Exclusive interviews with BA Glass, Guardian & O-I + market reports & technology. Latest news & highlights from this issue at www.glassworldwide.co.uk

From raw material intake to batch charging

1945 | More than 2300 lehrs
2019 | for the glass-industry
4 REASONS TO BUY RAMSEY CHAINS

1: LIFEGUARD®

2: RAMSEY ALL-STEEL®

3: R-SELECT™

4: SENTRY®

Unique and Patented Solutions From Ramsey

Ramsey Lifeguard, All-Steel, R-Select and Sentry Two Pin - four innovative chains tough enough for the most demanding applications all from one source. Ramsey... the only source for ground-breaking new chains.

Contact Ramsey at www.ramseychain.com, (704) 394-0322, sales@ramseychain.com
In recent weeks, members of the Glass Worldwide team have attended various industry events throughout the world, providing valuable opportunities to catch up with many old friends and new acquaintances, to discuss their hopes and expectations for the future.

The latest issue of Glass Worldwide celebrates the corporate and individual achievements of some of the world’s leading names in glassmaking, with the industry looking forward confidently to the start of a new decade. The utilisation of enhanced process automation and ‘big data’ are expected to deliver essential opportunities to increase production efficiencies, as many speakers at a recent GlassTrend seminar in Munich confirmed. While significant benefits are anticipated by adopting the latest Industry 4.0 advances, however, it was concluded that human operators would still have an essential role to play in the management of key glassmaking processes for many years to come. In addition, delegates were warned that to realise its successful implementation, Industry 4.0 is not simply an IT project but a collaborative effort that requires the involvement of all disciplines within the business. A review of the meeting can be found in this issue.

Separately, some of the industry’s most influential personalities of recent years – including several past winners of the Phoenix Award – were present in Madrid to celebrate Professor Alicia Durán receiving the 49th prestigious annual award. Professor Durán was selected as Glass Person of the Year in recognition of her extensive work in the furtherance of glass, glass-ceramics and sol-gel materials research. She is also President of the International Commission on Glass, as our report from the award ceremony discusses.

Among this issue’s exclusive Factory Spotlight articles are interviews with Michael Prechtl (Country Group Executive for North/ Central Europe at O-I), Sandor Kis (Plant Manager at the Guardian Glass float plant in Oroshaza, Hungary) and Sandra Santos (Chief Executive Officer at BA Glass). All three interviews discuss recent trends and priorities for their respective organisations. All three also illustrate the value of employing skilled and fully committed personnel in all disciplines.

In addition to specially commissioned Focus Germany and Iberia features, readers will discover an extensive series of Technology articles and news stories, many of which are contributed by leading suppliers to the international glassmaking community. The conclusion of a two part Buyers Guide devoted to advances and opportunities in glass melting technology is also included, comprising 12 separate contributions.

The Glass Worldwide team would like to thank advertisers, subscribers and partner organisations for their continued support and encouragement during 2019. We look forward monitoring the glass industry’s progress throughout 2020.
Contents

Welcome

News

Spotlight
32 A passion for glass celebrated at Madrid Phoenix Award ceremony

Factory Spotlight
36 Innovation and sustainability lead European success strategy
42 Regional customer focus for Hungarian flat glass expert
46 Following the BA way to growth and profitability

Focus Iberia
52 Glass packaging on the Iberian Peninsula

Focus Germany
54 Positive performance recorded by German glassmakers
56 Intelligent solutions and a passion for innovation
60 Laboratory glassware specialisation

Supplier Focus
62 Finnish acquisition supports integrated solution goals

Technology
64 Process Control – Preventing power outages and reducing electricity tariffs
68 Quality Control – Automated volume measurement system for the shop floor
70 Forming – Mould design: Combined blow mould cooling
72 Ware Handling – Transforming flat glass logistics
74 Raw Materials – Biomass ash raw materials investigated for low-carbon glassmaking
78 Forming – Camera-based weight control provides precise gob management
80 Forming – Amazing discoveries part 23... Auto swabbing systems comparison
84 Ware Handling – Equalising axial cooled hanger boosts pack-to-melt ratio
86 Burners – Auxiliary burner applications in glass manufacture
88 Process Control – Accurate mould temperature measurement

Buyers Guide - Melting (part two)
90 Electric boosting in an oxy fuel-fired glass fibre furnace
94 Accurate energy demand measurement of industrial glass batches
98 The benefits of andalusite derived Mullite refractory materials
102 Flexible forehearth system trends
104 Operating parameters that affect furnace energy performance
110 Corrosion of fused cast refractories in soda-lime melters
112 Precision and safety increased in hot drilling
114 Is knowing plant asset condition important?
118 Advocating the benefits of bubbling systems
120 Efficiency, emissions, quality and flexibility
122 Smart furnace design considerations

Events
124 Exploring process automation and big data opportunities
128 43rd ASEAN Glass Conference review

Associations
131 Society of Glass Technology awards recognition
134 Green is the new ‘black’ for the luxury industry
136 Industry legends and school children honoured
138 More than just transparency

Events
144 Forthcoming events
STAND-ALONE LASER MODULE

- Crack off the caps at the cold end
- Suitable to all known crack off machines at the cold end
- Glasses up to 3 mm wall thickness
- Reducing of scrap during crack off process
- Replacement of existing laser system
- Replacement of thermo shock

➡ Single index
➡ Double index
➡ Tripple index

Technical details:
- Up to max. 70 pcs/min
- Life time up to 3 years = 25.000 hours
- Output increase up to 10 % at cold end machine
- No dust extraction required
- Laser cutting without dust

SUITABLE TO ALL KNOWN CRACK OFF MACHINES AT THE COLD END!
Thank you!

As 2019 draws to a close, the Glass Worldwide team offers its sincere thanks to the following companies for their recent advertising support (see page 144 for an index to display advertisers in this issue). Their backing has helped to further establish Glass Worldwide as the leading bi-monthly title for all sectors and regions of the international glass industry. We look forward to continuing to promote the latest technology innovations to our global readership in 2020.

We also extend our warm thanks to our subscribers, editorial contributors, industry associations and event organisers for the support this year.

Advanced Energy Industries
AFGM
AGC Ceramics
Agr International Inc
Air Products and Chemicals Inc
All India Glass Manufacturers’ Federation
AMETEK Land
Anglo Carbon & Contacts Ltd
Antonini Srl
Applied Vision Corporation
Anglass Southeast LLC
ATIV
Ayro SCRL
BDF Industries SpA
Binder & Co AG
Bock Energetiechnik GmbH
Bohermi Chemicals Srl
Bottero Glass Technologies
BT-Wolfgang Binder GmbH
Bucher Emhart Glass
Buckelew Ltd
Bühler Alzenau GmbH
Bystronic glass
G G Cade Technologies Limited
Calumite Ltd
CAR-MET srl
CellSian Glass & Solar
CERION laser GmbH
Changshu Jianhua Mould Co Ltd
Chemetall GmbH
Chpolansky SAS
Clear Edge Filtration CFE GmbH
CMS SpA (Costruzioni Macchine Speciali)
Crud-Efco International sa/mv
CONDAT Lubricants
Continental Glass Engineering GmbH
Cortex Glass
Covia Corp
Cugher Glass Srl
Curvink bv
DISMATEC Ltd
DSF Refractories & Minerals Ltd
Dukhirm Maurya Engineering & Refractory Works (India) Pvt Ltd
Dura Temp Corporation
Electroglass Ltd
EME Maschinenfabrik Clasen GmbH
EMS Group (Emmeti)
Encres Dubuit
ESMA
Eurotherm by Schneider Electric
Excelsius Global Services
Falorni Tech
Ferlane Technologies
Fermac srl
Ferro Corporation
FEVE
FIC (UK) Ltd
Fickert & Winterling Maschinenbau GmbH
Fimor sas
Fives Group
Flammatec Ltd
Forehearthis Services Ltd
Forglass Sp zoo
FORMA Glas GmbH
Fostebol
Fusioneat srl
futronic GmbH
Galus Ferdi Rüesch AG
Alfred Giesser Messerschifabrik GmbH
GiMAV
GlassChem Consult eK
Glass for Europe
Glass Consulting Group srl
Glass Global / OGIS GmbH
Glass Inc International
Conference on Glass Problems (GPC)
Glass Service Inc
Glass Service Srl
Glass Technology International GmbH
Glass Technology Services Ltd
GlassPrint
Glassworks Hounsell Ltd
Glasston Corporation
Global Combustion Systems Ltd
Global Inkjet Systems Ltd
Grafotec Spray Systems GmbH
Graphoidal Developments Ltd
Grenzubach Maschinenbau GmbH
Groupe Rondot SA
Grunig-Interscreen AG
Haldor Topsoe A/S
HarbinWalker International
HEGLA GmbH & Co KG
Heraeus
Heye International GmbH
HORIN Glass Industries AG
Hotwork International AG
Hotwork USA
Hunpreno Precision Engineering Ltd
HyGear
IFT GmbH
Ilis GmbH
Imaca BV
IMS Engineering Ltd
Inkups Now Corp
InPrint
Intco GmbH
Interglass SA de CV
INTERMOLDE Moldes Vidreiros Internacional,
Lda
Between September 2018 and September 2019, in comparison with directly competitive glass magazines, Glass Worldwide on average per issue published:

- **MORE:** editorial pages... making every issue essential reading.
- **MORE:** advertisements... influencing more buyers in their selection of products and services.
- **MORE:** previews and reviews of industry events – and issues officially distributed at **MORE** individual events in 2019 than competitive magazines!

The number one glass magazine - but don’t take our word for it... visit www.glassworldwide.co.uk for testimonials from industry figureheads from AGC, Ardagh, Fuyao, Guardian, HNG, O-I, Saint-Gobain, Schott, Sisecam, Vidraia, Wiegand and dozens more!

In last year’s readership survey, senior management and factory personnel with purchasing influence from a total of 24 different countries in Africa, Asia, Europe, Indian sub-continent, the Middle East, Oceania, North America and South America indicated that:

- More respondents found Glass Worldwide to be useful compared to any other competitive magazine (In fact, 100% of respondents found Glass Worldwide useful... 37% higher than the nearest competitor!).
- **78% of respondents confirmed that the editorial and advertising content in Glass Worldwide and Who’s Who / Annual Review directly influences their selection of products and services.**

For more details on the survey and how you can take advantage, request your 2020 media information now at www.glassworldwide.co.uk or contact one of the team for a customised proposal.
A prescription for aging regenerators

Undergoing regenerator repairs or having difficulty maintaining full production in an aging furnace? Turn to Air Products’ Cleanfire ThruPort, oxy-fuel burner for an on-the-fly heating solution to avoid downtime or extend your furnace campaign. This patented and commercially-proven technology, installed from the underside of your port, allows you to add heat where and when it’s needed.

Key features:
• Tandem water-cooled oxy-fuel burner and oxygen staging lance assembly
• Proven durable design; easily installed in an existing port while furnace is running
• Adjustable flame length and angle for optimal heat distribution and surface coverage
• Remote, wireless and continuous online monitoring of burner performance
• Available for rapid deployment

To make glass better, put Air Products in the mix.

tell me more
airproducts.com/thruport
800-654-4567, code 9091

© Air Products and Chemicals, Inc., 2019 (42615)
The basement has the ideal conditions for storing your vinyl record collection.

Your furnace should not.

Fosbel has been providing furnace services ever since a time when vinyl was still a widely-used medium for music. For over thirty-five years, we have been an industry leader helping to keep furnace operations rolling even while performing repairs.

Contact us today for a quote on any of our services.

Your record collection may be super cool, but your furnace should be anything but.
UK and Hungary float line upgrades

Guardian Glass is investing in the modernisation and upgrade of float glass lines at two of its European production plants. This includes a modernisation of the float line in Goole, UK, as the existing furnace nears the end of its lifecycle. The upgrade is expected to be performed in early 2021.

The rebuilt float furnace in Goole is planned to have a nominal melting capacity of 825 tonnes/day, representing an increase of 20%. Due to its optimised design, furnace energy efficiency as well as environmental performance are expected to improve on a per tonne basis. The line will continue to service customers in the UK and Ireland, providing a wide range of float, coated and laminated glass products.

Guus Boekhoudt, Vice President of Guardian Glass Europe, Russia and Asia and Managing Director, Guardian Europe commented: “By investing in our production plants in the UK and Hungary, we are demonstrating our commitment to the continuous improvement of our glass products and services for our customers. Glass demand is continuing to grow in Europe and these investments will ensure the supply to our customers, essential to developing and maintaining our strong partnerships.”

Verallia reports initial public offering success

Verallia has confirmed the success of its initial public offering with French and international institutional investors on the regulated market of Euronext Paris. The proceeds from the sale of existing shares amounted to €888 million, including €838 million sold by Horizon Parent Holdings sarl, which is 90%-owned by AIF VII Euro Leverage LP, an investment fund managed by an affiliate of Apollo Global Management Inc and 10%-owned by Bpifrance Participations, €41 million by certain managers of the group and €9 million by certain co-investors.

Based on an offering price set at €27 per share, Verallia’s market capitalisation amounts to approximately €3.2 billion.

Michel Giannuzzi, President/CEO of Verallia, commented: “We are very pleased with the successful completion of Verallia’s initial public offering, which illustrates the strong confidence of investors in our strategy and in the relevance of our positioning on the glass packaging market. This initial public offering bolsters our visibility, while providing us with more flexibility to seize future growth opportunities. It constitutes a major milestone in the group’s history.”

Collaboration for an industry standard on laser marks

Tiama, Emhart and other major glass industry players are collaborating to define a standard for laser marks on glass containers. This standardisation will ensure a distinct laser code on every glass container worldwide.

To facilitate such a standard, Tiama has granted Bucher Emhart Glass a royalty to its patents, which secure the possibility to include information about the originating cavity and/or mould number in the laser mark on the glass container.

This standard code will enable the traceability of each glass container through its entire lifecycle, giving many benefits to consumers, glass producers, fillers and other glass industry players.

www.bucherehmhartglass.com / tiama.com
Bulgarian glass packaging capacity expansion plans
Bulgarian news outlet Capital.bg reports that BA Glass is planning to invest in excess of €200 million over five years to double the company’s glass packaging production in the country. The Portuguese group currently operates two furnaces in Bulgaria, one each in Sofia and Plovdiv. Two more furnaces will be added, with the majority of investment scheduled for 2020 and 2021. BA Glass acquired Bulgaria’s Drujba Glassworks from Greek glassmaker Yioula in 2017. Subsequently, several major projects have already been initiated at the Plovdiv site, including the recent completion of a 70% larger melting furnace. This furnace is expected to help the company increase output from 330,000 to 380,000 tonnes by 2020.

Bormioli Pharma invests in Germany
Via its wholly-owned HIL-INVEST GmbH subsidiary, Bormioli Pharma SpA has confirmed its acquisition of a leading German pharmaceutical packaging business. R&G Beteiligungs GmbH employs approximately 270 people and operates plants in Schleusingen and Altenfeld, offering glass and plastic packaging. Last year, R&G registered a turnover of €25.6 million and an EBITDA equal to €4.1 million, representing a 16% margin. Via this acquisition, Bormioli Pharma reinforces its presence in northern Europe, expanding its current product range with complementary products and strengthening its manufacturing footprint and industrial competences. Closing of the transaction is planned for the fourth quarter of 2019 and is subject to the obtainment of merger clearance by German authorities.

Improved cold end coating technology
France’s TECADIS Systems has provided the hollow glass industry with cold end equipment solutions since 1990. This includes the company’s development of the REVOL-In on-line, integrated machine for improved cold end coating. This patented technology has been delivered to more than 15 plants throughout the world. REVOL-In has been designed for use with premium and non-round glass bottles with complex shapes. The machine sprays the entire body of the glass container and is supplied with integrated drying, extraction and filtration solutions. According to Frederic Cazade, Technical Manager, a compact version will be introduced next spring.
Furnace heat up completed in Thailand

The inauguration ceremony for a SORG end-fired furnace was held recently at the Siam Glass Ayutthaya glass container plant in Thailand. Designed to deliver 310 tonnes/day, SGA 2 furnace was heated up in the presence of senior management from the parent Osotspa Group.

Awarded in 2018, the SORG contract also included the company’s STW working end, as well as two type 340 and two type 240 forehearth.

An exclusive interview with Siam Glass General Manager Viwat Supatham describes this project in detail in the September/October 2019 issue of Glass Worldwide.

www.sorg.de

Scale model of the SORG end-fired furnace at Ayutthaya.

Heinz-Glas invests in electric melting technology

A replacement all-electric glass melting furnace is to be built next year at the Klintettau glassworks of Heinz-Glas in Germany. The specialist flaconnage manufacturer is responding to changing market demands in terms of production technology.

The furnace will be capable of highly flexible production for different glass types and quantities, employing increased levels of post-consumer cullet. In taking this step, Heinz-Glas is continuing along the path of meeting the highest requirements for low emission glass production. As early as 2016, the company explains, the last natural gas-fired furnace at the Klintettau site was replaced by a fully electric furnace, thus making fossil fuel reliance a thing of the past.

www.heinz-glas.com

Strategic partnership created for process measurements

CelSian Glass & Solar BV, the leading Dutch glass consultancy firm for process optimisation, has entered into a strategic co-operation agreement with SGS, the inspection, verification, testing and certification specialist. With more than 97,000 employees, SGS is widely recognised as a global benchmark for quality and integrity, operating a network of more than 2600 offices and laboratories throughout the world.

Via this partnership, CelSian can rely on SGS’ operational capacity worldwide for process measurements, while SGS has taken over the emission measurement activities from CelSian in the Netherlands.

“This is a true win-win for both parties” says SGS Business Manager Marc van Ryckeghem. “We expand our emission business in the Netherlands into the glass industry that was dominated by CelSian for a very long time.”

CelSian Managing Director, Harmen Kielstra is equally enthusiastic, emphasising that the partnership connects CelSian’s knowledge and expertise with the global scope and reach of SGS. “It means we can serve our customers better and faster around the world. Process measurement execution will be done by the experts from SGS anywhere in the world, whereas the data analysis and reporting remain the key task of CelSian in this co-operation” he confirmed. “It is an important step in the development of CelSian, with an increasing focus on software, training and R&D dedicated to the glass industry.”

www.celsian.nl / sgs.com

Call for strong EU research and innovation investment

A third joint statement for an ambitious Horizon Europe research and innovation programme has been co-signed by FEVE with EARTO and its research and industrial partners, representing key European research and innovation stakeholders. The 93 European association signatories have urged the EU institutions to make research, development and innovation (RD&I) a priority within the next Multiannual Financial Framework 2021-2027.

“With EARTO, we call on the Council of the EU to raise the budget allocated to the Horizon Europe programme to at least €120 billion (in 2018 prices)” a FEVE statement commented. “We call on EU institutions to prioritise excellent cross-border collaborative RD&I with impact within Horizon Europe and to allocate a budget share of at least 60% of Horizon Europe’s total budget to its pillar II – Global Challenges and European Industrial Competitiveness.”

FEVE remains convinced that Europe has the potential to lead the global innovation race and to remain a model of economic and social prosperity. To achieve this goal, however, the organisation believes that Europe needs to invest strongly in pan-European collaborative RD&I.

www.feve.org

Arc France announces solid progress

Since the beginning of 2019, the priority for the leadership team at Arc France has been the successful completion of its Synergie 2020 plan, thanks to a fruitful collaboration with social partners and site employees. The objective of this transformation plan is to improve Arc’s competitiveness and to ensure a sustainable future for the eighth largest industrial site in France.

By the end of March, the company had entered an operational phase, covering more than 150 projects in all fields of activity. This was possible after raising funds with the support of Arc’s shareholders, the French Government, the Hauts-de-France Region and CAPSO (Urban Community of St Omer). €49 million has been invested to support site modernisation, for example. With Synergie 2020, Arc France is working towards facilitating and deploying a more open and agile organisation, through six key measures such as labour cost optimisation and the transformation of its logistics organisation.

www.arc-intl.com
Advancing Glass Lubrication Technology

Kleenmold offers advanced lubrication technology for manual, automatic and robotic applications.

wwwtotalspecialties.com/glass-lubricants.html

Since 1938, Kleenmold Lubricants and Coatings have been the best choice in the glass container industry. Our latest innovation is a product line developed specifically for robotic applications. In particular, Robokleen 173 provides very good results with various types of bottles and production processes (B/B, P/B, NNPB). Samples are available upon request from your local Kleenmold distributor. Your local agents and distributors will work with you to enhance your productivity and minimize production costs when you choose Kleenmold products.

Total Specialties USA, Inc.
Kleenmold Glass Lubricants Division
+1 908 862 9300

Total Glass Lubricants Europe GmbH
+49 2247 6608
Automatic swabbing selected for South Korea glassworks

When leading South Korean beer and soju producer Hite Jinro rebuilds its Jinju glass container furnace in February 2020, the opportunity will also be taken to install some advanced production technology. This includes the acquisition of Socabelec swabbing robots on IS machines supplied by Bucher Emhart Glass.

Automatic swabbing is one of the areas in which Hite wants to invest in order to guarantee the highest level of productivity. User satisfaction, robot reliability, on-the-fly swabbing without stopping production, without rejecting containers, as well as a high level of safety for operators working together with the robot, were the main criteria for selecting the Socabelec equipment.

www.socabelec.com

Electronic press drive innovation

The latest generation E-Press drive from WALTEC Maschinen GmbH has been meet with great success. This machine features electronically-driven functions, including press cylinder, mould closing, funnel and pressing support. Energy and cost savings, flexibility and production speed are at the centre of this last generation equipment.

Customers benefit from reduced energy consumption (up to 80%) and increased output (up to 20%), thanks to higher speeds during the complete production process, together with greater accuracy and better process repeatability.

WALTEC is well-known globally for its introduction of technology innovations and improvements, especially over the past two decades. Almost every year, a different challenge has been overcome by adopting the highest technical standard and knowhow.

www.waltec.de

Glass container defects guide

American Glass Research has published its second book, entitled ‘Color Atlas of Glass Container Defects’. Authored by Senior Scientists Dr Brandon Aldinger and Peter de Haan, the book is a photographic guide for manufacturers, fillers and trade suppliers that can assist in quickly identifying defects and their sources.

“This volume delivers a common lexicon for understanding defects that often go by several names across industry sectors, even from facility to facility” said Dr Aldinger. The atlas comprises 154 pages, with over 450 original photographs, along with detailed descriptions of 65 defects that occur in container glass. It is hardbound and printed on high quality photographic paper. Defects specific to tubing vials are also included due to their importance in pharmaceuticals. Appendices include diagrams of the parts of glass containers, as well as a glossary of glass defect terminology.

www.americanglassresearch.com

SGD Pharma installs QC measuring machine

A Marposs VisiQuick measuring machine has recently been installed in the quality control laboratory of the Sucy en Brie plant of SGD Pharma in northern France. SGD Pharma is one of the world’s leading manufacturers of glass containers for primary pharmaceutical packaging.

The VisiQuick machine was chosen as part of an important plant modernisation project, devised to improve ware quality and increase production flexibility. The machine includes four measuring stations: An external dimensions measuring station with two high resolution cameras, allowing the user to measure all parameters on the body, neck and finish of containers having a maximum height of 230mm and a maximum external diameter of 105mm; an inside diameter and profile measuring station with a special bore gauge to measure, without any job change, containers having an inside diameter in the range 6mm-60mm; a push-up measuring station; and a wall thickness measuring station with chromatic confocal sensor.

www.marposs.com
SOLUTIONS FOR THE GLASS INDUSTRY

STIRRER
- Cat scratch removal
- Colouring forehearth
Manufacturing execution system development
As a leader in manufacturing execution systems for the hollow glass industry, Vertech® is constantly looking for innovative solutions to adapt to customer needs.

The company’s latest SIL4.0 product is able to connect to many sensors in the plant, including the batch house, furnace and IS machine and to generate a great deal of production data on energy consumption, raw materials etc. Thanks to these KPIs displayed on relevant dashboards, a precious amount of time is gained, since problems are solved before they occur. Considerable financial savings are possible since everything is optimised, environmental impact is reduced, energy consumption is managed etc. The number of possible KPIs to display is considerable; the glassmaker chooses the data, while SIL acquires and displays the information.

The objective of collecting and analysing this data is to anticipate production events and ensure the entire production process is under control.

www.vertech.eu ●

Positive burner performance demonstrated
The OPTIFIRE XD burner from Praxair Inc (a Linde company) has been designed to offer a continuous, low-momentum flame with reduced maintenance requirements. Burner performance has been demonstrated in multiple glassfibre and container glass furnaces and has proved successful in mitigating condensate build-up around the cooler oxygen ports. This is an important feature, because most staged oxy-fuel burners that operate in a glass atmosphere tend to build up condensate fairly quickly with continuous furnace operation.

The burner’s low momentum flames result in reduced volatilisation and batch carryover, while the highly luminous wide flames cover a larger glass surface area when compared with other burners. This results in fewer burners required per unit area of the melter.

In addition, the XD burner offers a quick-release feature for easy installation and removal of internal burner components and facilitated maintenance.

www.praxair.com/glass ●

Remote furnace monitoring service
AGC Ceramics Co Ltd has initiated a furnace remote monitoring service as part of the company’s furnace operation support service. A customer in South East Asia has already installed this special system and expressed satisfaction with it.

The service allows many types of potential furnace problems to be identified early, with AGCC monitoring daily operating data via the internet. In-house developed software technology is used to process ‘big data’ at high speed. Furthermore, AGCC engineers visit the customer’s plant and undertake furnace inspections based on the analysed operational data. After the inspection, AGCC provides useful advice to the customer.

www.agcc.jp ●

Forehearth training updates
Forehearth Services recently completed the latest edition (revision 6) of the Forehearth Services training course. Five of the six modules - Glass conditioning, Forehearth design and operation, Forehearth combustion systems, Forehearth control systems and Forehearth troubleshooting - were updated during 2018. The update to module 6, Container defects, was completed in August 2019.

All modules have been enhanced to reflect the latest trends in forehearth technology and specific glass plant requests. In particular, the Container defects module has been greatly expanded to better provide glass plant engineers and operators with the ability to determine the nature, origin and elimination of all glass defects originating in the distributor, forehearth and spout areas.

Across five continents, hundreds of glass plant engineers have benefited from the glass industry’s most comprehensive forehearth technology and operation training course. The five day course ensures trainees are equipped with the knowledge to ensure distributors and forehearts are operated correctly and optimally.

www.forehearthservices.co.uk ●

Environmentally-friendly cutting fluids
The surface treatment global business unit of the Coatings Division of BASF, Chemetall provides customers with a range of cutting fluids that guarantee a green footprint. They are characterised by low consumption rates and produced from the purest components that continue to offer the same high performance.

Selection of the correct cutting fluid is of utmost importance to overall glass processing, as it has a direct influence on subsequent production processes. With global awareness increasing to address environmental problems, Chemetall has recognised the need for environmentally-friendly products and supports customers with more than 50 years’ experience. The company’s recently announced Acecut generation of glass cutting fluids, for example, consists of at least 50% of sustainable raw materials.

www.chemetall.com ●
Get superior plunger cooling using lower air pressure than conventional forming systems.

The Quantum Cylinder and Process equipment work together to allow the Forming Plunger to be cooled throughout the entire forming cycle.

How do you clean your Hot End?

- The unique Hot-End Cleaning System ME 1700 was developed especially for the requirements of container-glass production.
- Requires no chemicals or detergents.
- Savings of up to 80% of manual cleaning time in the IS-Maintenance Workshop.
- Excellent cleaning-results, even the worst backed on carbon, grease and oil deposits are easily and quickly removed.
- Cleaning of all IS machine-parts such as mould holders and inserts, take out tongs, shear-mechanism parts, neck-ring arms, funnel arms etc., with perfect results in the shortest time.
- Conveyor-belts cleaned in minutes during a job-change, belt is rendered completely free of baked on carbon, grease, oil and hot-end coating deposits. Under belt cooling is improved, contamination of container bottoms eliminated.
- Cleaning IS-machines, feeder platforms and area around the productions lines.
- Appreciated worldwide by International Glass Container manufacturers.
Automatically adjustable palletiser generation

The latest MSK palletiser systems adjust themselves automatically to numerous types of bottle. This makes changing over faster and more efficient. Manual finetuning is no longer required. The system works with precision on the basis of the article database stored in the MSK EMSY software and offers high process reliability.

The recently developed MSK stacker, with its open base frame, offers great accessibility. Because it is automatically adjustable to various different glass containers, it offers optimum storage formatting without manual readjustment.

The latest palletising systems are also fitted with quick-change apparatus so that, when using different bars and gripping systems, these can be changed easily and temporarily stored in a retractable magazine. With an innovative design and a 15% weight reduction, the MSK Unitech universal palletiser head is now even more efficient.

According to MSK, its systems will continue to offer advantages in the future through the use of digital technologies and sensors, process automation and Industry 4.0 networking of the entire cold end with the MSK EMSY analytics software.

www.msk.de

Automatic swabbing lubrication expertise

Automatic swabbing technology has now proved its efficiency within the hollow glass forming process, having progressively entered the market and become recognised as standard equipment by glass plants, robot and IS machine OEMs alike. As a lubricant expert and exclusive OEM partner, FUCHS has developed SwabMatic technology that fits with all automated swabbing installations. Targeting a ‘less is more’ approach, SwabMatic generates superior process results at low application rates.

“We are now working closely with major OEMs in this area and supplying SwabMatic into major container manufacturers around the world” commented Stephen Harris, FUCHS Head of Global Business Segment – Glass.

“We have seen significant benefits from the introduction of SwabMatic, with increased production rates and reduced reject rates down to zero in some instances.”

www.fuchs.com

Direct customer assistance advance

Thanks to an augmented reality programme dedicated to service, Adelio Lattuada reports that it is now feasible to provide technical assistance to customers more simply and directly via a tablet or a smartphone.

Through the camera of the smartphone/tablet, it is possible to observe any problem, error, fault or alarm on the machine and solve it more intuitively thanks to 3D icons and indications applied to the real environment. In this way, it is possible for flat glass processing customers to have a clearer, faster and more economic service, leading to reduced downtimes and costs caused by machine stops.

www.adeliolattuada.com

Digital powder system for glass decoration

Tigital, the business unit of Tiger Coatings, an Austrian technology leader in surface finishing products, is changing the way of glass decoration. Its digital powder system results in print images up to 1200 dpi resolution. This two step transfer and fixation process produces photographic images as well as sharp text and digital information like QR- or barcodes on hollow glass as well.

“This process is geared towards high profile hollow glass applications like cosmetics or alcohol bottles and combines the advantages of digital printing such as fast turnaround, personalisation and short runs at a cost that allows users to produce in industrial quantities” says Francisco Marti, Technical Product Manager.

“Being able to move from flat glass decoration to even complex shaped hollow glasses widens the application portfolio drastically.”

www.tigital.com

Francisco Marti, Technical Product Manager at Tigital (image: fotogestoeber – Fotolia).

HOT TOPICS

For latest industry news and highlights from this issue, visit www.glassworldwide.co.uk
If it’s in your glass, we’ll inspect it.

Brilliantly.
20% sales growth recorded by inspection solutions specialist

It has been an exceptional year for IRIS Inspection machines, recording a 20% improvement in sales for 2019. Growing global demand for the company's non-contact glass container inspection technology has required manufacturing capacity to be doubled during the final quarter at IRIS headquarters on the outskirts of Lyon. This expansion has been made possible by the acquisition of additional premises and the relocation of production/assembly operations last year and by hiring additional, multi-lingual engineers.

At the heart of this significant business increase is the success achieved for NEO EVO5 and EVO12 inspection machines in recent months. This Industry 4.0-compatible equipment has received widespread glass industry acceptance, generating multiple orders, in particular from European and Latin American glass packaging producers.

Already, 320 machines are running NEO software throughout the world, with excellent customer feedback generated for the innovative defect approach adopted. Glassmakers are particularly impressed by the technology's accuracy and user-friendliness.

The equipment delivers valuable features that help glass container producers to save time during the manufacturing process. Every setting has been designed to be handled by the machine itself, making the equipment less dependent on human operators. Evolution NEO recognises the article and its exact shape, automatically drawing the inspection zone. This simplifies job changes and reduces the human error factor. The equipment allows operators to follow defect rejection rates, while also bringing their immediate attention to the most significant information analysed by the machine. In addition, within its statistical tools, Evolution NEO integrates a helpful set of different data, including time, mould number, images etc.

In total, there are now more than 1400 operational IRIS inspection machines in the field, with NEO designs increasingly specified as the equipment of choice.

IRIS Inspection machines has recorded a 20% improvement in sales for 2019.

High-tech CTS system with UV lasers for large formats

Following successful installations of JetScreen! LT CTS systems in Germany and Switzerland, Lüscher Technologies AG is expanding its range of products with JetScreen! LT 55/32, designed for a maximum frame format of 5500mm x 3200mm.

The design will include state-of-the-art components such as maintenance-free linear motors and data transmission via Gigabit network. The system will be available in various formats. Since mid-2019, the 55/32 series with a maximum frame format of 5500mm x 3200mm can also be ordered. The first system sold will be installed in Germany by the end of December.

Depending on customer requirements, the system can be equipped with 64 up to 128 laser diodes. All systems can be retrofitted on-site, which means they can be equipped with additional laser diodes if higher output powers are required. Optionally, all JetScreen! LT systems can be easily integrated into fully automatic production lines such as Zentner systems with corresponding development, coating, sieve dryer and magazine units. An optimal ratio between quality and speed is achieved with the latest Trioptic! system. This allows the free choice of resolutions 635, 1270 and 2540 dpi.

www.luescher.com

Disappointment at advance towards DRS

Scotland’s Deposit Return Scheme (DRS) continues to move forward, despite concerns from the UK glass industry and 16 supporting organisations that glass should be excluded.

Cabinet Secretary for the Environment, Climate Change and Land Reform, Roseanna Cunningham, has laid draft regulations in the Scottish Parliament that will create the legal framework for Scotland’s DRS. The announcement comes shortly after British Glass and 16 supporting organisations issued an open letter to the environment secretary.

The new regulations will see the establishment of a scheme that will include PET, aluminium and steel cans, as well as drinks containers made of glass with a 20p deposit.

“We are disappointed that the Scottish Government, regardless of concerns from industry, continues to push forward with a DRS including glass,” commented Dave Dalton, British Glass CEO. “We believe that the Scottish Government is bringing in the DRS to tackle a plastic litter issue rather than taking a measured and joined up approach to improving the wider recycling infrastructure. The glass sector will unfairly pay the price for the fight against plastic litter when we believe there is not a glass litter problem.

“Recycling is such an important issue for our sector, both in terms of the circular economy and decarbonisation, so it is vital that we get it right. We do not believe that including glass in the DRS will achieve the environmental goals set out by the Scottish Government. In fact, waste management experts argue that including glass in a DRS would actually reduce the current UK glass recycling rate of 67%.”

www.britglass.org.uk

www.iris-im.com
Perfumery and cosmetics specialist selects advanced furnace

Stölzle Masnieres Parfumerie has hired Polish company Forglass to supply its technology in designing, erecting and commissioning a furnace for producing extremely high quality, extra white flint glass. The company will supply all components of this technologically advanced furnace, including complete design and engineering, construction, heat-up and commissioning. According to Forglass, the technology guarantees unmatched quality of flint and forehearth coloured glass, which are so important for Stölzle’s demanding clients from the perfumery and cosmetic market.

www.forglass.eu

Opportunities for processing equipment experience

BENTELER Glass Processing Equipment develops machinery and equipment for processing flat glass used in architectural, automotive and technical applications. With over 3500 successfully completed projects in approximately 60 countries, the company supports customers with innovative solutions.

Recently, a ‘TechLab’ was launched at the company’s headquarters in Bielefeld, Germany. Three sample lines are provided for customers to experience live operations in various applications. It is also possible to customise the systems to meet specific requirements and conduct glass processing tests. The equipment installed comprises a user-friendly and flexible system combining digital and screen printing, a pre-processing cutting-breaking-grinding line and the latest version TecWasher glass washing machine.

www.benteler-glass.com

A WORLD BUILT ON PERFORMANCE AND STYLE

For outstanding glass color and coating technologies – both decorative and functional – Ferro are global market leaders.

We are the only business offering a complete package of decoration and design options for container glass. For use either in the glass – forehearth color technology – or on the glass with our lead-free enamels, organic inks and coatings.

Ferro is trusted by the world’s leading brands to deliver solutions that exceed expectations.

www.ferro.com
**UK soda ash storage capacity expansion**

Soda ash supplier Newport Industries Ltd is increasing its total UK storage capacity to over 40,000 tonnes, with additional warehousing in Glasgow and Hull. These sites are in addition to the company’s dedicated soda ash import terminal and silo storage in the Port of Liverpool. The company also has warehousing in Ipswich and Londonderry.

