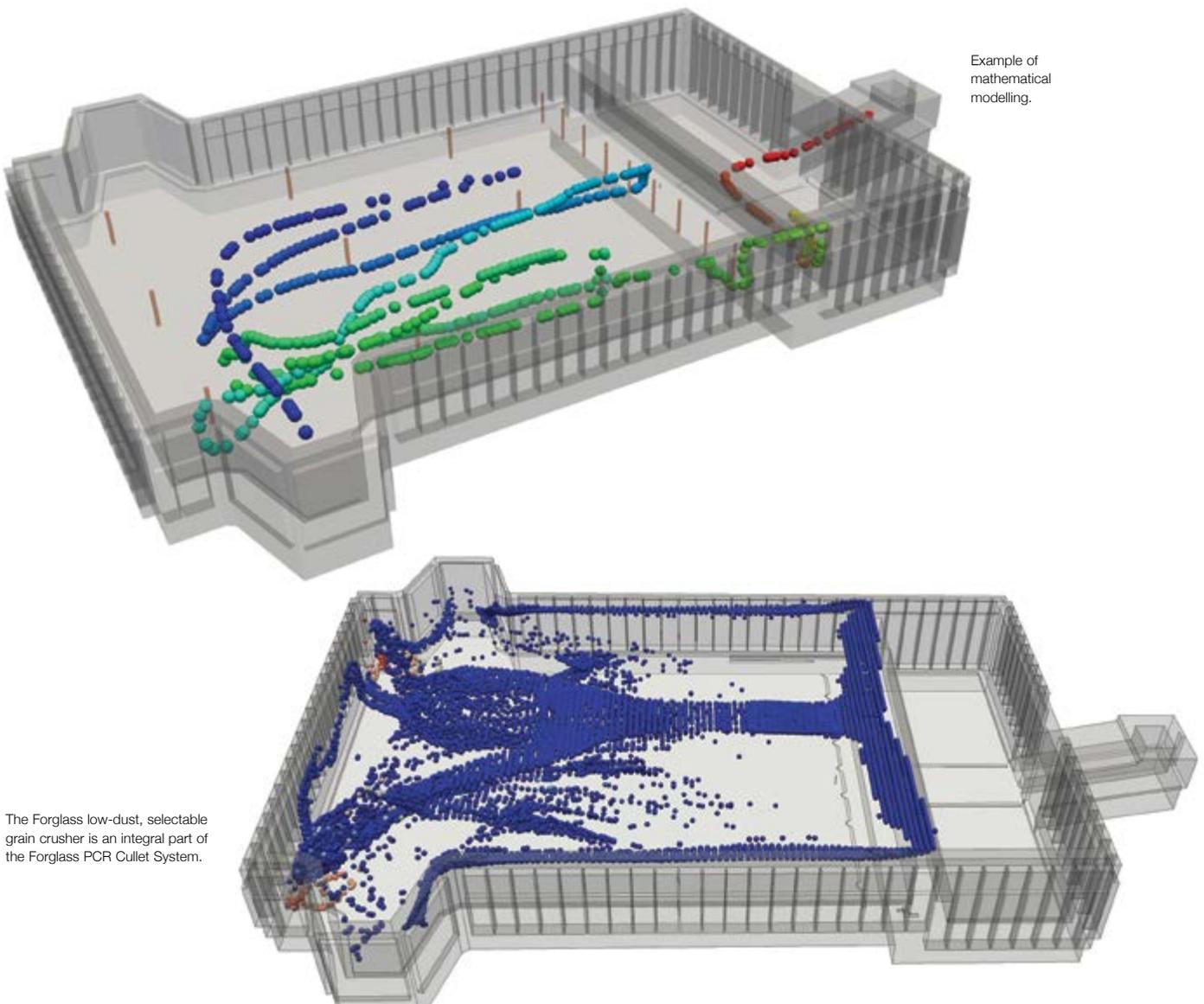
approach, the company has been working on a number of creative innovations for many years, blending the line between the technical and the creative.

The advent of mathematical modelling has made it possible to test a number of promising innovations in furnace design and according to Piotr Knast, several powerful solutions are currently in the final stages of testing

and will be released to the industry over the coming months and years.

Bold approach to innovation

Headquartered in Krakow, Poland, Forglass is an engineering and technology company that has earned the trust and respect of some of the leading glass producers in Europe and elsewhere. The company's bold approach to innovation is well known ▶



Example of mathematical modelling.

The Forglass low-dust, selectable grain crusher is an integral part of the Forglass PCR Cullet System.

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in the area of automation and integration with Industry 4.0 solutions. And Mr Knast says that the fundamental improvement in furnace design is yet another brave leap forward.

While the details of the company's revolutionary furnace design are still to be made public, its main claimed benefits can be reported. A variety of tests have shown up to 15% energy savings and reduced CO₂ and NO_x levels. Forglass reports that its furnace can be easily erected in conventional glass plants, without the modification of production halls and other structures. In addition to the savings and ease of installation, the company's solutions are expected to allow glass producers to take a different, more flexible – indeed, revolutionary - approach to sales and production planning.

Having come from diverse areas of glass production, the founding fathers of Forglass had first-hand experience with the multitude of challenges faced by glass producers and were determined to solve them. This is why today, Forglass is not only a technology developer but also a company with extensive practical experience in erecting, maintaining and repairing glass furnaces. And they know what works and what does not, not only from solving the problems faced by glass producers every day.

Indeed, the company's approach to solving problems is well-founded in science, Forglass engineers testing their designs extensively in computer modelling studies. Having partnered with the Dutch company CelSian Glass & Solar BV to provide its GTM-x software, Forglass has been testing the revolutionary furnace design for a variety of applications on four virtual production lines that have been running continuously for over a year. Certain physical elements have been installed in a working, experimental furnace. Forglass reports that the test results have been impressive and that it is engaged in ongoing conversations with potential investors.

Batch plant developments

Other recent innovations from the Forglass Batch Plant Division include an 'intelligent' scraping conveyor, aptly named SmartScraper. Equipped with an innovative overload protection system, the design uses electronic sensors to continually monitor the working conditions of the conveyor, diagnose problems and react instantly to changes in operation. The machine's built-in intelligence allows it to slow down or stop before its elements are damaged, including the protection system itself. Additionally, when connected to a comprehensive array of sensors like



Forglass engineers working on a project.

temperature, working speed or efficiency, SmartScraper allows detailed analysis of its performance to avoid future malfunctions.

Forglass has also created a low-dust, selectable grain crusher, which is described as an integral part of the latest technology in PCR cullet management – the Forglass PCR Cullet System. This equipment actively manages the removal of impurities (both magnetic and non-magnetic), allows the recovery of contaminated cullet and provides high separation efficiency. Reportedly, the tangible benefits are improved glass quality, reduced cost and extremely low dust levels.

Sharing its inventions

What is particularly intriguing is that Forglass does not stop at innovating in the realm of technology. The company aims to revolutionise the industry's business rules by sharing its inventions.

To understand this decision, it is necessary to look at the company's

history. Forglass was created as a result of merging five companies with diverse expertise in the glass industry and the company's five owners have equal shares in the business and equal input. Piotr Knast says that this synergistic relationship between them that has allowed Forglass to grow so quickly.

The founders believe that supporting other companies and finding synergies is the only long-term strategy that can truly work now and in the future. So, rather than 'fighting' with other furnace suppliers over market share, it is intended to support them with this new technology, especially outside of Europe.

"If you can break through the mental barrier of scarcity, you have a chance to really grow, to sail your ship in the 'blue ocean' of abundance" says Piotr Knast. "I think that in the long-term, this strategy will bring better results for everybody.

"Working together with other engineering firms, we can change the world of glass production forever. We can give our clients the tools to face the challenges of the next decade. We can radically reduce CO₂ and NO_x emissions, reduce energy consumption and literally change the future of furnace design, not unlike Sir Alastair Pilkington's invention of float glass." ●

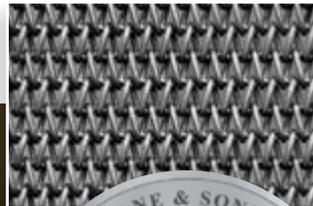
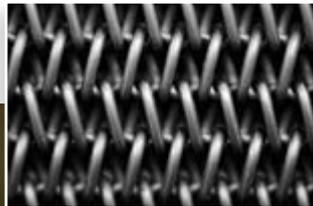
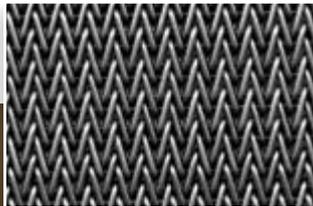
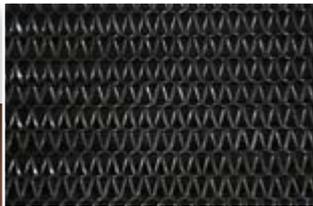


The SmartScraper 'intelligent' scraping conveyor from Forglass.

About the author:
Piotr Knast is CEO at Forglass

Further information:
Forglass Sp z o o, Krakow, Poland
tel: +48 12 352 42 22
email: office@forglass.eu
web: www.forglass.eu

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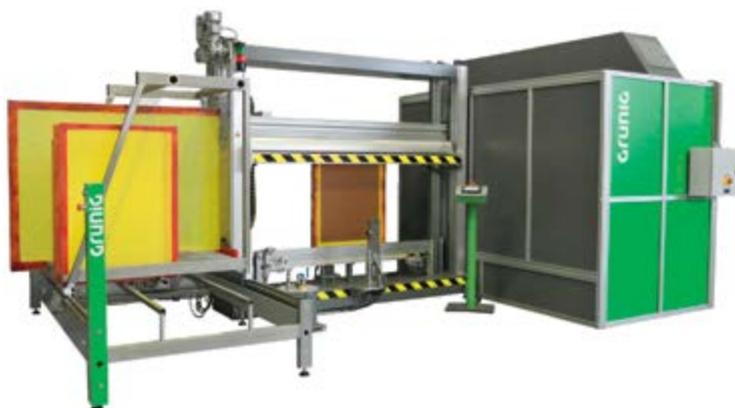


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Custom fabrication of refractory products

A specialist USA-based fabricator of refractory products has found a niche in the glass industry by providing customised work scope, exceptional customer service and customer-friendly lead times. Don Roenigk outlines the services provided by RMS and the company's development.

Refractory Machining Services, located in Butler, Pennsylvania has become an industry leader in refractory material fabrication. The company provides cutting, grinding, drilling and custom fabrication services to the refractory industry. Services also include construction of lip spouts and bay 'O' cover assemblies, together with layout and match-marking services. According to Operations Manager Jim Frye, "there really isn't a material or dimension that we can't work with at this point. The only thing we can't make smaller would be a hole!"

RMS was founded in 2003 by Jim Frye, Larry McKivigan and Mike Hartley. As the founders were looking at a long-term retirement strategy, they found one in Don Roenigk and Tim Hibbard and sold the business to the current owners in January 2020. Long-term employee and shop supervisor Dan Trombatt rounds out the ownership team.

Jim Frye and Larry McKivigan have elected to stay onboard to ensure that the level of service and accumulated knowledge will transition successfully. Jim Frye has over 40 years in the refractory industry, working operations at both Global Ceramics and Minteq. Larry McKivigan also has over 40 years in the industry, with much of that time spent in the field representing RMS, Furnace Products and Services and others. "With Jim, Larry and Dan involved, we're keeping over 100 years of industry experience" says Tim Hibbard. "You can't replicate that."

According to Jim Frye, ensuring continuity and a smooth turnover was important to the sellers. "We believe it was a win-win for everyone involved, particularly our customers.

By making a change, we are able to ensure stability in the long run."

As far as the new owners are concerned, continuing to maintain strong customer relationships is paramount. "Jim and his team have done an exceptional job at creating a very responsive and incredibly knowledgeable team, built upon customer satisfaction. Our goal is to not only maintain that but build upon it."

One aspect of the business that the new owners have concentrated on is shortening lead times and increasing responsiveness to customers' changing needs. "The RMS motto has always been 'meeting your requirements, on time, every time.' By concentrating on those areas, we feel that we can give more flexibility to our customers. And that's been the feedback that we've been receiving."

Refractory fabrication

RMS offers cutting, flat and cylindrical grinding, drilling and planing of refractory materials, to include fabrication of custom shapes. "From fabricating items two inches in diameter

out of refractory, to flat grinding 70in tank walls, we can work with just about any material; from an IFB (insulating fire brick) all the way to a 41% fused cast AZS (alumina zirconia silica) mix and anything in between," Don Roenigk explains. "There isn't a project that we aren't interested in discussing with a customer. Jim and Dan have proved time and time again that there is often more than one approach to a successful project and they're great at finding a solution."

The company can do a custom shape for a special product or multiple pallets of the same dimensions. And depending on the customer's needs, it can have a turnaround within a matter of days or add it into the queue for six months out to support their longer-term projects.

RMS has seen an increase in consumable material projects, which often places an emphasis on quicker turnaround times. This has been a natural evolution from working to ensure responsiveness with customers and reasonable and consistent turnaround times.



Flatness tolerances between 0.001in and 0.002in are easily achieved.



RMS can grind nearly any size or composition refractory material.



An RMS craftsman fabricating an IFB insulator.

Customers include refractory manufacturers, engineering and contracting firms, as well as float, container and fibre glass production facilities. "We can provide service at any point in the evolution of a project, from testing, construction and production, to continued maintenance and emergency support."

Custom services

One area that has seen an increase in the last few years is match marking and assembly. "That is a great value add, particularly for our international customers with US projects, or for product manufactured outside the USA. We can lay out the project in our nearly 2000ft² assembly room and match mark, fabricate as needed and ship it directly to the point of installation." This allows for any final fabrication work to be completed, as well as facilitate pre-installation customer inspections.

Another opportunity to eliminate lead times for customers is the RMS' company owned and consigned inventory. The company has various fused cast products on hand and can easily provide anything from paving panels to sidewall blocks custom cut to customer specifications. "We try to be as responsive as possible to our customers, particularly with their emergency needs. If we have it in stock or once we receive it, we can turn it around in a matter of hours."

Over the last 10 years, RMS has become a trusted provider of lip spouts and Bay 0 assemblies to both the USA and international markets. As far as assemblies are concerned, its competitive advantage is two-fold. The cost structure and flexibility allows for competitive pricing and responsive lead times compared to established industry standards. "The feedback we receive on our lip spout and Bay 0 assemblies has been very positive, particularly with regard to lead times" says Jim Frye.