The Liverpool facility, known as Bulk Powder Terminals Ltd, includes two 8000 tonnes storage silos for soda ash and a wholly-enclosed conveyance system, linked to a dual tanker loading system. Bulk road tankers are fully loaded within between seven and ten minutes.

**Driving sustainable cosmetic glass packaging via recycling**

As a leading producer of glass packaging for cosmetic products, Gerresheimer is committed to driving sustainability in the sector. The company has been successfully producing glass with a high proportion of post-consumer recycled material for over 10 years in Momignies, Belgium and from 2020, it will also start producing glass with a higher proportion of recycled glass at the Tettau site in Germany.

As part of its commitment to the circular economy, Gerresheimer has worked hard to reduce the proportion of raw materials used in its clear glass to just 45% of the mix. The glass composition has been audited and certified by Belgian company RDC environment, who also completed a full life cycle assessment of Gerresheimer’s recycled glass. This LCA was then reviewed by Quantis, expert in sustainability for cosmetics packaging. They also meet the requirements of EU legislation and the recently established Spice Initiative.

**Glenfiddich bottle delivers striking heritage cues**

The latest Glenfiddich bottle has been designed to emphasise the brand’s special provenance and heritage, taking cues from its origins in the Valley of the Deer. The triangular bottle design includes a dramatic ‘V’ shape cut into the glass, framing the brand’s stag logo, plus shoulder embossing and red tab neck labelling.

The Ardagh Group’s Design Team used their creativity to adapt the triangular bottle, designed by Here Design, to work flawlessly on production and filling lines, while delivering William Grant & Sons’ vision for the distinctive new bottle.

The moulds were manufactured from an upgraded material to achieve the desired definition in every bottle. Tiny modifications were made around the V-shaped ‘Valley’ on the face of the bottle, to ensure a more premium finish. The neck design’s bulbous surface was adapted to a tapered, conical platform for the revised tab label to sit on. The design has a sharper, triangular shape but by contouring the edges, it still acts like a round bottle for ease of handling and efficiency on production lines. Two contact points were also created in the foot and shoulder to give stability on the high speed filling lines.

**Lamination system installation**

PGT Innovations of Florida, USA has selected the recently introduced Bürkle IFL glass lamination system for installation in 2020. This system is a serial production in-line, thermal, oil-heated, flat platen lamination system.

The Bürkle IFL process is a multi-stage laminating process, which uses a vacuum flat press heated on both sides in the first step. For glass that is thicker than average, a second step is recommended, which uses a flat press that also applies heat from above and below the product. A flat press with cooled press plates is then used to cool the laminated glass. The system has a useful laminating area of 2.6m x 5.0m.

The in-line system is ideally designed for the production of laminated glass, safety glass (VSG), smart glass, decorative glass, solar modules and other specialist flat glass products.

**Tin bath casings shipped to international customer**

At the end of September 2019, four tin bath casings, each weighing five tonnes, were shipped from Germany to an international float glass customer of HORN Glass Industries. The tin bath bottom casing is used as a support tank for the bottom refractories. It is designed to expand on heated up temperatures, without flexing or distorting. When operating the hot tin bath, it needs to be air-cooled continuously at the underside and at the lower sidewalls.

The refractory blocks are profiled to vary the tin depth. The profile design depends on the size of the bath, the products and thicknesses it is required to produce.

**Lamination system installation**

PGT Innovations of Florida, USA has selected the recently introduced Bürkle IFL glass lamination system for installation in 2020. This system is a serial production in-line, thermal, oil-heated, flat platen lamination system.

The Bürkle IFL process is a multi-stage laminating process, which uses a vacuum flat press heated on both sides in the first step. For glass that is thicker than average, a second step is recommended, which uses a flat press that also applies heat from above and below the product. A flat press with cooled press plates is then used to cool the laminated glass. The system has a useful laminating area of 2.6m x 5.0m.

The in-line system is ideally designed for the production of laminated glass, safety glass (VSG), smart glass, decorative glass, solar modules and other specialist flat glass products.
Drawn to quality...

Order from HUNPRENCO for the proof

The world's leading plunger and cooler manufacturer

+44 (0) 1723 890105 • info@hunprencocom • www.hunprencocom
Screen printing equipment innovations

For over 50 years, Cugher has designed and produced both standalone machines and complete lines for screen printing, integrating the offer with solutions for drying, automation, process and quality control, handling and stacking.

The company has recently developed three product lines that convey innovation, quality and customisation. This includes the Sketch series JS 270X160 printing machine, which is suitable for everything from small to large glasses of rectangular shape, from 500mm x 200mm to 2700mm x 1600mm.

Cugher has developed three product lines that convey innovation, quality and customisation.

Considered ideal for the interior design sector, the frame is usable for several glass dimensions with references on the left-front side.

Cugher’s Flexy series JX 200X130 printing machine delivers versatility and is capable of processing small lots with different characteristics. It is ideal for multiple glass types (thin, coated and standard) and features a stainless steel magnetic table with a vacuum and blow system for easy nesting.

Finally, the Italian company’s Compact series LS100X70 printing machine is intended for high precision, high speed printing on flat glass of various sizes. Horizontal movement of the printing table enables easy loading and unloading and the printing table itself can be adapted to customers’ requirements.

www.cugher.com

Enhanced windscreen production accuracy

In September 2019, nokra installed its first rate-of-change (ROC) calculation and visualisation software for extended production control towards head-up display (HUD) areas for automotive glass manufacturers.

Growing demand for such technologies as HUDs and AR is driving the need for higher production accuracy. Using a nokra alpha.ws+ system, a laser-optical measurement device, nokra customers can evaluate the cross curvature of their windscreen directly after the bending furnace on up to 13 measurement tracks, each with an unlimited number of test points.

In the HUD area, a grid of measuring points is brought into correlation to determine the ROC. Depending on the OEM’s demands, different calculation methods are available. An automated evaluation of the determined values against product tolerances and action limits is performed by the system. A clear presentation allows for an immediate understanding of these results. As a result, customers can easily assess the quality of their windscreen early in the process, allowing faulty products to be sorted. The results can also be used to optimise furnace control and increase yield.

www.nokra.de

Customers can evaluate the cross curvature of their windscreen directly after the bending furnace on up to 13 measurement tracks.

Flexible plastic packaging addition

Marpak Extrusions, a leader in polyethylene packaging for the glass container industry, has introduced Luminene Supertough to its range of flexible plastic packaging. Responding to market demands for more environmentally sustainable packaging, Supertough is a bimodal metallocene-based resin with properties that allow for a balance between processability, rigidity and impact strength.

The primary benefit of Supertough is its ability to produce a thinner film that retains the strength of thicker films. This reduces the weight of the film and has double the downgauging potential of other products in the market. The result is substantial cost reductions, CO2 reduction and weight reduction, while impact resistance is doubled and tear resistance is also improved.

The molecular weight distribution of the resin means that as well as being used to produce film that is thinner yet maintains its strength and rigidity, it also allows for easier processing, resulting in a lower carbon footprint and high quality aesthetics.

www.marpak.co.uk

USA focus for flat glass processing machinery specialist

Italian flat glass processing equipment specialist, Elettromeccanica Bovone is opening a branch in the USA to serve the North American market. The recently announced headquarters is based on a strategic decision, aimed at answering market demand, in sync with the company’s technology distributor in the area, Salem Distributing Co. The operation will consolidate the presence of the brand in a market that, year after year, continues to value made in Italy technologies.

The US headquarters are located in North Carolina, a state with a rich history in the furniture industry, a leading sector for flat glass.

The company has finalised the purchase of a building to accommodate commercial offices, a spare parts warehouse and a mechanical workshop for overhauls. The headquarters, which will be 100% operational from 2020, will be strategically located to best serve customers from a logistics perspective.

www.bovone.com

Chinese batch house contract

Shanghai Precision, a company registered and operated in China, was selected recently by Schott China to deliver a complete batch house for pharmaceutical tubing.

Established 15 years ago, the company focuses on batch plant and cullet system design and supply for various glass industry customers. As well as being active in China, Shanghai Precision has also delivered batch plants to customers in Europe, the Middle East, South East Asia, South America and Africa, organisations making float, container and fibre glass products etc. In 2013, the company was acquired partly by EME GmbH, becoming part of the SORG Group.

www.shpws.com

Upgrading your oxy-fuel burners, adding burners to boost production, or answering market demand, the专利 pending Cleanfire HR burner offers you expanded functionality and flexibility with unmatched performance. It can deliver:

- High throughput, high fuel efficiency
- Optimum flame profile for diverse applications
- Easy nesting
- Ultra-low NOx emissions
- Increased flame radiation
- Optional remote performance monitoring feature
- CO2 reduction and weight reduction
- Tear resistance is also improved
-andReturn to a market that, year after year, continues to value made in Italy technologies.

www.airproducts.com/HRx

© Air Products and Chemicals, Inc., 2018
Air Products is blazing a new trail for oxy-fuel burner technology . . .

Boost your performance and productivity for better glass with the Cleanfire® HRx™ burner!

Upgrading your oxy-fuel burners, adding burners to boost production, or converting your air-fuel furnace to oxy-fuel?
The patent pending Cleanfire HRx burner offers you expanded functionality and flexibility with unmatched performance. It can deliver:

- Increased flame radiation for high fuel efficiency
- Ultra-low NOx emissions
- Foam reduction capability for higher-quality glass
- Enhanced productivity
- Optional remote performance monitoring feature

This burner is the latest innovation in the long line of industry-leading Cleanfire® burners for the glass industry. To learn more or to schedule a demonstration in our state-of-the-art lab, call 800-654-4567 (code 10868) or visit airproducts.com/HRx.

To make glass better, put Air Products in the mix.
**Dew point sensor development**

VP Instruments has launched a smart dew point sensor for compressed air and industrial gases. Its large measurement range, -70°C to +60°C, enables one single product for monitoring the dew point of both refrigerant and desiccant type air dryers.

The VP dew point sensor features state-of-the-art polymer technology that fully withstands getting wet and that is resistant to particulate contamination, oil vapour and most chemicals.

It enables monitoring of both dew point and temperature simultaneously in VPVision and other energy management systems, thanks to its RS485 (Modbus RTU) output. The sensor also features a 4.20 mA output. With the built-in alarm function, alarms are made visible via the LED and in management software.

www.vpinstruments.com

**Production investment for electrode holders**

Following the construction of another production hall in Gösen, Germany, Bock Energietechnik GmbH has expanded its production area by 400m². In addition, to meet increasing demand for electrode holders, the company has invested in a spinner CNC milling machine and expanded its welding equipment.

Bock Energietechnik develops standard and custom-made electrode holders for the glass industry and manufactures them in-house. Recently acquired sheet metal processing facilities also enable Bock to manufacture tailor-made cooling water systems and protective coverings for electronic components independently and flexibly for its customers.

www.bock-energietec.de

**Expansion completed by Portuguese supplier**

Portugal’s Vidromecanica has recently completed an expansion of its Marinha Grands premises, the company’s third significant expansion in recent years, providing additional space for the design and manufacture of equipment for the glass container and tableware sectors.

Founded in 1984 by Antonio Barreto, Vidromecanica remains a family-run business, involving two generations. The company is celebrating its 35th anniversary this year and employs some 60 production staff. All machinery is manufactured in-house by specialists and international partners to deliver competitive advantages, which Vidromecanica exploits fully when supplying its equipment.

Today, the company serves customers throughout the world, located in more than 60 countries and provides a wide range of thermal equipment, including annealing, decorating and toughening plant, hot and cold end coating and cullet treatment equipment.

www.vidromecanica.com

**IS machine cooling fans order**

LWN Lufttechnik GmbH has received an order from Wiegand-Glas to equip four IS machines with cooling fans. They will be operated at the glass container producer’s Schleusingen site, the largest greenfield project in Germany next year.

LWN’s range includes all process steps from detailed planning to installation and commissioning and includes fans, piping and electrical installation. Managing Directors Aleksander Pinda and Reiner Giesbert have realigned the company in recent years to be recognised as a full range supplier of cooling systems. As a result, production has been expanded and optimised.

All four machine cooling systems will be completed by the end of February 2020.

www.lwn-lufttechnik.de

**Celebrating 50 years of processing machine innovation**

Celebrating its 50th anniversary in 2019, Schiatti Angelo continues its technological innovation and development of solutions for the flat glass processing industry. The Italian company’s machines are well known internationally for their reliability and ability to keep up with the needs of the times, providing the most suitable innovations and improvements for operators.

The latest Schiatti straight edgers feature the automatic adjustment of diamond wheels. The machines were already able to manage automatically the adjustment of polishing wheels and now, the glass removal step can also be performed automatically by means of the same Mitsubishi PLC. Automation of the grinding process reduces machine set up times significantly.

www.schiattiangelosrl.com

**Schiatti Angelo’s FPS20RS fully automatic straight edger**

Schiatti Angelo’s FPS20RS fully automatic straight edger was exhibited at Vitrum 2019.

**Bock Energietechnik GmbH has expanded its production area and invested in manufacturing equipment.**

**The Vidromecanica premises in Marinha Grande.**

**The VP dew point sensor.**

**IS machine cooling fans order**

LWN Lufttechnik GmbH has received an order from Wiegand-Glas to equip four IS machines with cooling fans. They will be operated at the glass container producer’s Schleusingen site, the largest greenfield project in Germany next year.

LWN’s range includes all process steps from detailed planning to installation and commissioning and includes fans, piping and electrical installation. Managing Directors Aleksander Pinda and Reiner Giesbert have realigned the company in recent years to be recognised as a full range supplier of cooling systems. As a result, production has been expanded and optimised.

All four machine cooling systems will be completed by the end of February 2020.

www.lwn-lufttechnik.de
Tiama: your co-pilot on the way to the Smart Factory

Introducing YOUniverse, unique to Tiama and further proof why we are the leaders in business intelligence within the glass manufacturing industry. YOUniverse has been specifically developed with YOU and your needs at its core. Utilizing flexible and automated “plug and play” systems YOUniverse makes the inspection process smarter and capable to adapt to any changes.

From batch plant to the warehouse, YOUniverse creates a maximum flow of information to enable as many machines as possible to “talk” to each other to improve efficiency, productivity and profitability. With its open information interchange, this revolutionary system allows machines from any manufacturer to be linked to the YOUniverse. Welcome to the future – yours and your factory’s.

Take your first step towards Smart Factory technology by visiting youniverse.tiama.com
Development of extra long-life refractory material nears completion

In 2018, Parkinson-Spencer Refractories Ltd embarked on the process of developing a glass contact material to provide enhanced operating life, primarily for feeder expendable refractories. The project began following a funded PhD research project carried out in collaboration with the School of Chemistry and Process Engineering at the University of Leeds.

The chemical composition of the material incorporates a higher zirconia content (24.9%) than PSR’s traditional feeder expendable materials. However, it is the back to first principles approach applied in order to achieve an optimum particle packing, high material density and low apparent porosity, which makes the material distinctive. The PSR-930 material has so far exhibited exceptional thermal shock resistance and high temperature glass corrosion resistance in soda-lime-silica glasses.

Throughout 2019, tests have been ongoing, both in-house at PSR and at external testing bodies, as well as field trials in glass factories with several of PSR’s industry partners. Initial results and feedback from the field trials have been positive and will assist PSR in progressing the material to market in the near future.

www.parkinson-spencer.co.uk

Flat glass washing and drying solutions

Since June 2019, Bavelloni SpA has been the majority shareholder of Yalos Bavelloni, a business specialising in flat glass washing and drying solutions that integrates and complements Bavelloni product portfolio.

The focus of Yalos Bavelloni is to offer a complete line of horizontal and vertical washing machines, featuring the highest performance in terms of washing and drying quality, durability and minimum maintenance. The machines have been designed in a standardised and modular way but at the same time, a wide range of options are available to configure them according to specific needs.

Danilo Cigoli, Managing Director of Yalos Bavelloni and the company’s other shareholders have considerable experience and knowhow in the field of flat glass processing and in particular, in the washing and drying process. This also allows the company to operate in the special machinery segment, developing customised solutions on demand.

HW Series horizontal washing machines from Yalos Bavelloni are available in different sizes and configurations. They feature innovative solutions for glass drying, oversized structures and extensive use of stainless steel. Moreover, they are extremely compact and easy to inspect and maintain.

www.bavelloni.com

Latest software release computes thin spots

Germany’s Nogrid GmbH, supplier of computational fluid dynamics, has announced its latest pointsBlow software release. This software was developed especially for the glass container industry and computes the glass forming process in full 3D (BB, PB, NNPB and PB for tableware).

In the latest 3.2.0 release, users are able to compute thin spots in glass containers with its geometrical adaptive point density feature. The effect of thin corners in rectangular 3D containers (eg perfume bottles) can now be computed more realistically, even in containers with a wall thickness lower than 0.1mm.

www.nogrid.com

Measurement and monitoring solutions family

LumaSense Technologies Inc, provider of innovative temperature and gas sensing devices, was acquired by Advanced Energy, a global leader in highly engineered, precision power conversion, measurement and control solutions, in September 2018.

With the integration process recently finalised, legacy LumaSense products are now part of the Advanced Energy family, adding a line of photonic-based measurement and monitoring solutions that are synergistic with Advanced Energy’s leading precision power and control technologies in both semi-conductor and industrial markets.

www.advancedenergy.com

North American hub for Italian processing machinery

Italian flat glass processing equipment specialist, Keraglass has opened an operation in New Jersey, USA. This strategic move is an indication of the company’s desire to strengthen its presence and confirm its role in the North American market. It also allows closer collaboration with regional sales agent Matodi LLC.

The organisation will be managed by Franco Capecechi, who boasts an established track record in the North American sales industry. As well as providing a reference point for commercial and administrative functions, the set-up will concentrate on customer support and after-sales service.

www.keraglass.com / www.matodi.biz
BDF Industries (all season) Collection
Our best experience for your Glass Industry

More than 100 years of tradition and more than 60 years of experience in Glass Industry, always in continuous research in new technologies and innovations to improve your production performances. The enthusiasm makes us truly unique because it is a passion that never fails. BDF Industries has everything you need to “dress” your Glass Plant: from Furnaces to Forehearths, from IS Machines to Variable Equipment, from Automation to Controls, to Energy management and recovery.

BDF Industries. The perfect Partner who always knows how to put itself in your shoes.
**Expert training sessions**

With over 30 years’ history of research within glass science and technology, CelSian Glass & Solar has announced two expert training sessions to take place before the end of 2019. The first is a one day session on ‘Heat transfer in glass furnaces’, to be presented by Anne-Jans Faber, Senior Scientist at CelSian. This training course is scheduled for 20 November in Istanbul, just before the International Sisecam Glass Conference from 21 to 22 November, also in Istanbul.

The fundamentals of heat transfer processes in the different domains (combustion space, batch blanket and glass melt) of industrial glass melting furnaces will be presented and the course will focus especially on radiative heat transfer in glass melts, depending on the presence of colouring ions and redox state of the melt. Exercises and exemplary calculations are part of the course, so that after the training day, participants know how to apply the knowledge, eg for estimating the effect of glass chemistry, colour and redox changes on heat penetration in the glass melt and in the batch blanket.

The target audience for this training includes employees from batch and furnace departments and R&D groups of glass producing companies and suppliers to the glass industry.

CelSian is also organising a two day expert training session on Fining, redox and glass quality. This course is scheduled for 11-12 December at the CelSian premises in Eindhoven, the Netherlands. The target audience of this training includes employees from batch and furnace departments and R&D groups of glass producing companies and suppliers to the glass industry. “Such a subject is of key importance for those that work on a daily basis on controlling and optimising glass quality, which is highly influenced by redox state (disturbances)” commented Oscar Verheijen, Senior Consultant at CelSian.

Presentations for both sessions will be in the English language and online registration is open. [www.celsian.nl/academy](http://www.celsian.nl/academy/)

---

**Industry support for 25th charitable fundraiser**

The 25th anniversary of 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 and evening’s entertainment.

The event was organised by glass industry stalwart Ian Robertson and his brother Duncan to raise funds for local charities who receive little or no funding from central or local government. This year’s event was to raise funds for CRY (Cardiac Risk in the Young), which provides screening days and the local Macmillan nurses.

A total of 16 teams teed off and the day was supported by local glass companies including Allied Glass Containers, Ardagh Glass and Stolzle Flaconnage, as well as such suppliers as DAS Engineering, Forglass, Gillian & Baines, Graphoidal, Land Ametek, Marpak, RGB and Sheppee International, plus teams of friends.

As the only participants to enter a team in every tournament since the event’s conception in 1994, Allied Glass Containers received a commemorative award, presented to Alan Minto, Production Manager, by Glass Worldwide’s Frazer Campbell.

The winning team was captained by Duncan Robertson, with Allen Haywood from CRY being the individual winner. Eighty four attendees then joined together for an evening dinner, with entertainment provided by Liverpool comedian, Bill Woolard. Approximately £2800 was raised, giving a total of £70,000 raised by the tournament over the years.

“Thanks once again to the support of all glass companies, suppliers and friends for entering teams and to Glass Worldwide for sponsoring the event” commented Ian Robertson. 😊

---

**Industry 4.0 connectivity available**

Graphoidal Developments Ltd, specialist manufacturer of shear spray, cold end coating and lubrication equipment, is now able to offer optional Industry 4.0 connectivity across its full range of equipment.

Features include secure remote access, allowing service engineers to troubleshoot and access equipment without going on-site, as well as secure VPN remote connectivity using ethernet (built-in), wi-fi or cellular (extension cards). Data acquisition supports Modbus, OPC UA, while OPC UA is embedded to offer easy-to-deploy data integration within factories. This feature enables alarming, machine KPIs and historical logging.

Graphoidal’s data logging and retrieval system allows users to log up to one million time-stamped data values, in addition to which logged files can be easily retrieved or sent for data aggregation and analysis using HTTPS, MQTT or FTP.

Email and SMS notifications can be used to configure alarms on key parameters. Furthermore, notifications can be sent by email or 4G SMS or using Talk2M services.

[www.graphoidal.com](http://www.graphoidal.com) 📩
Nice to meet you

If you think you already know who we are, maybe it’s time for us to get to know each other better...

We are the only company in the world to operate successfully in the field of technology for the production and processing of both flat and hollow glass. A company with more than 50,000 installations in over 100 countries. An independent and reliable company that can accompany its customers in their growth. A company that makes innovation its mission and invests in research to continue to lead the market. A company that knows how to evolve to keep up with the times.

Sometimes you think you know and then...

www.bottero.com
Penico Gauges supplies a complete range of Gauges & Reamers for mould production, inspection & repair

Penico’s range of Mould Gauge Equipment provides the glass container industry with gauge solutions. Proven gauge design - Application know-how and fast delivery to all parts of the glass container industry.

- IS Blankmould - Blowmould - Neckring and Bottomplate Gauges - Fitter Gauges to inspect Dovetail Profiles.
- Non Standard Gauges manufactured to customer’s own requirements.
- Blankmould & Mould Reamers manufactured in either HSS or Carbide Tipped to simplify the repair of mould dovetails.

Penico Gauges Limited
Albion Works • Keighley Road • Bingley • BD16 2RQ • United Kingdom
Tel: +44 (0) 1274 511044 • Fax: +44 (0) 1274 510770
E-mail: info@penico.com • Web Site: www.penico.com

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

Arc appointments support future development
Arc has confirmed three appointments to its executive management team to support key initiatives in the company’s future development. Xavier Roy-Contancin is named Group Chief Financial Officer, Laurent Hien becomes Group Vice President of Operations and Stéphan Fertikh is appointed Director of Human Resources for Europe.

After more than 15 years as Chief Financial Officer of Antalis and the Sequana Group, Xavier Roy-Contancin, has joined Arc as Group Chief Financial Officer, replacing Jacques-Olivier Baert, who has decided to pursue other personal and professional projects. As a member of the Group Executive, Operations and Strategic Committees, Mr Roy-Contancin will participate in the decision making process regarding the company’s main operational and strategic plans and will provide analyses and forecasts on the group’s performance and financial outlook. He will also play a key role in the analysis and control of costs and in the implementation of an efficient and harmonised financial organisation.

Laurent Hien has been appointed Group Vice President of Operations. Prior to joining Arc, he was Vice President of Operations and Engineering at Novares Group. As Group Vice President of Operations, he will be responsible for furthering the safety culture throughout the group. He will also ensure the development and implementation of a strategic operational plan to support the group’s business objectives, while implementing best-in-class manufacturing practices to improve productivity.

Stéphan Fertikh takes over as Human Resources Director for Arc Europe, succeeding Emmanuel Saussard. He will ensure that Arc successfully meets the challenge of generational skills and expertise renewal, supporting the initiatives tied to Project Synergie 2020. As such, he will accompany the strategic management of Arc France operations.

www.arc-intl.com

Mark Powys remembered
Mark Powys, Principal Engineering Director at Gallo Glass, recently passed away, aged 50. Born and bred in South Africa, Mr Powys moved to the USA with his wife Melony and daughters Lisa and Terri in 1997 in pursuit of ‘the American Dream’. He was an experienced and highly respected furnace and production engineering professional, who spent just over two decades associated with the glass manufacturing industry in the USA.

Having worked in the float glass sector for PPG Industries and Guardian Glass, he joined Gallo Glass in Modesto, California in 2014, developing extensive experience in hot end process engineering and the project management of furnace rebuilds.

Mark Powys was well versed in the latest glass industry technology. He was an active member of the Glass Manufacturing Industry Council and leader of the Furnace Lifetime committee for International Partners in Glass Research.

Furnace health monitoring team expansion
PaneraTech Inc has expanded its furnace health monitoring team in recent weeks. Jon Wechsel has joined as SmartMelter Services Manager. He brings 18 years of experience in the glass industry, primarily as a glass engineer for companies such as Owens Corning, Libbey and Owens-Illinois. Mr Wechsel will manage the SmartMelter field services team, delivering inspection reports and working with customers as the technical contact throughout the inspection process.

Separately, Ece Isel has joined the IT team in Ankara, Turkey as Senior Product Manager. Ms Isel has been recruited to lead PaneraTech’s rollout of the XSight online platform, the furnace health management software that launches in the fourth quarter of 2019. Her extensive background in information technology product management includes work for Comodo, Havelsan and OpsGenie.

Penico Gauges Limited
Albion Works • Keighley Road • Bingley • BD16 2RQ • United Kingdom
Tel: +44 (0) 1274 511044 • Fax: +44 (0) 1274 510770
E-mail: info@penico.com • Web Site: www.penico.com
Ware handling specialist appoints CEO

Ramsey Products has appointed Mark Taylor as the company’s CEO, succeeding William Hall, who continues as Chairman. Mr Taylor joins Ramsey with a wealth of business experience from a diverse background in manufacturing and industrial environments. Most recently, he was Division President of a North Carolina-based waste and recycling equipment manufacturer. His responsibilities at Ramsey include developing and implementing the company’s strategy, leading the day-to-day management of the organisation, working with the various departments from manufacturing to sales and continuing to grow the business.

www.ramseychain.com

Tableware production machinery specialisation

IPROTec GmbH, a leader in the production of forming, finishing and handling machines for stemware and tableware production has appointed Paolo Panza as Business Development Manager. With 30 years’ experience in the tableware machines market, Mr Panza will strengthen the IPROTec sales team and assist Managing Director Gerhard Röck to reach ambitious targets in worldwide markets. Part of the Zwiesel Kristalglass AG Group, IPROTec reports excellent recent results, having successfully commissioned its latest generation machines (blow-blow, laser filament cutting, inspection and packaging machines) for leader companies in the USA, China, Thailand, Czech Republic and Germany.

www.iprotec-gmbh.com

Sales role at UK ware handling specialist

Will Law has recently joined Pennine Industrial Equipment as a trainee international sales engineer. Having recently graduated from Sheffield Hallam University with a first class honours degree in materials engineering, he is looking forward eventually to conducting business in Asia and the rest of the world.

www.pennine.org

UAE processing equipment specialist

Dubai-based glass processing machinery specialist Huda Al Hashmi Industrial Equipment Trading LLC (HIET) has announced the appointment of Savio Dagher as CEO. Mr Dagher has held a variety of global management positions in different industries. He is a seasoned leader, with strong international experience, particularly in Russia, Turkey, Italy, Egypt and Saudi Arabia etc.

www.hiet-me.com

Optics technology management

Dr Karl Lamprecht, currently the Executive Board Member responsible for the ZEISS Semiconductor Manufacturing Technology business, will become President and CEO of Carl Zeiss AG in April 2020. He will succeed Professor Dr Michael Kaschke, who will not renew his contract beyond his current tenures, as planned.

www.zeiss.com
A passion for glass celebrated at Madrid Phoenix Award ceremony

Professor Alicia Durán received the 49th annual Phoenix Award at a ceremony in Madrid this October, supported by colleagues and friends. In an acceptance speech that emphasised her passion and support for glass and for members of the international glass community, Professor Durán confirmed her commitment to achieve a series of goals while President of the International Commission on Glass. This involves the realisation of the ICG2030 project and support for the International Year of Glass 2022 proposal.

Professor Alicia Durán has enjoyed a highly successful career in the world of glass science and technology, bridging the gap between industry and academia. A Research Professor at CSIC, Consejo Superior de Investigaciones Científicas (the Spanish Research Council), she has developed her entire professional career at the Institute of Ceramics and Glass in Madrid, Spain.

Highly respected for leading the GlaSS research group at the Department of Glass, she graduated in physics from the Universidad Nacional de Cordoba, Argentina, in 1974 and obtained a PhD in physics from the Universidad Autonoma de Madrid in 1984. In 1988, she was awarded the ICG’s Gottardi Prize for young glass researchers.

Under the chairmanship of Jean-Luc Logel of IRIS Inspection machines, the 2019 Phoenix Award Committee selected Professor Durán to receive this year’s prestigious award in recognition of her extensive work in the furtherance of glass, glass-ceramics and sol-gel materials research. This extends from basic research to applications in the industrial glass sector and for other final users of glassy materials. The work of her team embraces different materials and components for fuel cells and Li-batteries, transparent nano glass-ceramics for photonic applications and glass and glass-ceramic sealing. These materials come together with protective and environmentally-friendly anti-corrosive coatings, meso-structure films with photocatalytic activity and multi-functional sol-gel coatings.

**Co-operation and collaboration**
Over many years, Alicia Durán has developed and maintained close collaboration with the Spanish and international glass industry. Much of her work has related to some of the industry’s most pressing issues, including the development of opportunities to enhance energy savings in furnaces, environmental issues and emissions control, recycling systems and the certification of food safety of glass containers.

“Co-operation and collaboration are key words that have guided my life” she explained during her Phoenix Award acceptance speech in Madrid. As well as maintaining continuous contact with the glass industry, positive relationships have been established over many years with research and development centres throughout Europe, North America, Japan and Latin America.

Professor Durán has been an influential figure within the Sociedad Espanola de Ceramica and Vidrio (Spanish Glass and Ceramics Society) and the International Commission on Glass for more than two decades. Elected ICG President in 2018, there are some important goals that she would still like to achieve. “ICG combines the ideals and goals of our founders with the emerging features of glass science and technology but if we want to represent the glass world, we need to change with this world” she commented.

“ICG2030 is our project to face the new challenge of ICG. We have to carry forward the work of international collaboration between glass technologists and scientists of the world and also to identify future directions for research and development.” Professor Durán emphasised that her ambition is to build a positive future for the industry and its products. “Glass is the transparent tool that allows building a sustainable planet with more developed and fair societies. But glass...”

---
[32] Latest industry news and highlights from this issue at www.glassworldwide.co.uk
2 wind turbines helped us improve our green credentials.

With a potential 50% energy saving a System 500 forehearth conversion could improve yours.

WE HAVE THE BETTER SOLUTION

www.parkinson-spencer.co.uk
involves much more than science. It is also art, the history of this material sharing the history and evolution of humankind.”

**Gender equality**

As well as emphasising the importance of collaboration and internationalisation, education and training, the 2019 Glass Person of the Year stressed the importance of gender equality, both within CSIC and in the glass field generally. “Although women constitute half the undergraduate population, there is a continuous drop in the number of women at each level of academic or industrial careers” she explained. “We have to use different tools to help women achieve their full potential... women are half of the world and we have to become half of the glass world.”

Interestingly, Alicia Durán is the second woman to be elected ICG President and the second to receive the Phoenix Award. The standard bearer in both instances, Alev Yaraman, was present in Madrid to support her long-time friend as she received this year’s award. Mrs Yaraman was one of five previous Phoenix Award winners in the audience, the other industry luminaries being Surasak Decharin, Javier Gutierrez, James O’Callaghan and Helmut Schaeffer.

**UN Year of Glass proposal**

In her role as ICG President, Professor Durán also emphasised her support for a proposed United Nations International Year of Glass for 2022. “Extensive planning is now underway at an international level, involving scientific glass-themed societies, academia and industry, as well as museums and art societies. “A United Nations International Year of Glass for 2022 will underline the technological, scientific and economic importance of glass. It is a transparent material that can facilitate the emergence of more developed, just and sustainable societies to meet the challenges of globalisation.”

**Outstanding contribution**

Jean-Luc Logel, Chair of the Phoenix Award Committee for 2019, emphasised that Alicia Durán has made an outstanding contribution to the world of glass science and technology throughout her career and is recognised as a worthy winner of the 2019 Glass Person of the Year. “Her extensive knowledge is matched only by her great simplicity and exceptional generosity” he confirmed. “As a scientist and as a human being, Alicia embodies the PAC’s values perfectly.”

Further information:
web: [www.phoenixawardcommittee.org](http://www.phoenixawardcommittee.org)
ZIPPE solutions for a smart factory.

As a manager, you need relevant information to take the right decision promptly. B-ZMART® by Zippe fulfills this need by placing real-time batch plant reporting at your fingertips – anytime, anywhere.

The B-ZMART® concept is local, remote or cloud based and delivers instant live information regarding your plant’s runtime and performance. All you need is our NEW easy, user-friendly app for laptops, tablets or smartphones. So that you, quite literally, stay in touch.
Innovation and sustainability lead European success strategy

While visiting the O-I glass plant in Estonia recently, John Wallis met Michael Prechtl, Country Group Executive for North/Central Europe to discuss recent trends and priorities for Europe’s leading glass container manufacturer.

With a turnover of some $7 billion, O-I is the world’s largest glass packaging producer. The company employs more than 26,500 people at 77 plants and in 23 different countries.

It was in 2004 that O-I successfully completed a series of important European business acquisitions, culminating in its purchase of the multi-national BSN Group to become the continent’s largest player. Today, the company maintains interests as far afield as Estonia in the east and Spain in the west, collectively representing approximately one third of the glassmaker’s worldwide operation.

The European glass packaging business is recognised as the world’s most competitive, characterised by high quality expectations and unsurpassed innovation potential. “In essence, European glassmakers are responding by delivering some of the most innovative products” Country Group Executive for North and Central Europe, Michael Prechtl explains. “This situation is effectively fuelling many important glass industry trends at the moment, whereby leading brewers and other key customers are filling in Europe and successfully exporting their products throughout the world.”

With operations in 10 European countries and 34 plants in total, O-I is well positioned to champion glass and serve literally thousands of customers. An impressive portfolio of plants throughout the region manufactures up to 5000 different glass bottle, jar and container designs every day that are shipped to more than 50 different countries.

**Extensive capabilities**

Michael Prechtl is responsible for O-I’s interests in the Netherlands, Germany, Poland, Czech Republic and Estonia. This region includes 10 manufacturing plants, each of which is geared to accommodate specific sector production needs on a plant-by-plant basis.
Discover the building blocks behind End to End.

These are the building blocks behind End to End; they are the technology behind the process. Future-proof machines and control systems. Enhanced process stabilization and insight. From data collection and analysis, to container traceability and tracking, End to End is here to help you increase your efficiency.
Earlier in his career, the experienced Austrian national spent several years with Verallia, running the company’s business in Germany, before expanding its activities into Russia and Ukraine via the acquisition of existing glassworks in both countries. Subsequently, he left Verallia to pursue interests outside the industry, before joining O-I in 2014. Initially, he was appointed Regional Manager for the Czech Republic and Germany and successfully developed the numerous business connections that exist between these two countries both in terms of markets and production. Only latterly have his responsibilities been expanded to encompass the Netherlands, Poland and Estonia.

Factories are strategically located in Dubi and Nove Sedlo (both Czech Republic), Järvakandi (Estonia), Bernsdorf, Holzminden and Rinteln (all Germany), Leerdam and Maastrict (both Netherlands) and Jaroslaw and Poznan (both Poland) to provide extensive regional coverage.