Operating environment

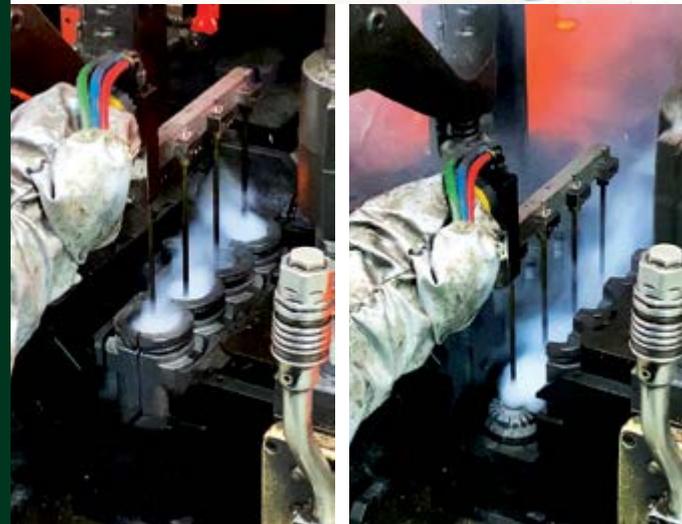
"Wading into a new venture is never easy" says Don Roenigk. "The good news is that we're all doing it together. Our goal is to maintain RMS' position as a reliable partner in the industry but even more so in this challenging environment. We have an extremely skilled workforce and are able to address a full range of customers' requirements and react to any changing needs as necessary. Really, at the end of the day, the question comes down to 'What can RMS do for you?'" ●

About the author:

Don Roenigk is President at Refractory Machining Services

Further information:

Refractory Machining Services, Butler, PA, USA
tel: +1 724 285 7674
email: sales@rmsbrick.com
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Code laser marked on the hot glass container.

characters, it is ensured that even for lines running at high speed, the containers can be marked. An important element to ensure a worldwide unique code is that a worldwide unique line number is used. The line number will be issued by Cetie on request of the glass producer. This service is free-of-charge. If the machine speed allows for bigger datamatrix codes, codes with more code content can also be marked.

Another important aspect is the

position of the code on the container. There are different interests involved. First of all, the code needs to be marked and read. There are a couple of criteria that need to be taken into consideration; detailed recommendations can be found in a document issued by Cetie. Further criteria for the code placement are the requirements of the filler. Depending on his use case, the code should be either clearly visible (eg for marketing purposes) or hidden (eg for anti-counterfeiting).

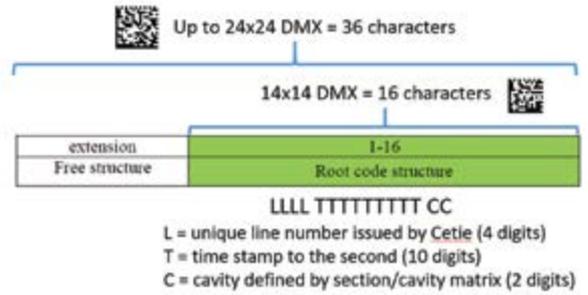


Figure 3: Code definition following the Cetie recommendation.

Small numbers - huge potential

This article explains that the introduction of two small numbers – the container ID to connect the forming and inspection data and the code marked on the hot container – opens huge potential for optimising the glass forming process and creates interesting new possibilities along the value chain of container glass usage. Using this potential will further increase the competitiveness of glass against other packaging materials. ●

About the author:

Thomas Bewer is Senior Project Manager at Emhart Glass

Further information:

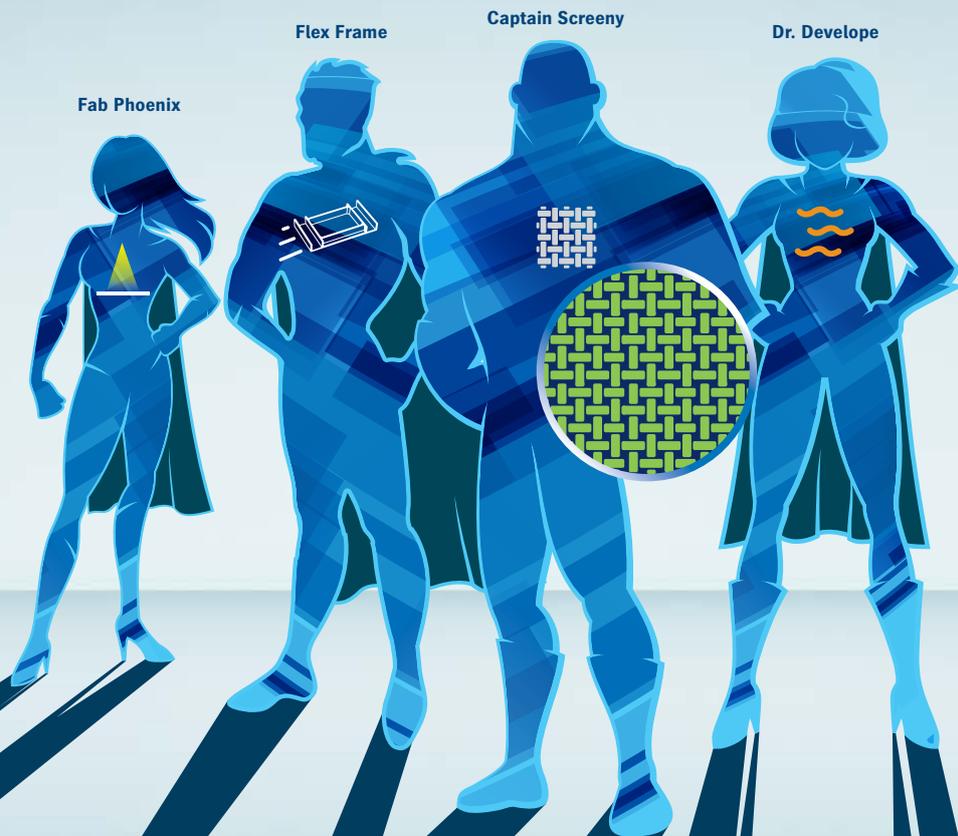
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Conductive digital silver inks innovation

According to Keren Peleg, Dip-Tech's latest conductive digital silver inks provide outstanding functionality.

Dip-Tech, the digital ceramic glass printing business of Ferro, is a leading supplier of digital glass printers and digital ceramic inks. The company's latest innovative product is a conductive silver digital ink, a lead-free silver composition that can be applied directly to standard conductive coating (ITO) on glass. It is part of Dip-Tech's automotive solution package, comprising both machinery and a special set of inks for varied automotive applications. This comprehensive package meets the automotive industry's most demanding standards and requirements for intensive mass production capacities.

Dip-Tech's conductive silver digital ink provides an ideal solution for printing heating grids, bus bars, antennas, demisters and other conductive pads and contacts. All this is possible with the use of Dip-Tech's NEraV printer and the corresponding conductive silver digital ink. This solution enables the application of high quality conductive lines on to glass, with precise positioning and high speed. The printed ink layer is cured during firing, toughening or tempering processes and provides a highly conductive and tough mechanical film, enabling good soldering properties.



Dip-Tech's NEraV enables the printing of high quality designs.

Due to the ideal conductivity and resistivity parameters of Dip-Tech's digital silver inks, many automotive glass manufacturers achieve excellent results in their respective applications. Customers in the automotive sector can rely on a solution that meets the most demanding standards and requirements for intensive mass production techniques.

In addition to the automotive market, the Dip-Tech inks can also be used effectively in many architectural applications to create distinctive, high performance elements such as electrically heated windows, glass heat radiators, alarm and security glass, anti-radiation glass and glass illumination effects.

The conversion is performed with Dip-Tech's NEraD printer. The advantages of this sophisticated technology are

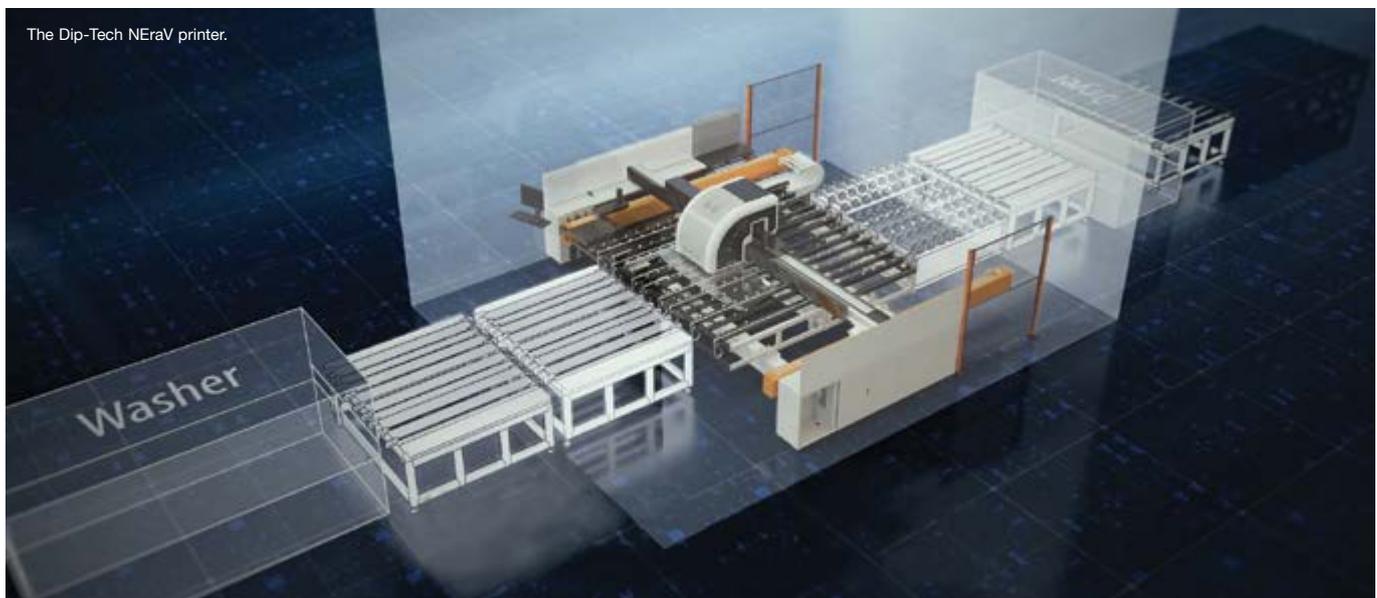
obvious, providing the possibility for glass manufacturers to expand their product range and giving architects increased creative freedom. ●

About the author:

Keren Peleg is Marketing Manager at Dip-Tech

Further information:

Dip-Tech, Kfar Saba, Israel
tel: +972 9 790 8463
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The Dip-Tech NEraV printer.

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Batch preheating - a comeback?

Philipp Zippe reflects on recent batch and cullet preheating system developments and considers the technology's possible future outlook.

ZIPPE Industrieanlagen supplies high performance batch and cullet systems, as well as tailored machinery to the international glass industry. This year, the company celebrates its 100th anniversary. An important part of its portfolio involves batch and cullet preheating systems.

Batch and cullet preheating systems have been known to the industry for more than 40 years. It was in 1984 that ZIPPE filed its first patents, including this technology. Also, the first preheater was installed that year. These preheaters were so-called plate heat exchangers and were designed for preheating cullet. Subsequently, these systems were designed to handle higher amounts of raw materials (sand, soda ash etc), which has always been technically more advanced because one has to deal with the chemical reactions taking place in the raw materials when they are being heated up.

Soda especially appears in several different hydrate phases and at different temperature levels H₂O is being released or bound within it. It can appear even in a decahydrate Na₂CO₃•10H₂O, or completely dry

(Na₂CO₃). For example, these different phases have to be taken care of when designing a batch and cullet preheater, because when the evaporation of water (either from outside like the cullet storage etc, or bound within the raw materials) during heat up is not being handled correctly, safe operation of the system cannot be assured.

Over a period of several decades, considerable effort has been put into coping with that challenge. Nowadays, one can say that second generation preheating systems can run safely without problems of material flow and also with lower cullet ratios than in the past. It is surprising why these systems have not been adopted by the industry more strongly, only a few handful of systems known to be running in the industry. ZIPPE has built a significant number of these. It is known industry-wide that by applying this technology, up to 15% of the total melting energy can be saved. These systems can be implemented at greenfield sites but they can also be retrofitted.

Even today it is true that in modern glass plants up to 30% of the overall melting energy is being lost as waste gases. As long as this is the case, it

remains an environmental but also an economic burden for glass production in general. In many cases, environmental setbacks also reveal economic drawbacks. In a totally efficient world, hardly any losses and waste are generated and therefore, also opportunities.

Initial interest

A first peak of interest in these systems happened during the 1980s/1990s, when the so-called oil crisis also took place and oil prices sky rocketed (figure 1).

A second peak of interest in the implementation of these systems has taken place in the 2000s, again when oil prices reached another high. During these years, a lot of effort was again put into the development. Test installations and pilots for low cullet ratios have been installed. Also, industrial-scale systems have been installed (eg at Ardagh Glass and others) that are often still running today.

These second generation preheaters showed improvements in the handling of evaporated water. It was now possible to direct the released water out of the system and as such, assure a reliable material flow also under lower cullet and high moisture scenarios.

An interpretation of this general investment cycle is that earlier investments in preheating have been to a large extent cost-driven. In scenarios with high oil and gas prices, payback periods are shortened and so capex investments appear more attractive. The author's interpretation is that these investments were mainly cost-driven rather than pure environmental decisions, therefore. ▶

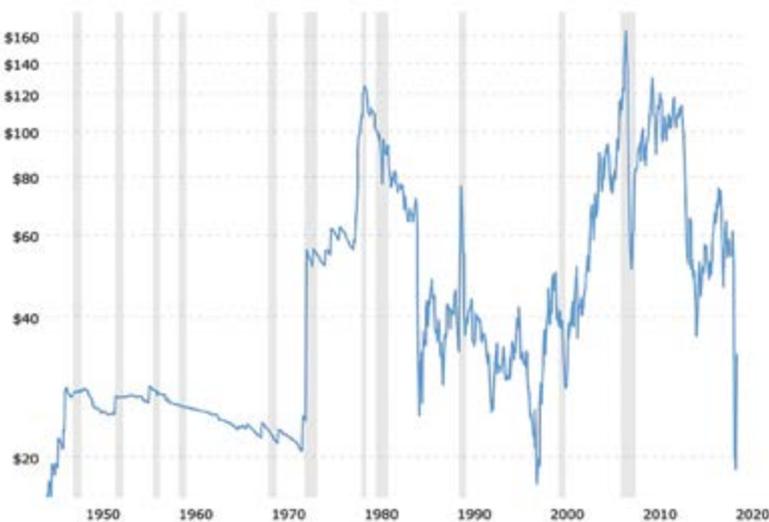


Figure 1: Timing of glass industry interest in batch and cullet preheaters.