Within the North/Central Europe region, an ongoing programme of furnace rebuilds and factory modernisation projects have included multi-million Euro investments at the Rinteln, Järvakandi and Dubi sites in recent years. In addition, two furnace rebuilds have been conducted in Poznan over the past 24 months. Plans are now finalised for a furnace rebuild at the Bernsdorf glassworks in Germany at the end of 2019. Scheduled for commissioning at the beginning of 2020, this project reinforces O-I’s commitment to continue its asset optimisation programme throughout Europe.

Mr Prechtl confirms that this and similar investment projects in the future will continue to rejuvenate melting, forming, inspection and other production process steps wherever appropriate technological improvements can be identified. “It is important to initiate permanent innovation in each of these areas, especially those that relate to the energy-intensive melting process” he explains.

Diverse requirements satisfied
Over the last four years especially, the European business has developed very positively, with increased volumes and margins generated. This success is based on the development and implementation of a long-term strategy under the leadership of Vitaliano Torno, President of O-I Europe. According to Michael Prechtl, part of the strategy is to constantly improve and tackle the challenges that lie ahead.

The diverse requirements of European customers has led O-I’s European arm to maintain strong production flexibility, with an important focus on product individuality, in many instances necessitating short production runs, while maintaining excellent quality levels.

Effectively, O-I has compartmentalised its business into key segments, in line with customer requirements and asset capabilities. The beer sector, for example, has completely different requirements to those of premium spirits producers. “In beers, you want long runs, high efficiencies and the lowest costs and some of our European assets have been set up to target this type of work and are performing successfully in line with the volume requirements of a highly concentrated customer base” Mr Prechtl confirms.

Premium spirits represents a second important market segment, where the optical quality of the glassware produced is critical. For example, the Järvakandi plant in central Estonia is focused on meeting the regional needs of leading premium spirits producers for clear and extra clear flint glass packaging. It is the EU’s most northerly and easterly glassworks and as such, is well placed to serve the interests of customers in Finland, Scandinavia and neighbouring Baltic countries. The full spectrum of technologies, capabilities and commercial strategies available from within the wider O-I Europe organisation is being utilised by Plant Manager Kaido Turro and his team to satisfy the needs of a growing client list that includes many well-known, high value spirits brands.

“When a consumer buys an expensive bottle of spirits, he/she wants to know that the quality of packaging is perfect” says Michael Prechtl.

Another key glassmaking segment targets local producers of wines, oils etc, serving the lower volume needs of a more fragmented customer base. This requires a different distribution approach.

According to Michael Prechtl, O-I is initiating innovations throughout its plants that relate to the energy-intensive melting process.
We are world leader in the field of sensor and robot solutions for hot end inspection, quality assurance and closed loop automation. With our solutions we actively work together with glass producers on making containers and table ware products lighter and stronger, produced with (almost) zero defects at higher speed and with minimum human dependency. The result is that the container and table ware industries are more competitive with other materials and more sustainable. Consequently together we create a better world!
In the food sector, O-I is working closely with customers who specifically require value-enhancing packaging for their products.

strategy and significantly greater flexibility from the glass factories set up to meet this demand.

And in serving another key market, food, O-I is working closely with customers who specifically require value-enhancing packaging for their products.

Market trends

Alongside other local players, O-I is well positioned to respond to improving customer and end consumer positivity towards glass packaging throughout Europe.

While emphasising that the prevailing ‘anti-plastic’ sentiment is definitely a very positive development, Michael Prechtl says “it is prudent to remain alert and carefully observe market developments and trends – and understand what is driving these developments.”

Mr Prechtl stresses that the most sustainable glass container is one that is reusable, although the ability to recover and reuse it depends on the legal framework in place from one country to the next. In the Czech Republic, Germany, Switzerland or Austria, for example, there are high reusability rates thanks to the existence of a system that aligns itself closely to retailers. Elsewhere, a single use system has been the preferred option, so there is no common approach across the European market.

Throughout the region, however, the market growth experienced for glass packaging in recent years is expected to continue into the foreseeable future. “Coca-Cola investing in a new glass filling line in Germany and bringing back the one litre glass bottle to the German retail trade represents a massive development.”

Encouragingly, Michael Prechtl is confident that the retail sector is now offering a genuine choice of packaging to consumers once again, a choice that includes glass as well as plastic. Furthermore, there is strong evidence that glass packaging is again being selected in some countries for milk, mineral water and other beverages, sometimes as part of a sustainable, returnable system. “Ultimately, the extent of consumer pressure will dictate how much reverts to a returnable system again” Mr Prechtl concludes. “In line with O-I’s Europe-wide strategy, we have the passion, expertise and dedication that is fundamental to becoming the leading glass container manufacturer in the world. We have very strong relationships with our customers that represent some of the biggest brands and newest craft producers. And we have innovation and sustainability as key pillars of our strategy.”

Further information:
O-I Europe Sarl, Mex, Switzerland
web: www.o-i.com

Holzminden plant to feature innovative production line

Owens-Illinois has earmarked its Holzminden plant in Germany for the first installation of MAGMA glassmaking technology, together with a highly flexible production line. Revealed for the first time last November, MAGMA technology has been successfully operating on a pilot line at the company’s Streator plant in Illinois. The equipment in Holzminden represents the next step towards full commercialisation by scaling up the production volume and allowing the company to increase testing intensity and scope.

MAGMA is a breakthrough initiative to reimagine glassmaking with transformational technology and processes. This O-I innovation will allow for ultra-flexible glass production that can be expanded rapidly and at low capital intensity. “Innovation and technology are key cornerstones of O-I’s business strategy” commented Vitaliano Torno, President of O-I Europe. “The MAGMA technology enables us to define a new way of making glass to better serve our customers and bring more options and flexibility to production.”

Reiner Zinnecker, manufacturing leader at O-I Germany, added: “It is great news that our highly flexible and technically advanced plant has been selected for such breakthrough technology. We are excited to be at the forefront of driving innovation in the glass industry. Our team of highly skilled employees is eager to play a key role in achieving O-I’s vision for the future of glassmaking.

The O-I plant in Holzminden is among the world’s most flexible, producing glass containers for the food and beverage industries and the majority for renowned spirits brands. By means of a recent modernisation (multi-gob), flexibility has been increased and now bottles with different weights can be produced using the same machine.

The O-I plant at Holzminden further developed its flexibility and efficiency thanks to recent modernisation projects. Now, bottles of different weight proportions can be produced on one machine due to the multi-weight shear system.

In the food sector, O-I is working closely with customers who specifically require value-enhancing packaging for their products.

strategy and significantly greater flexibility from the glass factories set up to meet this demand.

And in serving another key market, food, O-I is working closely with customers who specifically require value-enhancing packaging for their products.

Market trends

Alongside other local players, O-I is well positioned to respond to improving customer and end consumer positivity towards glass packaging throughout Europe.

While emphasising that the prevailing ‘anti-plastic’ sentiment is definitely a very positive development, Michael Prechtl says “it is prudent to remain alert and carefully observe market developments and trends – and understand what is driving these developments.”

Mr Prechtl stresses that the most sustainable glass container is one that is reusable, although the ability to recover and reuse it depends on the legal framework in place from one country to the next. In the Czech Republic, Germany, Switzerland or Austria, for example, there are high reusability rates thanks to the existence of a system that aligns itself closely to retailers. Elsewhere, a single use system has been the preferred option, so there is no common approach across the European market.

Throughout the region, however, the market growth experienced for glass packaging in recent years is expected to continue into the foreseeable future. “Coca-Cola investing in a new glass filling line in Germany and bringing back the one litre glass bottle to the German retail trade represents a massive development.”

Encouragingly, Michael Prechtl is confident that the retail sector is now offering a genuine choice of packaging to consumers once again, a choice that includes glass as well as plastic. Furthermore, there is strong evidence that glass packaging is again being selected in some countries for milk, mineral water and other beverages, sometimes as part of a sustainable, returnable system. “Ultimately, the extent of consumer pressure will dictate how much reverts to a returnable system again” Mr Prechtl concludes. “In line with O-I’s Europe-wide strategy, we have the passion, expertise and dedication that is fundamental to becoming the leading glass container manufacturer in the world. We have very strong relationships with our customers that represent some of the biggest brands and newest craft producers. And we have innovation and sustainability as key pillars of our strategy.”

Further information:
O-I Europe Sarl, Mex, Switzerland
web: www.o-i.com
No. 1 in Speed and Flexibility
Maximise your profit

Combine speed and flexibility with superior lifetime

- High production speed
- Fast job changes
- Reduced downtimes
- Robot option
- Clean design

www.hey-einternational.com
In 2018, a high performance laminated glass production line was commissioned alongside the Guardian Glass float plant in Hungary. Plant Manager Sandor Kis discusses this and other projects undertaken at the Oroshaza site.

Oroshaza is one of 10 float plants operated by Guardian Glass in Europe and one of 25 worldwide. Primarily, the site produces float, laminated and coated glass products for the residential sector, in addition to specialty products such as anti-reflective glass for high value-added applications.

According to Plant Manager Sandor Kis, the plant has been the subject of significant changes within the past decade, as existing strengths have been reinforced and the product portfolio developed to accommodate growing customer requirements. Mr Kis joined Guardian in 2011 as a Finance Manager at Oroshaza and was appointed Plant Manager in 2017. The factory had been acquired by Guardian Industries in the late 1980s and was upgraded to start producing float glass in 1991. In 2007, a coater was added and the latest significant investment was completed in 2018, when the laminated glass production line was commissioned. As well as producing standard laminated products, this facility makes a range of thick, coloured, acoustic and coated laminated glass.

Float glass produced at the factory is either shipped direct to customers or is further processed on-site into laminated and/or coated glass. “We have an advanced magnetron sputter coater, which allows us to produce a range of Guardian ClimaGuard coated glass, our low emissivity glass, used mostly in residential applications” Sandor Kis explains. “We also produce Guardian Clarity, our anti-reflective coated glass for special applications such as retail shopfronts, museum glass displays or high end facades.”

The majority of glass produced at Oroshaza is destined for the residential market. As well as customers in Hungary, the plant delivers to such neighbouring countries as Romania, Bulgaria, Serbia, Croatia, Slovenia, Bosnia, Kosovo and Montenegro, while its Guardian Clarity anti-reflective glass is sometimes shipped even further afield.

Skilled workforce

Approximately 320 people are employed at the Oroshaza site, including 220 production staff, working a three shift, 24 hour operation. The importance of maintaining a skilled and experienced workforce is never overlooked, especially as the technology employed continues to change quickly. “Our personnel are very skilled and together, we function as a single team” Sandor Kis confirms. “Employees are provided with the necessary tools and methods to enable them to carry out their tasks effectively and efficiently. Of course, Guardian Glass being part of a large group, Koch Industries, is also an advantage, as we share and learn from each other.”

Mr Kis also emphasises that transformation is a continuous process, involving not only business transformation but also the personal transformation of employees.

Laminated glass investment

Guardian Glass invested in the new laminated glass production line to support growing demand throughout Europe, which is driven by three long-term trends. First, country-level regulations in Europe require the use of safety glass in an increasing number of fenestration and interior applications, for which laminated glass is recognised as the most effective solution. Second, the desire for buildings to have more natural light is driving the trend towards larger, energy-efficient windows, which requires the use of laminated glass for higher mechanical resistance and security. And thirdly, a general rise in demand for noise reduction for both residential and commercial buildings.

Sandor Kis has been Plant Manager of the Oroshaza float glass plant since 2017 and has worked at the site since 2011.
Leading-edge design for a new living library in Helsinki

“We knew there would be high demands on the glass, especially as it needs to withstand huge loads from the building itself. Thanks to our capability to handle such large glass sizes and with Glaston’s ProBend machinery, we were able to supply the glass for its demanding use.”.

— Maija Kantelus, Sales Manager, Tambest, Finland

More about the project: www.glastory.net
has increased the use of acoustic laminated glass.

“We believe we are well positioned to capture this growth due to our strong presence in Europe, a comprehensive product range, as well as our business approach, which is to create value for customers” Mr Kis contends. “Furthermore, the plant has demonstrated its stable operation over the years and was ready to add further fabricated products to its portfolio. Everything was in place to ensure a successful investment.”

Engineers worked closely with key suppliers to design the laminated glass production line, which is the first fully automated line installed within Guardian Glass. This created the possibility to produce jumbo sizes in a more time-efficient and effective way. Defects are detected by a scanner, just like on the float line, while loading and unloading of the glass in the autoclave is a fully automated process.

**Investment plans**

Future investments at Oroshaza include a scheduled repair of the existing float furnace during the second half of 2020. This project, together with the Guardian Glass plant in Czestochowa, Poland – where one float line was recently repaired and upgraded and a second is currently under construction – will ensure continued support to satisfy increased demand in Eastern Europe.

In line with Guardian Glass strategies, the management team at Oroshaza strives to innovate to deliver better product solutions using fewer natural resources. Like other Guardian float operations throughout Europe, the plant is ISO 14001 certified. This covers a wide variety of aspects, including air emissions, water consumption, waste management, transport and packaging.

“We have a strong culture and our vision is to create value for our customers and our communities, as well be a preferred partner for all of our constituents” says Sandor Kis. “We want to be the first choice if they need any solution for glass. We focus on delivering high quality products through an optimal service from initial order to glass processing. Furthermore, our technical support is also highly appreciated by customers.”

According to the Oroshaza Plant Manager, the automotive market in Eastern and Central Europe is expected to remain fairly stable in the coming years, although demand is currently affected by a degree of economic uncertainty. “Globally, electric vehicles, autonomous driving vehicles and shared mobility will change the picture of the automotive industry over the coming decades but new functionalities could increase the use of glass in cars, in displays, for example.”

Turning to prospects for the region’s architectural glass sector, Mr Kis confirms that the situation often differs from one country to another. “In Hungary, the building industry has recovered from the 2008 crisis and last year was a very good one. Various investments are in the pipeline, including some very nice commercial buildings. However, some commercial projects have been delayed because of a lack of capacity.” The building industry is described as very busy in the residential sector especially, as companies speed up to finish projects before the end of the 5% VAT period announced for the end of 2019.

The primary focus for the Oroshaza team next year is to successfully complete the float furnace repair. This will represent the foundation for the plant’s future development. “In the long-term, we need to work on planning, how we will further improve our operational capability and move in the direction of the factory of the future” Sandor Kis explains.

“My main challenge is to execute the repair properly” he concludes. “I’m positive about our flexibility and capability to serve customers locally, regionally and globally. We want to be a strong contributor to the Oroshaza community and an employer of choice.”

Further information:
Guardian Glass, Oroshaza, Hungary
Tel: +36 68 887 200
Web: www.guardianglass.com
The SplitFin is an integrated and continuous solution for fast, effective and uncomplicated processing of glass sheets. The line is aimed especially at the complete processing of sheets. A significantly higher output is achieved in comparison with individual machines as a result of the distribution of the processing steps (edge polishing and grinding / drilling and milling with water jet / washing & drying) and the associated permanent use of the individual devices. The SplitFin sets new standards, not only through extremely fast cycle times, unparalleled in the industry, but also with regard to ease of maintenance as all of the most important mechanical assemblies are easily accessible and in the dry area as far as possible.

Use our configurator for possible machine and line configurations:

www.lisec.com/configurator
Following the BA way
to growth and profitability

BA Glass has emerged as one of Europe’s leading glass packaging producers for food and beverages in recent years, with 12 plants in seven different countries. Sandra Santos, Chief Executive Officer, spoke exclusively to Glass Worldwide about the group’s multi-national activities and some of its achievements.

Today, the company has a strong position in European markets and has been able to operate through a higher demand cycle without losing important market position, continuing to innovate and supporting the growth of its customers. Exports to countries where BA has no production facilities account for approximately 24% of total group sales and are conducted to 70 different countries.

The BA way
It was following the retirement of Jorge Alexandre in 2014 that Ms Santos took over as CEO, although she has been associated with the company in various management roles for two decades, including time as a Plant Manager. “As CEO, my main task is to lead and inspire our teams, to create value for my shareholders and to make the company better prepared for future growth and challenges” she suggests. “I dedicate my time mainly to my team, customers and growth projects.”

Leading by example is cited as a key element of Sandra Santos’ leadership philosophy, in addition to which she takes great pride in preparing employees to assume greater responsibilities.
Et voilà!

Your inspection machine is now equipped with NEO Intelligence.

NEO intelligence inside
Packed with innovations, NEO Intelligence propels your inspection machine into the 4.0 era. Your EVOLUTION machine is now intelligent and connected. Defect recognition, easy settings, hot end alerts and trend analysis are all new features from which your production can benefit.

All existing IRIS machines can be upgraded with NEO Intelligence. Contact us to upgrade your machine.
responsibilities. “Throughout my career, I have been part of successful teams that have implemented transformations, so working with such diversified teams at BA is very special.”

The group’s management team is working diligently to develop its workforce, creating conditions that provide exciting career challenges and opportunities in current and future projects, as well as engaging them in the options and outcomes of each decision. “Afterwards, they are given the authority to proceed with the implementation and recognition for the results accomplished. Ownership is part of the ‘BA way’, a roadmap of principles for those who wish to be successful at BA” the CEO confirms. “We have a clear understanding of the fact that people are what can differentiate us from others. The entire senior management is directly involved in the assessment of the performance and potential in all management lines and clear career and succession plans are built to cope with the group’s growth and development.”

Last year, the Futura Programme was launched, for example, as an immersive initiative, designed to attract and integrate recently graduated engineers who aspire to develop behavioural and technical skills in an industrial environment. “We are focused on preparing future generations who will lead and ensure that BA grows stronger every day!”

An in-house training academy has also been created as a structured way of training and developing people. “We have worked hard to ensure that it is possible to deliver training adapted to our specific needs and allow our teams to be prepared for current and future challenges across all departments and geographies” says Sandra Santos. “We continue to believe that by displacing our people across geographies, we will spread the internal knowledge and consolidate our culture, the ‘BA way’. During all short or long-term displacements, we assure the growth of the person displaced but also that of the teams in which he/she is integrated, as benchmarking is leveraged.”

Corporate goals
As well as creating value for its shareholders, ensuring expected levels of growth and profitability, BA Glass strives to be first choice for its customers, a partner in their growth, innovations and developments by providing consistent service excellence. As previously explained, the glassmaker is also keen to enable the development of its people by providing them exciting
challenges and opportunities in current and future projects, engaging them in the outcome of each decision and recognising the results accomplished. Social and environmental responsibility is another key tenet, engaging in activities with local and educational entities, while promoting and investing in the continuous improvement of BA’s environmental performance.

The company’s commitment to research and development is described by Ms Santos as fundamental to the realisation of product development and improvement of glass manufacturing practices. “It is a matter of survival. Although several advantages of glass packaging are recognised by consumers, there is still a lot to be done to ensure growth of the glass share in the total packaging market. Today, we seek to develop packaging that supports consumer needs in close partnership with our customers. It is our goal to boost our customers’ sales and brand and make glass the packaging of choice for consumers. Glass is the only packaging material that can be infinitely recycled without changing its initial properties and which, given the natural properties of its raw materials, blends in with nature. It is also the healthiest material, preserving the taste of food and ensuring that there is no level of food contamination.”

According to the BA Glass CEO, planet sustainability is changing the way in which the industry is taking decisions and making investments. “There is a clear will in the supply chain to change the course of global warming and we truly believe that creating partnerships with our customers and suppliers is the only route to rapid success.”

Furthermore, it is recognised that the labour market has undergone significant changes, requiring the industry to increase its ‘attractiveness’. “Digitalisation of the manufacturing process in a closed loop will undoubtedly bring the power of predictiveness to an industry where automation has been a reality for years but requires upgraded skills.”

Environmental initiatives
As with many other industries, it is now considered fundamental to ‘do more with less’ in order to accomplish a competitive cost base. And in this regard, BA Glass has a clear perception of its impact on the use of natural resources such as raw materials and energy.

The production of lighter and more environmentally-friendly packaging is part of the development process, with a reduction of its environmental footprint being one of the organisation’s greatest priorities. To increase the use of more cullet in its products, for the last two decades the group has been investing in building its own recycling facilities. The group consumes more than 750,000 tonnes of recycled glass every year, treating approximately 400,000 tonnes of material at its recycling facilities.

“We need to continue to work together with local communities to promote recycling” Sandra Santos maintains. “The more the local authorities can collect, the more we can reuse. There are no limits. BA will continue to buy and use all glass available for recycling. We wish there was more!”

Several million Euros have also been invested in the implementation of environmentally-friendly technologies at the group’s production sites. This includes the recent installation of photovoltaic panels at one facility, with similar projects in the pipeline to increase the use of renewable energy.

Our conveyor chain transports glass around the world.

Our conveyor chain transports glass around the world.

Our conveyor chain transports glass around the world.
In 2018, BA Glass became a founding member of the Porto Protocol initiative, making a public commitment on sustainability goals to be achieved by 2030. This involves the following goals:

• Use at least 70% of electricity from renewable sources.
• Reduce natural gas usage by 10% by replacing it with electricity.
• Reduce water usage by 75%.
• Increase the use of recycled glass by at least the same percentage as the increase in the collection rate.
• Reduce CO₂ emissions to at least the levels defined by the European Union.
• Work together with customers and suppliers to reduce the amount of secondary packaging used in the final product.

“These are goals that each European country has taken on.”

Furthermore, we trust that investments in the production of clean energy will be speeded up by the demanding increase the replacement of raw materials by recycled glass. Collection systems will become more efficient and effective, allowing us to work hard to make the waste collection systems more efficient and effective, allowing us to increase the replacement of raw materials by recycled glass. Furthermore, we trust that investments in the production of clean energy will be speeded up by the demanding commitments that each European country has taken on.”

“BA Glass is committed to transforming its process into an eco-friendly operation and this has been proved by our improved performance on each of the environmental metrics over the years,” says Sandra Santos. “We believe that all countries will have to work hard to make the waste collection systems more efficient and effective, allowing us to increase the replacement of raw materials by recycled glass. Furthermore, we trust that investments in the production of clean energy will be speeded up by the demanding commitments that each European country has taken on.”

Collaborative innovation

Innovation is acknowledged as a key driver to potential successes achieved by customers and that of the group, the result of BA Glass dedicating time and resources to a wide variety of projects in recent times. “Three years ago, we changed our vision to introduce a new pillar, the consumers pillar” Ms Santos explains. “And we did so because we believe that we still lack knowledge on consumer behaviour and preferences that can make our proposals richer and more successful. Our striving for value-added innovation has certainly been a strong contributor to growth. With a larger market research and design team, we continued to pursue our vision, trying to bring to the discussion ‘complete’ proposals for every product launch, evaluating the complete portfolio and geographical scope of our customers and helping them to increase their sales and profitability.”

It is suggested that relationships with all stakeholders must be supported and reinforced with transparency, rigour, trust and ambition, all of which are important values for the group. Close partnerships are maintained with existing and potential suppliers with the purpose of always seeking the best technical and most creative solutions that can benefit both parties and lead to sustainable development.

“All suppliers play an important role in BA’s growth and its ability to provide an excellent and innovative service” says Sandra Santos. “That is why BA continues to apply its supplier assessment tools, to ensure a solid base of suppliers who share the same purpose and are compliant with appropriate ethical and environmental principles.”

Growth potential

While agreeing that glass packaging is becoming increasingly popular among consumers throughout Europe, BA Glass believes greater efforts are required to reinforce the material’s position as a sustainable choice. “Today, we benefit from a very important window of opportunity from the increasing awareness about plastics’ negative impact on global sustainability and human health” Ms Santos contends. In the long-term, she anticipates significant opportunities for glass, as a result of income growth and the more sustainable choices being made by consumers. “The key factors that can turn this into reality are enhanced innovation in product development and in the way we produce bottles and jars. Lightweighting is critical and obligatory in order to compete with other materials, while a reduction of the industrial environmental impact is mandatory. All of this will require a great deal of innovation and the establishment of partnerships.”

Over the coming 12 months, the BA Glass management team will continue to lead the business in the direction of greater profitability and growth. Its aim is to be the preferred option for current and future customers, with a strong value proposition and to contribute to the promotion of glass as the best packaging material. Several important projects are now underway, with sustainability and digitalisation at the top of the agenda. The need to remain competitive is critical, in order to accommodate any significant market changes encountered.

A key priority for the team, however, is to attract and retain a skilled workforce. “We have to reinvent the way we do it and how we manage our processes to make working in the glass industry more attractive” says Sandra Santos. “The people are at the centre of the organisation and we are fully aware that they will be the main reason driving us to reach the level of profitability and service we are aiming for.”

The BA Glass CEO is confident that her company and the glass industry in general is full of vitality and people whose dream is to generate transformation, disrupting traditional (and sometimes false) paradigms. ●

Photovoltaic panels have been installed at the Vila Franca de los Barros glassworks in Spain, heralding a move by BA Glass to increase the use of renewable energy.
Bright ideas. Better glass.
Focus Iberia

Glass packaging on the Iberian Peninsula

Juan Martín Cano discusses recent glass packaging trends for Spain and Portugal.

ANFEVI has been representing the glass packaging industry for food and beverages in Spain since 1977. In 1980, the association launched, managed and promoted glass recycling by creating the Centre for Glass Packaging. This was the very beginning of the current mono-material integrated system, ECOVDRIO, the non-profit organisation responsible for managing the infrastructure of bottle banks, the collection service, transport and processing of glass packaging waste. This system has achieved great results over the years, increasing the recycling rate from 31.3% in 2000 to 73% in 2017. Furthermore, ECOVDRIO has launched the ‘Horizon 2020’ plan, which involves an investment of €300 million to cover three areas of action: Recycling, prevention and awareness.

In order to reflect the reality of a sector, it is necessary to understand it from a general point of view. This way, it is possible to gain an idea of where the industry stands, where it wants to go and the path to achieve it. Within this approach, the first step would be to try to frame the work in relation to current circumstances. In this sense, the market has recovered its levels from before the global economic crisis and the forecasts for 2017 (data for 2018 is not yet available) show moderately optimistic levels (an estimated growth of 3% for the domestic market).

Since this presentation discusses the market in general, it is convenient to unlimit it. From an industrial perspective, the Iberian Peninsula market includes Spain and Portugal, a market unit with enormous similarities that share the same glass packaging manufacturers. This is why it seems sensible to refer to them as a single unit.

Huge potential

The Iberian Peninsula market has huge potential, both for having great agricultural development - to which glass packaging serves as an ambassador, contributing to add value and provide a guarantee of origin - as well as for being an appealing tourist destination, with the number of annual visitors reaching 100 million and their consequent consumption.

In this regard, it is important to point out that when referring to the domestic market, this article talks about sales made to fillers located on the peninsula, regardless of whether the final products are later destined for the domestic market or are exported. In fact, the Iberian Peninsula is clearly an export market of products packed in glass. These exports are of maximum relevance to the glass industry and the entire market. Both empty and full glass packagings are exported and therefore, domestic consumption is lower than that produced. Consequently, the availability of cullet is lower than that in other European countries.

In the industrial area, this unit is served by five important multi-national groups that provide it evenly, confidently and with a view to the future. Evenly balanced because
they allow competition, encouraging on the other hand a service of the highest quality. Confidence due to the structure of an industry investing in a medium and long term plan, providing security and value in the locations where they are implemented. And looking into the future, given that these business groups have enough strength to be able to count with the best technologies available, as well as developing their own. These five companies are BA Glass, O-I Europe, Verallia, Vicsa and Vidrala.

When talking about the efforts to increase the market and defend the sector’s interests, it is necessary to highlight the attributes of glass for the packaging market. Glass has the best physical, chemical, food safety, ecological and commercial qualities. Despite this, however, probably due to the excess of familiarity with glass bottles and jars, these virtues may not be taken into account at the time of purchase, when not only rational aspects count but also - and with great importance - practical and emotional aspects. Precisely and for this reason, the glass industry emphasises the importance of this in its marketing campaigns, at both national and European levels. In Spain for example, by following the learmings of neuro marketing studies and the analysis of consumer behaviour, ANFEVI is developing, for the third year in a row, an influental marketing campaign. In this way, through a modern and attractive campaign, starring well known personalities with influential capacity, glass packaging has gained greater visibility within society. The result has been that glass has improved its share of the global packaging market and this improvement will be consolidated.

**European co-ordination**

Since the European level has been mentioned, it is convenient to comment that it can be one of the keys to success. Each region has its own identity in an increasingly globalised world, including strategic, legislative and technological areas. A cleverly co-ordinated combination of lobbying and glass marketing actions is key. Establishing common positions to then be able to transfer freely to local markets and to the administrations of Member States is crucial to move towards the future. And in the author’s opinion, this has been carried out with great professionalism and efficiency in recent years.

Before talking about the future, it is necessary to analyse the challenges faced by the industry. Overcoming these challenges is reaching out to a bright future.

In the knowledge that there are many challenges that all industries face, such as climate change, energy efficiency, food safety, sustainable development, circular economy, improvements in working conditions and interconnection via the internet of all processes, glass packaging has the best tools to tackle these challenges.

Success will reside in the industry’s ability to combine three areas: The positive properties of the material, which it has to spare; the technological developments invested in the right directions; and above all, an open attitude and integral service delivered to the market and its customers. All this should be reflected in flexible production processes, in communication campaigns oriented strongly towards joint developments with fillers and retail, a social responsibility approach and in the search for talent and good conditions for its workers, who will mark the future of the sector.

**About the author:**
Juan Martín Cano is Secretary General at ANFEVI

**Further information:**
Asociacion Nacional de Fabricantes de Envases de Vidrio, Madrid, Spain

tel: +34 915 610 175
email: asociacion@anfevi.com
web: www.anfevi.com
Positive performance recorded by German glassmakers

According to Dorothée Richardt, 2018 was a very successful year for the glass industry in Germany. As well as achieving further substantial growth in total revenue, the €10 billion revenue mark was also passed for the first time, while the industry’s number of employees also increased. These positive developments reflect the fact that glass is a material with a viable future.

The glass industry closed out 2018 on a positive note overall, with 4% revenue growth to approximately €10.05 billion, taking it over the €10 billion revenue threshold for the first time. To a great extent, this positive development was driven by strong foreign revenue growth of 10.2% to a total of €4.45 billion. Domestic revenue fell slightly (by 0.4%) to €5.60 billion. The industry’s number of employees increased significantly by 4.7% to around 56,000.

Sector developments
The flat glass industry sector comprises two segments: Flat glass manufacture and flat glass finishing (processing). Business developments in the glass sectors diverged during 2018. Whereas the flat glass manufacturing sector recorded revenue growth, the flat glass finishing sector’s revenue declined slightly.

Total revenue in the flat glass manufacturing segment was €1.06 billion in 2018 (2017: €1.01 billion), which constitutes growth of 5.6%. Both domestic and foreign sales contributed to this positive overall result. Domestic revenue increased by 2.1% to €480 million (2017: €470 million). There was an 8.7% increase in foreign revenue, which climbed to €585 million (2017: €515 million).

The positive revenue development is also reflected in the production value increase of 8.9%. The flat glass finishing segment closed out 2018 with a 2.1% decline in revenue to €3.75 billion (2017: €3.84 billion). Both domestic and foreign revenue shrank. Domestic revenue declined by 2.5% to €2.42 billion. Foreign revenue fell by 2.5% to €1.33 billion (2017: €1.35 billion).

There is still a strong focus on the aspect of daylight in flat glass industry products. Demand for expansive floor-length facade elements continues to grow in both the commercial and private residential construction sectors. Glazing with integrated solar protection ensures optimum lighting conditions, even when there are high levels of incident light. UV filter glass is finished with a thin metallic coating that allows daylight to enter but considerably reduces the amount of infra-red light that penetrates the building. ‘Smart’ glazing is another effective option for solar protection. It is used mainly as electrochromic glass, which darkens at the touch of a button, without affecting the view of the world outside.

Revenue in the consumer-oriented container glass industry rose by 2.3% in 2018 to €2.00 billion (2017: €1.95 billion). Both domestic and foreign revenue increased; domestic revenue by 0.7% to €1.20 billion (2017: €1.19 billion) and foreign revenue by 4.7% to €801 million (2017: €765 million).

Packaging is currently a widely discussed issue in Germany, although not with a focus on its positive characteristics, such as the effective protection of content. The general public’s perceptions are negatively impacted by the daily images of packaging waste in the oceans and the resulting deaths of marine animals. Glass is the one packaging that is excepted from the discussion and demand for glass packaging is rising. It enjoys a good reputation among consumers, recyclability and reusability have made glass packaging attractive (again) and revived its popularity. The first companies to make the switch back to glass in recent years were mineral water fillers. Now the trend has spread to other sectors.
Revenue in Germany’s consumer-oriented container glass industry rose by 2.3% in 2018.

Composition by weight of the plastic components in a cough medicine bottle with plastic lid was 4.5%, which is why it has a higher recyclability of 94.5%.

• Colour has no impact on the recyclability of glass packaging. In the category of glass food jars and glass bottles with metal closures, the level of recyclability was established as approximately 99%. This category included products such as a green and white wine bottle with a screw cap and a gherkin jar.

• The category of glass bottles with other closures had a recyclability rate of between 93% and 98% and included products such as an olive oil bottle with a wooden closure and a vinegar bottle with a cork.

• Glass packaging with plastic closures varies in terms of recyclability between 84% and 96%. The recyclability of a pepper mill with a plastic grinding mechanism, for example, was 84% due to its composition by weight of plastic components being 15%. In contrast, the recyclability of a pepper mill with a ceramic grinding mechanism was only 9% due to its composition by weight of ceramic components being 85%.

Recycling and waste management are key issues for the container glass industry in Germany. A BVGlas study reveals that glass packaging is up to 99% recyclable. In 2018, it examined 30 different glass packaging types in the beverage bottles, glass jars and food packaging and glass cosmetic and pharmaceutical packaging segments. Glass packaging, glass jars and metal components are currently classified as recyclable. However, the plastic components are considered as contaminants due to their opacity and are automatically rejected from the recycling process. The Cyclos HTP Institute concluded a study in 2018 on the recyclability of glass packaging on behalf of BVGlas. It examined 30 different glass packaging types in the beverage bottles, glass jars and food packaging and glass cosmetic and pharmaceutical packaging segments. Glass packaging, glass jars and metal components are currently classified as recyclable. However, the plastic components are considered as contaminants due to their opacity and are automatically rejected from the recycling process.

The German glass industry achieved 4% revenue growth last year to approximately €10.05 billion.

Crystal clear.

Whichever way you look at it: Our infrared camera PI 640 G7 was specially developed for the glass industry and offers a line scan camera function.

Would you also be interested in particularly fast, robust, light, personal and cost-effective infrared thermometers and cameras for non-contact temperature measurements from −50 °C to +3000 °C? Take a look: www.optris.global
Intelligent solutions and a passion for innovation

As Grenzebach prepares to celebrate its 60th anniversary in 2020, Egbert Wenninger discusses the company’s performance and range of high-tech production technology, flat glass market trends and opportunities to embrace digital resources to create multiple added value for customers.

GW: How has Grenzebach performed in general over the last year?

An increase in demand for Grenzebach products and services started back in 2017. This led to 2018 and early 2019 being very good years for the company, with the glass business performing particularly well.

GW: What are the prevailing market conditions for the flat glass sector and the outlook moving forward?

At the beginning of 2019, we could still see a higher than normal demand. We noted slower investment activities in the flat glass sector in the second half of this year and expect this situation to continue until 2020. After the order income peak in the preceding years, we are forecasting a return to a more ‘normal’ situation that cannot compete with 2017 and 2018.

GW: Did a specific region contribute strongly during the recent boom period?

Beside the main flat glass market China, one of our main drivers was the US market. With our presence and manufacturing facility in Newnan, Georgia, we were able to convince many US-based customers to buy our products. In times of import tariffs, our ability to produce equipment in the USA was also appreciated.

GW: So overall, how would you summarise Grenzebach’s current standing in the marketplace?

Grenzebach is very well positioned as a market leader for cold ends of float lines and with our outstanding coating technology, we are now a well-acknowledged player in that industry. Various initiatives were instigated to further develop our products and solutions; new high speed stacking devices, a new host and optimisation system, as well as a full mobile HMI system are now on their way. Also, with our IIoT platform SERICY, we can offer an integrated development engine with various possibilities of analytics and process improvements.

GW: How is the company dividing its priorities in the different flat glass sectors?

Clearly the standard float process for architectural and automotive glass is the biggest portion of our business. Although there are only a small number of thin glass float lines, the Grenzebach high-tech specialised cold end equipment clearly differentiates itself from other commercially

Egbert Wenninger, Senior Vice President Business Unit Glass, Grenzebach Group.
available systems. With our coating technology, we are very well positioned to convince more and more customers.

GW: What are the benefits of Grenzebach remaining a family-owned enterprise?
I think the mind-set of a family-owned enterprise is different, since the employees identify themselves more with the company. We are looking for a long-term strategy and not for quick success; the owners are encouraging us to further develop and grow the business.

GW: What does your role as Senior Vice President Business Unit Glass entail?
Our Business Unit structure gives a wide responsibility to the Business Unit heads. Everything ranging from sales to product and project management, engineering and on-site activities are within a Business Unit and optimised for the respective business field.

GW: Having initially worked at Grenzebach from 1995 to 2012, what are the main initiatives you have driven since your return to the company in 2016?
We brought Industry 4.0 to our glass activities. It starts with our vision of a fully mobile operation of a cold end, with an improved and modernised host and optimisation system… and it ends with our IIoT platform SERICY.

GW: So Grenzebach is fully embracing the Industry 4.0 concept?
Yes, we are. Already during glasstec 2018 we presented our digitisation concept with our open IIoT platform SERICY and many other applications. For example, for our coating process we developed algorithms to reduce coater down times, optimise energy consumption and improve the yield of targets.

GW: In reality, what does this mean to your customers?
Better performance and output of the production lines. With the open concept, other areas of a production line may also be integrated. For a float line, all data and information generated in the value chain from the batch house to the cold end and warehouse can be gathered and analysed, creating a tremendous route to continuous improvement.

GW: Are there any planned product innovations that particularly excite you?
Our host and optimisation system will be completely renewed, running on our SERICY platform together with other applications to bring additional value to our customers. Also, we will switch over to a completely mobile operation of our lines, providing even more flexibility and ability to access the relevant information at all times.

GW: Looking further ahead, what are Grenzebach’s plans for glasstec 2020? Are there already further product launches planned for Düsseldorf?
For sure. We have started our ‘Float Controls 2020’ initiative and many new aspects and features will be seen by visitors to our glasstec 2020 booth. Besides that, the Grenzebach Group will have its 60th anniversary in 2020 and there will be a real reason to celebrate...

GW: At the last glasstec in 2018, you adopted the theme ‘IIoT for the glass factory of tomorrow’. How well was this initiative received by visitors?
We see our IIoT platform SERICY as a tool for our customers to improve the yield and throughput. The interest of visitors at our glasstec 2018 booth was tremendous and first pilot installations are already in the field.
GW: And how successful were the product innovations introduced during glasstec 2018, such as the TASS High-Speed Stacker?
We were very pleased with the customer interest and received several orders for the Tin-Air-Speed-Stacker (TASS). With its outstanding performance to load and unload glass tin- or airside, it is a unique piece of equipment and helps to automate new float lines, replace manual unloading lines, exchange slow and inflexible stacking equipment or upgrade high performance hardening and coating equipment.

GW: How is Grenzebach’s R&D department contributing to such successful product launches and developments?
Our R&D department is at the very basis of many of our successful products. They are one of our main drivers for innovation since they are constantly pushing our team of engineers to improve our products and develop new things.

GW: What main factors are helping Grenzebach differentiate itself from competitive suppliers?
Solid designs and high quality products are our special selling feature. Those lines have to run up to 20 years without interruption. However, our sophisticated control systems and in particular our host and optimisation system, allows for extra yield and throughput, making our system superior to those of competitors. Last but not least, customers also appreciate our global footprint with engineering, manufacturing and service facilities in Germany, China and the USA.

GW: What are the main benefits of such local presence to customers in those regions and how do the different facilities co-operate?
Our global footprint and especially our global manufacturing footprint are of key importance. We are close to our customers and are also less impacted by import tariffs and changing exchange rates. We have regional heads for all our entities, which are organised in Business Units with global responsibilities.

GW: How is Grenzebach investing in its employees to ensure the necessary levels of expertise?
We are constantly training our people to keep them fit for their job. We offer leadership seminars for not only junior team leaders but also for experienced teams and department leaders. Just this year, we started a sequence of seminars on glass knowhow with companies such as Bohle and BASF, covering the topics of glass cutting and snapping and IFG giving insights to glass surface protection technologies.

GW: How beneficial is it to Grenzebach to be a member of the VDMA Glass Forum, with you as Chairman?
First of all, I am glad that Grenzebach is allowing me to dedicate the necessary time for the various VDMA activities. Being the Chairman of Forum ‘Glastechnik’ of course helps to spread the name and popularity of Grenzebach in the glass world, just as it does for all members. However, even as a large enterprise, we do make good use of VDMA services such as consultancy for overseas installations and export restrictions etc.

GW: To summarise, what are the main challenges currently facing Grenzebach?
In global business, we are confronted with global competition. Float glass lines exist for quite a long time… however, our original brilliant ideas have been upgraded again and again to keep up with the latest technological trends and to meet today’s requirements. To keep us ahead, we strive every day to become better and more efficient so that our products will generate even more value for customers.

GW: And the main opportunities for the business?
I think Industry 4.0 and digitisation is the main opportunity. The vision of gathering data that reflects the product’s way from raw material up to the warehouse in our IIoT platform SERICY may become a reality very soon. Analytics of all influencing factors of the complex glassmaking process and new algorithms to react faster and avoid losses and poor quality might be the next revolution in glassmaking.

About the author:
Egbert Wenninger is Senior Vice President Business Unit Glass at Grenzebach Maschinenbau and Chairman of the VDMA Glass Forum

Further information:
Grenzebach Maschinenbau GmbH, Asbach-Bäumenheim/ Hamlar, Germany
tel: +49 906 982-2000
e-mail: info@grenzebach.com
web: www.grenzebach.com

The ability to very quickly pick sheets from the top (air side) as well as the bottom (tin side) gave the High-Speed-Stacker for small size glass sheets its name. TASS stands for Tin-Air-Speed-Stacker.

The IIoT platform SERICY developed in-house, which co-ordinates all processes from glass production to the warehouse and on to the end customer, integrating all devices and systems from multiple sources.

The IIoT platform SERICY provides companies with the means of digitising their processes and interfaces entirely independently, while retaining full sovereignty over their data and company knowhow.
COUNTLESS IMPROVEMENTS FOR ONE THING THAT REALLY COUNTS.

ULRICH IMHOF (EXECUTIVE DIRECTOR)

With our experience we are constantly improving the efficiency of our Container and Special Glass furnaces. Today, we are up to 25 % CO₂ and 35 % NOx reduction (compared to previous furnace campaigns). Besides these environmental advantages, our technologies help our customers to reach a more efficient production process saving up to 20 % energy.

New Hybrid Furnace Technologies will satisfy the future’s requirements.
Laboratory glassware specialisation

The merger of two long established, family-owned businesses in Germany and the UK led to the creation of laboratory glassware specialist Poulten and Graf in 1999. As John Poulten explains, considerable international success continues to be realised by the company, which recently consolidated production and sales in Wertheim, Germany.

Poulten and Graf is renowned throughout the world for the manufacture and supply of an extensive range of laboratory products, sold under the FORTUNA and VOLAC trademarks. The range includes the precise and high quality OPTIFIX and POLYFIX bottle top dispensers and the OPTIMAT 3 automatic dosing station.

The manual bottle top dispensers were developed in order to carry out volumetric work in laboratories more efficiently. These products are suitable for the safe and fast filling of a wide range of even aggressive chemicals.

The company’s latest innovation is the FORTUNA OPTIMAT 3, an automatic dosing station that can be integrated into the dosing process via an interface. Even aggressive chemicals and liquids can be dispensed safely and precisely across a wide range of applications. Also manufactured is a wide selection of glass volumetric instruments, precision disposable Pasteur pipettes made from three different glass types (soda lime, borosilicate and soda lime glass with cerium) and a large selection of glass syringes for technical use.

Established family businesses

The Poulten and Graf Group was formed in December 1999 by the merger of two long established family companies. Established in 1923, Walter Graf and Co was based in Wertheim, Germany, while the origins of Barking, UK-based John Poulten Ltd date back to 1952. Both were producing volumetric items for laboratories throughout the world.

The realigned group comprised Poulten and Graf Holding GmbH, with its two manufacturing subsidiaries, Poulten & Graf Ltd and Poulten and Graf GmbH, both 100%-owned by Poulten & Graf Holdings GmbH. Hans Graf is Managing Director of the manufacturing subsidiaries and joint Chairman of the holding company.

Strong relationships have been established with European partners to further extend the business to create a prosperous organisation, with a significant share of the glassware and liquid handling markets. Constant efforts have been made to improve customer service, simplify administration and to build on the organisation’s existing strengths and reputation.

After nearly 20 years of production in both Germany and the UK, earlier this year the decision was taken to close the Barking facility and to consolidate production and sales at Wertheim in Germany.

VOLAC Pasteur pipettes and laboratory bottles continue to be produced under licence in the UK.

Located in the heart of Germany, Wertheim offers excellent infrastructure and transport hub connections. Many glass processing companies settled in the town in the 1950s, as did Walter Graf and Co. Initially, the company produced glass syringes, before expanding the product range to include the full range of volumetric glassware.

Embracing evolution

The history of Poulten and Graf over the past 20 years has been one of evolution and change to meet the requirements of customers in international markets. And the recent consolidation in Wertheim is the latest step along this road.

The next few years will see the celebration of some important anniversaries and further progression. In 2023, the company marks the 100th anniversary of the original founding of Walter Graf and Co, while 2024 will be the 25th birthday of the Poulten and Graf Group and 2027 will commemorate the 75th anniversary of the initial founding of John Poulten Ltd.

The business will continue to be owned privately by the Poulten and Graf families, who are looking forward to another decade of progress and success.

About the author:
John Poulten is Chairman of Poulten and Graf

Further information:
Poulten and Graf GmbH, Wertheim, Germany
tel: +49 9342 9229-0
email: john@poulten-graf.com
web: www.poulten-graf.com
There’s only
ONE WAY
to make a such quality product

SA-42, SA-48 and SA-60
Sealing/stretching machine for stemware
Finnish acquisition supports integrated solution goals

Germany’s HEGLA Group has acquired a majority shareholding in TaiFin Glass Machinery Oy, the tempering furnace manufacturer based in Nokia, Finland.

The HEGLA Group has signed a sales agreement with the current shareholders of TaiFin Glass Machinery Oy regarding the majority of the company’s share capital. HEGLA will acquire 51% of TaiFin’s stock and the company will conduct its future business under the name HEGLA-TAIFIN Oy.

“We are pleased to have found a young, dynamic and innovative partner company in TaiFin, who is already established as a leader in the automotive and architectural glass tempering furnace segment with its high quality safety glass furnaces and press bending technology” commented Jochen H Hesselbach, CEO of the HEGLA Group. With immediate effect, TaiFin will use the international sales and service infrastructure of HEGLA Group to provide enhanced sales, consulting, maintenance and long-term spare parts supply services.

Towards integrated solutions

Bernhard Hötger, COO of the HEGLA Group, is looking forward to his partnership with the team at TaiFin and reported that many of HEGLA’s customers have asked the company to provide integrated solutions and optimised logistics for smart glass placement on furnace racks as part of their projects. In conjunction with the marking options provided by HEGLA-boraident GmbH and the software solutions of HEGLA-HANIC, HEGLA aspires to provide customers in the future with optimised, fully integrated production processes and shop floor logistics that have been tailored to suit their needs. This will give customers the opportunity to generate more value thanks to optimised production processes.

According to Mr Hötger, the HEGLA Group’s portfolio is completed by its proven, reliable and long-term partnerships with customers, which feature long-term service and spare parts supply alongside personal consultation.

Continuity maintained

In future, the founders and owners of TaiFin Oy, Esa Lammi, Jukka Sääksi and Jarno Nieminen, will continue to actively manage and further develop HEGAL-TAIFIN as managing directors and shareholders. “We are happy that today in Nokia, on the occasion of our company’s 10th anniversary, we are able to announce this joint venture with HEGLA. Our partnership means that TaiFin will now be able to progress on its successful course even faster and reach new customers in international markets together with the other companies in the HEGLA Group” said TaiFin Managing Directors Esa Lammi and Jukka Saaksi.

Jarno Nieminen, Sales Director at TaiFin, is looking forward to having direct access to the international sales network of the HEGLA subsidiaries and HEGLA’s international sales agencies and partners, now that TaiFin has entered the HEGLA Group. “Until now, we have been perceived as a manufacturer of extremely high quality safety glass furnaces with cutting edge technology, primarily for the automotive sector. Through our partnership with the HEGLA Group, we will now be able to offer our expertise directly to architectural glass customers” he confirmed.

Poolig knowledge and knowhow

The requirements of future markets in both the automotive and construction glass sectors will be increasingly varied in terms of glass thickness and the safety, transparency, digitalisation, workability and finishing of coated and technically high quality glass. This is why, for HEGLA management, the next logical step was to continue to expand the group’s product range and pool additional knowledge and knowhow within the HEGLA Group to the advantage of the company’s customers, Jochen Hesselbach explained. “HEGLA-TAIFIN is an important step towards the HEGLA Group becoming a single source for machinery and service for the (flat) glass manufacturing and finishing industry.”

Further Information:
HEGLA GmbH & Co KG,
Beverungen, Germany
tel: +49 52 73 9 05-121
email: info@hegla.de
web: www.hegla.de

TaiFin, a company known for its safety glass and tempering furnaces, will be called HEGLA-TAIFIN in future, expanding the knowhow and product range of the HEGLA Group to the mutual advantage of the group and its customers. Jarno Nieminen (Managing Director for Sales at HEGLA-TAIFIN), Esa Lammi (Managing Director, HEGLA-TAIFIN), Jukka Sääksi (Managing Director, HEGLA-TAIFIN), Jochen H Hesselbach (CEO of the HEGLA Group) and Bernhard Hötger (COO of the HEGLA Group) are looking forward to working on future projects.
Combined glass expertise in forming and annealing process

Leading annealing lehr & float bath provider

Contact us
A CNUD-EFCO International NV/SA
Noorderlaan 30, B-1731 Zellik, Belgium
T +32 2 481 88 00
E info@cnudefco.com
W www.cnudefco.com

Integrated glass process solutions & extended services
Improve your production yield and energy efficiency with us!
Preventing power outages and reducing electricity tariffs

Peaks in electricity demand from unmanaged electric heating systems can increase the risk of power outages, especially if these systems are running on emergency power generation. When power is demanded from multiple heating zones at random, it can unpredictably overload the power supply system, causing circuit breakers or gen-sets to trip. In the worst case, unmanaged demand from multiple heating systems can leave glass manufacturing plants operating close to the limit of their main electrical power supply and at risk from a plant-wide power outage. Peak power demands can also affect the measurements used by electricity suppliers to set tariffs and calculate bills resulting in higher electricity costs than necessary. René Meuleman and Amber Watkin explain how using predictive load management strategies in the EPower Advanced SCR power controller help minimise peak power demand through ‘load sharing’ and ‘load shedding’ technology.

A glass plant can have many instances of high power electrical equipment demanding power from the main supply. The biggest offenders are electric heating systems such as furnace electric boosting, tin bath roof heating and annealing lehrs. Left unmanaged, power to these systems can be switched on at random by their control devices.

When several turn on at the same time across multiple heating zones, huge peaks of electrical power can be demanded from the supply. Not only can this impact energy costs but in the worst case scenario, it can exceed the maximum capacity of the main or emergency power supply, causing an electrical power outage.

As glass plants need to operate 24/7, power supply interruptions are highly undesirable. Power outage can prevent temperature, process and emissions control systems from working, which can be extremely costly to the business in lost production, waste product, environmental emissions fines and possible temperature-related damage to furnaces and other expensive equipment.

Due to the high temperature process, appropriate emergency procedures need to be in place to maintain safety during the uncontrolled outage and while bringing systems back online. Typically, emergency backup generators (gen-sets) are in place for electric heating systems, and a control system is able to respond to an overcurrent scenario. However, having a proactive solution can help to avoid such a situation and reduce the risk of a power outage.

René Meuleman is Business Leader for Global Glass at Eurotherm.

Figure 1: Unmanaged heating zones can randomly switch on at the same time, causing peaks in power demand.

Figure 2: The Eurotherm load sharing strategy balances demand by switching heating zones on at different times in the modulation period.
systems but these devices are sensitive to harmonic distortion on the supply and easily tripped due to unstable momentary peaks in unmanaged power demand. Peak demand can particularly become an issue when process improvements are being made, products are being upgraded or production capacity is being increased, where any additional load may exceed the designed power capacity of individual transformers or the main supply.

Frequently occurring uncontrolled peak power demands cause fluctuating mechanical stress in the high current parts of the system like busbars and transformers, which results in reduced life time or increased maintenance costs. From a system efficiency point of view, power losses are strongly related to the current the system will need to supply. In power loss calculations, the current is always squared. In that respect, it is more efficient to apply a specific amount of power at a stable lower current than to run the same amount of power with fluctuating current.

In some regions, peak power demands on the supply can also affect the measurements taken by electricity suppliers to calculate agreed tariffs and electricity bills. Utility companies need to ensure they have enough capacity to provide electrical power to their customers reliably, even at times of peak demand. In order to plan and allow for this, an assessment is made of the user’s peak demand and additional charges are applied to the bill.

This ‘demand charge’ can be calculated in different ways, depending on the region. Peak demand readings can be applied to the demand charge throughout that billing period, which inevitably leads to higher energy costs than necessary. Agreed tariffs are also typically set to allow for random peak demand, again unnecessarily increasing the overall electricity cost.

Upcoming regional environmental and energy efficiency targets are driving glass manufacturers to reduce their energy usage and CO₂ emissions. As fossil fuel-fired furnaces are considered to have reached their limits in terms of substantial future efficiency improvements, the way forward is expected to involve a move to a mix of predominantly electric and all-electric furnaces. As a typical fossil fuel-fired furnace has a lifecycle of 15-20 years, glass plants are only one or two furnace builds away from needing to move towards higher efficiency technology to meet their local government targets, many of which are aimed at the year 2050. High efficiency electrical power supply methods will need to be introduced as part of this transition.

Predictive load management

Eurotherm worked with global glass manufacturers to develop a solution. Known as predictive load management, this sophisticated patented control feature available in the Eurotherm EPower SCR Controller, addresses both peak demand and overload. Firstly, by load ‘sharing’, which manages the demand across many loads to reduce power peaks. This effectively ‘smoothes’ the average power demand on the distribution, while importantly maintaining the desired power to each zone. And secondly, by load ‘shedding’, which optimises and limits the maximum allowable peak power demand of the system. Used in conjunction with zero-cross firing (also known as burst or full-cycle firing) method provided by the EPower Advanced SCR controller, these ‘load sharing’ and ‘load shedding’ features allow glass plants to manage peak power effectively to keep within the limits of their power supply capacity or energy tariff.

The EPower controller power management system is based on a control module that can control up to four thyristor power stacks in a ‘PLC-like’ design layout. In the field, up to 64 heating zones can be synchronised together using a CAN bus network, separate from optional fieldbus such as Ethernet or PROFIBUS. Heating zones can be monitored, for example, on one furnace, across several furnaces or even plant-wide to realise the most effective results on the main power supply network. The predictive load management function takes care of the disparity between zones and considers the fact that a zone of 10kW does not have the same impact as a 100kW zone when...
distributing power. Suitable applications can range from glass bending lines, tempering furnaces and autoclaves, up to complete float glass baths, annealing lehrs and complex multi-zone furnace boosting installations.

**Why zero-cross firing?**

Although SCR controllers traditionally use the phase angle firing method as it provides smooth power control, it also causes high harmonic distortion and poor power factor (typically <85%), which has a negative effect on the power efficiency. While the zero-cross firing method is known to introduce flicker effect which can increase random peak power consumption, it provides a much cleaner power waveform with minimal harmonic noise, as well as a high power factor (typically >95%).

Many utility companies apply a surcharge when the power factor goes below 95%. By the end of the year, this can translate into thousands or even tens of thousands of dollars, depending on the size of the installation. As random peak power consumption can be managed by predictive load management, zero-cross firing is considered a superior method of control in this instance. The considerably better power efficiency helps reduce electricity charges and **CO₂** emissions.

**Load sharing strategy**

Eurotherm load sharing strategy plays a significant part in predictive load management functionality, by managing the firing of multiple EPower SCRs in zero-cross mode to maintain a stable overall power demand. The strategy distributes the power for different loads to obtain a balanced overall power consumption that minimises transient power peaks.

Each heating zone controlled by an EPower SCR controller is defined by an output power, cycle time and a maximum power (maximum capacity), which can be represented as a rectangle (see figures 1 and 2). Rather than letting these rectangles pile up randomly to create peaks within a given timeframe, as shown in figure 1, the power load management uniformly distributes them, as shown in figure 2, thereby ensuring that at any given moment the overall power demand is as smooth as viable.

It is important to understand that the output power is not being changed but rather balanced and shifted to even out the demand. Through intelligent load sharing, the issues of flicker effect and the resulting random peaks are mostly eliminated, evening out the overall power usage.

**Load shedding strategy**

The Eurotherm load shedding feature is designed for systems where power demand could exceed the capacity of the heating system equipment or main power supply. The function can be set to limit and shift the power only if demand would exceed the pre-set maximum capacity. Managing the power demand to remain under the set limit helps prevent local and plant-wide circuit breakers from unnecessary trips and reduces the risk of costly equipment damage.

In regions where electricity costs are high, the load shedding feature can also be used to limit power demand under a set electricity tariff threshold. For example, if the total installed power is 2.5MW but the user wishes to keep the total demand under that limit. Adjustments can also be made through fieldbus communication (PROFIBUS, DeviceNet and Ethernet), enabling adjustments in view of ON peak period surcharges.

By dynamically adjusting the maximum threshold for the installation, glass plants can control the maximum electricity demand charge, which can result in substantial savings. In some regions, surcharges are applied to the bill for up to the next 11 following months, depending on the contract. So exceeding the maximum demand once can result in a penalty applied for up to 12 months. Monitoring and controlling the demand can drastically reduce energy cost. The predictive load management function allows setting up user-defined priorities, which allows the shifting of power on an as-needed basis.

**Conclusion**

As the glass industry is expected to increase its use of electric heating technology in the transition to a more energy-efficient future, best practise control methods need to be considered to improve cost-effectiveness, while reducing environmental impact. Utilising intelligent predictive load management strategies in EPower SCR controller helps glass plants to keep power demand within the limits of their main power supply. In existing installations, this can allow the use of electric heating technology in the transition to a more energy-efficient future. Best practate control methods need to be considered to improve cost-effectiveness, while reducing environmental impact.
Minimize Energy Usage

Eurotherm
Expertise to manage glass plant energy more efficiently

Predictive Load Management in the EPower Controller is EcoStruxure-ready, designed to keep peak power demand to a minimum and reduce energy waste.

EcoStruxure™ is Schneider Electric’s open, interoperable, IoT-enabled system architecture and platform.

eurotherm.com/glass
Automated volume measurement system for the shop floor

David Dineff discusses a more efficient way to manage volume and fill height requirements during glass bottle production.

Agr International Inc has introduced the latest addition to its family of products for the glass container industry, the SPT2-Volume. This automated, self-contained testing station is designed to provide hands-free, automated volume measurement of glass containers on the shop floor or in the laboratory, offering a cost-effective alternative to the tedious hand measurement of bottles.

According to Agr, this system was developed to meet the needs of glass container producers and brand owners that need fast and precise volume measurement but do not require pressure testing. This product is particularly applicable to the producers of non-pressurised ware, including spirit, olive oil and specialty beverage and food containers, where volume measurement is critical.

SPT2-Volume is an extension of the industry leading Agr SPT2 product line. Built on the same testing platform, this system shares many popular features, including a rugged stainless steel framework, no job change bottle handling system and a Linux operating system.

What is distinctive about the SPT2-Volume is its ability to perform fill height and volume measurement with laboratory accuracy, the repeatability that is achieved with automation and a fast throughput necessary for effective process management. System handling and operational components have been configured with this in mind. Plus, the system can be configured to operate autonomously, where it can provide round-the-clock volume measurement without additional labour requirements.

Volume measurement with precision

The system utilises positive-displacement as it core technology. A known volume of fluid is transferred from a temperature compensated, calibrated cylinder into the test container. At the same time, the fill level is dynamically monitored as the container is filled to overflow.

The positive-displacement method offers a number of advantages over traditional laboratory methods. Most significant is the accuracy and speed. This filling technique, in tandem with a high precision fill height sensor, makes it possible to deliver defined volume and fill measurements at any point within the process, to an accuracy of ± 0.5ml. Measurements can be performed at a rate of up to 120 bottles/h (350ml bottle).

Other advantages include little or no effect on measurement precision due to water quality, container shape or rate of fill, regardless of the size and volume of the container. Furthermore, the volume measurement system on the SPT2-Volume is self-contained, requires no delicate scales and is not affected by water density, flow rate, vibrations or issues that commonly plague other methods.

Since the SPT2-Volume can perform in-process job changes, it is possible to test bottles from different manufacturing lines, or hand feed a set of bottles as required, with testing protocols specific to that specific bottle type, without the need to stop and reconfigure the system, maximising testing efficiency.

This system can be configured as a standalone testing station, integrated into a sampling line in conjunction with a plant-wide process management system or combined with Agr’s OmniLab automated measurement system.

The SPT2-Volume is the latest generation in a long line of automated testing systems supplied by Agr for the glass container manufacturing industry. The company develops and manufactures a full line of laboratory and on-line testing/quality control devices for containers and similar products.

About the author:
David Dineff is Director of Marketing at Agr International

Further information:
Agr International Inc, Butler, PA, USA
tel: +1 724 482 2163
e-mail: marketing@agrintl.com
web: www.agrintl.com
Crystal-clear:

Your career with ARGLASS, America’s game-changing new glass container manufacturer.

Flexibility : Efficiency : Sustainability

positions open for talented and experienced glassmakers.

Contact: hr@arglass.us

The Quantum Forming System

- Longest lasting blank side forming equipment on the market
- Basic components have an indefinite life
- Quantum units supplied in 1980 are still running in state of the art machines today

QuantumForming.com
Mould design: Combined blow mould cooling

In the third of a series of four articles, Dominique Vassaux explains the importance of mould cooling, its influence on the performance of the IS process and on container quality.

Standard blow side VertiFlow equipment introduces cooling air at the base of the blow mould (via the bottom plate) and directs it upward to the top of the blow mould. The superiority of the BEG standard VertiFlow cooling is the total freedom on the cooling holes patterns. Depending on the body diameter of the container, the number and the diameter of the cooling holes must be correctly defined, as well as the correct distance between the mould cavity and the cooling holes. Patterns made of two rows of cooling holes with a distance of 12mm-17mm between the mould cavity and the cooling holes give the best cooling results.

A typical blow mould temperature distribution is illustrated. When using standard VertiFlow cooling, the bottom part of the blow mould is much colder than the body/shoulder part. This can be a drawback in production, as the mould extracts more heat from the glass in the bottom part and less heat in the body/shoulder part. This results in stiff glass in the heel/bottom part and soft glass in the body/shoulder part of the newly formed container.

The use of configured holes (or isolation grooves) along the length of the holes helps to make the vertical temperature more uniform but the tendency still shows that the bottom part will be colder than the body/shoulder area. In addition, it is important to note that standard VertiFlow cooling can only be used when the blow mould is closed, just after the final blow event. This limitation in total cooling duration sometimes leads to blow mould cooling restrictions (mainly in NNPB).

Additional cooling

In order to improve cooling at the blow side, BEG introduced ‘VertiFlow Assist’, which is an ‘add on’ cooling system to be used together with the standard VertiFlow cooling.

VertiFlow Assist is available on both AIS and NIS machines. On the AIS machine, the cooling air is supplied radially to the blow mould via the mould holder insert, whereas it is supplied vertically to the second row of cooling holes on the NIS machine.

Since standard VertiFlow and VertiFlow Assist can be timed independently, not only is it possible to significantly reduce the overall blow mould temperatures (up to 80°C in the shoulder area of a TG 4 ¼in blow mould) but the capability is provided to influence this ‘combined cooling’ system, in order to balance the temperatures vertically. This feature makes it possible for the production operator to achieve a homogenous temperature distribution within 20°C along the vertical and horizontal axes of the blow mould. This decrease in temperature amplitude (minimum, maximum) generates less stress in the mould material, leading to an increase in mould lifetime (up to 20%). It also results in potential speed increases of up to 5%, depending on the type of container produced.

Temperature control

Looking into the near future, closed loop systems will enable the operator to control blow mould temperatures automatically, not only in amplitude but also in vertical temperature gradient distribution. If the temperature measuring system detects too high temperatures in the shoulder region, only the VertiFlow Assist duration will increase, lowering the temperatures in the shoulder of the mould.

In the same logic, in case the bottom part will be too cold, the closed loop system will only reduce the standard VertiFlow duration, warming up the heel region of the mould. In addition, having this first closed loop system to ensure homogenous blow mould temperatures, a second closed loop system between the BEG FlexRadar system and the thermal parison conditioning (total blank mould closed duration and/or blank mould cooling duration) can be used, in order to have direct control on the vertical glass thickness distribution of the container.

The fourth in this series of articles will be published in the January/February 2020 issue of Glass Worldwide.
Conveyor Tooth Chains
Made in Germany

Some suppliers show CAD images, Quality suppliers display masterpieces of Art. All interested customers are welcome to see our capabilities and this true masterpiece of craftsmanship.

Excellent guiding characteristics, a long service life, reliable operation: our laser-welded inverted tooth conveyor chains are convincing in any production setting.

The ORIGINAL Inventor of LASER WELDED tooth chain!

Original link plates and components, designed by the LASER WORKSHOP
Renold GmbH, Gronau
Transforming flat glass logistics

Italcarrelli, a leader in the development of solutions for flat glass handling, reports to have revolutionised logistics in float glass factories via the introduction of automatic guided vehicles, as Davide Schiavon explains.

Italy’s Italcarrelli srl has always been oriented towards innovation and automation. Thanks to the company’s long experience in automated guided vehicles in sectors as diverse as metallurgy and aerospace, this knowhow has also been successfully applied to the flat glass division.

Italcarrelli has developed several navigation systems to transform its machines into AGVs, including inductive and optical guidance systems but in particular, Laser Guided Vehicles (LGVs).

The laser guidance system is an innovative system that can be installed on any inloader or side loader to turn it into a self-driving machine.

Thanks to laser guidance, high accuracy can be achieved, even greater than 5mm in terms of positioning. It is also a flexible navigation system and the routes can be generated easily, modified or extended without particular impact on the facilities.

In the glass field and in particular at float glass plants, LGV machines can be easily interfaced with the stackers at the end of the line, to unload the racks with glass automatically and also with WMS (Warehouse Management System) software for glass handling automation in the warehouse.

Italcarrelli LGV machines allow the optimisation of logistics between the production line, warehouse, glass processing lines and shipping areas, thus increasing productivity and safety and consequently reducing production costs.

During last October’s glasstec fair, Italcarrelli demonstrated a laser guide, which was a great success. Based on its application to a self-propelled platform for flat glass transport on trestles with a capacity of 33 tonnes, in the simulation the platform reproduced the grip of a tripod from one station to another independently and without the aid of operators.

Thanks to LGV technology, in addition to automatic guidance systems, the company is also developing an innovative localisation system, which will allow the tracking of the position in which a rack or glass package is unloaded. These positions are automatically communicated to the warehouse management software or ERP, so it will be possible to know at any time the exact location of glass and racks. The localisation system can be supplied both for machines with onboard operators and for automated driving.

About the author:
Davide Schiavon is Sales Manager at Italcarrelli

Further information:
Italcarrelli srl, Chiampo (VI), Italy
tel: +39 0444 623393
e-mail: info@italcarrelli.eu
web: www.italcarrelli.eu
Bystronic glass symbolises innovation with machinery, systems and services for the processing of architectural, automotive and display glass focused on tomorrow’s market.

From basic requirements through to entire, customised installations Bystronic glass provides pioneering solutions – naturally, all in the highest quality.

www.bystronic-glass.com
In the current economic and cultural climate, the glass industry is facing significant challenges to reduce energy demand and CO2 emissions. In the UK, the industrial manufacture of glass consumes 6.5 TWh a-1 in furnace power and generates 2.2 MT a-1 of CO2, according to the UK Department of Energy and Climate Change (2015) (1).

The majority of the CO2 is produced through the operation of natural gas-fired furnaces common in the industry. However, approximately 18% of the CO2 generated in the UK glass sector is released during melting through the thermal decomposition of carbonate raw materials such as soda ash (Na2CO3), limestone (CaCO3) and dolomite (CaMg(CO3)2). By exploring potential new raw materials that can be used in partial replacement for these carbonate raw materials, significant reductions in the amount of CO2 released can be achieved. Furthermore, by utilising the properties of these raw materials, different glass formulations can be produced, which possess lower melting temperatures. Hence, further CO2 reductions can be achieved by reducing the energy demand of the furnace.

In pursuit of these dual goals, the UK government has funded the two year Enviroglass 2 (Innovate UK) and BiomAsh (BEIS) projects. These projects specifically target the development of ashes from biomass combustion as raw materials for glass production. Enviroglass 2 focuses on colourless container glass, float glass and mineral wool, whereas BiomAsh targets the amber and green container sectors.

**Historical context**

Biomass ashes have been known as raw materials for glass production for over a millennium. From the 1st to 4th Centuries AD, the Roman Empire produced significant amounts of glassware, utilising a two-stage process (2). Firstly, primary glass centres around the Mediterranean produced large quantities of raw glass, ie cullet. This raw glass was then transported across the Roman Empire to secondary glass centres, where it was remelted and worked to produce glassware for the local market.

The raw glass itself was produced using two primary raw materials: Lime-rich sands and natron. Natron is an evaporite formed during the drying of lakes and seas. It consists primarily of Na2CO3•10H2O and NaHCO3. The primary natron sources for the Romans were at Wadi Natrun and al-Barnuj, both located in Egypt (3). However, between the 7th and 9th Centuries AD, there was significant unrest in the region of the natron deposits.
Hot glass handling is evolving

The PROTATHERM® range is trusted by some of the world’s premier glass container manufacturers.

They trust PROTATHERM® to meet their need for highly durable yet sympathetic contact materials and parts.

Our aim is simple, increase our customers’ productivity, through reducing down time due to excessive wear or breakages of contact parts, and increase pack rates by helping to reduce checks and cracks in the glass.

For more information on how ‘glass handling is evolving’ contact us today:

Phone: +44 (0)113 256 4664
Fax: +44 (0)113 257 1119
Email: info@protatherm.com

WWW.PROTATHERM.COM

Anglo Carbon, Waterloo Mills, Waterloo Road, Pudsey, Leeds, LS28 8DQ, UK
In 619 AD, there was an invasion by the Persians, followed by the conquering of Egypt by the Rashidun Caliphate (639 - 642 AD). Later, the region was hit by repeated invasions by the Berbers (809, 867/868, 871 AD) and a prolonged civil war (811-832 AD).

This political upheaval resulted in the supply of natron at Wadi Natrun and al-Barnuj becoming unreliable. Glassmakers were forced to find alternative flux materials. In the Levant and Near East, they turned to halophytic plants, such as Salicornia and Salsola, whereas in northern and western Europe, wood ash, primarily beech, was favoured. The use of wood ash led to the production of 'Waldglas' (forest glass), which is known in the Carolingian Empire as 'Waldgläser'.

The presence of Fe₂O₃ is important, as it resulted in the forest glasses being yellow-green in colour. Forest glasses were produced on a large scale into the 18th Century but their manufacture declined from this point. There were several reasons for this decline: There was increased demand for glass products, which was difficult to sustain due to the fact that the production of one tonne of glass required 250 tonnes of wood. In addition, there was a general move from wood-fired furnaces to coal-fired furnaces, reducing the availability of wood ash. Perhaps most importantly, there was increased demand for high quality, consistent glass products, which was difficult to achieve with the locational and seasonal variation of wood ashes.

Further investigation

In 2017, the original Enviroglass project identified biomass ashes as potential raw materials for commercial glass production. From this project, the Enviroglass 2 and BioMash projects were born to further the investigation into biomass ashes.

These projects are run by a consortium headed by Glass Technology Services and Sheffield Hallam University. To date, 23 ash types from 11 UK biomass power plants have been analysed (locations shown in figure 1). Chemical and phase composition for two promising ashes are shown in figure 2. Figure 3 shows colourless container glass, float glass and mineral wool glass samples made with 10 wt % of ash one (colourless container and float) or ash two (mineral wool), compared to benchmark samples.

Despite colour being a known potential issue for biomass ashes, the colourless container and float glass samples both exhibit colours closely matched to the benchmark. Batch calculations show reductions in the CO₂ content of the batches compared to the benchmarks of 17% for colourless container, 16% for float and 14% for mineral wool. Work is ongoing to develop ash-based formulations with reduced melting temperatures in order to reduce furnace temperatures, energy demand and thus overall CO₂ emissions.

Some low melting temperature glass formulations using standard raw materials are known but they are rarely implemented due to the high cost of the alkali and alkaline earth raw materials, of which they contain elevated levels. Biomass ashes offer a cost-effective way to enable lower melting temperature glasses and thereby reduce furnace temperatures and CO₂ emissions, due to their significant alkali and alkaline earth content and comparatively low cost.