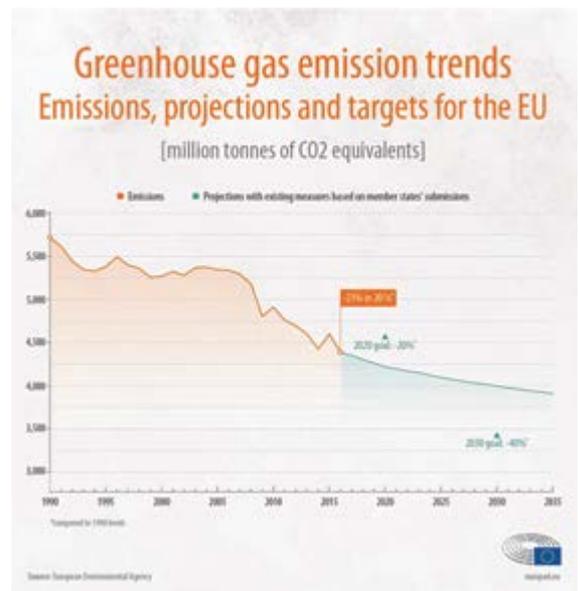


Figure 2: Greenhouse gas emission trends.

GlassTrend



This article is based on a paper presented at the GlassTrend spring seminar on raw materials processing and recycling in May 2020. www.glasstrend.nl

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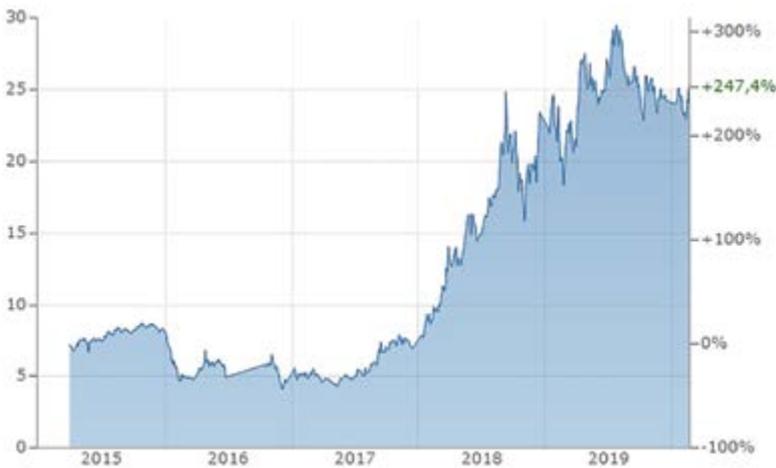


Figure 3: Financial graph.

Regulatory pressures

Today, however, several developments are challenging this rationale. Figure 2 shows the EU's ambitions to reduce their greenhouse gas emissions also for the coming years.

The 2020 goals had already been reached by 2016, while the targets for 2030/2050 are far more challenging. Statements coming directly from EU official announcements include the following:

"Under the directive, all EU countries are required to use energy more efficiently at all stages of the energy chain, including energy generation, transmission, distribution and end-use consumption."

"Putting energy efficiency first is a key objective in the package, as energy savings are the easiest way of saving money for consumers and for reducing greenhouse gas emissions. The EU has therefore set binding targets of at least 32.5% energy efficiency by 2030, relative to a 'business as usual' scenario."

"The EU aims to be climate-neutral by 2050 – an economy with net-zero greenhouse gas emissions. This objective is at the heart of the European Green Deal and in line with the EU's commitment to global climate action under the Paris Agreement. The transition to a climate-neutral society is both an urgent challenge and an opportunity to

build a better future for all."

Several of these announcements are 'directives' that means they must still be ratified by the EU's single national governments within a certain time.

An instrument that showed the willingness of the EU to reduce the greenhouse gas emissions is the ETS (European Trading System), under which producers from CO₂-intense industries are obliged to purchase emission rights. If they produce CO₂-friendly, they can sell unused CO₂ emission permits. It took some years of adjustments until this mechanism showed its impact and effects, with lately strongly rising certificate prices (figure 3).

Besides this regulatory pressure, there is also however another influence, which is perhaps more subtle but may even be more powerful and is coming from consumers and society. The author argues that the mindset of many people is changing in some ways. In the EU, 'Friday for future' movements have been seen, large engined fuel vehicles have seen a certain downturn, the car industry is in a significant transition period, many products are labelled as 'ecological' (or 'bio') for which consumers are willing to pay significantly more and vegan products are seen, as well as the restrictions against the use of plastic etc. The overall direction seems to be that people want to enjoy products



Figure 4: Another comeback is on the cards for modern batch and cullet preheating.

that do not (seem to) harm anybody else; enjoyment must be socially acceptable. Perhaps the consumer is willing to pay a small premium for a container labelled as 'green', or 'ecological' when produced under certain conditions, if an ecological inferior bottle is socially disregarded?

Environmentally-driven mindset

Looking at this development, the author would argue that the EU and many other parts of the world will not reduce their pressure towards an environmental-friendly industry. Therefore, he would like to raise the question whether the glass industry and its decision makers can come from a purely cost-driven mindset to an environmentally-driven mindset. It is to be expected that the cost of pollution will have to be internalised into economic calculations now and even more so in the future.

Suppliers stand ready to find ways and strategies to positively shape this change together with producers and all members of the international glass community. In many major developments, suppliers will have to work together with producers in a collaborative approach, as hardly any major development can be achieved by one supplier alone.

If the above-mentioned framework leads to future decisions that are increasingly influenced by an environmental way of thinking, there certainly is also another comeback on the cards for modern batch and cullet preheating (figure 4). ●

About the author:

Philipp Zippe is CEO at ZIPPE Industrieanlagen

Further information:

ZIPPE Industrieanlagen GmbH, Wertheim, Germany
 tel: +49 93 42 8040
 email: zippe@zippe.de
 web: www.zippe.de

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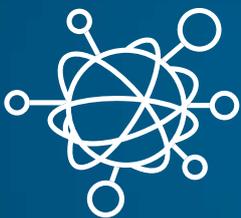


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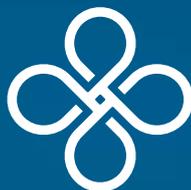
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Specialist image storage capability created

The handling of customer complaints, recalls, resorting and claims is more than a headache for many glass container producers. Above all, when these things occur, time and money spending is high says Paul Schreuders, whose company XPAR Vision has created a specialist image storage capability as an add on to XPAR Vision's InfraRed Dual camera system (IR-D) for the inspection of all glass containers produced and monitoring the glass forming process.



Paul Schreuders.

Based on several customer requests, in recent months XPAR Vision has finalised the development of so-called Long Term Image Storage (LTIS). The LTIS is marketed as an add on to XPAR Vision's InfraRed Dual camera system (IR-D) for the inspection of all glass containers produced and monitoring the glass forming process. Where in the standard IR-D, a maximum of 100,000 images of rejected bottles only are stored, with this LTIS

feature, images from all containers passing the IR-D are stored, effectively two images per unit.

Millions of images

Upon the choice of the customer, storage can be organised on local hard disks or in the Cloud, for as long as the customer wants; up to 12 months and more. Through the technology chosen, literally an 'unlimited' number of images can be stored. Logically, with the help of an

XPAR viewer, the stored images are easy to retrieve. Images are presented in a grey scale or colour, as shown in figure 1.

Great value

Based on the first customers' feedback, the main value of using LTIS are as follows:

- Track and trace: Support internal or external traceability on shorter and longer term. In case of internal use, the availability of all images including their time stamps allow for accurately determining of the minimum of held ware, as such dramatically reducing the numbers of units to resort. In case of external recalls, the same availability of all images allows users to identify the contaminated pallets precisely, with proof towards the customer and so potential damage can be managed and limited.
- Improve hot end settings and the alignment of hot end and cold end settings, as such improving on (internal) quality control and on (external) quality to the customer.

XPAR Vision develops and supplies hot end sensor and robot technologies for the purpose of making glass containers lighter and stronger, produced with zero defects at higher speed and with minimum human dependence. ●

About the author:

Paul Schreuders is Chief Executive Officer at XPAR Vision

Further information:

XPAR Vision BV, Groningen, the Netherlands
 tel: +31 50 316 2888
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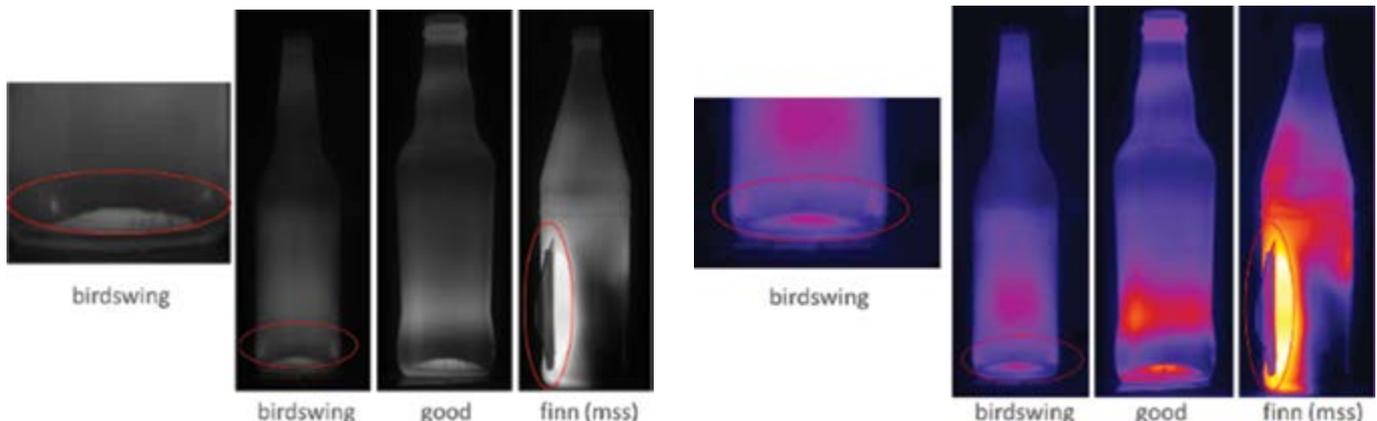


Figure 1: Images are presented in a grey scale (left) or colour (right).

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Utilising waste heat, improving climate balance and reducing costs

According to Bernd Schaezler, to make climate protection tangible, to increase energy efficiency in production, reduce the use of resources, improve the CO₂ emissions balance and significantly reduce costs, the waste heat recovery system from Grenzebach and CNUD EFCO GFT is a mature and highly efficient technology.

Producing glass has always been associated with high energy requirements. The main reason is the comparatively inefficient glass melting process, with a relatively low energy efficiency.

A large part of the lost energy is found in the waste gas from the glass melting tanks. This is where waste heat recovery (WHR) plants come into play. They utilise the waste heat to generate electrical energy, as well as heating and cooling energy for process and air conditioning purposes.

“Our patented heat recovery concept stands out from other technologies, particularly through improved efficiency without neglecting the plant reliability of a flat or container glass line” says Dennis Schattauer, Managing Director of GFT GmbH. The WHR solution from Grenzebach and CNUD EFCO GFT contributes in particular to achieving climate targets, resource conservation and cost efficiency, three of the fundamental challenges in the glass industry.

CO₂ pricing will increase

With the use of the WHR system, the energy efficiency in production increases and the climate balance is improved. The avoidance of CO₂ emissions and the reduced purchase of electricity and fossil fuels has a significant effect on cost reduction. “Especially in view of the European

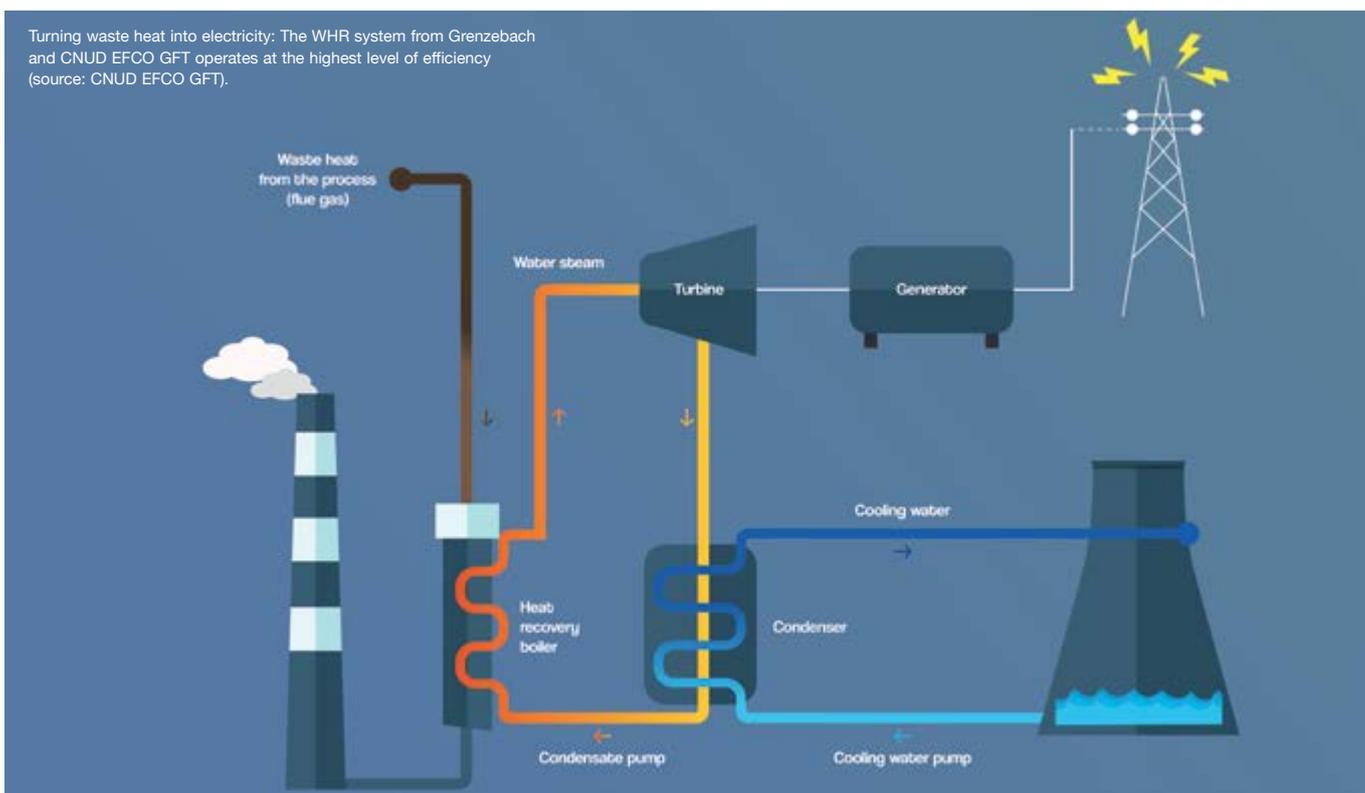
Green Deal, companies should act now to sustainably improve their climate balance” Dennis Schattauer emphasises.