The Enviroglass 2 and BioMash projects continue to further the scientific and industrial basis for the use of biomass ashes in commercial glass production, with promising results thus far. Further work to scale up the trials and develop cost-effective low melting temperature formulations is ongoing, with results expected over the next year.

References


About the authors:

Daniel J Backhouse and Wei Deng are Postdoctoral Research Fellows, Feroz Kabir is a Senior Lecturer, Ronak Janani is a Postdoctoral Research Associate, Masoud Bigharaz is a PhD student, Adrienne Guilbot is a student and Paul A Bingham is Professor of Glasses and Ceramics, all at Sheffield Hallam University.

Co-authors Alex Wardlow and Adam Jackson are Technologists, Martyn Marshall is Principal Technologist and Rob Ireson is Research and Innovation Manager at Glass Technology Services.

Further information:

Sheffield Hallam University, Sheffield, UK
tel: +44 114 225 6449
email: p.a.bingham@shu.ac.uk
web: www.shu.ac.uk/research/specialisms/materials-and-engineering-research-institute

Glass Technology Services Ltd, Sheffield, UK
tel: +44 114 290 1801
email: r.ireson@glass-ts.com
web: www.glass-ts.com
Over 1000 production lines are equipped with Graphoidal Shear Spray Systems. Contact us today to find out how our latest technology can help you.

www.sheppee.com

Halifax Way, Elvington, York, YO41 4AU, UK  T: 0044 1904 608999   E: sales@sheppee.com  W: www.sheppee.com

Graphoidal Developments Ltd, Broombank Road, Chesterfield S41 9QJ, England
Tel: +44 (0) 1246 266000  Fax: +44 (0) 1246 269269

Email: sales@graphoidal.com  Website: www.graphoidal.com
Camera-based weight control provides precise gob management

Heye Process Control 4.0 with camera system.

Heye Process Control 4.0 is a closed-loop solution for the pressing process of all plunger mechanisms within an IS machine. Simultaneously, it keeps the gob weight stable. The technology displays a number of forming events on several selectable charts and permits the improvement of parameter setting by comparing data. Early recognition at the start of malfunctions increases production efficiency. The integrated plunger cylinders ensure certain gob parameters for press-blow and NNPB production. For heavy and premium articles produced using blow-blow operation, however, this technology cannot be utilised. Consequently, glass container manufacturers have increasingly requested access to gob supervisory and adjustment technology for blow-blow production as well. The Heye Gob Master satisfies this requirement.

Functionality and benefits
The camera-based system offers the possibility to determine and control the gob weight and favourably exploits the additionally generated data for all production processes. Two cameras placed underneath the shears act as sensors, generating 3D gob images. The software logic determines geometric data of these digital 3D models, such as length, diameter, position and tilt angle. This data ultimately calculates the gob volume and weight.

In real-time, the cameras monitor the gob shape and where malfunctions or deviations are identified, the system immediately reacts and the Heye Process Control directly initiates rejection of the article at the hot end. Consequently, Heye stepper motors automatically correct these deviations by mechanically adjusting tube height and plunger position.

Production runs operating the blow-blow process benefit the most from this recent technology. However, the added value for press-blow and NNPB production runs is also obvious. With Gob Master technology, gob shape and gob fall can be measured, which is impossible using the plunger cylinder functions alone. Gob shape and weight become reproducible, which results in a stable production process, ultimately improving efficiency and quality. There is no waste of energy or raw materials due to data inaccuracies.

Answered by experts
Heye International experts confirm that the Gob Master can be retrofitted to existing equipment: Where a Heye Process Control system is already available, the latest version can be retrofitted via a plug-and-play device. The Gob Master itself consists of two high speed cameras, a control unit, a water chiller and a monitor.

Furthermore, the settings of the Heye Process Control system can be adapted to several gob weights running simultaneously on a single machine. This underlines the flexibility of the system and shows its sophisticated functionality.

Live gob forming images.

Hello Process Control 4.0 with camera system.
We transfer your ideas!

Decoration machines for processing glass, plastic and metal packaging.

Koenig & Bauer Kammann GmbH
Bergkirchener Str. 228
32549 Bad Oeynhausen

kammann.de
Amazing discoveries part 23...
Auto swabbing systems comparison

Following his exploration of different steps to be taken towards optimising forming process stability and reducing the weight of glass containers, in the coming issues Paul Schreuders addresses amazing discoveries related to XPAR Vision’s BlankRobot development. Introduced at glasstec 2018 exhibition, BlankRobot is a true revolution in glass forming, whereby the amount of disturbances to the forming process is reduced drastically, hence paving the way for effective forming process automation. Here, the focus is on swabbing and the BlankRobot itself.

As the name suggests, the BlankRobot is designed not only for swabbing but for other applications as well. For swabbing, by applying a special lubricant together with a highly precise application, swabbing frequency is reduced to once every two to three hours only, leaving enough time for the robot to execute other functions.

In previous articles of the ‘Amazing Discoveries...’ series, the functionalities and consequently the learnings of the BlankRobot in operation have been reviewed. This article provides a quick comparison between currently available technologies for automatic swabbing for blank mould and neck rings.

Automatic swabbing technologies
When considering the different technologies for automatic swabbing that are offered by various suppliers, these can be categorised in three groups: (1) by using a robot on IS machines, swabbing section by section; (2) by installing a fixed add-on tooling per section; and (3) by installing a cavity-based assembly to apply carbon by means of an acetylene/ oxygen mixture that is ignited. The most important difference in functionalities between the categories is whether they are able to lubricate neck rings or not. The second and third options do not provide neck ring swabbing. Therefore, this quick comparison concentrates on the robot-based automatic swabbing solutions, where the systems offered provide both blank mould and neck ring swabbing.

Robot-based automatic swabbing solutions
A robot-based technology for automatic swabbing is based on the technology that a robot arm is positioned over the blanks and performs a downward movement into the blank to apply the lubricant by means of a nozzle-based spraying method. The robot, with all available systems using a Fanuc model, is moved from section to section by a dedicated carrier design. This carrier uses either a rail mounted on section boxes or mounted on the operator control panel construction. The space required for these two types is not significantly different.

From a conceptual perspective, the section box-mounted rail type provides the option for more additional functions (besides swabbing) to be applied by the robot solution. When looking at the appearance of the different systems offered, some come with a closed carrier casing for safety protection for machine workers. Others do not provide this additional safety protection.

Finally, the different lubricant application assemblies are to be emphasised. Some provide with their standard configuration a spraying nozzle that lubricates the blank profile from one position over the blanks. Others come with dedicated nozzle tools (nozzle-lance assembly) that enter into the blanks to follow the blank profile from top to bottom. As such, these also swab the neck rings from inside.

XPAR Vision’s BlankRobot uses a carrier rail-mounted on section boxes, has a closed carrier casing for safety protection and uses dedicated nozzle tools, allowing for both blank and neck ring swabbing.

Performance
As well as the technical differences reviewed above, an important comparison comes from the performance of the different robot swabbing systems. Here, several performance areas can be differentiated. In this comparison, the areas that are discussed are process disruption, consistency, operability, consumption and health safety.

Forming process stability
In the genes of XPAR Vision is the ‘fight’ against variation in the forming process. This originates from the year 2000, when the company presented its first generation InfraRed (IR) camera systems to the glass container industry.

Over the years, while being at the seventh generation of IR-system software, XPAR Vision is still the hot end technology leader, with a complete portfolio of hot end sensor systems measuring forming process variations; think cullet quality, glass homogeneity, glass viscosity, ambient temperature (manual) swabbing, equipment wear etc.

Available sensor systems start with gob condition (shape, weight, temperature with GobMonitor) via gob...
ADVANCED SOLUTIONS FOR GLASS DECORATION

LAST CHANCE TO REGISTER FOR EUROPE’S ONLY GLASS DECORATION EVENT!

www.glassprint.org
loading (GobAssist) and blank mould, neck ring and parison temperature control (BTC) to cavity-based process monitoring and quality inspection of each bottle (IR-D). The ultimate purpose is finally to measure only ‘true’ process variations and make these measurements available for closed loops (process control).

**Disruption**

One main factor of the disturbances or disruptions while making a bottle at constant quality with highest output is the swabbing. Manually, this is an inconsistent, repetitive action but one that is necessary to keep the sections running. Inconsistency starts with several operators maintaining the IS machine day in, day out, each operator performing differently. Here, automatic robot swabbing brings the first added value. However, alternative systems perform differently by concept.

For all available systems, the swabbing frequency is different (from every five-seven minutes up to every two-three hours). Here, XPAR Vision’s BlankRobot chooses the approach of ‘less is more’. The BlankRobot is designed to apply lubricant extremely accurately in very low quantities. Combined with its special lubricant from LubriGlass, the BlankRobot needs to swab only every two-three hours, without disturbing the process in the meantime. With alternative equipment, more frequent swabbing is required and in higher and less accurate application (weak quantity control and/or poorly controlled application).

Represented in figure 1, the level of process disruption between automatic robot swabbing systems becomes clear.

**Consistency**

Important for process performance and thus bottle quality is the repeatability of the swabbing operation. Together with the precision and accuracy of the application of lubricant, this combines to a good level consistency of swabbing. As indicated earlier, the constant change of operators, shift by shift, results in poor repeatability and consistency when swabbing. Here, swabbing robots do better of course. When comparing precision, however, the BlankRobot is - by design - the outstanding option. In every swab action, BlankRobot precisely applies the same quantity of lubricant to the defined areas in blanks and neck rings. With other systems, quite simply, this level of perfection is technically unavailable.

XPAR Vision’s BlankRobot applies exact and precise quantities. These two elements of consistency are best guaranteed with this option (see figure 2).

**Lubricant consumption**

A straightforward comparison is possible by reviewing the commercial sales information from different suppliers relating to the lubricant consumption. Adding an experience number from the BlankRobot in 24/7 operation on a 12-section double gob IS machine, where it consumes 0.1 litres/day for all cavities, it reflects in the comparison shown in figure 3.

**Operability**

With operability, several aspects are to be considered. Firstly, how easy to use are the user interfaces in comparison? In essence, the XPAR Vision BlankRobot asks basically for only layer thickness of lubricant to be applied and the areas where wanted. All other movements of the robot are predefined, based on initial calibration of the BlankRobot against the section’s dimensions (moulds, deflectors, baffles etc). With other robots, movements need to be programmed with a dedicated robot movement control unit, separate from the actual user interface, where product-related settings are configured.

Furthermore, the aspect of accessibility to sections is taken into account. The more frequent the swabbing robot moves from section to section (swab interval), the more access for the workers to the sections is compromised. Additionally, the worker’s access to sections blocks the swabbing operation, which consequently means the workers have to swab manually for that period, as the process needs to maintain operation (see figure 4).

**Health and safety**

The impact on workers’ health from swabbing is generally related to the smoke and fumes that arise when oil-based lubricant is applied to the hot surface of the blanks. Oil burns and vaporises into the air with significant health impacts. Even when applied by a robot swabbing system, these health risks occur but at a lower extent.

Taking this into account with the oil consumption and swab interval, the comparison becomes clear again. The factor of safety comes with other dimensions, where access to the sections is one of the differentiators.

XPAR Vision’s BlankRobot allows workers to access sections with much lower interference to the robot swabbing operation. Each two-three hours swab interval does not intervene with operator tasks like very high swab frequencies. Especially in these situations, the safety risk is high, as the operator should swab manually when the swabbing robot is unable to during worker interventions (see figure 5).

**Summary**

A comparison of automatic swabbing systems by means of a robot is helpful for potential users to make a selection based on important topics. Ultimately, the bottom line selection is also a choice for the concept behind the solution.

Is copying the manual swabbing operation into automation ultimately the company’s goal? Any robot will do the job. Looking further into the future, additional tasks that a robot could perform as well as swabbing makes the selection obvious. To perform new functions, the robot simply needs time. It is obvious that with five minutes’ swab intervals of even 15-20 minutes, the robot has no spare time to perform other functions when needed. Here, the XPAR Vision BlankRobot is the only option.

What tasks or functions are within reach is the next interesting subject. XPAR Vision believes in the automatic adjustment of deflectors, based on GobAssist measurement data input and verification. Furthermore, deflector swabbing is feasible. Realising these functions are still to be developed, the selection of an automatic swabbing robot is not one for the short-term (swabbing only) but for a longer period. When taking this into consideration in the selection process, users receive the best designed swabbing robot in the short-term as well!

**Publisher’s note:** Other suppliers of swabbing robots are welcome to contribute articles for future issues covering their technology. Contact sales@glassworldwide.co.uk for editorial deadlines. Material published in Glass Worldwide does not necessarily reflect the views or opinions of Chameleon Business Media Ltd, any of its staff, contributing consultants or sponsors of the magazine.

---

**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

email: contact@xparvision.com

web: www.xparvision.com
In the year of
“Parma Italian Capital of Culture 2020”

XXXIV ATIV Conference

Where Glass Science, Art and Technology meet together

Parma (Italy)
June 24th-25th-26th 2020
Parma University Campus

Organizing Secretariat
Via Marchesi 26/d - 43126 PARMA (Italy)
Tel. +39 0521 290191 - Fax +39 0521 291314
ativ@ativ-online.it

www.ativ2020.it

With the Patronage of
Equalising axial cooled hanger boosts pack-to-melt ratio

Pyrotek’s patented converted equalising axial cooled hanger is being used by glass container plants around the world to reduce maintenance downtime and optimise pack-to-melt production ratios. According to William Meza, with conventional hangers, there is no full, even movement of all cavities or moulds. The equalising hangers evenly distribute the closing force among all cavities.

“You can easily remove a couple of bolts, pull out the worn inserts and replace them without taking down the 100kg hanger” says William Meza, Pyrotek’s Glass Applications Engineer for Mexico. “The process of changing inserts can be reduced from 40 minutes to 10 minutes. Saving 30 minutes of downtime represents a lot of money in bottle manufacture.”

Pyrotek can also level the hanger in approximately 20 minutes compared to the typical four to eight hours. The hanger has a cooling plate that has been modified from standard plates, in that it divides into four sections. The modification was made because only the front section of the cooling plate suffers wear and damage. This allows machine operators simply to replace the centre cooling plates instead of the entire cooling plate. The ability to replace just the worn pieces and to make the changes to cooling plates without taking out the full hanger reduces maintenance costs.

“Also, there is an added benefit in maintenance safety” Mr Meza says. “Reducing downtime, while at the same time reducing bottle defects combine for a higher PTM ratio and an improved customer bottom line.”

The patented hanger technology has proved to plant managers that they can nearly eliminate seams on containers, according to Doug Stanley, Pyrotek’s Global Manager for Container Technology. “Plants adopting the use of these equalising hangers have seen them provide a quick return on investment” he says. “We have recently seen a complete 10-section conversion where that investment was paid off in six months. As for that customer’s pack-to-melt numbers, they were putting up to 2% more bottles in the box after conversion to Pyrotek’s equalising hangers.”

Pyrotek also supplies the shafts, links, pins and levers, all the components that make the movement of the hanger possible.

Glass container plants are constantly seeking ways to boost production and stay competitive by keeping their machines operating, generating less scrap from defects and enhancing the quality of their finished products to meet the requirements of final customers.

“Glass container plants want the right customer service experience” says William Meza. “Plant operators rely on quick answers and solutions to their questions. They need to count on a long-term supplier partner like Pyrotek, who understands their business, speaks their language and shares their passion for the products.”

Members of Pyrotek’s global glass team are engineers, former glass plant managers, industry researchers, equipment and process experts and others who have worked for industry leading companies. The global glass team has considerable knowledge around customer challenges and how the company’s resources can help.

“Also, there is an added benefit in maintenance safety” Mr Meza says. “Reducing downtime, while at the same time reducing bottle defects combine for a higher PTM ratio and an improved customer bottom line.”
shaping the future...

AUTOMATION

Process Addicted
TECHNOLOGY | AUTOMATION | SERVICE

www.bottero.com
Auxiliary burner applications in glass manufacture

Discussions about heating applications in the glass industry almost always involve the melter or forehearth, as most of the fuel in the factory is needed to melt and condition the glass. However, in every plant there are many other applications requiring heat, most of which use small amounts of fuel. As safety and control needs become more critical to efficient plant management, looking for improved solutions for these smaller applications has grown in importance. Two applications are discussed here, namely sodium silicate and float applications. David Fontes reports.

Many of the heating needs discussed here have traditionally used a small torch, which was manually lit using no flame safeguards. Control of the gas flow was manually set using just a globe valve and the operator’s eye for good combustion. Today, the use of proper flame ignition and monitoring, as well as the use of proper control techniques even on these small applications are needed for safe and reliable operation.

Sodium silicate applications

In one application, heat is applied to a glass stream in the manufacture of sodium silicate in two places. In both locations, the use of a manually lit and controlled burner was replaced with NFPA-compliant control and flame monitoring system, which could easily be designed for EN standards as well.

The main gas train included two control lines, one for each burner with the required safety equipment, including a double block safety valve system. Total natural gas use is low at 600 SCFH (16 Nm³/h) for one burner and half of that for the second burner. Flame safety becomes more important even though fuel use is low, as this system is used at temperatures below auto ignition.

The controls for one burner, the Selas 1001 NM, include mass flow controls for both gas and blower supplied combustion air. The second burner is an atmospheric burner using self-induced air via its included mixer. Gas for this burner is manually set using a manual flow meter.

For both burners, a compliant flame ignition system is used. To start the burner, the operator pushes the start button for the blower then the burner on button for the Selas 1001 NM burner to initiate the flame ignition process. The gas safety system then opens and the flame is lit via spark ignition and the flame is verified via a flame rod. This then ensures a completely safe and compliant system, compared to the old manual torch used in the past. Figures 1 and 2 show the completed air and gas control system and control panel for the 1001 NM burner arrangement.

Auxiliary burner applications

In glass manufacture

Discussions about heating applications in the glass industry almost always involve the melter or forehearth, as most of the fuel in the factory is needed to melt and condition the glass. However, in every plant there are many other applications requiring heat, most of which use small amounts of fuel. As safety and control needs become more critical to efficient plant management, looking for improved solutions for these smaller applications has grown in importance. Two applications are discussed here, namely sodium silicate and float applications. David Fontes reports.

Many of the heating needs discussed here have traditionally used a small torch, which was manually lit using no flame safeguards. Control of the gas flow was manually set using just a globe valve and the operator’s eye for good combustion. Today, the use of proper flame ignition and monitoring, as well as the use of proper control techniques even on these small applications are needed for safe and reliable operation.

Sodium silicate applications

In one application, heat is applied to a glass stream in the manufacture of sodium silicate in two places. In both locations, the use of a manually lit and controlled burner was replaced with NFPA-compliant control and flame monitoring system, which could easily be designed for EN standards as well.

The main gas train included two control lines, one for each burner with the required safety equipment, including a double block safety valve system. Total natural gas use is low at 600 SCFH (16 Nm³/h) for one burner and half of that for the second burner. Flame safety becomes more important even though fuel use is low, as this system is used at temperatures below auto ignition.

The controls for one burner, the Selas 1001 NM, include mass flow controls for both gas and blower supplied combustion air. The second burner is an atmospheric burner using self-induced air via its included mixer. Gas for this burner is manually set using a manual flow meter.

For both burners, a compliant flame ignition system is used. To start the burner, the operator pushes the start button for the blower then the burner on button for the Selas 1001 NM burner to initiate the flame ignition process. The gas safety system then opens and the flame is lit via spark ignition and the flame is verified via a flame rod. This then ensures a completely safe and compliant system, compared to the old manual torch used in the past. Figures 1 and 2 show the completed air and gas control system and control panel for the 1001 NM burner arrangement.

Figure 1: Completed air and gas control system for the 1001 NM burner arrangement.

Figure 2: Control panel for the 1001 NM burner arrangement.

Figure 3: Typical Selas Ensign Utility Burner setup.

Figure 4: The Selas Ensign Utility Burner provides a ribbon or line of heat.
In many cases, past and present, where extra heat is needed at the edge of the glass ribbon, many different simple torches have been used. The Selas Ensign Utility Burner provides a ribbon or line of heat. The burner length can be from 50mm to over 750mm long with energy output of 25,000-45,000 BTU/in (7.3-25 kW/25mm) of burner length. A typical setup for the burner is shown in figures 3 and 4. This can then be set over the glass to fire and provide the heat needed to either side of the glass ribbon.

An additional application for float is a premix burner for the tin bath. This burner system is used during lip changes for holding heat and to promote a quick change, while preventing the tin bath from cooling down. Some may be concerned with firing directly into the tin bath but with the accurate control of the premix, there is no excess oxygen to oxidise the tin.

The burner system uses the Selas Redi-Pak control unit (figure 5) for control and ignition of the premix. The total volume of air and gas premix is controlled via a 4-20 mA loop through a variable speed blower, which is added to the Redi-Pak control system. The burner rated at 800,000 BTU (230 kW) includes a Selas supplied ceramic nozzle, so there is no concern with nickel. The burner block is housed in a metal frame, so the burners can be easily placed in the tin bath when the side seal is removed.

Compared to furnace controls, these systems may seem quite basic but the fact is that around many glass furnaces, there are many applications that require heat that have not seen the attention to control or safety in the past. With a proper evaluation of process needs and requirements, a safe and reliable combustion system can be designed for any application. Selas has a wide array of premix and nozzle mix burners available for low temperature and low heat applications. With the proper controls, these burners will provide safe and reliable control.

Grenzebach keeps improving equipment efficiency as a supplier of complete lines for coating technology inducing upstream and downstream processes. The focus is on reduction of downtime and higher productivity.

A whole series of optimizations contribute to these benefits:

- Modular drop-in shield & drive system
- Gas bar segmentation easily adoptable to process requirements
- Process gas inlet at pass line and top pumping
- Fixed gas separation at varying glass thicknesses
- Stable and reliable ≤30 mm glass gap
- Two planar cathodes in one process compartment
- Minimal floor reinforcements and no special foundation requirements
Increasing production speeds and the requirement for lighter products have emphasised the need for more effective control of the glass container forming process. Many of today’s IS machines are equipped with 10 or 12 sections and can reach production speeds of up to 700 bottles/min. At these rates, glass factories can offer customers large quantities of glass packaging at affordable prices.

Mould temperature plays an important role in hollow glassware quality. The temperature profile of a mould directly affects the glass distribution of bottles and jars. Only a correct temperature profile of the mould can allow the production of high quality glass.

The measurement of mould temperatures is an important factor that enables the operator to adjust the amount and time of mould cooling system, plunger cooling, the time of contact of mould and molten glass and other forming-related parameters. Among the parameters that affect temperature of moulds are mould cooling, glass temperature, machine speed, time of mould closing and swabbing.

Importance of mould temperature measurement
Higher speed machines, trends to reduce glass weights and use of the NNPB process make mould temperature control more critical and important. So now, the industry is looking for tools/technologies to measure the mould temperature more precisely, with easy application and economic solutions.

Nowadays, the wall thickness of glass bottles is reaching 0.8mm and this really low amount of glass is achieved by precise measurement of the mould temperature. The temperature profile of blank moulds is not uniform and varies along the vertical axis of the blank mould. This illustrates the importance of accurate and precise temperature measurement in several defined points on the blank mould rather than at only one point.

The temperature profile of a blank mould in BB and NNPB processes exhibits very different trends, especially in the middle of the blank height. In other words, the ideal temperature profile has significant differences in BB and NNPB processes. This makes precise mould temperature measurement even more important.

Shown below are different methods available for measuring mould temperatures:

- Thin type ‘K’ or type ‘J’ thermocouples, built inside the vertical hole made on the mould and connected to a measuring system by mineral insulating flexible high temperature cable have been used for measuring mould temperature. The disadvantage of this method is that interpretation of such measurements in a material such as glass with rapidly varying temperature gradients is quite difficult. In addition, application of this on the machine is complex.

- Using simple radiation pyrometers with a laser point is common in some glass plants but the fact is that this technology is not precise enough and is not a correct choice for mould temperature measurement due to technological limitations.

- Latterly, online systems were introduced, installed on the beam of the IS machine, above the blank side panels. These systems measure such information as the temperature of PGM+ rotation.
moulds and accessories like plungers and neck rings. These systems require significant investment and costly maintenance and as such, are not a feasible solution for many glass plants. Also, system adjustment is complex.

**Portable pyrometer**
The portable glass mould thermometer was introduced to provide a more suitable temperature measurement solution using an infrared technique to answer the glass container industry’s precise requirements. After successfully introducing the PGM (Portable Glass Mold Pyrometer) and gaining positive customer feedback from around the world, Tempsens Instruments is now supplying the latest generation PGM+ device.

PGM+ is a robust and lightweight, hand-held pyrometer for quick, precise and easy measurement of glass mould temperatures. It is capable of transferring stored temperatures to a computer via USB or Bluetooth. The user can easily measure and record the temperature by pressing a single button. The button can work in three modes, which can be selected by users via software. The temperature readings are stored into memory and logged with serial number and date/time for future review and analysis.

The PGM+ pyrometer is equipped with rotatable fibre optics and an optical head. It features an infrared detector with associated electronics, all installed in a single unit. The probe head collects the infrared energy emitted by the glass mould and transmits to the sensor assembly in the probe handle via a rugged mono fibre stainless steel protection tube. The probe head has options of 90°, 45° or straight angle for easy operator accessibility to the mould.

The equipment’s processor converts the signal to a temperature and displays it on the OLED display. The entire process is completed within two to 10 milliseconds (adjustable by software) to ensure fast mould measurement. Processor temperature measurement can be taken either by contact or non-contact with the mould, without affecting the accuracy of measured temperature. The probe’s tip is designed in such a way that it eliminates reflections coming from the mould. This is another factor considered by Tempsens to make the PGM+ sensor work in 1.6 microns, which ensures highest accuracy and low effect of emissivity changes.

**About the authors:**
Mr V P Rathi is Managing Director at Tempsens Instruments India and Basant Rahti is General Manager at Tempsens Instruments Germany

**Further information:**
Tempsens Instruments, Udaipur, Rajasthan, India
tel: +91 294 3057727
email: praveens@tempsens.com
web: www.tempsens.com

Tempsens Instruments GmbH, Hennef, Germany
tel: +49 2242 870319
email: basant@tempsens.com / info@tempsens.de
web: www.tempsens.com

---

**Intco liefert feuerfestes Material für Anlagen aller Größen.**

Unsere Kunden produzieren exquisites Kunstglas, brillantes Glas für den gedeckten Tisch mit herausragender Klarheit, anspruchsvolle Glasflaschen und absolut fehlerfreies Floatglas für Displays.

Intco und unsere Kunden teilen die Leidenschaft für ein absolut perfektes Produkt.

**Intco supplies refractory material for glass melting furnaces of all sizes.**

Our customers produce exquisite art glass, brilliant tableware glass with outstanding clarity, sophisticated glass bottles and absolutely flawless float glass for displays.

Intco and our customers share the passion for an absolutely perfect product.

---

**CONTACT:**

**Germany**
intco GmbH | www.intco.de

**China**
Zibo Intco Import & Export Co., Ltd | www.zbintco.com

---

**GLASSPrint2019**

**CONFERENCE**

**27-28 NOVEMBER 2019, DÜSSELDORF, GERMANY**

**LAST CHANCE TO ATTEND!**
www.glassprint.org
Electric boosting in an oxy-fuel-fired glass fibre furnace

Merve Durubal and Burçin Gül evaluate the performance of an oxy-fuel unit melter type glass fibre furnace to meet the requirements of expected capacity of the furnace and product quality. This article is based on a paper presented at the 14th International Seminar on Furnace Design – Operation and Process Simulation, sponsored by Glass Service as.

Glass fibre is a special type of glass having significant characteristics as high electrical resistance, mechanical and chemical durability. Production of this type of glass is highly challenging, mainly due to its strongly corrosive interaction with most refractories at the required high temperature.

Glass fibre applications determine the requirements of glass fibre production, as well as certain properties of glass composition. The most significant aspect of glass fibre melting is an excessive foam layer formed on the glass surface due to its composition. Additionally, oxy-fuel glass furnaces enhance the formation of a layer of foam, which has a great insulation on the molten glass surface compared to air-fuel operation.

Therefore, heat transfer from the combustion space to the glass bath is decreased. To overcome this difficulty, it is considered to supply an amount of energy by electrical boosting, so that energy is released directly in the melt. Electrical boosting is such a longstanding application to glass furnaces that is favoured progressively because of restricted energy resources and environmental aspects.

The glass melt is heated from the bottom by direct Joule heating, with most of the heat often generated close to the electrodes. In glass furnaces, alternating current is used and in this study, three-phase transformers are employed. Glass fibre fabrics are outstanding for electrical insulation purposes and have a low electrical conductivity compared to regular silicate glasses, as a result of having less alkali metals in their composition. Consequently, the amount of current flow through the glass is low and this leads to low current density at the electrode surface.

In this study, the main parameters investigated for the design of electrical boosting system are:

- Amount of electrical energy applied to the furnace.
- Distribution of electricity in the furnace, number of zones and amount of electrical energy per zone.
- Location, position and immersion of the electrodes.

Furnace overview
The furnace in this study is an oxygen-fired unit melter, equipped with nine flat flame burners. At the beginning of this project, the design parameters of the furnace were optimised by the use of the Sisecam furnace model. Then, it was decided to use electrical boosting to reach a 28% increase in capacity by setting up ideal convective currents and temperature profile in the furnace, hence maintaining glass quality. This helps for flexibility of furnace pull rate during the furnace lifetime. A general view of the furnace temperature and flow distribution can be seen in figures 1a and 1b.

By examining the temperature distribution and glass flows obtained by mathematical modelling, different cases are decided to work with different amounts of electricity and its distribution. The amount of supplementary electrical heating in to oxy-fuel.
fired glass fibre furnace also depends on economical optimisation, involving electricity and oxygen costs, as well as efficiency of these two alternatives. The ratio of electricity in total energy given to the furnace for each case is seen in figure 2, which also highlights the effect of electrical power contribution on specific fuel consumption.

**Effect of electrical boosting system**

Considering the factors mentioned above, the total amount of electrical energy required to gradually increase specific pull rate from 1.60 tons/m²/day to 2.0 tons/m²/day was calculated and is shown in figure 3. In this modelling study, electrodes are decided to be placed in a spread configuration, on the basis of operational experiences. Four zones, each designed with six electrodes to get a relatively even loading of the three phase electrical transformers. Electrodes are vertically installed at the bottom of the glass bath. Four zones are located from the beginning of the melting end to the hot spot, as can be seen in figure 3. This configuration was studied to observe the potential of the electric boosting system, which could influence overall furnace operation, energy consumption and glass quality, with increasing output.

In this boosting system, only for zone four, six electrodes are installed as a single row to obtain a stronger hot spot, so convective currents can enhance glass circulation from the bottom to the surface. Power distribution in the glass melt is arranged to use 53% of energy under the batch and the remaining 47% in the hot spot.

A well placed boost system enhances convection currents that co-operate with desired effects of the top firing. For a comprehensive analysis, the Sisecam mathematical model was used to carry out investigations with a series of five cases regarding incremental electrical power distribution. The temperature profile along the furnace length in each case is compared in figure 4.

Electrical input increases glass temperature in the melting tank. With an increase in the total electrical power, glass convection currents are enhanced and the temperature of the glass melt, flowing from the doghouse area towards the throat increases. Generally, the refining zone temperature increases as hotter glass from the hot spot flows into the refining zone. Consequently, it is expected to see higher riser temperature with increased total electrical power. It is also obvious that a bubbling system improves the overall heat distribution.
transfer in the glass tank by bringing the relatively colder glass melt from the bottom to the surface of the melt.

The main temperature difference obtained by the use of different amounts of electrical boosting is noticeable at the hot spot region. In all cases with electrical boosting, the temperature profile stays similar in the refining zone. At this point, increasing the energy input in the hot spot does not contribute as much difference as expected in the glass temperatures. Figure 6 shows bottom glass temperatures along the furnace for all cases. While bottom glass temperature difference between case one and case five is 23°C under the batch blanket, the temperature difference is about 13°C in the refining zone, as seen in figure 5.

In figure 6, the temperature difference along the glass depth at the batch side for each case is examined in more detail. The calculated temperature difference allows for an increase in specific pull rate of 2.0 tons/m²/day. It is seen that hot spot boosting does not have a contribution on glass surface temperature on the batch side. However, switching on zone three enforces upper convection currents, which flow under the batch blanket and a noticeable temperature escalation is recorded in this region of the glass melt. Convection currents flow downward along the back wall of the furnace under the first circulation loop and these convective currents increase bottom glass temperatures.

Foam on the surface of glass melt generated in E-glass reduce energy efficiency and can lead to poor glass quality. Therefore, it is highly important to obtain a desirable temperature profile in the refining zone. It is justified that electrical boosting improves the glass flow pattern, so refining time to remove possible bubbles or seeds, which would affect the properties of the final product. Therefore, the glass should pass through certain temperature areas in the refining zone.

**Effect of bubblers**

Convection of the glass in the furnace is affected by implementing bubblers, which are important for a well-defined hotspot and heat distribution. As a result of bubbling, colder glass rises to glass surface and heat transfer from the combustion space to the glass bath increases. Placing electrodes in the vicinity of the hot spot, this advantage could be influenced adversely. The bubbling system in this study comprised two rows of bubblers, reasonably closely spaced, arranged across the width of the furnace.

Figure 7 justifies that bubbling systems are significant to regulate glass flow pattern. As seen, the bubbling system establishes a thermal barrier and promotes two main glass convection loops. The benefits of a bubbling system are not only decreased fuel consumption but also a notable increase in quality promoted by the improved homogeneity. Besides, when
the bubbler is switched on in the case of applying 1700kW of electrical power, the average temperature of the furnace increases by ~35°C. This shows that the mixing action of bubblers is very effective and an economical way to increase average glass temperatures in the furnace.

In figure 8, the effect of a bubbler installed across the furnace at a hot spot on bottom temperature is shown. Bubbling through the glass significantly improves heat exchange, both between the glass melt and the flame and also inside the glass itself, as explained above. Therefore, it is expected to see higher bottom temperatures when the bubbler system is introduced. Besides, the homogenising action of bubblers can significantly speed up colour or composition changes.

Figure 9 examines three cases that are equipped with only bubblers, only electrical boosting and a combination of bubblers and electrical boosting. In the melting and refining sections, temperature profiles across the glass depth are compared and it is seen that bubbling is much more effective on temperature distribution in the glass bath.

**Conclusion**
The furnace in this study is an oxygen-fired unit melter, equipped with nine flat flame burners. This study aims to increase the pull rate of the oxy fuel fibre glass furnace by 28% by supplementary heating. Within the context of this study, the amount of electrical energy transferred by electrodes into the glass melt is determined based on targeted furnace pull rate and market prices of oxygen and electricity. A multi zone boosting system is placed in the furnace and a bubbler system is located along 70% of the furnace length as double rows. A series of cases are investigated by the Sisecam mathematical model with different amounts of electrical boosting for a specific oxy fuel fibre glass furnace.

The boosting system enhances convection currents formed by the temperature distribution, obtained with the heat transfer from combustion space. So average furnace temperature increases, maintaining the glass flow pattern. Electrical power has a minor impact on convection currents, since these currents are regulated by the bubbler system. However, the boosting system is still essential to regulate furnace temperature distribution.

**References**
Accurate energy demand measurement of industrial glass batches

One of the major challenges for the glass industry is to develop routes in view of the transition to CO₂ neutral glass melting. Although laboratory experimental facilities have proved to be a powerful tool to find more efficient ways of glass melting resulting in lower energy consumption and reduced CO₂ footprint, one essential measurement set-up was still lacking. Therefore, CelSian has developed and built an experimental set-up that enables users to measure the overall energy demand needed to convert industrial sized batch to a glass melt. Mathi Rongen reports.

In a glass melting furnace, the mixture of raw materials (batch) is fed on top of the glass melt and pushed into the furnace. There, the batch is spread out and forms a batch blanket with an initial thickness of approximately 10cm-20cm. The batch floats on top of the glass melt and is heated in a conventional gas-fired furnace from two sides (underneath the batch by the glass melt and from the top by the combustion space) and for an electrical melting furnace, from one side only (from below by the molten glass).

Local reactions between batch materials will start after reaching a reaction onset temperature. This ‘batch melting onset’ temperature depends mostly on the batch composition. The use of a High Temperature Melting Observation System (HTMOS) in combination with Evolved Gas Analysis (EGA) enables a reliable determination of this ‘batch melting onset’ temperature(1). An example for a soda-lime-silicate batch is shown in figure 1.

Recently, an upgrade of the HTMOS equipment has been realised, which shows the glass-batch interface under cold top configuration (electrical melting concepts); see figure 2.

Energy is required to melt the raw material batch. The quantity of energy required is a sum of the energy needed for: (a) bringing the raw materials up to the reaction temperature; (b) endothermic fusion reactions; and (c) further heating up of the melt and gases to the melting tank exit (forehearth/waist/bushing). For a glass melting furnace (float/container/fibre), the total energy required for batch melting is between 25% and 50% of the total required energy.

The coverage of the batch blanket in an industrial glass melting tank depends on the total melting energy to convert batch-to-glass, the melting kinetics (reaction speeds of raw materials), the heat transfer within the batch blanket and the flows underneath and above the batch blanket. Besides the fact that the batch position is partly determined by the glass melt flow underneath it, the flow pattern in a glass furnace depends strongly on the location and coverage of the batch blanket. As this flow pattern is related to glass quality (bubbles/seeds, stones, homogeneity) and energy consumption, a detailed knowledge of batch melting and thermal behaviour in the blanket is essential for proper simulation of the batch blanket.

An accurate determination of the total energy required for batch melting is of key importance to improve the description/modeling of the batch blanket. Although commercial thermal analysis equipment (DTA/DSC) is available on the market, they lack the possibility to measure the energy demand on large volumes of batch material. Thermodynamic models (eg FactSage) are frequently used to determine the energy demand. However, the accuracy of thermodynamic models is only satisfactory in the case that reliable thermodynamic data is available for all raw materials used in the batch.

Experimental set-up
An experimental set-up has been developed and built at CelSian to measure the overall energy demand of industrial glass batches. It is based on the principle of a drop calorimeter.

The energy (J) to heat up batch from

---

Figure 1: Determination of ‘batch melting onset temperature’ by HTMOS equipment. Left: Ternary batch at a temperature of 775°C (prior to batch melting; individual grains visible). Right: Same batch at T = 925°C (just above onset temperature), where first primary melts are visible.

Figure 2: Image of batch-glass melt interface under HTMOS ‘cold top’ configuration.
SORG examines each customer’s unique needs and sells solutions, not off the shelf hardware. We listen to what each individual customer wants to achieve in terms of lowering ongoing costs and extending the life of their furnace. Every customer has a different existing asset base, energy costs, raw materials, emission regulations and quality requirements to consider. Lowering total cost of ownership and developing solutions that maximize customer value is the key to your success.
room temperature to glass melt temperature can be derived from the experimental procedure. Validation measurements have been performed on a ternary glass (SiO₂-Na₂O-CaO) and float glass and results are compared with data calculated by thermodynamic models (FactSage).

Features of the set-up are:

- Operational temperature: Typically between 1200°C and 1500°C.
- Sample size: 250g-600g; set-up can handle ‘industrial’ batches; cullet size - powdered up to cullet pieces of ~30mm-40mm.
- Measurement accuracy: 5% absolute.
- Measurement reproducibility: 3%.
- Set-up to be used for measuring the effect on energy demand of batches using alternative raw materials or cullet, for example.

The impact on the total energy demand using batches with calcined material (burnt lime CaO) versus limestone (CaCO₃) for the production of ternary glass with the same final glass composition is shown in Figure 3. As no endothermic reaction enthalpy is required for the decomposition of limestone and there is a lower release of CO₂ gas, the batch using burnt lime (CaO) consumes a significantly lower amount of energy (12% less). Figure 3 also shows the impact of using cullet. Depending on the request of the customer, very fine (powdered) cullet can be measured, as well as large cullet pieces (as used in industrial batches).

Experiments on E-glass batches (reinforcement fibre glass) showed that considerable energy savings were measured by modifications in the batch (leading to the same final glass composition). By exchanging raw materials (e.g. kaolin/anorthosite), differences in energy consumption of approximately 10% were measured. By using burnt lime, an energy reduction of up to 20% was achieved.

Figure 4 shows the actual energy demand as a function of time for batch that is inside the heated furnace. The asymptotic value is the equilibrium state from which the total energy demand can be derived. Due to confidentiality issues, only relative numbers are presented in Figure 4. In practice, data will be provided to customers in (kJ/kg glass).

Summary

Laboratory experiments are of vital importance on the route to reduced energy and CO₂ footprint in glassmaking. An experimental set-up has been developed that enables users to measure accurately the total energy required to heat up raw material batch and convert it into a glass melt. The set-up is capable of handling batches with weights of between 250g and 600g. The set-up is able to measure the impact on energy consumption by using calcined raw materials, anhydrous materials, slags, cullet and alternative raw materials, for example.

In CFD modeling of glass furnaces (e.g CelSian’s GTM-X), the description of the batch blanket (batch thickness, length, location of batch) plays a dominant role in the flow pattern that will occur in the melting tank. One of the important input parameters for the batch model simulation is the total energy demand for batch. In the case of new batch formulations or use of alternative raw materials, it is recommended to perform energy demand experiments to derive accurate input values for the modeling.

Outlook

Besides the total energy demand, melting kinetics plays an important role in the batch melting process. In the set-up described in this presentation, the time-dependent energy demand is measured. Preliminary results show that significant differences in ‘energy-time-responses’ were measured while applying different raw materials and/or grain sizes. It will be investigated how these responses can be correlated with melting kinetics of batches.

References:


Note: The experimental ‘Energy demand set-up’ as described in this paper is developed and built by financial support of GlassTrend project GT32 ‘Batch heating and melting in cold top furnaces (www.glasstrend.nl). Industrial sponsors of this project have the advantage (insight to detailed layout of set up) and first rights for the characterisation of their glass batches.

About the author: Mathi Rongen is a Glass Technology Consultant at CelSian Glass & Solar

Further information:
CelSian Glass & Solar, Eindhoven, the Netherlands
tel: +31 40 2490118
e-mail: mathi.rongen@celsian.nl
web: www.celsian.nl
CONTINUALLY DESIGNING, BUILDING AND MODERNISING

TOTAL FURNACE CAPABILITY

BEWARE OF IMITATION

KTC HOLDER TECHNOLOGY

www.teco.com
The benefits of andalusite derived mullite refractory materials

As Paul Hutchinson explains, high fired mullite has been used in regenerators with great success for many years, the materials available having slowly evolved to give an optimum technical and cost value solution.

The development of reactively formed mullite materials, based on andalusite, has helped drive through the conversion of many glass furnace regenerators from traditional refractory materials such as silica, magnesite and mag-chrome to mullite. Mag-chrome is now, from an environmental viewpoint, difficult to justify. Current legislation requires expensive disposal of the used mag-chrome refractory as hazardous waste. MgO. Cr₂O₃ (Cr³⁺) reacts with sodium hydroxide vapour in the regenerator to form carcinogenic hexavalent chromium Na₂CrO₄ (Cr⁶⁺). Silica is still used but does not have the longevity of mullite and magnesite is not as stable.

Critical to manufacturing andalusite or mullite-based refractories for long campaign life is to use pure and tightly controlled raw materials and to fire to optimum temperature to ensure that maximum crystalline conversion is achieved. In addition to the mullite phase content, the method of manufacture can also significantly affect refractory performance.

There are two routes to manufacture mullite products. The traditional method utilises pre-formed mullite grains with mullite fines formed on firing. DSF’s original high temperature rated mullite products were based on pre-formed fused or sintered mullite grain. The second method, focused on here, combines andalusite raw materials with alumina to form mullite reactively during the manufacturer’s firing process. Reactively formed mullite bricks have shown better performance in the hotter parts of the regenerator and are typically less expensive than pre-formed mullite grades.

Andalusite mineral
Andalusite, with a chemical formula Al₂O₃. SiO₂, is a crystalline mineral belonging to the sillimanite family, which has the characteristic of developing a high level of mullitisation at low temperature (from 1300°C):

\[
3(\text{Al}_2\text{O}_3 \cdot \text{SiO}_2) \rightarrow 3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 + \text{SiO}_2
\]

Andalusite  Mullite

Andalusite has the following important characteristics:
- Converts to mullite at low temperatures.
- Low thermal expansion (very stable).
- Native crystalline structure.

The conversion to mullite occurs during the firing of the refractory bricks or shapes, creating a rigid skeleton in the hot state. This can impart exceptional characteristics to the refractory products at high temperatures, up to 1700°C in some cases. The low thermal expansion at the time of conversion to mullite results in a minimal volume increase, which compensates for the shrinkage of the refractory bond.

When the andalusite is heated, it disassociates to form mullite with excess silica; the expelled silica then combines with alumina to form further mullite. This process creates a composite structure, made up of a capillary network of mullite crystals forming interconnected microtubes filled by a silica rich glass. It is this structure that gives andalusite derived mullite bricks superior characteristics to pre-formed mullite bricks, as the mullite intergranular bonding provides excellent thermo-mechanical properties, while the glass trapped within the mullite is released from the structure by alkali interaction, forming a protective barrier or sealing layer on the surface of the refractory preventing further reaction.

Advantages of andalusite-based mullite refractory
Andalusite used in high alumina refractory products for the glass industry imparts many beneficial properties:
- Volume stability.
The evolution of refractories

20 million and 127 years in the making
glassglobal / the global glass competence

**glassglobal Community**

www.glassglobal.com is the leading portal for the international glass industry. Over 360,000 visitors/month use the portal as expert marketing channel, browse the portal to get updated information, execute researches or successfully trade equipment or glass.

**glassglobal Consulting**

Our team of glass production and market experts prepares general and customized glass market studies and marketing concepts, conducts price and competitor analyses, SWOT analyses and evaluation of investments, and develops sales strategies and bankable business plans e.g. for greenfield glass production plants.

**glassglobal Plants**

Access to data from glass producers worldwide – display factories by furnace details, capacities, glass types, year of construction, IS-machines, etc. Glass market and product statistics.

**glassglobal Trading**

The Trading platform is an international business area for all companies active in purchase and sale, covering all technologies. The key segments are dedicated to glass production and processing equipment and float resp. container glass trade.

**glassglobal IT-Services**

Professional realization of all elements in websites from presentations to calculations, from design to CRM. Our glass expert team supports industry-related design, keyword programming, search engine optimization and target oriented customer approach.
• Resistance to creep.
• Thermal shock resistance.
• Corrosion resistance.
• Hot load resistance.

Mullite materials have several advantages over traditional refractory materials including stability (low expansion and high resistance to creep), lower thermal conductivity and resistance to chemical attack. The low linear thermal expansion of high fired mullite has advantages on heat up, cool down and in operational furnace efficiency. Mullite brick is easier to reheat for a second campaign and there is less chance of open joints after heat up. Mullites formed reactively during the manufacturing process have proved better against carryover than traditional pre-formed mullites in the case studies observed.

Once fired, the portfolio of products that make up DSF’s regenerator offering range between 80% to 97% crystalline mullite. The different locations in the regenerator experience very different chemical and thermo-mechanical conditions. There is no single grade of refractory that is suitable for use in all applications. Careful zoning ensures that the optimum grade of material is used in each region of the regenerator.

Typically, this means lower alumina materials in the lower zones with more glassy phase to form protective boundary layers and higher alumina, more crystalline materials in the upper walls and crown to ensure the necessary resistance to creep and stability at higher temperatures. The technical benefits of mullite have been underpinned by the commercial case in more recent years. Traditionally magnesia refractories were less expensive than high fired mullites but now, this is often not the case, especially with the development of reactively formed mullite materials based on andalusite.

About the author:
Paul Hutchinson is Sales & Marketing Director at DSF Refractories & Minerals

Further information:
DSF Refractories & Minerals Ltd,
Friden, Newhaven, Nr Buxton, UK
tel: +44 1629 636271
e-mail: info@dsf.co.uk
web: www.dsf.co.uk

---

Praxair’s OPTIFIRE™ Wide Flame Burner, Gen III
Optimized for Oxy-fuel Glass Furnaces

Praxair’s newest generation wide flame burner features a staged combustion process that provides high flame luminosity and low momentum, allowing optimum heat transfer during the melting process.

Key Features:

• Highly luminous wide flame enhances heat transfer to glass melt
• Low momentum flame reduces particulate emissions & crown corrosion
• Wide flame pattern results in fewer burners required per unit area of melter
• “Quick-release” feature for easy installation & removal of internal burner components
• Effective at foam mitigation

Learn more at www.praxair.com/glass

© Copyright 2019, Praxair Technology, Inc. All Rights Reserved. Praxair, the Flowing Airstream design, Making our planet more productive and OPTIFIRE are trademarks or registered trademarks of Praxair Technology, Inc. in the United States and/or other countries.
Flexible forehearth system trends

Johannes Kappe discusses experiences with the GCS301 forehearth system from HORN Glass Industries in the glass container industry.

As the international glass container industry attempts to remain competitive with PET by producing lightweight beverage bottles, the production of such bottles requires a fully understood NNPB forming process at high machine speeds. In order to obtain uniform wall thickness when the container is formed, the viscosity of the liquid gob has to be as homogenous as possible. This target is only attained by minimal temperature variations of the glass gob. At the end of the forehearth, before the glass enters the spout bowl, thermal homogeneity is measured and calculated by various – customer specific – formulae. The so-called ‘K-Factor’ is required to be beyond 95% over the entire production profile and different glass colours.

A second trend – caused by just-in-time production, of course in turn caused by the aim to save storage costs – shows that plants which are re-built or are greenfield projects, have enhanced requirements on forehearth performance regarding pull ranges. So the trend shows that nominal minimum and maximum loads spread. This is accompanied by a wider field in gob temperatures.

The recently designed GCS301 forehearth family is the answer from HORN Glass Industries to increase demand regarding forehearth flexibility and performance. Channel widths from 36in up to 54in are available.

Superstructure design

Going back to basics, the GCS301 forehearth works with concave-shaped cover blocks. There is a separation between the centre part and the outer part of the forehearth. The volume above the colder glass at the boundary area of the channel block is concaved and also the inner part to guide direct cooling air only via the centre.

The working principle is complete with lateral aligned chimneys and a central radiation opening. With these lateral and central openings, the waste gas patterns can be distributed over the entire glass surface or guided only to the required areas (centre or border) in each single section of the forehearth, except the equalising zone which is flat roofed.

Heating

The colder glass in the outer sections of the forehearth channel requires energy input in order to balance the temperature difference between the outside and inside. For this purpose, the forehearth is equipped with the above-mentioned cover blocks, to separate the left and right outer portion physically and to heat selectively.

The central section of this cover block is deeper and thus closer to the glass surface than the outer section. This results in a slope of the cover block from the outside to the inside. Regular pencil burners fire along the entire forehearth length.

Heat transfer from the flame gases is affected by both convection and radiation. From the sloped cover block part, the radiation of the flame gases is reflected towards the outer sections at the glass surface. And at the slope of the superstructure, the waste gases move in geared turbulences. So the heat is transmitted by convection from the flue gases to the glass surface in the colder outer section at an increased rate.

Cooling

The GCS system works with different cooling systems in order to cool down the hotter glass in the forehearth centre. For this purpose, indirect and direct superstructure cooling is employed by means of cooling air. At forehearths with frequent job changes and quick temperature adaptation, the indirect and direct air cooling will be installed in the superstructure. The system allows direct cooling air via the centre part or to spread over the entire surface by chimney adjustment, in the same way waste gases can be guided.

The aforementioned cooling systems are used in function of forehearth tonnage, inlet temperature and required gob temperature in various sizes and numbers. So each forehearth concept is adapted exactly to the specific requirements of the glass producer.

References

HORN Glass Industries has installed over 120 type GCS301 forehearth units for customers throughout the world. All have indicated satisfaction regarding control and function of the systems and also pointed out the reduced energy consumption of about 25%-30% compared to the previous HORN systems. Moreover, a thermal homogeneity index beyond 96% has been realised in several plants. This shows that the GCS301 forehearth is the ideal solution to comply with the industry’s high for flexibility and performance.

About the author:
Johannes Kappe is responsible for forehearth technology/glass conditioning at HORN Glass Industries.

Further information:
HORN Glass Industries AG, Plössberg, Germany
tel: +49 9636 9204 312
email: johannes.kappe@hornglas.de
web: www.hornglass.com
ARE YOU READY FOR THE WINTER COOLING?

WE ARE. SUPPLIER OF PROCESS AIR TECHNOLOGY TO THE GLASS INDUSTRY.
Operating parameters that affect furnace energy performance

Ernesto Cattaneo et al present an analysis of the operating parameters that affect the energy performance of a regenerative glass furnace.

In the process of designing a glass furnace, the designer has few but powerful operative leverages. However there are many, unchangeable additional boundaries set by production needs that deeply affect furnace energy performance.

In this article, the technicians of Stara Glass and its innovative scientific start-up SGRPRO list most of the significant parameters affecting a glass furnace heat balance and describe their impact on furnace consumption. The analysis have been made possible by the utilisation of FurnaceMaster (FM) and Regenerators and Budget (RNB), the software Stara Glass has developed in-house for regenerative furnace design. Different versions of the software can be used to deliver correct sizing of recuperative and oxygen furnaces. However, it has been decided to relate this analysis to state-of-the-art technology, which today is represented by end-fired regenerative furnaces.

Parameters analysed

The input and output parameters analysed are given in tables 1 and 2 respectively. All parameters will be individually varied in the analysis. Their impact on consumption will be evaluated.

The specific useful heat is a parameter that Stara Glass has implemented for identifying the expected glass quality (the lower, the better). This parameter is meant for refining the concept of specific pull (ton/m²/day) and specific pull ‘from gas’. It represents the heat which combustion yields to glass per square metre, deducted by the quantity lost in waste gas and by furnace superstructure heat loss. This parameter is more representative than the specific pull because it considers the real energy need for glass production in a way that is not affected by cullet and boosting utilisation. Therefore, it makes possible comparing furnaces with very different production conditions.

Table 1: Input parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Driver</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pull (tonnes/day)</td>
<td>Set by the glassmaker, based on production needs</td>
<td>The more it is stable, the more efficient the furnace will be</td>
</tr>
<tr>
<td>Melting area [m²]</td>
<td>Defined based on pull, available space and the possibility of utilising electrical energy than “What area do we need for this pull?” - it has been kept constant in this analysis</td>
<td>For a furnace designer, it is more frequent to be asked “What can we do with this area?” instead</td>
</tr>
<tr>
<td>O2 excess at the port [%]</td>
<td>Environment, materials and quality</td>
<td>This parameter is useful for balancing undesired production of CO and NOx</td>
</tr>
<tr>
<td>Boosting [kW]</td>
<td>Investment</td>
<td>Always useful for quality and capacity but increases production costs</td>
</tr>
<tr>
<td>Glass temperature at the throat [°C]</td>
<td>Production and colour</td>
<td>Remarkable impact on consumption</td>
</tr>
<tr>
<td>Mix humidity [%]</td>
<td>Production, geographical position, storage method</td>
<td>Remarkable impact on consumption</td>
</tr>
<tr>
<td>Preheated air temperature [°C]</td>
<td>Available for use/design</td>
<td>The higher, the better</td>
</tr>
<tr>
<td>Thermal loss [kW]</td>
<td>Design/glassmaker boundaries</td>
<td>The lower, the better but not in every part of the furnace</td>
</tr>
<tr>
<td>Mass composition</td>
<td>Production/primates local availability</td>
<td>Primary importance - it has been kept constant in this analysis</td>
</tr>
<tr>
<td>Fuel/heating value [J/Nm³-kg]</td>
<td>Geographical/strategic</td>
<td>The higher, the better but not in every part of the furnace</td>
</tr>
</tbody>
</table>

Table 2: Output parameters.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption [Sm³-kg/h]</td>
<td>Increases with the pull</td>
</tr>
<tr>
<td>Specific consumption [kcal/kg]</td>
<td>Decreases when the pull increases and with the usage of electrical power</td>
</tr>
<tr>
<td>Production cost [€]</td>
<td>Increases with the pull and with the utilisation of electrical boosting</td>
</tr>
<tr>
<td>Specific useful heat [Mcal/m²]</td>
<td>Decreases with a larger utilisation of electrical boosting</td>
</tr>
</tbody>
</table>

Figure 1: Reference case.
Energy cost

The following values have been considered:
- Fuel cost [€/Sm³] – 0.25
- Electric energy cost [€/kWh] – 0.11

Reference case

The reference case presented in figure 1 identifies a production of 260 tonnes/day of green glass for containers, utilising proper insulation (1.563 Gcal/h) and proper heat recovery (1270°C air temperature), which represent most of the performance leverages in the hands of the designer. Do not refer to the higher temperatures displayed on furnace control panels. These thermocouples are not shielded from furnace material radiation. The displayed heat balance comes from the FurnaceMaster software but as explained, it is numerically identical to an ideal heat balance detected on such an operating furnace.

Pull

The curves and tables shown in figure 2 have been obtained by changing the pull while keeping the electrical boosting constant. The nominal point is assumed as maximum pull and for the purpose of this article, electrical energy utilisation was not changed. Such a parameter would have been changed in common furnace operational practice.

In addition, air temperature has been kept constant in order to contain the simulation time. The FM software feature was used, allowing thermal loss to be matched to the furnace combustion energy intensity.

As is widely known, the more pull increases, the
more consumption increases. In such conditions, however, specific consumption reduces together with quality expectations, which is connected to the minimum residence time rather than to the average that is steadily defined by pull and furnace geometry.

**Oxygen level**

The higher the oxygen excess at the port, the higher the consumption will be. The theoretical curve shown in figure 3 does not take into account the following:

---

**Figure 4: Furnace management cost.**

**Figure 5: Glass temperature.**

**Figure 6: Cullet.**
At very low O₂ levels, combustion is incomplete and a certain quantity of CO is formed.

Different levels of O₂ correspond to different waste gas and air volumes. The higher the volumes in the chambers, the higher will be the heat efficiency but the lower the temperature efficiency of the chambers.

Nowadays, this parameter is more under the spotlight for its connection with NOₓ and CO production rather than for its energy implications.

---

### Table: Mix humidity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>280</td>
<td>700</td>
<td>60</td>
<td>779</td>
<td>906</td>
<td>65.5</td>
<td>23</td>
<td>5.3</td>
<td>2771</td>
<td>29.2</td>
<td>80.0</td>
</tr>
<tr>
<td>1</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>798</td>
<td>900</td>
<td>66.4</td>
<td>23</td>
<td>5.3</td>
<td>2824</td>
<td>29.6</td>
<td>82.0</td>
</tr>
<tr>
<td>2</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>816</td>
<td>1007</td>
<td>67.3</td>
<td>23</td>
<td>5.3</td>
<td>2883</td>
<td>30.4</td>
<td>84.3</td>
</tr>
<tr>
<td>3</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>836</td>
<td>1034</td>
<td>68.2</td>
<td>23</td>
<td>5.3</td>
<td>2942</td>
<td>31.0</td>
<td>86.6</td>
</tr>
<tr>
<td>4</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>855</td>
<td>1091</td>
<td>69.2</td>
<td>23</td>
<td>5.3</td>
<td>3001</td>
<td>31.6</td>
<td>88.9</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>879</td>
<td>1088</td>
<td>70.1</td>
<td>23</td>
<td>5.3</td>
<td>3060</td>
<td>32.2</td>
<td>91.0</td>
</tr>
<tr>
<td>6</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>900</td>
<td>1115</td>
<td>71.0</td>
<td>23</td>
<td>5.3</td>
<td>3118</td>
<td>32.9</td>
<td>93.3</td>
</tr>
<tr>
<td>7</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>920</td>
<td>1142</td>
<td>72.0</td>
<td>23</td>
<td>5.3</td>
<td>3177</td>
<td>33.5</td>
<td>95.5</td>
</tr>
<tr>
<td>8</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>940</td>
<td>1189</td>
<td>72.9</td>
<td>23</td>
<td>6.3</td>
<td>3226</td>
<td>34.1</td>
<td>97.6</td>
</tr>
<tr>
<td>9</td>
<td>260</td>
<td>700</td>
<td>60</td>
<td>961</td>
<td>1196</td>
<td>73.8</td>
<td>23</td>
<td>6.3</td>
<td>3265</td>
<td>34.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>

---

**Figure 7: Mix humidity.**
Boosting
The heat coming from the boosting is directly transferred to the glass heating it up with a better efficiency. Therefore, increasing the boosting corresponds to decreasing the specific consumption and the fuel flow. Yet, electrical energy is by far more expensive than the gas utilisation (figure 4).

Some barrier boosting is always helpful for the proper creation of two opposite convective cells in the glass batch. However, an excess of boosting utilisation might jeopardise the correct thermal profile of the superstructure and production itself.

It is to be noted that analysis of the specific useful heat values points out that, in this furnace, a too low boosting utilisation might prevent the achievement of good quality levels.

Glass temperature
Obviously, increasing glass temperature means consumption increase (figure 5). This parameter is strongly dependent on the type of production and glass colour. It is not adjustable in order to reduce consumption.

Cullet
Glass cullet utilisation significantly reduces furnace consumption because the percentage of glass mix represented by cullet does not need the heat that turns into primal matters in glass (figure 8). Yet, external cullet utilisation is not possible for high quality or extra-white glass.

Mix humidity
This underestimated parameter (figure 7) has a severe impact on furnace consumption, because batch mix water absorbs heat in order to become steam and to reach the waste gas temperature. In fact, a covered storage area for the raw materials to be used can represent a very useful investment. On the other hand, a too low mix humidity commonly fosters carryover problems.

Thermal loss
Good thermal insulation is fundamental for a good energy performance (figure 8), yet it is important to know which parts of the furnace can be well insulated and which ones would be induced to collapse by an excess of insulation.

Conclusions
Glass furnaces are complex systems, whose production achievements, in terms of energy, environment performance and glass quality depend on a high number of parameters, including furnace ageing. It is important to analyse production in order to obtain the target quality by fine tuning the most convenient parameters according to the regulation options of the operators.

It is also important to keep all parameter trends under control and evaluate furnace performance by detecting its heat balance with fixed frequency. This systematic detection method will prevent the occurrence of possible deviations.

About the authors:
Ernesto Cattaneo and Giorgio Minestrini are Stara Glass R&D Department personnel, while Alessandro Mola and Allessandro Spoladore work for SGRPRO

Further information:
Stara Glass SpA / Sefpro srl, Genoa, Italy
tel: +39 010 57 6291
e-mail: ernesto.cattaneo@hydragroup.it
web: www.staraglass.com
NO FUTURE WITHOUT A PAST
SINCE 1946

GLASS MACHINERY
ANNEALING LEHRS, DECORATING LEHRS, TEMPERING LEHRS,
LEHRS FOR GLASS BLOCKS, LEHRS FOR HV INSULATORS, MOULD PRE-HEATING KILNS,
COLD END SPRAY SYSTEMS, UPGRAADING AND OVERHAULING.

ANTONINI
Florence - ITALY

www.antoninisrl.com
Corrosion of fused cast refractories in soda-lime melters

Kevin R Selkregg discusses the corrosion of fused cast refractories in industrial soda-lime glass melters.

The environment of an industrial glass melter during operation is harsh and complex. The simple objective for the glass manufacturer is to safely contain the process of adding the raw material batch to an existing glass melt within a specific volume (ie industrial furnace).

The manufacturer must produce quality glass at high temperatures (~1500ºC), with little variation in its required chemistry. The refractory lining necessary to contain this process has evolved over the last century from bonded fireclay, to bonded alumina-silica (sillimanite/mullite), and to the current alumina/zirconia/silica (AZS) fused cast refractory lining. This transition in refractory type created a service life evolution in the melter lasting from months to several years in duration. Furthermore, operating temperatures and pull rates could be increased with the fused cast AZS lining leading to higher quality glass. To understand the corrosive environment in an industrial glass melter, consideration has to be given not only to corrosion as a result of molten glass contact but also, due to the atmosphere above the molten glass (figure 1). Both regions have their own respective convection currents, which corrode the refractory lining.

The atmospheric velocities above the molten glass create specific corrosive behaviours. These are evidenced by raw batch ‘blown’ onto the superstructure walls and penetrating vapour species. At glass contact, corrosion leads to the formation of a passivation layer to be discussed later.

Bonded refractory versus fused cast refractory

The bonded refractory linings in industrial glass melters of the early 1900s served their purpose in providing the best refractory lining available with existing refractory technology. After the Second World War, the usual fireclay and bonded sillimanite/mullite bonded refractory lining were replaced by the fusion cast lining, which initially was alumina and later alumina/zirconia/silica (AZS) became the material of choice for several reasons.

The first reason is simply that fused cast refractories have greater density and less porosity than the bonded refractories. Figure 2 is a simple schematic of the bonded refractory microstructure, showing the major primary grog (filler) grain with the secondary bond phase. This bond is formed during high temperature heat treatment of the refractory in production. The porosity can range from 10% to 20%, which is a detriment to bonded refractories as this is the region of penetration for molten glass and vapours, thus accelerating the corrosion of the body.

Fusion cast refractories typically have low porosity in the 1% range. This will significantly reduce molten glass penetration, keeping the corrosion behaviours at the glass/refractory interface.

Secondly, the major phases present, namely corundum and zirconia, (as in AZS) are high melting point phases that provide corrosion resistance in and of themselves. The advantage of fused cast AZS over conventional bonded refractories is a combination of its density, low porosity and zirconia content.

The manufacture of bonded refractory shapes begins with a designed mix of primary grains and/or grog (fragments containing more than one phase), which contributes to most of the refractory properties. The secondary bond phase formed upon firing will contribute to some properties by their refractoriness and reduction of porosity. In contrast, the final phase distribution in fused cast refractories is dictated by the phase equilibria dynamics of the oxide mix ratios.

The method of manufacture of fusion cast refractories is an old technology, dating back to the early 1900s, initially involving fused high alumina. The fusion cast process first begins with the blending of the oxide material with a percentage of recycled...
internal production scrap to calculated mix proportions. This batch is fused into a melt in the electric arc furnace by energy released in arc-resistant paths.

After melting and homogenisation, the melt is poured into graphite or sand moulds of a predetermined shape to solidify as it loses heat (figure 3). During the heat loss period, crystals precipitate out as the melt cools through the melting point of the solid phases, based on the system phase equilibria. Next, the shape is cooled in a controlled fashion under a bed of insulating ore for a period of 10-14 days. At the end of this period, the block is removed from the insulating ore bed, cleaned and inspected. Finally, the block is sawed, ground and machined to its final tolerances, before delivery to the customer.

Fused cast AZS
The refractory of choice for decades in the industrial glass furnaces involving soda-lime glass chemistry has been fused cast AZS (alumina-zirconia-silica). This is a refractory consisting of isolated zirconia crystals, a co-precipitate phase of corundum with embedded zirconia crystals and a glass that takes up nearly 30% of the body by volume (figure 4). The glass serves to cushion the volume change due to the zirconia crystal structure changes with temperatures during manufacture.

This glass is a high alumina phase, containing approximately 23% Al₂O₃, which is a high viscosity liquid in its molten state. However, it is a conduit for migrating alkali and alkaline earth species into the refractory lining during service. The interaction of this structure in contact with soda-lime glass in the melter involves the diffusion of alkalis and alkaline earth oxides through the AZS ‘glass’ phase (then a highly viscous phase at furnace temperatures) leading to dissolution of the primary corundum phase into the microstructural ‘glass’. This ‘glass’ will expand within its primary existing spacial volume as it absorbs dissolved alumina.

As the ‘glass’ expands in this fixed volume region, it will be under pressure to migrate to the external region by pushing a viscous ‘glass’ to the surface. In addition, the surface undergoes a reaction with the soda-lime tank glass at the glass/refractory interface, creating a zone called the passivation layer (figure 5), which inhibits (‘passivates’) the rate of corrosion at the glass/refractory interface. This layer contains undissolved primary zirconia grains within a high alumina viscous glass, both acting to reduce the rate of corrosion at the interface region.

The AZS superstructure sidewall above the tank glass exhibits glass pushed to the surface from the corrosion of the AZS internal structure. In addition, dusting on the furnace exposed surface will contain material from the batch due to atmospheric velocities dispersing particles containing various oxides not found in vapour forms (such as MgO, CaO and SiO₂). Two major vapour species will be potassium and sodium hydroxides, which will also migrate through the AZS glass phase, promoting the dissolution of the primary corundum grains.

Corrosion of AZS refractories in an industrial soda-lime glass furnace is expected and unavoidable. Good AZS refractory corrosion resistance will be dependent on the quality of the AZS lining, good furnace operating procedures and the engineering involved in the installation of a new furnace.

---

**About the author:**
Kevin R Selkregg was Manager of the Analytical and Testing Laboratory at Monofrax until his retirement

**Further information:**
Monofrax LLC, Falconer, New York, USA
tel: +1 716 969 3763
gmail: kevin.selkregg@monofrax.com
web: www.monofrax.com

---

Electroglass Ltd, Benfleet, England
www.electroglass.co.uk
Drilling into melting furnaces during production is always associated with risk, with extreme caution advised to avoid glass leakages. The professional and reliable actions of technicians are an absolute necessity.

The first requirement for successful work is high quality and reliable drilling equipment. Indispensable here are cooling lances, cooling plugs and suitable safety equipment. In order to meet this requirement, Bock Energietechnik has developed equipment with a hydraulic drilling drive. This allows technicians to work safely under extreme conditions.

Because of the noise pollution inherent in the use of compressed air machines and problems associated with electric drills, Bock decided on a hydraulic drilling drive solution. This drive offers many technical benefits.

The main advantages of this specially developed drilling equipment are:

- Exact speed definition.
- Torque stability.
- Longer drill bit service life.

In addition, this drill drive allows a stable drill rod and easy change of drill bits. Various drill bits with diameters from 10mm to 250mm can be used, with optimal speed and torque values. Furthermore, this equipment allows flexible use when space is very tight or cramped around the furnace. It is irrelevant whether the bore needs to be carried out horizontally or vertically.

Equipment optimisation has been achieved via a series of detailed measures. This includes changes to the feed slide and the cooling intensity of the drill bit.

This improved equipment allows reliable and experienced drilling specialists from Bock Energietechnik to carry out the following tasks safely and reliably:

- Installation or replacement of electrode holders.
- Installation of bubbling pipes.
- Installation of probes.
- Installation of firebox cameras.
- Investigation and drainage drilling.
- Drilling for the glass drain.

About the author:
Günther Bock is CEO and owner of Bock Energietechnik

Further information:
Bock Energietechnik GmbH, Floss, Germany
tel: +49 9603 1295
e-mail: info@bock-energietec.de
web: www.bock-energietec.de
WE SEE LEAKS BEFORE YOU DO.

Up to 3 years before visual or thermal indications.
Is knowing plant asset condition important?

Michael Horsfield identifies the importance of key personnel throughout an organisation, including stakeholders, shareholders and senior management through to operatives, knowing plant assets condition at different stages throughout a campaign life. Also discussed is the methodology for achieving this knowledge.

Throughout the production process, it is all too easy to allow assets to continue working until there is a problem or failure. The common statements ‘if it doesn’t break, don’t fix it’ and ‘if it runs, don’t touch it’ are left to reality in many operations.

Many see this culture as ‘cost saving’ by eliminating the need to know asset condition at scheduled intervals. However, in real terms this is not the case as the cost of rectifying an unexpected and unplanned problem or failure is a much higher and non-budgeted cost in comparison to that of regular asset condition checks.

The need to rectify unexpected and unplanned problems creates a significant wound in an organisation’s production and commercial strategy, ultimately introducing an amount of supply risk within market sectors and segments. This article identifies how asset condition checks throughout the production process and beyond, together with identifying problems and potential problems for which a correct prognosis and treatment is recommended, provides a route towards company asset protection.

Asset condition checks, problem identification, correct prognosis and treatment together assist in developing a realistic and cost-effective maintenance plan and minimise the risk of serious wounds to an organisation’s production and commercial strategy.

Plant assets condition check

The plant asset condition check is carried out in the form of scheduled audits of varying disciplines, over selected time periods throughout the production process, including batch plant, furnace, production, inspection, packing, storage and external parameters.

Scheduled audits include the following:

- Visual inspection.
- Thermography inspection.
- Endoscopy inspection.
- Specific measurement techniques.
- Results from installed condition monitoring equipment.
- Process observation and assessment.
- Checking processes within the external supply chain.

The selection of disciplines and frequency of audits is generally determined by the age of the production process sections and equipment, together with any identified reliability issues. Generally, it is not uncommon to have a varying number of equipment condition and external supply chain checks, not necessarily at the same time, over a 12 months period. For example, the furnace may require to be audited more frequently than other sections of the production process and external supply chain.

From the results of a plant asset condition and external supply chain check exercise, endorsed by the identification of production equipment symptoms, a consultation with a selected team (this team includes members of the organisation and external sources) should be arranged in order to debate plant asset condition and supply chain anomalies.

The goal of the team is to form a realistic view on particular symptoms that may be causing any identified problems and realise the correct treatment to rectify these problems in the form of a realistic maintenance plan.