The European Union’s Green Deal sets the goal of climate neutrality for all 27 member states by 2050. In achieving this goal, a significantly higher CO₂ price can be expected. The requirements for the energy efficiency of production facilities will continue to increase. Companies in the glass industry will have to make efforts beyond the voluntary commitment to save more than 20% of CO₂ emissions by 2030.

High energy efficiency and power generation

Based on controlled and proven technology, waste heat recovery plants enable improvements in energy efficiency and the reduction of resource consumption. The solution

from Grenzebach and CNUD EFCO GFT stands out due to its particularly high efficiency for power generation, which can be 35% or more. The WHR system uses the available thermal energy in the melting tank exhaust gas to produce steam at pressures up to 90 bar by integrating heat exchanger boiler systems into the exhaust gas flow. The steam is fed to the highly efficient turbine/generator unit to generate electrical energy. “The WHR technology is a solid solution we can contribute to the glass industry with the combined competencies of Grenzebach and CNUD EFCO GFT” says Egbert Wenninger, Senior Vice President Business Unit Glass at Grenzebach. “Customers benefit from the fact that we now work with integrated knowhow from the hot and cold areas of flat glass lines. A particular focus is on energy efficiency.”



Proven technology from power plant construction

The Grenzebach and CNUD EFCO GFT waste heat recovery systems are exclusively equipped with proven technology from power plant construction. The design is based

on many years of experience and proven computer-aided simulation programmes. The WHR solutions show a performance with guaranteed efficiency, net energy generation and plant availability. Many years of comprehensive knowledge from

the construction and operation of glass production plants are also incorporated into many detailed solutions for the optimal integration of the WHR plants. This smart integration of the WHR plants enables an additional reduction of operating costs and a lowering of investment costs for peripheral equipment.

Promoted by governments in many countries

In terms of return on investment, it should be taken into account that in many countries, the installation of WHR plants is government promoted. In the long-term, higher electricity and gas prices are to be expected, as is an increased use of CO₂ certificates. "In a favourable environment, a corresponding plant pays for itself within three to four years" Dennis Schattauer explains. The benefits of the system will remain fully intact, even if natural gas is substituted by hydrogen as the primary energy input. "Those who operate their production line with hydrogen in the future will maintain the yield of a WHR plant" Mr Schattauer concludes. ●



With a focus on sustainability, specialists at Grenzebach and CNUD EFCO GFT are working together on improved waste heat recovery systems for flat glass plants (source: CNUD EFCO GFT).

About the author:

Bernd Schaetzler is Technical Manager WHR and Utilities at Grenzebach Maschinenbau and CNUD EFCO GFT

Further information:

Grenzebach Maschinenbau GmbH and CNUD EFCO GFT, Asbach-Bäumenheim and Gelsenkirchen, Germany
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Glass experts seek carbon-free glassmaking materials

Researchers from UK-based Glass Technology Services are leading key research areas to develop innovations to significantly reduce carbon emissions generated during glass manufacture. Victoria Adams discusses the project and its goals.



Dr Nick Kirk, Technical Director, GTS.

“The glass industry is already working hard to improve energy efficiency and reduce carbon levels but there is a lot to do to decarbonise and reach the industry aim to achieve net zero by 2050” says Dr Nick Kirk, Technical Director at Glass Technology Services. “We’ve seen an increase in energy efficiency and a reduction in CO₂ levels already due to carbon reduction technologies but more can be done to reduce factory emissions.”

According to Dr Kirk, through research into raw materials, there is an opportunity to reduce the quantity of virgin raw materials needed to produce glass products, whether that is increasing recycling rates and recycled content or looking at glass compositions and the use of waste ash.

Alternative fuels research

“Research into alternative fuels also poses a huge opportunity for the industry to move away from gas-fired furnaces to biofuels and hydrogen



Small-scale melting trial.

and is currently being researched by the Glass Technology Services’ team and Glass Futures, amongst other partners.”

The latest in a number of Glass Technology Services’ projects aimed at reducing carbon emissions kicked off in September. The EnviroAsh project, led by Marlin Magallanes,

is looking at the development of waste-derived raw materials that can be used across other industries, not just within the glass industry.

Partners from across six



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foundation industries – glass, ceramics, steel, paper, cement and chemicals – as well as the energy sector, academia and the waste and raw material supply chain have been brought together to identify opportunities to take waste ashes, slags, mineral by-products and filter dusts from across the industries and convert them into new raw materials for a range of products in the glass, ceramic and cement industries.

Creating opportunities

Another goal of the project is exploring how these feedstocks might create opportunities to improve product performance in a cost-effective manner. Using practical laboratory demonstrations and exploring commercial-scale demonstrations, the consortium is assessing how the new waste materials can be incorporated into existing products and processes.

The project is a follow on from successful research projects EnviroGlass2 and Biomash conducted by Glass Technology Services that demonstrated reductions in CO₂ emissions through batch reformulations. The team has shown

that using waste ash could cut carbon emissions and replace up to a fifth of the conventional mined and man-made raw materials used to make glass (sand, soda ash and limestone). UK biomass power plants currently produce more than one million tons of waste ash/year.

The EnviroAsh consortium, led by Glass Technology Services includes Sheffield Hallam University, The University of Sheffield, Power Minerals, Glassworks Services, Glass Futures, Encirc, Saica Paper, Drax Power, Wienerberger and Castle Cement.

“We are delighted to receive funding to expand upon an established consortium (EnviroGlass2), introducing new partners from others foundation industries” commented Marlin Magallanes. “The work we have undertaken has the potential to revolutionise glass manufacture by using waste materials and can support the important goal to decarbonise the glass industry.”

Project funding

Project funding was received as part of the Innovate UK ‘Transforming Foundation Industries: Fast Start

Projects’ funding call. Support was secured alongside three other projects, namely:

- ‘IRIFIO Intelligent Robotic Inspection for Foundation Industry Optimisation’ led by i3D robotics and supported by Glass Technology Services and Lucideon, which aims to translate sensor technology from the steel sector for use in glass and ceramic manufacture.
- ‘Hybrid Sintering for Decarbonisation and Productivity in Manufacturing’ led by Lucideon with The University of Sheffield, Knowles, Vesuvius and Glass Technology Services. The project will develop techniques to sinter ceramics and glass materials at faster speeds and lower temperatures.
- ‘PowerCO2 Power Generation and Heat Recovery from Industrial Waste Heat with Advanced CO₂ Thermodynamic Power Cycles’ led by Celsa Manufacturing including Glass Technology Services, The University of South Wales and Glass Futures to develop techniques for using CO₂ fluids for electricity generation from foundation industry waste heat. ●

About the author:

Victoria Adams is Communications Manager at Glass Technology Services

Further information:

Glass Technology Services, Sheffield, UK
tel: +44 114 290 1801
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The first Speedliner® 10th generation lehr loader was commissioned in January 2020.



Lehr loader with preventative maintenance planning support

As information technology plays a critical role in increasing productivity, so productivity is the key to ensuring that the maximum return is reached with any CapEx investment. This is of paramount importance, especially in challenging and uncertain times. According to Roy Clarkson, the advent of Industry 4.0 has presented the perfect opportunity for Sheppee to deliver a lehr loader that not only surpasses the requirements of today's production speeds but also offers a way of delivering preventative maintenance planning and reactive support in this post Covid-19 era and throughout the challenges that lie ahead.

In January 2020, Sheppee successfully commissioned under glass its 10th generation lehr loader, the Speedliner®, some 72 years after the introduction of its first mechanical lehr loader. This equipment's success has immediately resulted in the installation of a second Speedliner® lehr loader on the same furnace. Sheppee is renowned for its constant drive to innovate and deliver industry standards. The inclusion of Industry 4.0 technology has taken its latest generation to a different level.

Preventative solutions

For many years, Sheppee lehr loaders have harnessed dial-in technology, allowing the company's technicians to react quickly to issues with the machines in the field. Sheppee strives for a proactive future, however, not a reactive one. The ability to gather and monitor the correct and relevant data in a real-time environment opens countless opportunities for the company to maximise the uptime of the machines it supplies and therefore, the productivity of its customers. Having the correct data to hand, combined with the right experience, means Sheppee can now see

problems with the lehr loader before they become a serious issue, informing the customer and providing a preventative solution with the correct and necessary preparation in mind and on time.

While everyone embraces the concept of preventative maintenance programmes, it is easy to overlook certain aspects due to production demands, especially in the glass industry and the high pressure, non-stop environment. With remote monitoring from Sheppee, a number of important factors can be realised:

- Production downtime is reduced.
- Better conservation of equipment and increased life expectancy, thereby eliminating premature replacement of machinery and equipment.
- Reduced overtime costs and more economical use of maintenance workers due to working on a scheduled basis, instead of a crash basis to repair breakdowns.
- Timely, routine repairs circumvent fewer large-scale repairs.
- Improved safety and quality conditions for everyone.

The ability to monitor and record the running data allows Sheppee to determine when critical components will require attention. Each machine will run at different cycle rates and it is possible to measure when components need changing, based on the cycles completed rather than the number of years running. This ensures that components do not fail due to a miscalculated maintenance programme.

Furthermore, as the industry enters the post Covid-19 era, glass container manufacturers will be looking nervously at the implications that future restrictions and possible lockdowns could have on their workforce and maintaining

their capacity at any one time.

Another consideration is the ability to allow external suppliers into their production facilities to perform essential tasks as travel restrictions fluctuate. Having access to a remote monitoring facility, constantly watching the running status of the lehr loader, combined with the remote support facility, provides a critical advantage to the glass manufacturer.

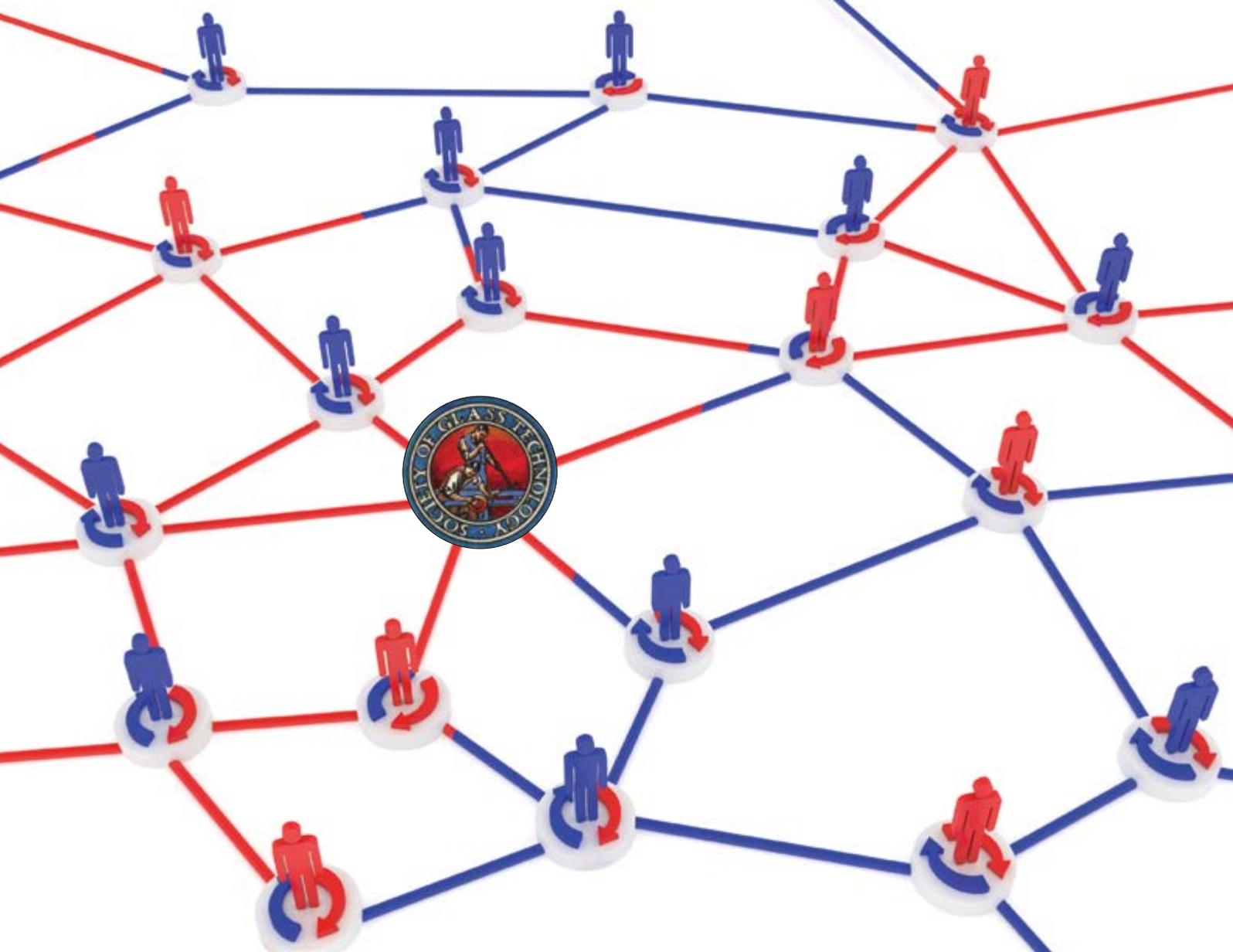
The Sheppee philosophy is one that embraces evolution and the introduction of Speedliner® has come at a pivotal time for everyone. The technology invested in this latest generation lehr loader will provide the security and service to ensure glassmakers will continue to manufacture during uncertain global market conditions. ●

About the author:

Roy Clarkson is Regional Sales Director at Sheppee

Further information:

Sheppee, Elvington, York, UK
tel: +44 1904 608999
email: rclarkson@sheppee.com
web: www.sheppee.com



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Hot gas filtration ensures clean air

The latest advances of hot gas filtration technology are addressed in the following contribution by Manfred Salinger.