External supply chain parameters

It is important to extend the health check beyond the production plant to include external supply chain parameters in order to optimise the production process efficiency, assist in obtaining asset protection, provide operation longevity and minimise the risk of poor health of the production process equipment.

Areas considered for the external supply chain parameters check include:

- Glass batch raw materials supply, specification and quality.
- Cullet supply, specification and quality.
- Raw materials and cullet delivery.
- Fuels supply, specification and quality.
- Materials supply, specification and quality.
- Equipment supply, specification and quality.
- Supply companies.
- Installation contractors and labour sources.

Plant assets condition check factors.

Plant assets condition check projection.

Plant assets condition check projection.
The external supply chain parameters check should include:

- Checking of specifications given on data sheets.
- Materials and cullet sampling and cross checking against the relevant data sheet and known standards.
- Materials location audit.
- Supplier audit.
- Delivery type.
- Delivery logistics.
- Equipment inspection and function testing prior to delivery.
- Materials inspection prior to delivery.
- Installation contractors and labour sources audit.

The results of the external supply chain parameters check will ensure that:

- Required optimum standards are met.
- Materials supplied meet specification.
- Standards and design criteria meet requirements.
- Delivery of raw materials achieves minimal risk of contamination.
- Equipment supplied satisfies operational criteria.
- Installation contractors and labour sources are qualified and experienced to carry out their selected task to a high standard.

**Asset condition check information**

Information from each scheduled audit making up the plant asset condition check is documented in the form of a comprehensive report, together with problem identification, actions to be taken and recommendations where necessary.

It is extremely important to identify and understand given conditions of the glass production process, including raw materials, cullet and equipment operation have the ability to identify problems and select the correct course of actions on a scheduled basis, in order to form a realistic proactive maintenance approach.

**‘The facts are in the understanding’**

If the understanding is incorrect, the facts will have been misinterpreted, which will lead to incorrect and inefficient actions being taken, jeopardising functionality, workability, longevity and company assets condition.

A quick and inefficient response to a given condition without the correct facts and understanding may lead to the wrong solutions being implemented. In time, this may lead to the creation of larger magnitude problems and unnecessary cost. This approach introduces increased product failure risk and a significant effect on an organisation’s commercial strategy.

**Asset condition check report**

The report, including information, results and conclusions together with the correct understanding of these provides the basis of actual condition status of assets and the forming of a realistic maintenance plan over the glass production process to assist in sustaining plant reliability, optimisation and ultimately, protection of company assets.

Problems creating risk either present or potentially in the future may be identified, which can be both risk and action categorised, depending on the severity and impact of the issues.

Global Combustion Systems

Here to support you for the future.

- **Burners for all Furnace Types**
  - Gas, Oil & Oxygen
- **Complete Fuel Control Systems**
  - Gas, Oil & Oxygen
- **Furnace Control Systems**
- **Engineered System Solutions**
- **After Sales Support**

**NEW - NOx Reduction by Auxiliary Injection**

- **to below 600mg/m³**

[www.globalcombustion.com](http://www.globalcombustion.com)
E-mail: sales@globalcombustion.com  Tel: +44(0)1506 416160
on their severity and included in the maintenance plan.

This allows for the correct maintenance work to be carried out at the correct time, thereby optimising the workability and longevity of the glass plant assets and overall process.

The ‘team’

The ‘team’ is described as experienced persons in the field of the glass production process, qualified to review the results and conclusions of the plant asset condition check, thereby providing a realistic condition assessment.

The team’s role is to analyse information gained from the plant asset condition check, give a prognosis of asset condition and suggest treatment for maintaining a healthy plant, production process and selected external parameters to the asset owner and their designated workforce.

After a plant asset condition check is completed, it is normal that the asset owner is presented with a report which, in some cases, can be very detailed and specific towards individual topics within selected areas of the production process and external supply chain parameters.

For the report receiver, such detailed and specific information may be difficult to interpret and understand. The prominent question is: “What does the information given in a plant asset condition check report mean and what action requires to be taken?”

If a wrong understanding is formed, then the wrong actions may be implemented, jeopardising assets life, workability and longevity, together with the actual production process and quality of product provided.

A consultation with the team assists the report receiver, the assets owner and designated workforce personnel to understand the meaning of report results, conclusions and recommendations.

Ultimately, this consultation gives a realistic prognosis of assets and external supply chain condition, thereby identifying the correct route to monitor and treat symptoms.

In summary, the team’s role is to analyse the data from the assets condition check, give a realistic prognosis against identified problems both immediate and future, provide the correct treatment to maintain an asset’s healthy life with minimal complications to achieve asset protection.

This discipline is considered to be extremely important to obtain the correct interpretation of assets condition check results, recommendations and conclusions, in order that correct timing of treatment, maintenance actions and decisions against the external supply chain is made, in order not to jeopardise asset life, workability and longevity, together with the overall production process.

If the wrong prognosis is given, the correct treatment for the symptoms will not be provided. Such an error will significantly affect the asset condition and asset protection.

It is important to form a correct and cost-effective maintenance plan to protect company assets, preserve their value, realise a possible extended campaign life and enhance the company’s commercial model, together with optimising productivity and efficiency of the external supply chain. During the period of forming this plan, it is important to identify and understand the categories of maintenance that may be required, including:

- Scheduled - daily or weekly.
- Pro-active - problem areas

identified by the assets condition check.

- Unscheduled - an unexpected failure that may happen.
- Major maintenance - requirement to replace failed equipment, a furnace refractory structure, acceptance of products from the external supply chain.

Added to this list are the following criteria:

- Maintenance work methods.
- Maintenance execution.
- Method statements and risk assessments.
- Who should carry out the maintenance work.
- Time factors and restraints.
- Commercial aspects.

All the above will assist in establishing a correct maintenance plan and realise opportunities towards preventative maintenance.

Plant assets protection

The glass plant process equipment represents a high level of investment for an organisation and should be protected throughout a given campaign life in order to achieve and extend that life. Knowledge of the actual condition of assets at given stages throughout a campaign life and beyond is critical to maximise assets protection and also to protect the organisation’s commercial model.

The plant assets check is considered to be a much required ‘tool’ for the protection of company assets, together with minimising major fluctuation of a company’s commercial model, with minimum interference from the external supply chain.

Conclusion

In order to protect an organisation’s assets throughout a campaign life and beyond, the plant assets condition check carried out at scheduled intervals is an important ‘tool’ to achieve assets protection and minimise risk of major variation to the production and commercial strategy. In addition, the results and conclusions of the check provide the assets owner with needed information to deal with possible change within the organisation and important corporate decisions.

It is extremely important to select members for the ‘team’ that are qualified to give constructive comment from the results and conclusions of the assets condition check.
Scheduled plant assets condition checks throughout the glass production process including the external supply chain:

- Provide important information on the actual condition of the equipment being checked and ultimately company assets.
- Should be carried out on a scheduled basis over a given campaign life and beyond.
- When conducted at scheduled intervals are a ‘tool’ providing a route towards protecting assets and critical investment.
- Minimise the risk of unplanned equipment failure, production unscheduled ‘down-time’ and loss.
- Assist in maximising assets performance and productivity.
- Are a means towards cost-effective maintenance, extending assets life and optimising productivity.
- Allow an organisation to achieve business goals, including maximising profit and providing high value products.
- Allow an organisation to balance budgets more easily and effectively manage overall costs more efficiently.
- Allow correct maintenance to be carried out at the correct time and to the required standards.
- Provide knowledge of the actual condition of the equipment throughout the glass plant process and external parameters criteria to assist with the forming of a realistic maintenance plan.
- Identify equipment that is adaptable to the installation of constant preventative maintenance monitoring.
- Provide the assets owner with assets risk management to realise plant optimisation and longevity.
- Provide the assets owner with much needed information to protect assets.
- Provide important and much needed information to assist the realisation of both present and future company planning.
- Provide policing of the external supply chain.
- Identify the role of the ‘team’ as being extremely important in forming the correct prognosis and advising the correct treatment against identified health conditions at the correct time.

Scheduled plant assets condition checks are important to assist in minimising the risk of unplanned equipment failure and the protection of an organisation’s assets throughout a given campaign life and beyond.

Knowledge of ‘plant assets condition’ is an important factor in an organisation’s operation and commercial planning, managing change and provides the assets owner with assets condition information. Therefore, to answer the title question, ‘knowing plant asset condition is important’.

DISMATEC provides plant asset condition checks and representation within the ‘team’ for consultation, prognosis and recommended treatment for identified health conditions in order to achieve a realistic maintenance plan, realise the protection of company assets and reduce the risk of major fluctuations to a company’s commercial plan.

GLASSWORKS HOUNSELL

We make new, we make spares, we refurbish and we advise. We have a tradition that dates back to our foundation in 1877 and we adhere to core values that have stood the test of time. How well our products work and how long they last drive our commitment to quality, allowing us to remain a leading manufacturer.

Please contact us to find out more and what we can do for you.

Tel: +44 (0)1384 560666 info@glassworkshounsell.co.uk glassworkshounsell.co.uk
Advocating the benefits of bubbling systems

Together with the installation of electrode holders and related services, ULG-GmbH specialises in the supply of bubbling systems, as Antje Birkenfeld explains.

Bubblers represent an important product to improve glass production. They are used to increase convection current and heat transfer from a furnace chamber to the molten glass, in order to raise production and deliver energy saving benefits.

Today, it is immensely important to protect the environment and to save resources. Using bubblers can reduce fuel consumption up to 5% and the furnace temperature can be decreased as well. At the same time, productivity will be increased.

Specialist bubbling tubes
To generate this benefit, compressed air is blown through special bubbling tubes into the furnace. ULG-GmbH uses multi-hole ceramic bubblers that are heat-resistant up to 1750°C operating temperature.

The bubbles take the cold glass from the bottom of the furnace to the top. The temperature gradient inside the glass will be reduced and due to the better homogenised glass, the production process is much easier to control.

ULG standard bubblers have a length of 1500mm and a 15mm diameter. Different sizes, lengths and diameters are also offered according to the customer’s requirements.

Bubbling systems can be installed for all kinds of glass: Container glass, float glass, fibre glass and special glasses. Usually, one or two lines of bubblers are employed.

ULG has developed a special safety fitting that prevents damaging of the ceramic bubbler. Maintenance and service (e.g. pushing) are much easier and installation is much safer via the use of this safety fitting.

System alternatives
Depending on glass type, ULG offers different kinds of bubbling systems. Ceramic tubes can be used for most types of glass, where the advantage is their low price. Corrosion problems can be virtually eliminated by pushing the bubblers regularly, about 30mm. Without this service, corrosion can destroy the AZS tiles on the furnace bottom.

A more expensive option involves the use of platinum bubblers. ULG offers a platinum sleeve that is pushed over the ceramic tube. This is necessary for special glasses, such as e-glass, borosilicate glass or glass wool. These compositions are very aggressive and will attack the ceramic tube. The advantage is that platinum bubblers do not have to be pushed, as there is no corrosion. Platinum bubblers do not wear out.

Safety fitting
ULG has developed a special safety fitting, which prevents damaging of the ceramic bubbler. As mentioned above, maintenance and service (e.g. pushing) are much easier and installation is much safer via the use of this safety fitting.

As a result, money is saved. Systems are built and tested thoroughly and the safety fitting is individually customised to each furnace at the customer’s request. Udo Laiacker, who can look back on decades of experience, will be pleased to advise you.

| Picture 1: AZS 1711 with 300mm height | Picture 2: Corrosion after 4 months | Picture 3: Corrosion after 6-12 months | Picture 4: Corrosion after 12-24 months | Picture 5: Corrosion after 24-36 months | Bubble system installation. | Bubbling system cabinet. | The ULG safety fitting. | Corrosion without service. |
experience in the glass industry, has conceived and designed this fitting. In addition, ULG offers cabinets that are suitable for control units in all desired versions. The company can deliver standard types, as well as fully electronic versions that can be connected to the main furnace control systems. In 2018, more than 160 bubblers were delivered to customers. Some were complete new installations with panels, while others were supplied to partner companies. Bubblers can be used for hot repairs and existing, broken equipment supplied by competitive suppliers can be replaced.

Specialist services
Bubbling systems can also be used by ULG for such situations as draining, to hold the temperature in the throat area. A frozen throat can be opened during furnace heat up or fill up procedures. Furthermore, some furnace problems in the feeder area can also be solved. A flexible team is available to provide fast and reliable solutions to customers.

Refractory abrasion is a major problem that can be minimised, while existing constructions can be maintained via rebuilding by ULG specialists. The company can look back on many years of experience with installation, service, pushing and hot drills. In particular, its bracket system is easy to use in cold and hot installations and is ideal for safe working and service.

ULG offers a full service, from planning, projecting and executing to service and maintenance, while the company’s specially converted machines and tools reduce costs, especially internationally.

About the author:
Antje Birkenfeld is Management Assistant at ULG

Further information:
ULG-GmbH, Karlstadt, Germany
tel: +49 93534926
email: antje.b@ulglass.de
web: www.ulglass.de

STARA GLASS

Glass furnace design
New generation solutions for a sustainable glass industry

Starag Glass offers:
Design – EPC projects – Engineering – Turnkey supply of glass melting furnaces (regenerative, recuperative, hybrid, oxy-fuel) for all kind of glass (container, tableware, sodium silicate, borosilicate glass, etc.) – Repair jobs: Demolition, reconstruction, hot repair – Supply of all refractory materials, equipment, combustion systems, recuperators, steel structure, process control and more – Technical assistance – Heat balance calculation on operating furnaces – Due diligence – Endoscopes – Advanced systems for NOx containment – Research and Development in glass industry.

www.staraglass.com

Piazza Rosselli 3 A/1 - 16129 Genova – Italy Tel.: +39 - 010 – 576391 Fax: +39 - 010 – 564763 staraglass@hydragroup.it
Efficiency, emissions, quality and flexibility

Irrespective the glass product being made, most furnaces generally consist of a melter, refiner/forehearth and cooling sections. As Jessica Irons explains, there are solutions along the process for helping to reduce emissions and improve efficiency, while keeping product quality intact.

Glass manufacturing is a complex and challenging process that requires a lot of energy. With ever-increasing focus on reducing emissions and improving efficiency in industrial applications, glass factories have a lot to gain from even small improvements in efficiency and emissions performance.

Of course, much of the energy intensity comes from the need to maintain temperatures high enough such that product quality is not compromised. Thus, as environmental regulations become even more stringent, the glass industry is very interested in improved combustion techniques, which reduce NOx formation while maintaining glass quality.

No matter the product being made, most furnaces generally consist of the melter, refiner/forehearth and cooling sections; and there are solutions along the process for helping to reduce emissions and improve efficiency, while keeping product quality intact.

Reducing NOx and improving efficiency

In the melter, using a burner technology called staged combustion coupled with oxy-fuel will help improve both emissions and fuel efficiency. The higher flame temperature of oxy-fuel firing increases the available heat and radiant heat transfer to most applications. Typical improvements include increased thermal efficiency, increased processing rates, higher product quality, reduced flue gas volumes and reduced pollutant emissions.

Honeywell Oxy-Therm FHR glass burners (figure 1) utilise a patented oxygen staging technology to reduce the formation of NOx in high temperature furnaces. Through deep staging of the oxidant flow, NOx is controlled to levels typically lower than conventional oxy-fuel burners. By reduction in total flue gas volume, the total mass of NOx created is often lower than air-fuel firing.

Figure 2 shows an Oxy-Therm LE staged oxygen, conical flame burner.

In regenerative melting furnace applications, the best available technology to improve NOx emissions is a dual gas injection technology burner from Honeywell Eclipse called the Brightfire 200. It is designed to allow two separate streams of gas to be injected through a single burner, inhibiting the formation of NOx and improving flame control. It was designed to improve heat transfer for lower energy use; reduce NOx emissions; improve ease of use, set up and adjustment; and enhance flexibility in flame adjustment and performance.

In one case, using the Brightfire 200 with an under-port firing arrangement on a large float furnace, NOx was demonstrated to be 15% to 25% less compared to other burners on end port and side port furnaces. In another application, NOx was reduced substantially on an end port furnace, a NOx reduction greater than 20% was realised, achieving the goal of less than 550 mg/Nm3 required for the application. Fig 3 shows the Brightfire 200 with mounting bracket.
Maintaining quality with edge heating

In a float glass furnace, one of the key steps is the tin bath, where the glass floats on a bed of molten tin to allow a seamless, flat, high quality sheet of glass to be produced. One area that is more difficult to control is the edge, where temperatures can cool more easily. This can lead to glass quality concerns and in the worst case, production shutdown to allow additional heating in the form of electrical heating elements to be added to the furnace.

However, with the use of an efficient, self-recuperative radiant tube burner, a glass manufacturer can use a different form of supplemental heating that can be installed while the furnace is operational and help to significantly improve temperature uniformity, even at the edge and prevent a production stop and prevent product loss, as shown in figure 5.

Complexity and flexibility

In float glass applications, additional heat is sometimes needed in the working end of the furnace. This can add more complexity to the manufacturing process, so a packaged, high velocity ThermJet burner from Honeywell can be mounted onto a cart with integrated controls and combustion air and kept on site to provide heat up when needed or assist with regenerator sulphate cleaning. This burner features a special cone, mounted on a cart with a full control panel, blower, hoses and safety equipment so it can be easily transported around the plant to meet the needs of the factory.

The system (figure 6) includes air and gas hoses to remotely mount the burner away from the combustion control cart. The combustion air blower and natural gas systems, including flame monitoring and ignition components, are included on a cart. This solution differs from the typical solutions provided by contractors for heat up, which requires 24/7 manned monitoring and may not have a full range of safety functions.

Conclusion

In the glass industry, the development of flexible heating systems with minimised energy consumption and emissions has become the focus of attention due to rising energy costs and decreasing emission limits, as well as higher product quality requirements and changing production demands.

The advent of efficient, high velocity industrial burners enables glass manufacturers to optimise heating applications ranging from edge heating, to working end/refiner and furnace heat-up.

Oxy-fuel burners, deeply staged burners, dual fuel inlet air-fuel burners and high velocity furnace burners represent the latest advancements in industrial burner technology, including improved heat transfer for lower energy use; reduced NOx emissions; ease of use, set up, adjustment and maintenance; and enhanced flexibility in flame performance.

About the author:
Jessica Irons is Global Product Marketing Manager at Honeywell Thermal Solutions

Further information:
Honeywell Thermal Solutions, Houston, Texas, USA
Tel: +1 815 877 3031
Email: jessica.iron@honeywell.com
Web: www.honeywellprocess.com/hts
Smart furnace design considerations

Gabriele Campani discusses the optimal parameters for smart furnace design to meet the glass industry’s global performance requirements in terms of emissions and energy consumption.

The glass melting process is by nature an energy-intensive process. The specific energy consumption for melting of a typical glass container could be estimated approximately in the range of 3.8-5.8 MJ/kg molten glass, depending on melting technology and process/product requirements.

Because melting energy accounts for about 60%-70% of the total energy consumption in a glass container plant, the necessity to develop and use energy-efficient technologies is obvious.

Natural gas or fuel oil are used mainly for combustion in the glass melting process. Sometimes, especially in furnaces producing coloured glass, electric boosting is used to support the primary fuel. The use of electricity as the main energy source for melting process is used only in small furnaces and often in countries where it is generated from nuclear power or hydro power plants. The energy from electricity applied via electrodes is more efficiently transferred to the glass compared to the energy released to the glass from combustion. However, based on the average energy efficiency of a power plant plus the transport losses, only about 40% of the fossil fuel energy content will be converted effectively into electrical energy (the primary energy equivalent of 1 kWh is about 9 MJ).

In terms of emissions, natural gas contains hydrocarbons, nitrogen and a small amount of carbon dioxide and no other impurities (sometimes it could contain very small additions of mercaptans applied to give the natural gas its typical smell for safety reasons). Fuel oil instead contains such impurities as vanadium, nickel, sodium and sulphur. The quantity of emissions, such as CO₂ and NOₓ, is related to the fuel consumption and resulting flue gas volume flows.

Energy performance

Energy efficiency improvement will not only lead to lower energy costs but will also deliver goals to lower the release of pollutants to the atmosphere, with particular attention to the emissions of greenhouse gases such as CO₂.

The energy demand of a glass melting furnace depends on various parameters, such as furnace design, type of furnace, furnace insulation and also on the operating conditions (air excess in the combustion process, the composition of the glass, recycled cullet level in the batch etc). The flue gas heat recovery system is an important matter for the energy consumption of a glass furnace; almost all glass plants using air-fired glass furnaces are equipped with a combustion air preheater, using the heat content of the exiting combustion flue gases. Obviously, the energy consumption of glass furnaces increases with its age, due to increased cooling of the sidewalls, increasing open joints and leakage, worsening of the efficiency to the heat recovery system (ie fouling of the regenerator checkers) and deterioration of the insulation. Also, the application of repairs during the furnace campaign has an impact.

End port-fired regenerative furnaces equipped with well-insulated regenerator chambers can preheat the combustion air up to more than 1250°C and are actually the most energy-efficient furnace types. The flue gases at regenerators’ exit have a temperature of 450°C-550°C, with residual heat that can be used to preheat the cullet or batch (up to 250°C-375°C with energy savings up to 15%) or for other secondary uses (eg HVAC). Cross-fired regenerative furnaces appeared, on average, less energy efficient than and end-fired regenerative glass furnaces. This could be due to the structural heat losses of the burner ports and relatively large outside regenerator surface area.

Glass furnaces equipped with recuperative systems reach a much lower air preheat temperature, about 400°C-750°C so generally, demand a much higher specific energy supply.

Oxygen fuel-fired furnaces are much more efficient compared to recuperative furnaces but the energy consumption for oxygen production (cryogenic distillation or VPSA system) appears less efficient (and more expensive) compared to end port air-fuel fired (5%-10% less efficient on average). However, the latest oxygen-fired furnace designs, for example, equipped with a batch pre-heater system, present energy efficiencies similar to end port-fired regenerative furnaces, while from an environmental perspective, present lower impact on NOₓ emissions.

Glass furnaces that use a high level of cullet in the batch show much lower specific energy consumption levels compared to furnaces with a low cullet ratio. On average, the specific energy consumption reduces about 0.28%-0.3% of the specific energy consumption of a normal batch (not using cullet) for a 1% increase of cullet in the batch. In the case of flint glass production, the use of recycled post-consumer glass is limited due the impurities it may contain, which may lead to glass colour deviation. For the production of green or amber glass, however, cullet levels in the batch may exceed 80% of the entire mass.

About the author:

Gabriele Campani is Project Engineer at Falorni Tech

Further information:
Falorni Tech – the Industrial Division of Falorni
Gianfranco srl, Empoli, Italy
tel: +39 571 922333
email: g.campani@falornitech.com
web: www.falornitech
GLASSMAN ASIA IS HEADING TO KOREA

Glassman events are where the hollow glass industry does business. Join us in Korea and meet some of the most innovative companies shaping the future of glass manufacturing with solutions for energy efficiency, quality control, packaging, logistics and decoration.

Register for your free entry badge at www.GlassmanEvents.com/Asia

Another point of view

Annealed by Pennekamp.

www.pennekamp.de
Exploring process automation and big data opportunities

A two day GlassTrend seminar held in Munich last September addressed opportunities to increase efficiencies in glass production via the utilisation of enhanced process automation and big data. Glass Worldwide, preferred journal of GlassTrend, was among those in attendance.

In excess of 70 international glassmaking specialists and leading suppliers of manufacturing technologies registered for the recent GlassTrend meeting in Munich, Germany, emphasising the importance attributed to the subject. Hosted by Linde AG, the two day seminar attracted GlassTrend members and guests from 10 different countries, including representatives from the float, fibre and container sectors. This was a valuable opportunity to discover that by progressing automation and utilising ‘big data’ effectively, significant production efficiency gains can be realised by glassmakers.

A combination of glassmaking specialists and experts who possess extensive knowledge of other industries presented their views on Industry 4.0, sensors, control systems and other relevant development opportunities. The 15 separate presentations were grouped in sessions devoted to ‘Digitisation in the glass industry’, ‘Sensors in the high temperature process industry’ and ‘Analysis of big data’, followed by an interactive session with break-out groups that evaluated what big data brings to the glass industry.

The theme of this meeting aligned closely with the aims and activities of GlassTrend, whose purpose is to identify the needs and requirements for improved and innovative production technologies and to define and co-ordinate appropriate research and development initiatives. Facilitated by CelSian Glass & Solar BV of Eindhoven, the Netherlands, GlassTrend is an international consortium of industrial glass producers, raw materials suppliers and related industrial partners, operating in the field of glass and glass production. The organisation strives to make basic/fundamental knowledge related to glass science and glass technology accessible for the industry, to derive innovative technologies from this basic knowledge and to find practical and feasible solutions for production and glass quality problems.

Digitisation potential

‘Looking ahead: Join us on the journey to the digital industry’ was the title of a presentation by Tobias Wachtmann of Siemens. As well as discussing successful glass industry projects undertaken by the group to date, Mr Wachtmann emphasised that the prerequisites for digital transformation are foresight, investment sense, expertise, corporate culture, people and partners. Siemens supports that transformation by providing kick-off assessments, digitalisation workshops, consultations and digital expertise. The group’s glass industry customers include Slovenian hollowware producer Steklarna Hrastnik, who is working towards the creation of a ‘smart’ factory within five years and float glass cold and equipment specialist Grenzebach Maschinenbau, who worked with Siemens to develop its latest stacker.

TAZ Spiegelau’s Harald Zimmerman emphasised that Industry 4.0 is not a new invention but a different direction, drawing attention to a rapid process that brings a change of paradigm for the glass industry. “The glassmaker with knowhow will increasingly be replaced by process engineers and technicians with ‘know why’,” he suggested. Mr Zimmerman discussed some of the glass industry’s process achievements in recent years and opportunities for the future. This includes the use of robots to perform simple jobs, the potential for retooling jobs automatically, automated administrative duties and the use of
Events

Braincube founder and CEO, Laurent Laporte identified what glassmakers can expect from an artificial intelligence (AI) project and how to achieve digital transformation. Current industry customers include Ardagh, Guardian, Saint-Gobain and Verallia, as well as inspection and quality control solutions specialist Tiama, with whom a shared vision was created in 2015 to modify production processes. Over the past four years, Tiama has used Braincube software to identify optimisation opportunities that could not be isolated previously from raw data analysis.

Part of the SMS Group, SMS digital, has achieved considerable success in the international metals industry, in particular the steel sector for its Industry 4.0 software solutions. Jesper Mellenthin discussed how the platform economy has been enabling “the learning factory” throughout manufacturing industries in recent years. Such platforms benefit all business partners, including manufacturers (providing easy and cheap access to new services and applications), machine builders (giving better understanding of their machines and new business models), software suppliers (easy access to data and infrastructure) and service suppliers (better access to data, with new business models).

A presentation by Owens Corning’s Bruno Purnode highlighted the benefits of advanced techniques and modelling to improve process efficiencies in glass fibre manufacture. A selection of results was provided to illustrate practical applications of modelling in design and operations. In addition, the development of innovative sensors was discussed, illustrating their importance in providing better process understanding. “We need to integrate new sensor measurements to improve.” Bruno Purnode emphasised. “Beware of making conclusions based on bad or untrustworthy data.”

Sensor innovations
Another five papers were devoted to the importance of accurate sensors in high temperature process industries like glassmaking. This included a presentation by Paul Laimbock of ReadOx, who described his company’s development of a disposable oxygen sensor for the continuous measurement of the redox state in glass container forehearths. The measuring principle and technical implementation of this small and economical in-line sensor were summarised, with practical examples of redox control given for...
emerald, olive and antique green glasses.

Secopta analytics has brought together advanced photonic technologies with the latest development in LIBS spectroscopy for customers in the steel, aluminium and mining industries. Amit Ahsan explained how the company is working with CelSian to bring this advanced technology to the glass industry as well. The system’s enhanced functionality was discussed, as well as its versatile potential areas of application in industrial process control, ‘alloy-to-alloy’ recycling and volumetric flow analysis etc.

A joint presentation by Peter Droegmueller of AMETEK Land and Simpson Combustion and Energy’s Neil Simpson highlighted the development of in-furnace thermal imagery and its application in glass melting furnaces. Case studies in cross- and end-fired regenerative furnaces have shown that flame shape and associated thermal profile for heat transfer can be monitored and used as a combustion optimising and troubleshooting tool. According to the speakers, the integration of long-term data is key to the analysis of flames and batch flow.

Ardagh Group’s Sven-Roger Kahl discussed his company’s use of the CelSian O₂ and CO sensor at the Moerdijk glass container factory in the Netherlands over the past three years. According to Mr Kahl, a 1-2% reduction in O₂ consumption has been recorded, as well as energy savings. Now, six more sensors have been scheduled for installation on three end-fired furnaces in Dongen.

‘Furnace risk and life monitoring with SmartMelter radar inspections’ was the theme of a paper delivered jointly by Fred Aker of PaneraTech and former Global Furnace Leader at Libbey Glass, Elmer Sperry. Several case studies were covered, showing how SmartMelter technology has assisted Libbey and other glassmakers. Also discussed was Libbey’s approach to merging multiple sensory information, such as SmartMelter refractory thickness data, endoscopy, thermal and visual inspections and maintenance information to make critical furnace repair decisions.

**Analysis of big data**

The final five presentations were devoted to the analysis of big data, starting with a paper by Linde’s Dexin Luo, describing the company’s launch of a global digitalisation team in 2016 to explore and capture the value of digitalisation for Linde. This team is active in four main areas: Acceleration, transformation, partnerships and replication. Ms Luo identified how this set up has helped to drive Linde’s digital journey, presenting specific projects in the areas of data and process automation.

Hans Mahrenholz of Glass Service summarised the evolution, definition, characteristics, analytics, industrial applications and scope of big data, before focusing on applicable Glass Service products and services. This includes the company’s ESMIII expert system for glass melting and conditioning, which provides better process stability, greater flexibility, enhanced glass quality, lower energy cost and emissions, as well as the need for less labour.

A spin-off from Radboud University in the Netherlands, Machine2Learn specialises in artificial intelligence and machine learning. Ali Bahrramisharif focused on the automated quality control of glass production using artificial intelligence. Using historical glass plant data, approximately 16% of anomalies have been correctly identified that can explain the occurrence of blisters and bubbles in the final output, 24 hours in advance. Root cause analysis has been applied to determine the underlying causes of anomalies and according to Mr Bahrramisharif, the results allow for defining measures to prevent them.

Eurotherm by Schneider Electric’s René Meuleman delivered a pragmatic approach to Industry 4.0, emphasising that while a change of attitude is required within the industry to overcome ongoing energy challenges, the change needs to be justified. “And data is what is needed to provide that justification” he asserted. “Some high end glass manufacturers are already investing a huge amount of money and resources into data analytics because the complexity of their process can no longer do without it. Others will need to follow and we, the suppliers of this technology, have an obligation to keep it pragmatic and at an acceptable price to enable glass manufacturers to remain competitive.”

Wrapping up the third session was Sisecam’s Atilla Ünsal, who provided a glassmaker’s perspective of what is possible with process automation and big data. Mr Ünsal is responsible for Sisecam’s engineering activities, including its implementation of digitalisation strategies. This requires plant-wise automation, as well as next generation IoT sensor developments, for example. His presentation discussed the results of a readiness level assessment in conjunction with potential pitfalls, as well as addressing ongoing real use cases based on actual production data. Examples covered specific equipment energy performance and POC results, based on end-to-end production site data and preliminary analyses. “Industry 4.0 is not an IT project but a collaborative action” he warned fellow glassmakers.

**Interactive session**

During the concluding interactive session, sub-groups of participants were invited to build arguments on big data and sensor-related statements to convince the voting audience in a plenary discussion. In spite of the progress of big data trends, voters were unconvinced that in 10 years’ time, glass furnaces will be operated completely automatically, without human intervention.

The audience believed strongly that adequate use of big data for improving glass furnace operation and yield requires detailed process knowledge. The glass industry remains attached to CFD modelling, as the audience voted by a large majority against a statement suggesting that big data will make CFD furnace modelling calculation redundant. A lively interactive session, showing green and red cards (for and against the statements raised), concluded a highly interesting seminar.

Dedicated to raw materials, the next GlassTrend seminar has been scheduled for 30 March to 2 April 2020. The event will be hosted in Belgium by Sibelco.
Celsian’s aim is to minimize the cost of making glass for end users and the environment. We have an agile team of glass experts using proven methods like furnace modelling, laboratory measurements and practical furnace health checks to optimize glass melting processes. We also train operators and glass technologists through our standard course, dedicated programs and various e-learning modules. We strive to be the best partner for optimization of glass production worldwide.

www.celsian.nl

DSCG400
ALL-IN-ONE DIMENSIONAL AND THICKNESS MEASUREMENT SYSTEM FOR GLASS CONTAINERS

- HIGHEST INDUSTRY PRECISION
- LOWEST % OF PROCESS VARIATION
- FASTEST THROUGHPUT
- LARGE LIBRARY OF STANDARD MEASUREMENTS
- UNMATCHED THICKNESS MEASUREMENT CAPABILITIES
- TOOLLESS JOB CHANGE
- INDUSTRY 4.0 COMPATIBLE

CONTACT US TO SEE THE NEW DSG400: +1.724.482.2163 // AGRINTL.COM
Hosted by the Glass Manufacturers’ Association of the Philippines (GMAPI) for the twelfth time since its launch in 1977 and for the fifth time in Cebu, the conference adopted the theme ‘Glass: Inspiring New Frontiers of Development’. A combination of technical and social events attracted over 300 attendees from 25 different countries in Asia, Europe, the Middle East, North America and Oceania.

Following a golf tournament and cocktail reception, Thai Tran Quoc, AFGM Chairman and Emmanuel R Alcantara, Chairman of GMAPI and Glass Business Manager at San Miguel Yamamura Packaging Corp, addressed delegates at a welcome ceremony. Detailing positive market conditions in the different glass sectors in the Philippines, Mr Alcantara described San Miguel’s withdrawal from the plastic bottled water business as part of efforts to reduce the company’s impact on the environment. “We sacrificed this lucrative business to support the call for sustainability. With this gesture, we hope to generate more commitment from the business communities in the Philippines and ASEAN. GMAPI wants to convert the momentum of sustainability into accelerated growth for the glass industry. This conference calls to everyone to collaborate to enhance the value of our products and service to society in general and stakeholders in the glass industry in particular.”

“The theme for this year’s conference highlights the continuing role of glass in progress and development and at the same time, poses a challenge and call to the glass industry about the role we play in future development, innovations and in creating new frontiers for glass to lead” added Conference Chairman, Gilbert Alvarez, before keynote presentations from James Sayson and Nuna Almanzor.

With Glass Worldwide as official journal, leading personalities from South East Asia’s regional glass communities came together in October to meet their peers and international suppliers at the annual ASEAN Glass Conference in Cebu, the Philippines.
Technical presentations

With Nolan Ricardo as Chairman of the technical sessions, industry experts delivered a full day of presentations.

On behalf of Ametek Land, Neil Simpson presented ‘Beyond the Visible: Industry 3.0’, describing how the company’s five year development of a Near Infrared Borescope (NIR-B) offers advanced levels of understanding of the glass furnace operation. Case studies demonstrated the potential to use data to further develop furnace controls to meet the needs of industry 4.0 and optimisation of the furnace process.

Presenting ‘Refractory and engineering technologies on glass melting furnaces’, Shintji Yamamura, General Manager of Glass Engineering Center at AGC Ceramics, introduced some elementary technologies about refractories, engineering and operational support to glass manufacturers looking to reduce fuel consumption without worsening glass defects and furnace campaign life.

Lars Biennek, Head of Technology at HORIN Glass Industries, examined electric melting technologies. With the all-electric furnace (AEF) based on the cold top technology having been successfully applied for decades, Mr Bienek explained the potential for increased applications and a wider role for the glass industry to reduce its CO₂ emissions.

Discussing various options, Hotwork International CEO, Benjamin Koster, presented a detailed overview of proven technologies to end users for the repair of regenerators (partial and full), with and without production loss.

PaneraTech’s industry standard in furnace life optimisation, SmartMelter, was outlined by Fred Aker, VP of Sales and Marketing, with the radar-based solution’s ability to improve decisions regarding furnace condition and maintenance without compromising the safety of the furnace. Case studies were presented showing uses at multiple stages of furnace campaigns to make cost saving operational decisions.

Victor Kurniawan, Senior Expert in Oxy-Fuel Combustion, described how Praxair, a member of the Linde Group, has developed the OPTIMELT heat recovery technology for glass furnaces. Recovering waste heat in flue gas from oxy-fuel glass furnaces, attendees were informed how the OPTIMELT Thermochemical Regenerator (TCR) system is expected to reduce NG consumption by about 50% versus recuperative furnaces, 30% versus air-regenerative furnaces and 20% versus oxy-fuel furnaces.