Removing dust from particulate-contaminated industrial flue gases at high temperatures early enough is a requirement that makes sense not only from an economic but also from an ecological perspective. However, where synthetic fibre filters reach their limits at around 250°C, with ceramic filter elements flue gases up to 1000°C can be filtered. The microporous filter material made of high temperature wool boasts its strengths. RATH has been developing innovative hot gas filter elements for many years, because those who are familiar with refractory technology are also predestined for hot gas filtration.

Emissions reduction goals

Fine dust, sulphur dioxide emissions and nitrogen emissions caused by high melting temperatures can all

cause poor air quality. As a result, the glass, cement and metal industries, chemicals and petrochemicals as well as waste incineration and recycling plants – like many other industrial sectors – face the same challenge: Filtering and dedusting flue gases and pollutants as efficiently as possible and reducing their emissions.

For many decades, synthetic fabric filters and bag filters have been used as standard for filtering and dedusting. However, these reach their limits when dedusting and filtering industrial flue gases in the high temperature range. They cannot withstand high temperatures and pollutants can no longer be filtered appropriately.

It is different with ceramic filter elements, which can be used to filter hot gases up to 1000°C. Cooling the gases for the purpose of filtering becomes obsolete, saving companies money and energy.

But this type of filtration also has other advantages. The dry particulate separation enables the preservation of process gas and dust properties. Another positive is associated with the cost-effective protection of catalysts. In addition, thanks to ceramic hot gas filtration, downstream systems are also protected by avoiding corrosion and deposits.

This type of filtration also benefits the environment. Because no water is required for this type of filtration, the problem of wastewater is also eliminated.

Highly efficient hot gas filter cartridges

With FILTRATH, RATH has developed a highly efficient hot gas filter cartridge system for the filtration of hot gases. The hot gas filter cartridges that RATH has developed have consistently stable filter properties over the entire temperature range of 250°C-1000°C. Therefore, they can be used in existing flue gas processes without temperature adjustment. Another advantage of the RATH filter cartridges is that they are light, highly porous and have a very low pressure drop.

The excellent quality of these products is based on decades of manufacturing expertise in the



RATH hot gas filtration reactor system equipped with ceramic filter elements, viewed from below.

refractory industry, especially in the field of high temperature insulation wool. The FILTRATH ceramic filter elements consist of vacuum formed, in-house high temperature wool. This brings valuable synergy effects and additional scope in the further development of innovative filter elements.

Catalytic filter cartridges for multiple filtering

FILTRATH CAT catalytic filter elements were developed for multi-pollutant emission control. These rigid yet highly porous and catalytically-coated ceramic filter elements are used for multi-pollutant control of (fine) dust, acidic gases, dioxins and nitrogen oxides used in hot gas flows (at temperatures of 250°C-420°C). RATH delivers tailor-made solutions to ensure optimal catalytic performance.

Filter cartridges of variable lengths

RATH also offers tailor-made solutions in terms of the length of the hot gas filter cartridges. Using a specially developed 'screw and glue' connection, filter cartridges up to a length of 6m can be produced from several segments. The segments are assembled into a long filter element when the filter cartridges are installed on-site.

This smart solution enables the use of long filter elements even where the spatial conditions do not allow it. It is an innovative technology that some cement plants have already opted for with the world's first filter systems with 6m long filter elements in use. ●

FILTRATH is a registered trademark of RATH

About the author:

Manfred Salinger is Managing Director at RATH Filtration GmbH

Further information:

RATH AG, Vienna, Austria
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Automatic double edging equipment innovation

Italy's Schiatti Angelo has upgraded its double edging machine for flat glass processing to fully automatic operation, as the following contribution from Silvia Villa explains.



Standard configuration for the BFP35 double edging line.

The Schiatti BFP35 double edging machine, already widely appreciated for its technical capabilities, is now a 100% automatic flat glass working machine. Complete lines assembled at the company's Seregno factory comprise two double edgers and two connecting/transfer tables. With 11 diamond and polishing wheels per side fitted on each machine, the line allows the processing of all four edges of glass sheets completely automatically, without operator intervention, granting perfect squaring. Precision and quality are assured.

The line features an automatic glass loader that works in co-ordination with the edgers. Depending on individual customer requirements, the line can also be integrated with a drilling centre or simply with an automatic glass unloader.

Production process

Everything starts with the accurate positioning of the glass sheet to be processed at the loader. The area near the loader features protection nets to safeguard the operator, allowing entry only when the machine has stopped. Opening the entrance door stops the loader operation.

A scanner positioned over the cupholder frame reads a barcode positioned on every glass sheet. Relevant data is taken both from the loader and the first machine. Based on the codes in the database, the loader sets itself automatically, activating only the necessary suckers and calculating the loading timing, while the first machine sets up the whole line.

The PLC of the first machine works as a control centre for the management of all line operations. The touch screen makes it possible to programme and manage diamond wheel pre-settings, even individually, as well as lubrication, control of all automation functions, while also visualising the working data and troubleshooting.

The main electrics box is self-standing and contains all main electrical and electronic components like the PLC and a modem for internet connection, which allows users to programme and maintain the machine and other service inputs remotely.

Every time the machines are started up, all diamond wheels are automatically preset and lubricated.

When the glass arrives at the machine entrance, mechanical readers record its position. The aligning group lines up the glass sheet to the fixed part of the machine, while the removal group sets the quantity of glass to remove for each side.

Grinding and polishing of the first two sides of the glass are performed at a pre-set speed. If the glass sheet is large, the central bar that supports the glass is moved automatically to avoid the glass flexing.

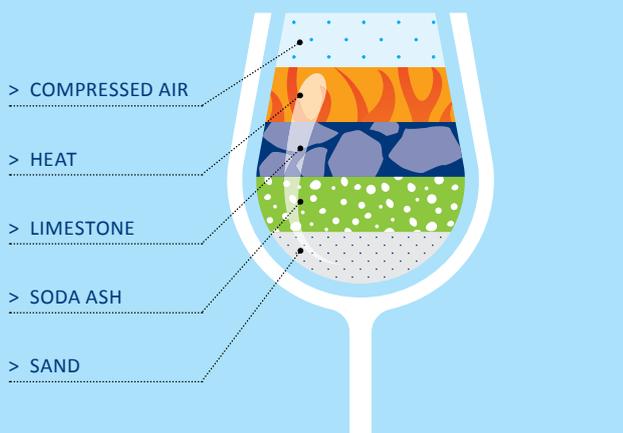
At the exit of the first machine, the sheet is moved into the roller section of the transfer table.

When the glass is completely over the transfer table, the roller section lowers and the sheet is laid on the belts, which carry it into the second machine for the grinding and polishing of the remaining two sides.

Before entering the second machine, the glass is automatically stopped for correct alignment and squaring. For large glass sheets, the automatic transfer system raises the glass to facilitate squaring.

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Oscillating diamond wheel.

Also in this instance, the group that regulates glass removal determines the quantity of glass to be removed for each side. Then, the remaining sides of the glass sheet are ground and polished.

The following dressing or 'dubbing' phase is optional, where the sharp corners are dubbed two by two from this group. After this process, at the outlet of the machine, the glass is automatically pre-washed and excess water is removed, before the glass is unloaded or is subjected to further processes.

Another optional feature of the BFP series of edging machinery involves the use of oscillating diamond spindles. This spindle has a peripheral wheel that facilitates the grinding of particularly thick and laminated glasses. Its oscillating movement helps to level the wheel's wear characteristics. ●



A custom-programmed Mitsubishi PLC is used.

About the author:

Silvia Villa is Communications Manager at Schiatti Angelo

Further information:

Off Mecc Schiatti Angelo srl, Seregno, MB, Italy
 tel: +39 0362 238496
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Drinking glass decoration proves efficiency and quality

In 2018, French glass manufacturer Arc used Gallus Screeny equipment on a small scale for the first time in its production following an extensive test phase. Two years later, the leading producer of tableware and drinkware uses 64 screen printing stations in its daily production and is impressed by the improved screen life, the reproducibility of high print quality and the fine details that can be produced reliably with Gallus Screeny C-Line precoated mesh. Rosina Obermayer reports.

“In early 2016” Matthias Rosenfelder, Head of New Business Screen Printing at Gallus recalls “the first request for the Screeny system came from David Leblond, R&D Manager at Arc France, who wanted to know what would be needed to implement it and which advantages they could benefit from using the Gallus Screeny equipment. Then, in spring 2016, they tested the first Screeny C-Line mesh on a printing machine.”

Based on the resulting positive experiences, Arc France invested step-by-step in further Screeny equipment. By summer 2020, the glassmaker was working with a total of 64 printing stations. This means eight printing machines are each equipped with eight Gallus Screeny C-Line units, an impressive volume of screen printing production used for the decoration of drinkware.

For printing with the Gallus Screeny C-Line properly, the company uses custom-made fast tension frames from Gallus. This enables increased overall efficiency during the screen printing process. Furthermore, in spring 2019, Arc installed the Gallus Screeny 400Eco, a fully automatic developing unit to wash out the screen meshes. For imaging the meshes, the tableware producer uses digital (computer-to-screen), as well as conventional imaging processes.

Established in 1825, Arc has nearly 200 years of knowhow in glassmaking. The company serves B2B, consumer goods and food service markets. The main application for the Screeny equipment is screen printing on drinkware, eg water, wine and beer glasses, as well as decorative printing on the food segment items like honey or mustard jars.



Compared to conventional screen manufacturing, the Gallus Screeny C-Line offers cost benefits and quality improvements when decorating hollow objects (source: Gallus Ferd Ruesch AG).

Increased productivity

Arc reports a longer screen lifetime and the reliable reproducibility in print and perfect quality. These reasons were enough for investing step-by-step in more Screeny units, now in total 64 printing stations. In combination with the fast tension frames and the Gallus Screeny 400Eco developing unit, the company reports significant improvements in productivity, as well as efficiency.

Compared to conventional screen manufacturing, the Gallus Screeny C-Line offers cost benefits and quality improvements when decorating hollow objects. The system solution including

the Gallus frame system is suitable for thermoplastic, UV, solvent and one- and two-component ink systems. The ideal application is direct printing on hollow objects.

Printing fine details

Printing reproducible applications with fine definition of details was and is still the key reason for investing in the Gallus Screeny C-Line. Using Gallus C-Line stencils, very fine details can be printed and high reproducibility is guaranteed. Fine fonts or lines can be printed easily, reliably and efficiently, in addition to the positive productivity impact.



From left to right: David Leblond (R&D Manager), Vincent Delattre (Production Manager), Jean-François Evrard and Benoit Pouille (both Industrial Operators) at Arc, in front of the Gallus Screeny Eco400 (source: Arc France).



Jean-François Evrard, Industrial Operator at Arc, during preparation of Gallus Screeny C-Line meshes (source: Arc France).



Vincent Lecomte, Industrial Equipment Operator, is impressed by the improved performance (source: Arc France).

“Gallus technology improves the definition of details, especially in food packing business and offers perfect reproducibility in print quality” says Nicolas Heunet, Plant Manager at Arc France.

The Gallus Sreeny precoated C-Line screen printing plates enable a fast production time of just 10 minutes for a ready-to-print stencil. This leads to a time saving of 60 minutes compared to conventional screen manufacturing.

Arc Group is leading in the design, production and distribution of tableware items and professional grade tableware. With several production sites around the world (France, USA, China, UAE and Russia), the company’s products are distributed in more than 160 countries. In Arques, France the Arc Group has its headquarters and employs approximately 4500 people. The company’s distribution channels cover all sectors; consumer goods, food service and business-to-business.

“With Arc, we have proved that the Sreeny C-Line is perfectly suited for the drinkware sector, more precisely for drinking glasses” says Matthias Rosenfelder from Gallus. “With our products, we are meeting all market requirements including all ink systems available in the market. “Experiencing such a great improvement regarding productivity, reproducible print quality, as well as fine details, is making me proud each time we implement our Sreeny equipment.” ●



A finer definition of details and a reliable and reproducible print quality are reasons why Arc France is already working with eight machine systems, each equipped with eight screen printing units (source: Gallus Ferd Ruesch AG).

About the author:

Rosina Obermayer is Content Marketing Manager at Gallus

Further information:

Gallus Ferd Ruesch AG, St Gallen, Switzerland
 email: rosina.obermayer@heidelberg.com
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High performance ware handling ensemble completed

Francesco Baldin discusses the latest glass container ware handling developments from Italy's Revimac.

Via over 30 years of developments in the hollow glass industry, creating vertical solutions for different types of container production, Revimac has been a leading manufacturer of hot end ware handling equipment, in addition to re-manufactured IS machines and glass conditioning forehearth.

Extensive global experience with installations worldwide, both for multi-national groups and independent glass plants, confirms that the policy of the biggest market players was increasingly moving towards large-scale container production and a lighter glass weight, the soul of the high performance line concept.

Until now, supporting customers on the basis of this principle, Revimac has successfully developed and installed the RSS 950 and RSS 100 lehr loaders (stackers), where the latter is capable of handling containers at speeds of 22 cycles/min. Both devices are equipped with the self-learning function, based on AI technology.

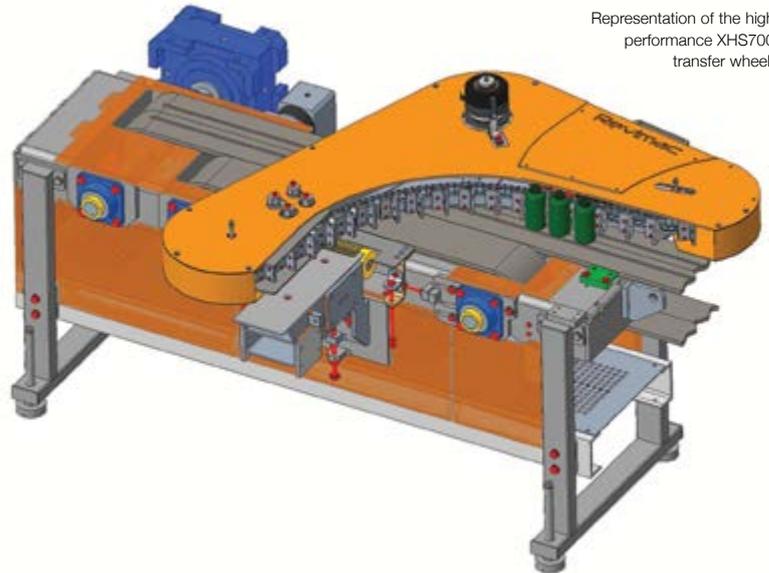
In order to match the high performance container process, Revimac has now designed and developed the XHS 700 high performance ware transfer, capable of transferring articles from primary conveyor to cross conveyor up to speeds of 950 bottles/min, depending on container dimensions.

The equipment design is based on a double belt conveyor drive with a short auxiliary belt. This makes it possible to keep the bottles in firm and steady contact with the fingers during their transfer.

The standard configuration comes with one drive for both belts and it is designed to have a 1:2 speed reduction ratio between primary and secondary belts. Optionally, in line with customer demand, it can be installed with one drive for the primary and one drive for the secondary belt. In this case, there is the possibility to set and adjust a different and independent speed on both belts. In any configuration, standard or customised, the containers benefit from perfect stability during the transfer phase.

Moreover, the conveyor drive integrates a fixed cross-conveyor connection to guarantee steady article transfer that is also supported by the perfect alignment between the belts. The cross-conveyor is connected with a hinged terminal to compensate for minor height variations.

This design is studied with a larger radius and a



Representation of the high performance XHS700 transfer wheel.

suitable chain guide along the transfer profile, where the fingers have no movable parts, being directly supported by the belt in a position that is very close to the contact point of the container. The combination of all these features, added to the perfect alignment between primary conveyor and cross-conveyor belts, allows containers to reach maximum transfer stability between the two conveyors.

The system is designed to eliminate vibrations on the pockets, thanks to the large guides and automatic chain tensioner. For easy alignment operations, the XHS 700 ware transfer is designed with an adjustable lower ware guide on the conveyor and cross-conveyor connection.

The adjustable transfer plate and the easy change system of the

cross-conveyor roller, make operation and maintenance easier for operators. It is worth noting that the integration of the double belt conveyor drive is also available for the other Revimac ware transfer models.

Finally, with the addition of the XHS 700 model, the company has completed a full set of high performance ware handling equipment, where ware transfer, stacker and cross conveyor are able to handle massive production runs of glass containers with the highest reliability, improving hot end efficiency and pack-to-melt.

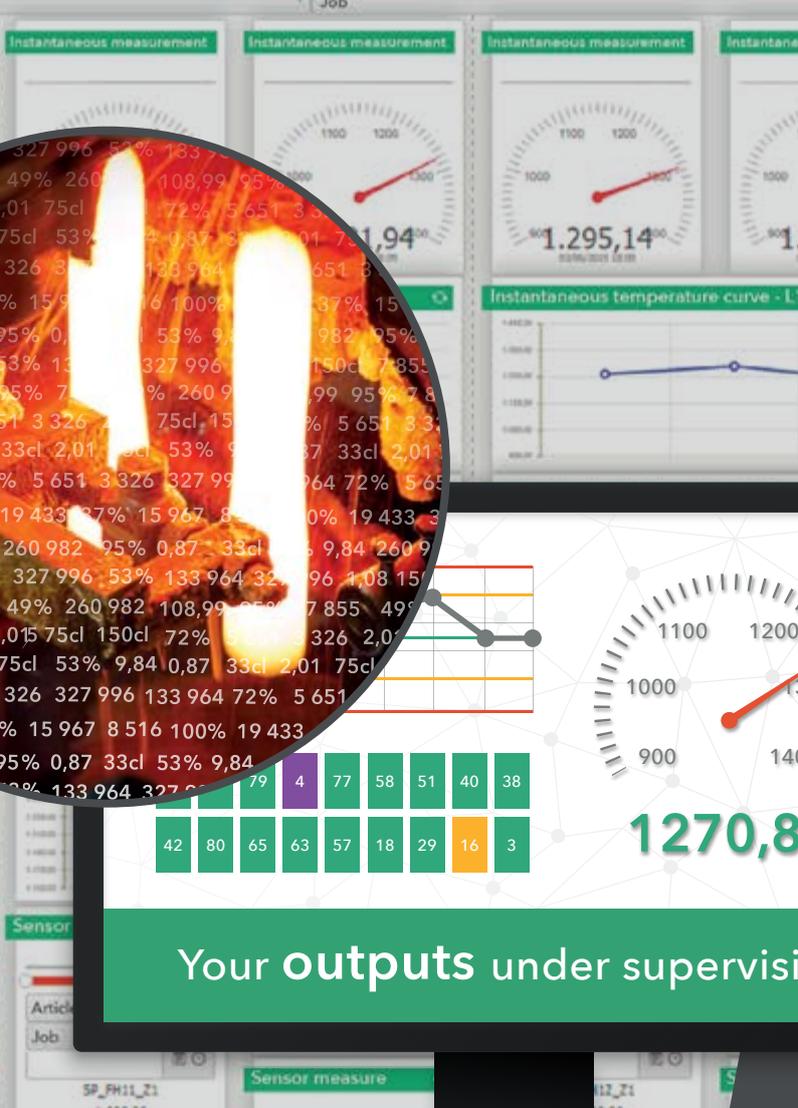
Specially conceived for double, triple and quad gob production, the Revimac high performance ware handling ensemble is the answer to a continuously growing and changing market, giving the flexibility to handle the widest range of glass containers. ●



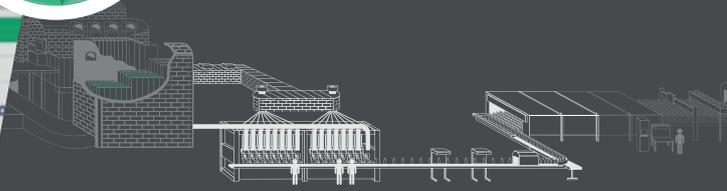
Paddle view of the high performance XHS700 transfer wheel.

About the author:
Francesco Baldin is a Key Account Manager at Revimac

Further information:
Revimac srl, Montecchio Maggiore, Vicenza, Italy
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Simply the best!

Whether flat or hollow, glass manufacturers must inspect their end product in order to meet customer requirements or guarantee compliance with safety standards. As outlined by Gesine Bergmann in this contribution from the VDMA – Glass Technology Forum, the correct measuring technology helps.

Viprotron GmbH, located in Pfungstadt, Germany, offers complex measurement systems for different types of glass. For monolithic glass, such as single pane safety glass, laminated safety glass and single insulation panes, the company's Quality Scanner 3D system contains three measurement arrangements. The first channel analyses the transmission of light in the brightfield to detect contour and contrast defects, such as scratches, inclusions, bubbles or butyl residue. A second channel uses the darkfield to make hairline scratches or marks from rolls or cork pads visible, while the third channel analyses reflection data. This channel is particularly suitable for detecting coating defects, such as pinholes or brush abrasions.

The three channel technology is deployed throughout the entire value chain, including laminating and coating or prior to printing. For example, it can recognise hairline scratches from a size of 0.05mm in width at inspection speeds of 50m/min and a glass width of up to 3.21m. Even smaller values can be implemented for technical glass. Panes can be between 2mm and 45mm thick, optionally up to 100mm thick. Depending on the version, the system can even inspect satinised glass or panes dyed on a single side. Users can perform cleaning or post-processing steps prior

to further processing, thereby ensuring good results.

The ECO Scanner is a simpler system for less stringent requirements, which inspects glass using transmitted light, while complying with the applicable standards. The camera and light source are combined in a single component and a measuring gap in the conveyor is not required. This saves time and costs during installation, while the space demands on the production line are lower too. These devices can recognise defects from a size of 0.5mm on a glass pane up to 3.21m wide and at inspection speeds of up to 20m/min, with the option of increasing this to up to 40m on insulating glass lines. They can inspect panes up to 19mm thick and are ideal for secondary lines, or for companies taking their first steps into scanning technology.

Stressed out

Glass panes intended for facade applications are generally tempered. This production process creates compressive stress in the surface of the pane, thereby increasing its strength. It is vital that this stress is distributed evenly across the pane. The Anisotropy and White Haze Scanner makes differences visible and specifies the optical delays in light transmittance. Photoelasticity provides the basis for this. This measurement technique is ideally suited for use immediately following a tempering furnace, as it not only evaluates the glass as a product but also provides

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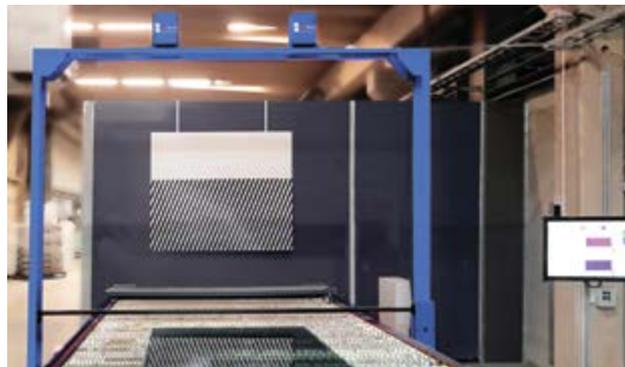
- **Longstanding tradition:** Founded in 1953, focusing on the R&D and manufacturing of steel chains, plastic chains & sprockets.
- **Strong capability:** Totally 1520 employee working at 7 manufacturing factories including a dedicated inverted tooth chain factory established in 2006.
- **Stable financial performance:** More than 1.2 Billion Yuan (around 180M USD) turnover in 2019.
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Viprotron GmbH offers complex measurement systems for different glass types.



VMA is a specialist for contactless optical thickness measurement of container glass.

valuable information on the state of the furnace and for optimising the furnace parameters. The Anisotropy Scanner can inspect glass up to a thickness of 20mm on a glass pane up to 3.21m wide and at conveyor speeds of up to 25m/min.

Subcommittee C14.08 on Flat Glass at ASTM is currently preparing a standard for specifying procedures for determining the anisotropy in flat glass. Viprottron is a member of this working group.

Through thick and thin

Ensuring uniform wall thickness is decisive when producing glass containers. As has been the case for a while, there is a trend towards lightweight bottles, as glass packaging is becoming ever thinner in order to save resources. The risk of the glass breaking increases as it is too thin at various points. Therefore, it can break during filling and block the customer's entire production line, resulting in high costs for both fillers and glass manufacturers. The correct measurement technology enables thin sections in container glass to be discovered during production, so that the affected glasses can be removed before they break.

VMA Gesellschaft für visuelle Messtechnik und Automatisierung mbH is a specialist for contactless optical thickness measurement of container glass. Its measurement devices identify the location of thin sections for glass manufacturers and deploy a sorting function to ensure that only container glass that meets the wall thickness specification is packaged.

Thickness measurement is used for a diverse range of tasks. Glass manufacturers produce container glass in a wide variety of shapes, some of which are highly complicated. In particular, the areas in which there are significant deviations from a cylindrical form – such as the transition to the bottom of the bottle or the shoulder area – are susceptible to thin sections and are difficult to measure. Equally problematic is very dark container



The TMC-FLX system from VMA.

glass, as thickness is measured optically. As the contactless measurements take place while production is ongoing, the inspection speed must be fast enough to keep up with the high production speed and the thickness measurement must be accurate.

VMA measuring systems are characterised by their specialised algorithms and a mature design. The devices can record up to 16 measuring points on the glass container. They offer the perfect sensor for every shape and can inspect almost every glass colour. The sensors are generally calibrated for measuring glass up to 7mm thick. In special cases, significantly thicker container glasses can be measured, with the lower measurement limit being just 0.2mm. The TMC-FLX system, for example, can reliably determine the thickness of up to 400 containers/min.

Fast and flexible

VMA devices not only measure the wall thickness but can also process and classify the data, enabling them to make the correct sorting decisions. The sensors can be integrated flexibly into existing inspection machines and transfer their results into the company information system. If the measured values of the sensors are linked to the shape numbers, there is the option of using statistical trend analyses to recognise and rectify any process or machine-related problems in a timely manner.

VMA develops all of its products in-house. As such, the customer has the benefit of being able to replace individual components over time – even in-house – instead of having to replace the entire system, thereby saving money and materials. ●

About the author:

Gesine Bergmann is responsible for the VDMA – Glass Technology Forum

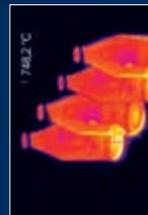
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Value in the use of anhydrous boron in glass

Allen Zheng discusses the value in use that various anhydrous boron compounds provide in glass melting processes.



Allen Zheng is APAC Development Specialist for U.S. Borax.

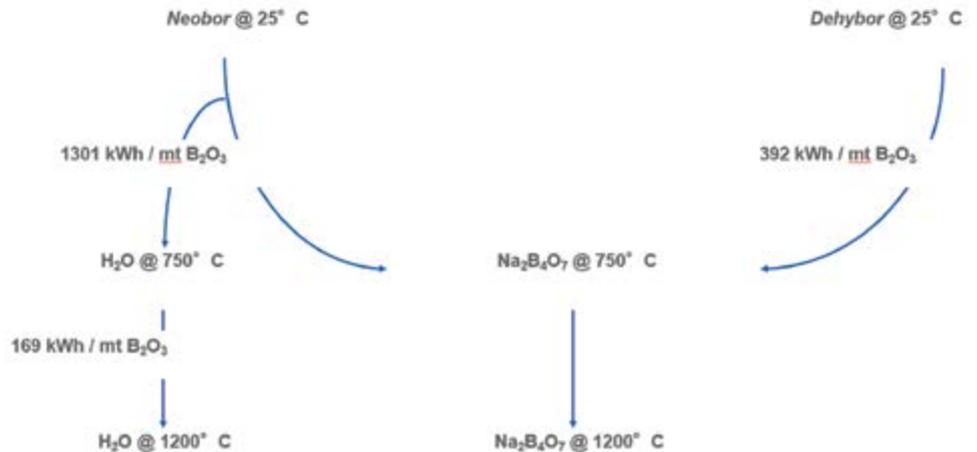


Figure 1: Energy necessary to melt borate products.

In the case of sodium tetraborate (commonly used in borosilicate glass or C-glass fibre applications), hydrous refers to $\text{Na}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$, whereas anhydrous refers to $\text{Na}_2\text{B}_4\text{O}_7$. In other words, anhydrous boron is a more concentrated form of boron, containing 1.4 times more B_2O_3 . The additional value that anhydrous products bring goes beyond the concentration difference of B_2O_3 .

Higher chemical concentration helps with debottlenecking the pull capacity and logistic/materials handling costs. The lack of crystal water in anhydrous and the absence of puffing and decrepitation phenomena are fundamental to other volatility related benefits.

Energy savings

An anhydrous product, such as Dehybor, will use less energy to melt than a hydrous product, such as Neobor. The actual savings will depend on the energy source and plant condition (see figure 1).

From a theoretical calculation, using anhydrous batch will enable an energy reduction of approximately 3%. Recent laboratory studies managed by

CelSian and performed within the framework of a GlassTrend consortium project used a time-dependent batch energy measurement system. They showed that glass batch using anhydrous is able to achieve more than 11% in energy savings, which is consistent with typical C-glass producer feedback (see figure 2).

Energy savings are an important consideration for C-glass manufacturers located in countries where gas prices are relatively high. Apart from gas price, savings will also be subject to plant-specific variables, such as the amount

of cullet used and the choice of raw materials. With less volatility loss of B_2O_3 , the Dehybor batch will further enhance the energy savings.

Improved productivity

Apart from a higher concentration in B_2O_3 , anhydrous products also have a higher bulk density, so anhydrous batch will create more space for

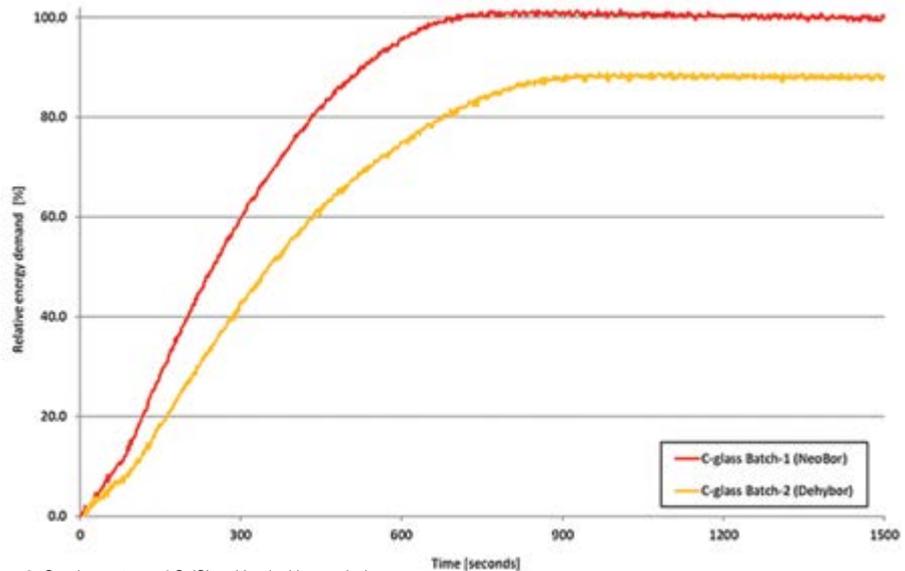


Figure 2: Graph courtesy of CelSian. Used with permission.

GlassTrend



This article is based on a paper presented at the GlassTrend spring seminar on raw materials processing and recycling in May 2020. www.glasstrend.nl

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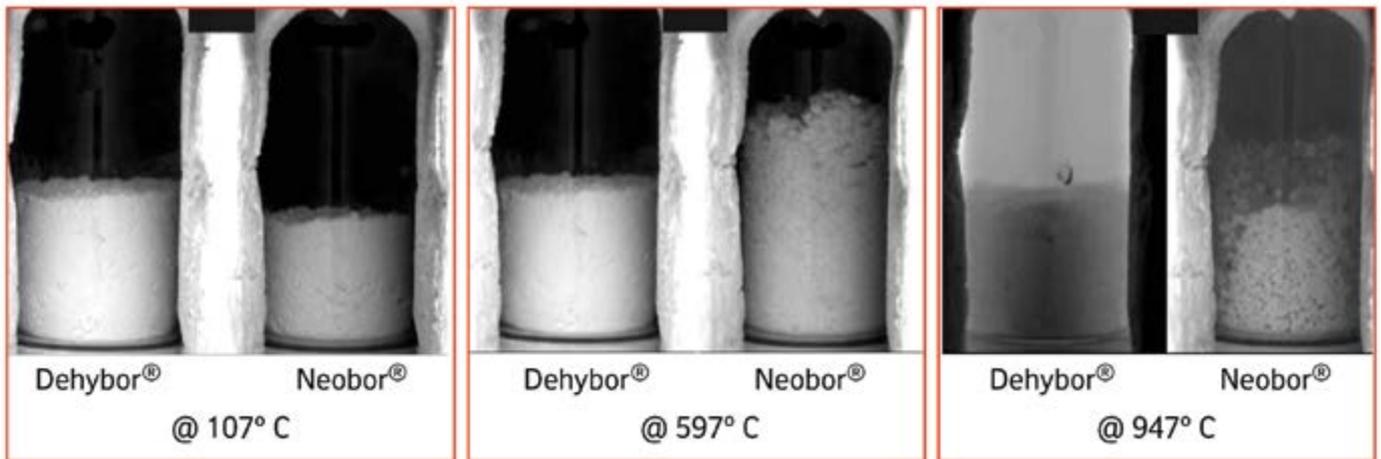


Figure 3: Photograph courtesy of U.S. Borax. Used with permission.

other raw materials, debottlenecking capacity when pull is constrained.

Typically, AB-consuming C-glass producers have reported a 3% capacity gain when using an anhydrous product. Although the extent of gains are subject to batch formulation and other process constraints, improved productivity is usually considered the most significant component of the value-in-use of anhydrous products. This provides not only a long-term benefit but also a flexible short-term alternative to capital investment.

Reduced volatility loss

Boron is volatile and subject to loss through emissions. High emissions could mean:

- Loss of raw materials and the expense that incurs.
- Additional cost involved with handling dust captured by the abatement system, if available.
- Environmental compliance pressure.
- Process challenge.

An anhydrous product will improve volatility, reducing boron loss through emissions. In part, the significant differences in behaviour are attributed to puffing and decrepitation phenomena of Neobor when releasing

water from the crystal structure. The observation can be replicated in high temperature observation camera systems that record the height and condition of batch at different time and temperature intervals (figure 3).

Typical emission loss of B_2O_3 in the Dehybor batch and the Neobor batch are 5% and 10% respectively. In some Asian C-glass producing plants, where the emission loss of using Neobor is more severe than 10%, hydrous products provide an attractive solution.

Reduced erosion to the furnace

While it is hard to quantify in the short-term, the reduction of boron and sodium volatility will then, in theory, improve corrosion resistance of a furnace and lower the lifetime maintenance costs.

One qualitative case study relates to a C-glass producer who collected wall deposition during a furnace cold repair and sent them to U.S. Borax for testing. The laboratory identified high Al_2O_3 and high B_2O_3 . According to the manufacturer, the elevated Al_2O_3 level was believed to be from the furnace's high Al bricks. After switching to an anhydrous borate product, the company found that the occurrence of wall deposition had been reduced (figure 4).

Composition	SiO_2	Al_2O_3	Na_2O	B_2O_3
Content	17.7%	23.2%	15.8%	31.8%

Reduced freight cost and end product quality

Because of its higher concentration, anhydrous products translate into freight benefits. Furthermore, although sporadically and less commonly mentioned, some manufacturers commented that anhydrous batch helps the application and process control of low quality cullet containing melt.

Future work and limitations

Despite all of the significant benefits of using Dehybor, some C-glass producers have suggested that it cannot be used in cold top electric furnaces due to earlier occurrences of volcano with Dehybor batch. U.S. Borax is researching the boundary and enablers of anhydrous products in this furnace type.

Keep in mind that the applicability and the extent of each benefit are subject to plant conditions and may vary in real world applications. U.S. Borax's technical service team works with customers to explore and verify these benefits through controlled plant trials. The technical service team can also provide other value-added services, including defect analysis and raw materials analysis. ●

Dehybor and Neobor are registered trademarks of U.S. Borax.

About U.S. Borax

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates - naturally-occurring minerals containing boron and other elements. The company employs 1000 people serving 500 customers, with more than 1700 delivery locations globally. Some 30% of the world's need for refined borates is supplied from a world class mine in Boron, California, approximately 100 miles north east of Los Angeles. The company pioneers the elements of modern living, including:

- Minerals that make a difference: Consistent product quality secured by ISO 9000:2001 registration of its integrated quality management systems.
- People who make a difference: Experts in borate chemistry, technical support and customer service.
- Solutions that make a difference: Strategic inventory placement and long-term contracts with shippers to ensure supply reliability.

About the author:

Allen Zheng is APAC Development Specialist for U.S. Borax and is based in Singapore

Further information:

U.S. Borax, part of Rio Tinto
tel: +65 6679 9000
email: allen.zheng@riotinto.com
web: www.borax.com



Figure 4: Photograph courtesy of U.S. Borax. Used with permission.

Survey highlights strong consumer preference for glass

A nationwide USA consumer trends survey from EcoFocus Worldwide, highlights an increasingly strong preference for and perception of glass bottles and jars across various spectrums and indicators. Scott DeFife reports.



In one of the first national consumer surveys post-Covid response, approximately 2000 survey respondents provided insights into a broad range of categories, including package purchase preference, sustainability and product protection. The survey, which has been conducted by EcoFocus Worldwide several times over the past decade, highlights the important role glass continues to play in the marketplace, its environmentally-friendly nature and the protection it provides to food and beverages.

Top choice for food and beverages

Consumers made significant increases in purchasing alcoholic beverage categories at grocery outlets in 2020 compared to 2019 and 2018. Survey respondents continue to prefer glass as the package of choice for beer, wine and spirits. For beer, 66% indicated a preference for glass bottles, followed by a 54% preference for cans. Glass' packaging preference for wine and spirits was even higher, with 88% of respondents choosing glass as their preferred packaging over can or bag-in-box. Over half of the survey respondents indicated they purchased food in glass jars in 2020, highlighting the continued trust in glass, even as packaging options continue to diversify.

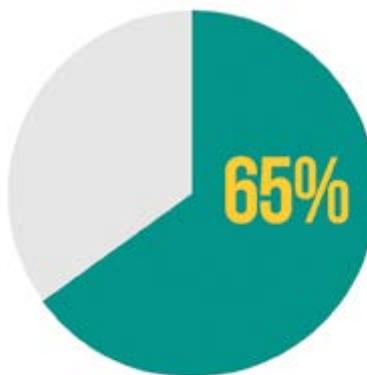
Respondents also rated glass higher than any other package (64%) when asked their preference for premium food and beverages. Glass was also the top choice when respondents were asked to consider how they viewed packaging for healthy foods (69%) and healthy beverages (70%). Respondents also have a clear grasp on glass' properties, as it ranked the best of all packaging surveyed when asked about their view of the potential to impact the taste or purity of the food or beverages it holds.

As the glass container industry witnessed over the first half of 2020, a double-digit increase in shipments of glass food containers to consumer-packaged goods companies and retail outlets dovetails with the perception that glass is a good fit for these categories.

Sustainability and environment

A focal point of the 2020 survey was placed on respondents' views regarding packaging's impact on their health and the environment. Covid-19 also seems to be having an influence on purchasing behaviour, as more consumers report being mindful of packaging attributes in reaction to the outbreak.

As issues surrounding food and beverage packaging's sustainability attributes continue to gain attention at state and national levels, consumer attitudes within these areas are important to understand. Over half of all survey respondents said they seek out packaging that is recyclable,



65% OF GROCERY SHOPPERS AGREE THAT HEALTHY BEVERAGE BRANDS NEED TO DO A BETTER JOB OF PROVIDING ALTERNATIVES TO PLASTIC PACKAGING. *



made from recycled materials or is reusable in some manner. Glass bottles and jars fit all of these criteria and were consistently top-rated in a variety of environmentally-based

questions, as highlighted below.

Survey respondents indicated that recyclable packaging (61%) was the most eco-friendly packaging option. Of the packaging options

GLASS IS THE HEALTHY CHOICE FOR CONSUMERS



76% OF GROCERY SHOPPERS BELIEVE THAT BEVERAGES PACKAGED IN GLASS BOTTLES OR JARS HAVE A POSITIVE/NO IMPACT ON HEALTH. *



74% OF GROCERY SHOPPERS BELIEVE THAT FOOD PACKAGED IN GLASS BOTTLES OR JARS HAVE A POSITIVE/NO IMPACT ON HEALTH. *

* Ecofocus Consumer Trends Survey, 2019

presented, glass (56%) had the highest eco-friendly score. With respect to a package's environmental impact, respondents rated glass the highest in both food (73%) and beverages (74%), indicating a positive impact on the environment. The potential of glass for reuse and storage were also noted.

Complementing these ratings is that

over 60% of respondents said they feel positive towards a company only if they use packaging that is either recyclable or made from recycled materials. Reducing waste, pollution and conserving natural resources are also key indicators for nearly seven out of 10 respondents and are company characteristics that are actively sought out by consumers.

The glass container industry continues to work to reduce its environmental footprint and recycling is a huge part of this effort. Glass is 100% recyclable and the general public agrees. Surveyed consumers ranked glass in a clear top three core of the most recycled household materials. Using recycled glass to make new glass bottles, jars and containers reduces greenhouses gases, conserves natural resources and saves energy for manufacturers.

The consumer response to the pandemic has paid more attention to the packaging of the products chosen and glass comes out on top in almost every category of health and environmental impact. Glass is seen as a premium packaging material that is best for healthy brands and organic food and beverage products. It is praised for its clean, natural reputation with shoppers. Parents especially trust glass for packaging and there are opportunities in the growing markets of non-alcoholic, health and specialty beverages. GPI is engaged in initiatives to showcase many more projects that enhance environmentally positive practices in the industry. ●

OVER TWO-THIRDS OF GROCERY SHOPPERS RATED GLASS AS THE ONLY FOOD AND BEVERAGE PACKAGING TO HAVE POSITIVE OR NEUTRAL EFFECTS ON THE ENVIRONMENT.*



GROCERY SHOPPERS VIEWED GLASS AS THE MOST "ECO-FRIENDLY" MATERIAL FOR FOOD AND BEVERAGE.*

About the author:

Scott DeFife is President at the Glass Packaging Institute

Further information:

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Children's vision of 'Glass Protects' unveiled in India



Chief Guest Professor Alicia Durán (Research Professor CSIC-Spanish National Research Council) and President of International Commission on Glass) unveiled a touring exhibition on 'Glass Protects' at the Annual General Meeting of the All India Glass Manufacturers' Federation last September.



Online entries from children aged between seven and sixteen were taken on a captioned theme. A jury of former Presidents Sanjay Somany, Sanjay Ganjoo and SC Bansal selected the top three drawings from 3000 entries received from schools across India.



Bharat Somany, recently elected AIGMF President, alongside former President Sanjay Somany with the prestigious C K Somany Award.



Managing Director of La Opala, Ajit Jhunjhunwala accepted the 2020 Balkrishna Gupta Award for Exports.



Dr Mukul Chandra Paul, 2020 winner of the C K Somany Award.

A digitised version of the exhibits can be viewed at www.aigmf.com.

During the AGM, former AIGMF Presidents Sanjay Somany and Mukul Somany awarded the prestigious annual 'C K Somany Award for Innovation and Technology' to Dr Mukul Chandra Paul, Sr Principal Scientist, Central Glass & Ceramic

Research Institute (CGCRI), Kolkata. Separately, the 'Balkrishna Gupta Award for Exports' was awarded to M/s La Opala RG Ltd by former President Pradeep Gupta. Both awards are supported by *Glass Worldwide*, preferred international journal of the AIGMF in association with *Kanch*.



Mr M K Bansal of Shri Sitaram Glass Works and Dr K Annapurna of CSIR-CGCRI were part of the AIGMF Awards judging panel.



Dr Mukul Chandra Paul is a senior OSA member along with IEEE and a life member of Materials Research Society of India and the Indian Ceramic Society. He holds seven US patents, four Indian patents and has published seven book chapters, edited two books on 'Fiber Laser' and authored over 300 SCI papers in peer-reviewed journals and conferences. Dr Paul has received many awards, including the BOYSCAST Fellowship from DST, IEEE Photonic Distinguished Lecture Award by Multimedia University, Malaysia, CSIR Technology Award for Innovation and the Senior Visiting Scientist award by National Taiwan University of Technology.

La Opala RG Ltd introduced opal



The C K Somany Award for Innovation and Technology is given to an individual who has made significant contributions to the glass industry in the field or fields of manufacturing, product development, environmental factors, business performance/ growth, research and development and/or science/ technology.

glass technology to India in 1988. Since then, it has progressed to captivate lifestyle consumers, with an impressive supply chain that delivers to over 40 countries, besides being a household name in India.

The awards jury comprised Dr



Seen here at Glass Focus 2019, Professor Alicia Durán was the chief guest at the Annual General Meeting of the All India Glass Manufacturers' Federation.



A selection of the judges for the AIGMF Awards, from left to right: Dave Fordham (*Glass Worldwide*), Sanjay Somany (HNG), Bharat Somany (HNG) and Vinit Kapur (AIGMF).

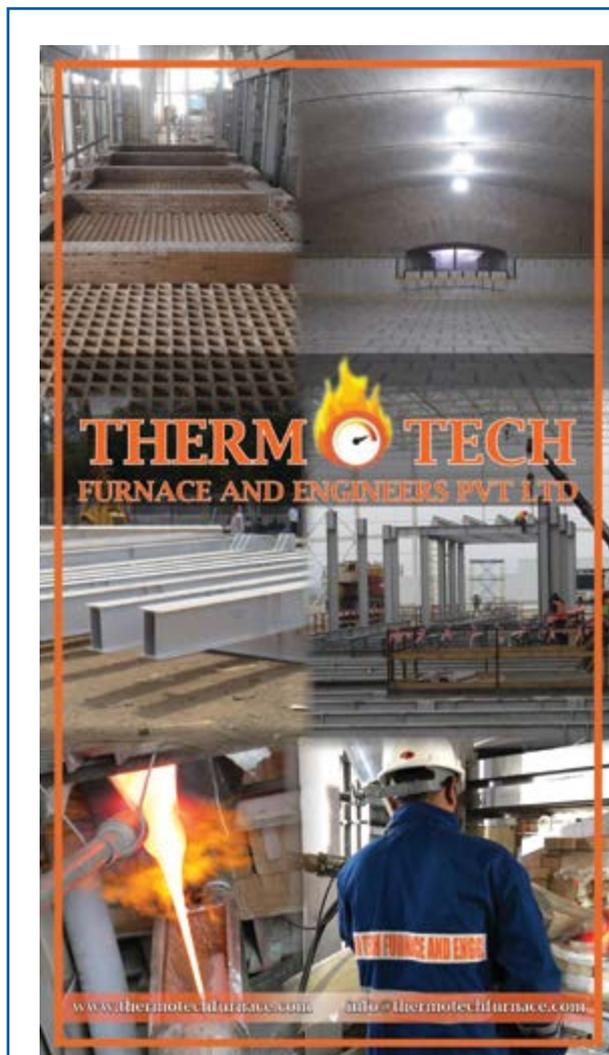
K Annapurna, Senior Principal Scientist, CSIR-CGCRI, Kolkata; Dave Fordham, Publisher, *Glass Worldwide*; Sanjay Somany, Chairman and Managing Director, HNG & Ind Ltd; MK Bansal of Shri Sitaram Glass Works, Firozabad (UP); and Vinit Kapur, Secretary, AIGMF.

Commenting on the day's proceedings, recently elected AIGMF President, Bharat Somany said: "The instilling of quality, safety and environmental consciousness in the minds of the next generation is a mantle the glass industry carries faithfully. I am grateful for the unprecedented participation and efforts of the students and congratulate them all heartily. The worthy recognition of Dr Mukul Chandra Paul and La Opala RG Ltd for their tremendous contribution in the fields of innovation and technology and exports respectively is a matter of great pride for the industry."

Glass Worldwide's Dave Fordham also congratulated Dr. Mukul Chandra Paul and La Opala RG Ltd, on their respective AIGMF awards. "Dr Paul's tremendous achievements in the field of technology were clear to the judging panel as a more than worthy winner of the prestigious 2020 C K Somany Award. With a brand that is appreciated globally, it is also very fitting for La Opala to receive recognition of their exceptional international trade with this year's Balkrishna Gupta Award for Exports." ●

Further information:

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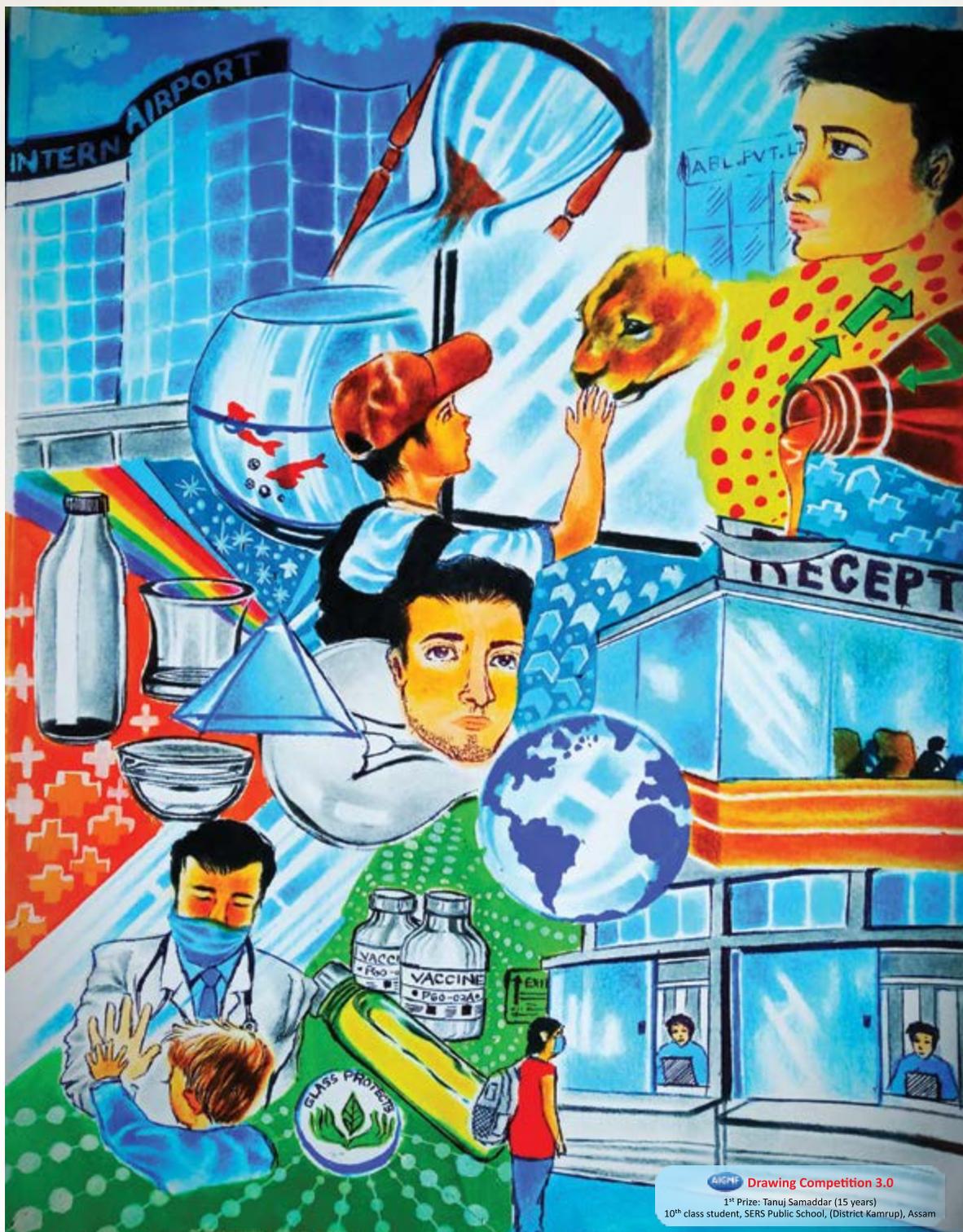
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'Glass Protects' ... says School Children ...



AIGMF Drawing Competition 3.0
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10th class student, SERS Public School, (District Kamrup), Assam

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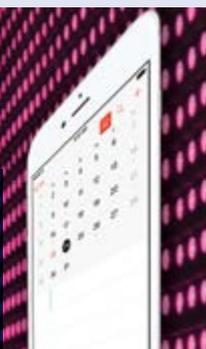
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FORTHCOMING EVENTS
2021-2022

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Looking towards a United Nations declaration



Over the past 60 years, the General Assembly of the United Nations has acknowledged important fields of international endeavour and their contributions to society by declaring United Nations International Years. The International Commission on Glass, along with the Community of Glass Associations and the Glass Art Society are promoting a United Nations International Year of Glass for 2022. It will underline the technological, scientific and economic importance of glass... that transparent and enabling material underpinning many technologies and can facilitate the development of more just and sustainable societies to meet the challenges of globalisation. Alicia Durán explains.

With their unparalleled versatility and technical capabilities, glassy materials have in recent decades fostered numerous cultural and scientific advancements:

- Glass is the main conduit of the knowledge-based society. Glass optical fibres have stimulated a change of paradigm that has led to a global communications revolution. They are the backbone of the internet and the associated globalisation of information. Glassmakers have delivered touch-sensitive glass covers for mobile phones that revolutionised the way people communicate with one another.
- Glass is the chemically-resistant container material for many life-saving medicines of today. This is particularly important in the world's quest in the delivery of a vaccine to fight the Covid-19 pandemic. Strengthened glass containers have dramatically improved the reliability of the EpiPen treatment of life-threatening anaphylaxis shock from severe allergic reactions.
- Glass sheets support solar cells and give clean energy; glass fibres reduce the carbon footprint by strengthening wind turbine blades, by insulating homes and through carbon capture and sequestration (CCS); the vitrification of hazardous waste is increasing nuclear energy safety.
- Bioglass compositions have advanced health care with their ability to integrate with human bone; stimulate the human body's natural defence to heal flesh wounds; aid tissue design and regeneration; and resolve hearing and dental issues.
- Glass optics and optoelectronics have evolved so that the James Webb space telescope can now study the very first moments after the big bang and expand understanding of the universe.
- Glass melting is being de-carbonised

and glassy products are being safely recycled.

- Archaeologists are learning more about ancient trade routes and the politics of raw materials.
- Glass artists across the globe have given humankind an awareness of this wonderful material including its remarkable methods of fabrication, inherent beauty and its ability to capture and display nature's full spectrum of colour.

In summary, glass is the transparent tool that can underpin sustainable, more developed and just societies. It is an important medium for art and its history is shared with that of humankind.

Extensive planning is now underway to make possible a UN Year of Glass in 2022, to include a kick-off meeting in Geneva, events at the ICG congress in Berlin, a worldwide congress focused in glass technology and a global art/history congress. It is hoped that the event will result in special issues of journals and magazines, exhibitions in museums and public and private glass collections and universal dissemination activities at all education levels.

As part of initial planning, the ICG, its members and supporters have contacted art and scientific glass-themed societies, glassmakers, fabricators and suppliers, as well as academia, R&D centres and museums, both to share the concept and to ask for formal endorsement. The initial aim is a successful resolution at the UN General Assembly in December 2020.

An agreement has been reached with UNESCO and the International Year of Basic Science for Sustainable Development (IYBSSD) to work together for projects to be approved in the same UN General Assembly. Despite the challenges created by the Covid-19 pandemic, ICG continues working for IYOG2022, expanding the borders of its efforts to invite more and more glass players to join the initiative. More than 950 endorsements have now been received from 69 countries but support is still needed from many other, particularly in Africa, the Middle East, ASEAN and Balkan regions. ●



Former ICG Presidents have lent their support to the UN International Year of Glass 2022 initiative.

About the author:

Alicia Durán is Research Professor CSIC and President of the ICG

Further information:

International Commission on Glass
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