Romain Pioch, Sales Area Manager at Tiama, presented ‘Smart Factory Traceability’, describing how the development of the company’s strategy in the fields of inspection, monitoring, traceability, service and intelligence led to its smart factory concept called ‘YOUniverse’ and the hot and cold end opportunities for collected data to be sent into intelligent supervision systems to be analysed with the results displayed on a single platform.

Industry 4.0 was the topic covered by Ulas Topal, CEO at Vertech’, looking at how the evolution of technology is only a starting point and the key challenge being how to use it in the best possible way. The Vertech SIL system was presented as a solution for analysing the past, in order to predict the future.

XPAR Vision CEO, Paul Schreuders.

A series of technical presentations adopted the theme ‘Glass: Inspiring New Frontiers of Development’.

Latest industry news and highlights from this issue at www.glassworldwide.co.uk
Presented the company’s ambition to assist the global glass container industry to make its bottles and jars lighter and stronger, produced with zero defects at higher speeds. With a strong focus on the glass forming process to realise this ambition, Mr Schreuders described hot end sensors and a blank robot for the purpose of swabbing blanks neck rings, as well as executing other functions at the blank side.

As official journal, adaptations of these presentations will be exclusively published in 2020 issues of Glass Worldwide, as well as being added to the AFGM online library of articles at www.glassworldwide.co.uk.

Networking
In addition to the technical programme, attendees benefitted from Business Connect sessions, as well as a social programme aimed at strengthening business networking and collaboration. Highlights of accompanying events included Fellowship Nights at the Oakridge Pavilion and the Tent-Mandani, a city tour and an excursion to the Cebu Safari and Adventure Park. The conference closed with a gala farewell dinner.

Organisers
GMAPI is a member of the ASEAN Federation of Glass Manufacturers (AFGM), now in its 42nd year as a regional industry association composed of glass manufacturers in South East Asia. Fellow member associations include the Indonesian Glass Manufacturers Association, Glass Manufacturers Association of Malaysia, Glass Manufacturers Industry Club, The Federation of Thai Industries and Vietnam Glass Association.

The 44th ASEAN Glass Conference will be hosted in Thailand in 2020 by the Glass Manufacturers Industry Club, The Federation of Thai Industries (GMFTI). Dates and location will be announced in a future issue of Glass Worldwide.

Further information:
web: www.aseanglass.org
Society of Glass Technology awards recognition

A number of personal awards are presented annually by the Society of Glass Technology, at its annual meetings, at ESG conferences or at such events as Furnace Solutions etc. The history and scope of these awards are recognised in the following contribution, which also highlights the significant contributions made by the people whose awards bear their names.

Awards presented by the Society of Glass Technology are judged either by the Board of Fellows, the Basic Science and Technology Technical Committee or by peers in the audience at conferences.

Recently, the SGT has established a memorial lecture and a student prize entitled 'AGC Glass Engineering Student Prize', in memory of Professor Michael Cable from the University of Sheffield and his contributions to practical glassmaking. AGC Inc sponsors both the student prize and the lecture.

The first memorial lecture was presented by Dr Richard Hulme of Guardian Industries at the International Congress on Glass in Boston, USA in July 2019. The Society of Glass Technology is now seeking candidates for the student prize. The memorial lecture is held biennially and the student prize will be awarded in the intervening year.

Candidates are sought for the 'AGC Glass Engineering Student Prize'. They can be of any age, working full or part-time in the glass industry and their work should be centred on glass engineering and technology, with no limits to the size of the company or institution in which they work. There should be a continuing education aspect to potential entrants, with affiliation to an educational institute. Entries will be judged by a panel set up by the SGT Board of Fellows. The award is made up of a cash prize and expenses to attend the presentation.

In the first Michael Cable memorial lecture, “You ought to go away and think again”, Dr Hulme, who studied for his PhD under Professor Cable, described some of the things he learnt from one of the most eminent glass technologists and why everyone should continue to reflect on and acknowledge his contributions to the field of work. Glassmaking is not a complicated affair but the science underlying the processes involved can be extremely complex. Michael Cable wrote extensively about the history and development of glassmaking and throughout his career, he pioneered research into some of the fundamental principles that are currently taken for granted, have been forgotten or are ignored at one’s peril.

Lucy Oldfield Award

The Oldfield Award is open to UK and international students. There are cash prizes for first, second and third places. Awards are presented for research projects carried out by either undergraduate or taught masters students. The subject of the project can be any experimental, theoretical or practical work related to amorphous solids, glasses, glass-ceramics or sol-gel materials, glass history and archaeology or glass arts, technology or design.

Reports not dealing entirely with glass should spell out the relevance of the subject to the science, technology or arts of glass. This can include fundamental science, applied science, arts, technology and engineering. It should be work completed within the 12 months prior to the June submission and presented in English. Entries are judged by a panel made up of members of the Basic Science and Technology Technical Committee.

Presentation of the Lucy Oldfield Award takes place at the conference dinner of the Society of Glass Technology’s annual meeting. The annual meeting includes presentations by new researchers, post-graduate students reporting the findings of their PhD investigations. Many Oldfield Award winners have gone on to join these new researchers.

Joint first this year was Jessica Rigby (Sheffield Hallam University) on Development of Novel Glass Formulations for Treatment of Post-Operative Clean-Out (POCO) Wastes for Decommissioning of the Sellafield Site. Also joint first was Francesca Lewns (University of Birmingham) on Electrospun Bio Active Glass Fibres as a Novel Haemostatic Agent. Placed third was Quentin Bollaert (UPMC Paris) on Study of the Conditions of Formation of two Tektites using Spectroscopy and Chemical Mapping.

Lucy Oldfield (1925-1989) was one of the outstanding women to have worked for the glass industry. She was educated at Harrow County School for Girls and Bedford College (London University), gaining a First Class Honours Degree in Chemistry in 1947. She worked as an analyst for British Drug Houses in London and was then accepted as a postgraduate research student at Imperial College (London University), being awarded a PhD in 1952 for her research in electrochemistry. She had completed her practical work

Jessica Rigby receives her Lucy Oldfield Award certificate and cheque from SGT President, Stuart Hakes at Trinity Hall, Cambridge in September 2019.
and most if not all of her thesis when she joined GEC Research Laboratories in 1951. Her first job was to try to isolate and identify the defects in TV tube components being manufactured on a Lynch press at the GEC Lemington glassworks in north east England.

Lucy Oldfield's primary interest was in the structure of glass and in the relationship between composition, structure and both physical and electrical properties. The Lemington problem with a glass containing fluoride was a most appropriate introduction. It was possibly her work on borosilicate glasses that brought her international recognition and her work on glass-to-metal seals followed on borosilicate glasses that brought her international recognition and her work on glass-to-metal seals followed.

Lucy Oldfield joined the Society of Glass Technology in 1958 and was awarded the Fellowship in 1965. She served on the Board of Fellows from 1970 to 1975 and as a Vice President in 1969-1972. She was Chairman of the London Section in 1960-1961 and served on the committee for 12 years. She was also a member of the Basic Science and Technology Committee from its inception and a member of both the Physical Properties Committee and Chemical Analysis Committee for a number of years. She also represented the Society on BSI Committees dealing with street lanterns and electric lamps and on the City and Guilds of London Advisory Committee for the glass manufacturing and process industries.

**Paul Award**

The Paul Award prize is offered to presenters of papers as a new researchers at the Society of Glass Technology annual conference. £250 + free student SGT membership for the year is on offer for the best presentation (clarity, technical content) as voted by Basic Science and Technology Technical Committee members in the audience.

Winner of the 2019 Paul Award was Katrina Love from Sheffield Hallam University, who spoke on phosphate solubility and impacts on properties of radioactive waste glasses for the Hanford site, USA. Previous winners have included Alex Scrinshire from Sheffield Hallam University in 2018, who spoke on the structural role of iron in nepheline-based aluminosilicates for nuclear waste applications. In 2017, Ray-Jay Jeng from Tokyo Institute of Technology won for his presentation on the determination of the critical forming condition for ultra-thin tellurite glass film using glass blowing technique.

The Paul Award is named after Professor Amalendu Paul (1937-1990) of the Indian Institute of Technology, Kharagpur. Amal Paul completed his graduate and postgraduate studies in chemistry at the University of Calcutta and in 1963, was accepted by Professor Douglas to the Department of Glass Technology at Sheffield University, where he was awarded an Owens-Illinois research scholarship. Professor Douglas supervised the work of numerous researchers at the University of Sheffield and in India and published more than 150 original research papers, jointly or as sole author. In 1982, he collected this material together with much else besides, in his well-known monograph *The Chemistry of Glasses*.

**Michael Garvey Award**

This award is presented every year for the best paper at Furnace Solutions. It is presented in memory of Michael Garvey, who worked for Guardian Glass in Goole and was a graduate of the University of Sheffield.

Michael Garvey died in a climbing accident in 2008, aged 27. He initially joined Guardian as a summer intern at the DeWitt, Iowa plant, where he received what could only be described as ‘rave reviews’ from the team. After completing his Masters, he joined the Carleton, Michigan facility and then moved to work in the Glass Technology Group in Carleton.

Having worked on a wide range of projects and with all levels of the company, he was an extremely motivated, dedicated and technically gifted glass technologist, who moved back to the UK and was a key member of the Goole process team.

Michael Garvey presented a paper at Furnace Solutions-3 and made a good impression on the audience and members of the Melting Technology Committee. This award is sponsored by Guardian but it came about thanks to Chris Windle, Geoff Evans and other members of the MTC and shows the ‘people matter’ side of the SGT.


**Pilkington Award**

It was his personal qualities and not his surname that gained Sir Alastair Pilkington a place in the famous Pilkington Brothers glass company.
Are you interested in CO₂ reduction?

Come to FIC for superboosting and large all-electric furnaces – we have the answers to reduce carbon footprint

- Innovative all-electric furnace designs
- Electric boost for extra tonnage and reduced emissions
- Versatile bubbler systems to eliminate floor wear
- All-electric forehearths reducing energy consumption by up to 80%
- Mathematical modelling
- Proven technical innovations

www.fic-uk.com
+44 (0) 1736 366 962

The World’s Number One in Furnace Technology
manufacturing company. He was not related to the famous glassmaking family but such was his ability and determination that within a few years, he was the inventor of the float process – recognised as the premier glassmaking invention of the 20th Century. Sir Alastair Pilkington changed the way the world thinks about windows, so the award that bears his name is designed to provide a fitting memorial to an extraordinarily gifted man.

The SGT-Alastair Pilkington Award is designed to encourage and recognise excellent work in glass research or innovation achieved by someone who has come relatively recently into the field of glass studies. This award is not restricted to hard science or engineering – it spans all dimensions of glass studies, creativity and research: glass art as well as glass science, conservation and museum studies, engineering, history and design, as well as molecular dynamics.

The next winning candidate receives €1500 and support to attend the ESG conference in Krakow, Poland, in 2020. The winner also receives a smaller replica of the iconic glass sculpture that is the focus in the award ceremony.

The award is funded by the Society of Glass Technology and the Mushroom Trust, a fund set up by Sir Alastair Pilkington’s family. The Mushroom Trust takes its name from the cover story provided for workers on the secret float furnaces – they were instructed to tell families and friends that they were looking at ways to use the waste heat from the sheet glass furnaces to grow mushrooms!

The fourth winner of the award in 2018 was Dr Morten Smedskjaer of Aalborg University, whose submission related to pressure-induced changes in interdiffusivity and compressive stress in chemically strengthened glass. The presentation was held at the PNCS-ESG conference in St Malo, France.

Entries are now being sought for the next Pilkington Award.

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

Green is the new ‘black’ for the luxury industry

Time has long gone when the ‘green’ values of environment, recycling, reuse and holistic economy were antithetic to the ideas of luxury built on premium, desire, ownership, individualism and aspiration. The Y, Z K generations born in recent decades are shaking up society from the bottom and imposing new values on brands by using the best weapons they have in their hands; their purchasing behaviour and social media channels. The luxury sector is progressively taking the commitment of elevating sustainability to a premium status. In this bold undertaking, particularly for the perfumery and cosmetics sector, luxury brands can rely on the support of a truly engaged European glass flaconnage industry, who can offer customers a premium material with inherent sustainability properties.

Just few years ago, ‘sustainability’ was just a buzzword to define ad-hoc activities made by businesses to better profile their activities or rather react to market challenges. Today, the ad-hoc response has evolved into a long-term strategic approach more and more companies adopt, conscious of the fact that their economic and financial prosperity is directly interlinked with their performance on social responsibility, environmental stewardship and corporate ethics, which is under severe scrutiny by consumers, particularly young consumers.

Luxury brands are not excluded. They also feel the need to evolve towards new business models to be accepted by these new generations of consumers. Transparency and truth are now a ‘must’ on topics so far treated only in companies’ CSR reports such as ethics, environment, social sustainability, animal welfare, production and research practices, impact on communities.

Luxury brands that cannot substantiate their sustainability claims are exposed to social media retaliation campaigns, which can result in a quick market ejection. On the other hand, conscientious brands gain support and loyalty from young consumers, even if their engagement is translated into goods at higher prices.

According to the recently published McKinsey report ‘Global Sustainability Report: Sustainability matters but does it sell?’ on behalf of the National Chamber for Italian Fashion (CNMI), fashion brands that do not embed sustainable values in their business plan risk exposing themselves to consumer rejection. Surveyed brands expected to almost double their total investment on sustainable products over the next five years, from 23% to 40%. But also, a quarter of them reported they had already delisted brands due to social or animal welfare concerns or a brand image inconsistent with the concept of sustainability. The study also showed that some 70% of customers are prepared to pay more for brands that can prove having shifted to sustainable practices.

Similar indications also come from a large-scale survey carried out earlier this year by the research institute InSites on behalf of European glass flaconnage manufacturers and the Friends of Glass consumer platform. Of those interviewed, 90% of consumers aged 18 and 34 have become more conscious of their
impact on the environment and want to review their purchasing decisions.

The survey shows also that not only products but also how they are packed is under scrutiny by young consumers. They look for solutions that best preserve the fragrance and quality of their preferred brands but which also respect the planet. In their mind, seven out of ten consumers say glass packaging ticks both boxes as the most recyclable and environment-friendly solution and eight out of ten say glass best preserves the fragrance and quality. Half of the interviewed people would switch to glass and want to see more perfume and beauty products in glass.

European glass flaconnage companies see a major opportunity in optimising the way glass is produced, by making plants more energy-efficient and investing in new technologies, switching to natural gas and aiming at a more systematic use of renewable and clean energies. The sector is keen to partner with customers on initiatives that bring together the value chain to achieve common objectives. The Sustainable Packaging Initiative for CosmEtics — SPICE — is an example which aims to collectively shape the future of sustainable packaging.

We are living in a very interesting transition from a consumeristic world to a world where there is a quest for authentic values and respect for the planet. And the ‘heroes’ of this transition are those young generations Y, Z, K who are often accused of having less values than previous generations. However, it is them who are actually leading the fight to sort out the new challenges and continue the work of previous generations in building a better world.

Further information:
FEVE, Brussels, Belgium
tel: +32 2 536 0080
e-mail: secretariat@feve.org
web: www.feve.org
Industry legends and school children honoured

The All India Glass Manufacturers Federation celebrated its platinum jubilee this September in New Delhi. The ceremony included the awarding of the the prestigious C K Somany Glass Award (supported by Glass Worldwide) and Balkrishna Gupta Award to Mr B L Kheruka and Firozabad Glass Shell Industries respectively.

The Honorary Minister of State for Jal Shakti and Minister of State for Social Justice and Empowerment, Rattan Lal Kataria was the chief guest at this year’s awards ceremony. Manish Asija, Member of the Legislative Assembly from Firozabad (Uttar Pradesh) was also in attendance, showcasing full commitment to the glass industry. The ‘Adopt a Glass Bottle’ roadshow was highlighted, displaying a selection of drawings by school children on glass packaging aiding the Swachh Bharat Abhiyan (Clean India Campaign), a vision set by the Prime Minister on the path laid by Mahatma Gandhi. Along with the paintings, an exhibition of glass water bottles and other packaging solutions were placed on display. The roadshow will travel to other cities showcasing the vital role of glass, being the only 100% recyclable packaging material.

Winning students were awarded cash prizes: First prize (Rs 10,000) to Archisha Shyam aged 13 years, class eight student at Orchids International School, (Jalahalli) Bangalore; second prize (Rs 7000) to Pranav Singh aged 11 years, class six student of Bal

Dharmendra Mohan Gupta collected the ‘Balkrishna Gupta Award for Exports’ on behalf of Firozabad Glass Shell Industries.

Nitin Dhand, Zonal Sales Manager at Borosil Glass Works Ltd collected the C K Somany Award for Innovation and Technology on behalf of Mr B L Kheruka.

The C K Somany Award for Innovation and Technology is supported by Glass Worldwide.
Bharti School, Bahadurgarh (Haryana); third prize (Rs 5000) to Swastik Saha aged 10 years, class five student of Bal Bharti School, Bahadurgarh (Haryana).

The Honourable Minister also presented the AIGMF Glass Awards: The C K Somany Award for Innovation and Technology (supported by Glass Worldwide) to Mr B L Kheruka of Gujarat Borosil Ltd; and the Balkrishna Gupta Award for Exports to Firozabad Glass Shell Industries.

Acknowledging his valuable contribution in the fields of technology, manufacturing, innovation, services and education, an appointed panel of jury members unanimously selected Mr B L Kheruka. Born in 1930, Mr Kheruka is a pioneer in the glass industry and the Chairman of India’s leading specialty glass manufacturing group, Borosil Glass Works Ltd. He presides over multiple vertical businesses, including laboratory pharmaceutical packaging (comprising vials and ampoules), consumer goods and solar glass.

“The contribution of Mr B L Kheruka to the Indian glass industry for more than 50 years cannot be overstated, right through from founding Window Glass Ltd in the 1960s to building the Borosil brand and overseeing the company’s evolution to become the leading specialty glassware enterprise in India” commended Dave Fordham, Publisher of Glass Worldwide, the preferred journal of AIGMF in association with Kanch (quarterly journal of the AIGMF). “He is a most worthy recipient of the 2019 C K Somany Award for Innovation and Technology and Glass Worldwide is pleased to support the AIGMF in recognising Mr Kheruka’s achievements and those of his family. We also offer sincere congratulations to Firozabad Glass Shell Industries upon being recognised for their export contributions with the 2019 Balkrishna Gupta Award.”

Raj Kumar Mittal, President, AIGMF commented: “Firozabad Glass Shell Industries has been engaged in the manufacture of doubled walled glass refills (glass liners) for vacuum flasks since its inception in 1980. FGSI is today the largest manufacturer and exporter of glass refills from India with a share of about 65% of India’s export of this product. The company is owned by Ram Kishore Gupta, Dharmendra Mohan Gupta and Sunil Mohan Gupta, who have over three decades in different spheres of glass production.”

The jury for these awards comprised Dr K Annapurna, Senior Principal Scientist, Glass Division, Central Glass & Ceramic Research Institute (CSIR-CGCRI), Kolkata; Dave Fordham, Publisher, Glass Worldwide (UK); Bharat Somany, Senior Vice President, AIGMF and Vice President, HNG & Industries Ltd; Mr M K Bansal, Executive Committee Member AIGMF and partner, Shri Sitaram Glass Works, Firozabad (UP; and Vinit Kapur, Secretary, AIGMF.

As a CSR initiative, the AIGMF gifted 100 glass water bottles with the Swachh Bharat Abhiyan logo to the Ashok Hotel, venue for the ceremony. Also, as a token of appreciation, the first 100 drawing competition entrants were gifted a glass water bottle with the Swachh Bharat Abhiyan (Clean India Campaign) logo, manufactured by Hindustan National Glass & Ind Ltd.

**Further information:**
The All India Glass Manufacturers Federation, New Delhi, India
tel: +91 11 23316507
e-mail: info@aigmf.com
web: www.aigmf.com
More than just transparency

Glass has become a smart component for a wide variety of applications. As the following contribution from VDMA Forum Glass Technology explains, laser technology makes it possible to meet customer-specific requirements precisely, quickly and cost-effectively.

A smart pane of glass should ideally screen, be transparent, darken and lighten, with users being able to programme these functions at any time of day or night. Whether it is in a public building, on a luxury yacht, in a car, or simply at home from the sofa, glass has to work. State-of-the-art technology during production is needed for this to succeed.

Rail passengers will be delighted if their high speed train has windows that shield them from the sun’s rays, while at the same time allowing mobile phone signals to pass through. The same applies to office buildings, which contain a lot of concrete and steel. Smart glass facades ensure a comfortable interior climate, individually regulate light and shade to fit the requirements of employees and permit mobile communication without interference, using technology that is invisible to the human eye.

Layer by layer
Glass designed to shield against electromagnetic radiation is always coated, for example with a low-e coating, to reflect thermal radiation. Laser beams make it possible to remove part of this coating, creating a filter structure or surface that is permeable to mobile phone signals or near-infrared light.

4JET microtech GmbH specialises in the micro-machining of very large, flat and curved panes of glass. Serial production of curved windscreen demands high resolution production (< 100 µm) and extremely short cycle times at volumes of up to 2000 x 1200 x 300mm³. It is possible to remove entire areas of coating on these panes so that sensors have a clear view through the windscreen at a cycle time of less than 30 seconds.

Another challenge for laser processing is posed by smart windows, which contain two electrodes, between which there may be liquid crystals or electro-chromic materials that are actively switched by the electrodes. When an electrical voltage is applied, these coatings either become opaque or darken. The laser can structure the electrodes into segments to make them appear more homogeneous. The track width during structuring can be as low as 10 µm, with the glass substrates measuring over 2 x 3m² and the processing system is designed to run on a production line 24/7.

Taking inspiration from sharks
State-of-the-art technology from 4Jet can cut fuel costs for aircraft and ships. Fine grooves about the diameter of a human hair – riblets – are incorporated into the paintwork to significantly reduce air resistance. This ‘shark skin’ effect is achieved using LEAF (Laser Enhanced Air Flow) technology, which uses laser interference texturing, where the laser beam is first split and then recombined. This allows the oscillations of the electro-magnetic fields of both partial beams to be superimposed in a controlled manner, resulting in a periodic pattern within a single laser spot. This method makes it possible to create 1m² of riblet surface in less than a minute.

Made to measure
Lasers need to meet entirely different requirements when used in the production of goblets. The aim here is to separate the cap from the goblet and create a pleasantly shaped mouth rim. In the conventional two-stage process, a small flame was first used to heat the glass locally, after which a CO₂ laser took over. In the second stage of the process, thermal stress was induced to snap the cap off, which was done using a cold stream of air, for example, after which the cap then had to be removed mechanically.

The original cutting process required extensive post-processing of the mouth rim, such as grinding and flaming. These subsequent processes took a lot of time and resulted in additional costs, while also resulting in additional breakage. This is avoided with laser systems in which Coherent’s SmartCleave process is used. The company originally developed the process and the laser systems to process untempered and tempered flat glass. It then adapted this method for goblet glass production in co-operation with iPROTec. The goblet hangs in a fixture at the top, so that the cap drops down at the end of the process. In the first step, an ultra-short pulse (USP) laser produces thin filaments in the glass in the infrared spectrum (1030nm). One pulse corresponds to a filament with a diameter of 0.5 to 1 µm.

Depending on the type of glass, the system can cut glass up to 3 to 4mm in thickness in a single pass. The pulse duration, pulse shape and non-linear optical effects in the glass are decisive here. Glass up to a thickness of 12mm can be perforated in this way but several passes are required for thicker glass. The thermal stress subsequently applied causes the glass to break along the filaments with high precision. In addition to this high accuracy, the quality of the edges is very high, with a surface roughness in the region of 0.5 µm. Depending on the application, this means that post-processing steps can be done away with, saving time and money and reducing the environmental impact. If the glass is too thick and too large or if the contours to be cut are too simple, the economic advantages of the process are lost.
The SmartCleave process is not only used in the production of tableware but also in medical technology, in the production of glass wafers, as well as display and cover glasses. SmartCleave laser subsystems can be integrated into any existing system. The more demanding and intricate the task, the more suitable the process. Even closed contours can be cut out, as long as the aspect ratio is not too large and the holes are not too small. For very intricate holes smaller than approximately 2mm, Coherent offers another method: Ablation and ‘milling’ with ultra-short pulse lasers, all of which is contactless, tool-less and can be integrated into other systems.

Who are you and where are you from?

Track and trace is another buzzword. Nanosecond lasers in the UV range, USP lasers in the green range or in the red range are particularly suitable for structuring and marking glass. The shorter the pulse, the less damage is done to the glass because no heat is transferred into it. The structures are formed in the micrometer range.

If 100% traceability and identification of products is possible, it will be more difficult to put counterfeits on the market, increasing safety for users and consumers.

Faster processing and higher edge quality with the laser sword

Cutting laminated safety glass is still a time-consuming task in comparison to float glass. One time and cost driver is the time it takes to heat the laminated film after breaking. As a rule, an infrared heater is used for straight cuts, which heats the film so that it can be separated mechanically in the next step.

Heating is comparatively time-consuming and is not particularly precise but covers a broader area, which can cause delamination at the edge of the glass. HEGLA GmbH & Co KG is already experienced with laser technology during mould cutting. In collaboration with the laser specialists at HEGLA boraident, it came up with the idea of accelerating the heating process for straight cuts using a diode laser and at the same time improving the edge quality. The results are impressive.

The ‘laser sword’ heats the foil precisely where it is needed with individual laser diodes, which are positioned in a straight line. Thermoplastic heating is concentrated on where the cut is required, with even greater precision than before. Numerous parameters are used to individually control the required power density, including the diode current and spacing, as well as the oscillation path and the oscillation speed. The heating process is thus more than halved, allowing the user to save a considerable amount of time and money when processing large quantities. Delamination is a thing of the past.

Diode lasers also have a longer service life than infrared heaters. Even special foils made of harder materials are easy to cut using this laser technology. This ‘cold heating process’ adds value to the product wherever edges of cut laminated glass can be seen and in structural glazing. In serial cutting in particular, diode laser heating could replace the infrared tube as a heat source and quickly recoup the additional investment simply due to the significantly higher productivity with otherwise the same system.

This innovative heating technology was presented for the first time at Vitrum in Milan this October, where it was integrated into a prototype system for demonstration purposes.

Further information:
VDMA Forum Glass Technology, Frankfurt am Main, Germany
tel: +49 69 66 03-12 59
e-mail: glass@vdma.org
web: glass.vdma.org/en

Glass processing machines since over 100 years

- Solar glass rolling machines up to 280 tpd output per line
- Cast glass rolling machines
- Wire mesh feeding equipment
- Wire mesh tearing machines
- Cast glass cutting lines

- Refractory cutting and milling machines
- Glass cutting machines
- Glass surface and grinding machines
- Spare parts for drawing machines, rolling machines, glass cutting lines and according requirements

We are precision and stability.
It’s really scary not to have the full picture!

Complete control, guaranteed.

Not just information — All information www.iris-im.com

**Adopt Glass Bottle to Save Earth**

**Kühnreich & Meixner**
Frankfurt am Main - Germany
Tel: +49 (0) 69 - 55 14 79
Fax: +49 (0) 69 - 55 26 51
info@kuehnreich-meixner.com
www.kuehnreich-meixner.com

**GLASSPrint 2019**
**27-28 NOVEMBER 2019, DÜSSELDORF, GERMANY**
LAST CHANCE TO ATTEND!
www.glassprint.org

**Glass level measuring**

**Inspection**

**UL-GmbH / UL-GLASS**
WORLDWIDE SERVICE FOR GLASS
Harthäuser Weg 30 D-77753 Karlsruhe Germany
Tel: +49 7231-6203 Fax: +49 7231-620395 Email: office@ulglass.de
Web: www.ulglass.de / www.ulglas.de

**Glass Worldwide**
Latest industry news and highlights from this issue at www.glassworldwide.co.uk

**Glass is inert and wholly recyclable**
**Glass bottle is environment friendly and hygienic**
**Contents in glass bottle cools faster and is refreshing**

**The All India Glass Manufacturers’ Federation**
812 New Delhi House, 27 Barakhambha Road, New Delhi-110001, India
Telephone: +91 11 23316507 Fax: +91 11 23350357 E-Mail: info@aigmf.com Website: www.aigmf.com

**Parc du Chêne, 14 rue du 35ème Régiment d’Aviation, F-69500 BRON, France**
phone: +33.(0)4.72.78.35.27
e-mail: contact@iris-im.fr

www.iris-im.com
Inspection & Forming Controls

**Optimize Your Glass Operations**

1-800-PRAXAIR

www.praxair.com/glass

**HOT TOPICS**

For latest industry news and highlights from this issue, visit www.glassworldwide.co.uk

**Metal Recycling**

We love copper based alloys!

WINNEN-Metall recycles scraps and shavings into specialized alloys (ingots). Call us: +49 2371 4914!

**Process Control**

Explore the Possibilities for a Sustainable Efficient Future

**Screenprinting**

IMPROVE Percentage packed Quality Traceability

www.vertech.eu

**Scrapers**

Make a Lasting Impression

- Digital cylinder printers
- Pretreatment systems
- Inks for digital, pad and screen printing

+1 978 646 8980 | info@inkcups.com

www.inkcups.com

**Screen printing technology to produce the perfect screen**

Grunig-Interscreen AG

www.grunig.ch

**Melting Technology**

Optimize Furnace Life

smartmelter

www.smartmelter.com

**Measurement Systems**

PENICO MOULD GAUGE EQUIPMENT

Penico Gauges Limited

Albion Works, Keighley Road Bingley, BD16 2RD, UK

Tel: +44 (0) 1274 51044

Fax: +44 (0) 1274 510770

E-mail: info@penico.com

Web Site: www.penico.com

**Scrapers**

TO PLACE A CLASSIFIED ADVERT

+44 (0)1342 322133

or email sales@glassworldwide.co.uk

**Screening Scrapers**

IMS Engineering

TWO WORLDS JOINED TOGETHER Scrapers for the world

IMS Engineering Ltd Co.Durham, UK

www.imsengineering.com

Longwall Services Inc Pennsylvania, USA

www.longwallservices.com

**Screen print your vision**

Ferro. Where innovation delivers performance.

For outstanding glass color and coating technologies.

www.ferro.com

**Quality Traceability**

Winnen-Metall GmbH & Co. KG

Iserlohn (Germany)

www.winnen-metall.de

Aluminium bronze (minax)

Aluminium nickel bronze • Brass Special brass • Gunmetal • Tin bronze

**TWO WORLDS JOINED TOGETHER**

Scrapers for the world

WINNEN-Metall recycles scraps and shavings into specialized alloys (ingots). Call us: +49 2371 4914!

**We love copper based alloys!**

WINNEN-Metall recycles scraps and shavings into specialized alloys (ingots). Call us: +49 2371 4914!
DIGITAL SCREEN PRINTING HOT STAMPING
FULLY AUTOMATIC UNIVERSAL DECORATING MACHINES

TO PLACE A CLASSIFIED ADVERT telephone +44 (0)1342 322133 or email sales@glassworldwide.co.uk

KOENIG & BAUER KAMMANN GmbH

High Tech Printing and Coating Equipment
- RKS System and Carbon Squeegees
- RKS Squeegees & Holders for PVT and Micro Electronic printing
- RKS Squeegee grinding technology
- RKS Special application machinery
RK Siebdrucktechnik GmbH
Nülbauweg 31
51030 Köln Germany
Tel: +49 (0) 2205 949970
info@rk-siebdruck.de

www.rk-siebdruck.de

WEBSITE: glassworldwide.co.uk

Drying for printed glass...
...made clear
natgraph.co.uk
+44 (0) 115 979 5800

Natgraph

Classified

Vacuum Pumps

Pneumofore

D A Oldfield Ltd

Ware Handling

D A Oldfield Ltd

Ware Handling

Hotwork

Services

Hotwork International
Law - N2 Combustion Technology
E6Or - the total Combustion Concept
Fabrikbrasse 1 g
8600 Erlen
Switzerland
Tel.: +41 (0) 71 649 20 99
Fax: +41 (0) 71 649 20 99
E-Mail: vorstand@hotwork.ag
Web: http://www.hotwork.ag

Worldwide supplier of glass furnace heating, expansion control supervision, regenerator sulfate burnouts, glass draining with hot water recycling, wet cut-off, furnace cool-downs and hold hots, and electronic crown rise monitoring. The only continuous operating Hotwork heating company since 1965 and proud sponsor of -
THE PHOENIX AWARDS COMMITTEE
Hotwork-USA, 223 Gold Rush Road
Lexington, KY, USA 40503
1-859-276-1570
www.hotwork.com

TO PLACE A CLASSIFIED ADVERT +44 (0)1342 322133

UV curing

uviterno

efficient curing UV Curing Systems UV-Härtungssysteme

uviterno ag
Bärnackstrasse 2a
71542 Bärnack
Phone: +41 71 747 41 51
E-Mail: uviterno@uviterno.com
Website: www.uviterno.com

SUBSCRIBE TODAY

to receive future copies and download content, visit www.glassworldwide.co.uk
Subscribers receive a FREE copy of the Who’s Who / Annual Review Yearbook!
Forthcoming events

NOVEMBER 2019
8 November: ATIV Training Course on Industrial Emission Directive (Parma, Italy)
12-14 November: GlassTech Asia 2019 (Jakarta, Indonesia)
13 November: ‘Fundamentals of Glass’ / GTS training programme (Sheffield, UK)
20 November: CelSian expert training session on Heat transfer in glass melting furnaces (Istanbul, Turkey)
20-21 November: Colombia Glass (Bogota, Colombia)
21 November: Glass Focus (Sheffield, UK)
21-22 November: Sisecam International Glass Conference/34th Sisecam Glass Symposium (Istanbul, Turkey)

27-28 November: GlassPrint 2019 (Dusseldorf, Germany)

28 November: British Glass health and safety leadership seminar (Derby, UK)

DECEMBER 2019
11-12 December: CelSian expert training session on Fining, redox and glass quality (Eindhoven, the Netherlands)

FEBRUARY 2020
25-26 February: Glassman Asia (Seoul, South Korea)

MARCH 2020
23-26 March: ICCG13 (Braunschweig, Germany)

APRIL 2020
13 April: GPD China (Shanghai, China)
14-17 April: China Glass (Shanghai, China)
18-19 April: Deco ‘20 (Cleveland, USA)

MAY 2020
7-13 May: Interpack 2020 (Dusseldorf, Germany)
13-14 May: Glassman Latin America (Monterrey, Mexico)

JUNE 2020
3-4 June: Furnace Solutions Conference 15 and training day (Stoke-on-Trent, UK)
3-6 June: Glass South America (Sao Paulo, Brazil)
4 June: GPD South America 2020 (Sao Paulo, Brazil)

8-11 June: Mir Steklo 2020 (Moscow, Russia)
15-19 June: Joint USTV/DGG annual meeting (Orleans, France)
17-19 June 2020: Intersolar Europe (Munich, Germany)
24-26 June: ATIV International Conference (Parma, Italy)

SEPTEMBER 2020
15-17 September: GlassBuild America 2020 (Las Vegas, USA)
20-24 September: ICG/ESG Annual Meeting (Kراكow, Poland)

OCTOBER 2020
20-23 October: glass-tec 2020 (Dusseldorf, Germany)
26-29 October: 81st Conference on Glass Problems (Columbus, USA)
NEW!

Non-Contact Optical Registration Vision System for the Strutz Chainless CLS-175 and CLS-200 Decorators

The revolutionary Strutz high production body and shoulder decorating machines now feature:

- Optical registration camera with servo control eliminating contact with glass beverage bottles
- Easy control of seam angular position or print placement on bottles with operator interface
- Detection using existing lugs on bottles, quality Plant Symbol, or Mark
- Up to 200 pieces per minute
- CLS-175 decorates body and shoulder of large bottles up to 1.25 liter
- CLS-200 machine provides optimum production for body and shoulder decorating typical 12 oz. bottles at speeds of up to 200 BPM

Performance Proven Worldwide

For information on the complete line of STRUTZ equipment and services, visit our website:
www.strutz.com

Strutz International
P.O. Box 509 • Mars Valencia Road • Mars, PA 16046 • U.S.A.
Tel: (724) 625.1501 • Fax: 625.3570 • E-Mail: info@strutz.com
Improving combustion can enable you to increase glass production, reduce fuel consumption, enhance glass quality, and reduce emissions, such as NOx, SOx, CO₂, and particulates. Let Air Products’ in-house modeling and melting experts help you get there.

For more than 70 years, we’ve delivered safe oxygen solutions, from our very first oxygen enrichment applications to our continuously evolving portfolio of low-emissions Cleanfire® oxy-fuel burners. You can count on Air Products for reliable gas supply and to help optimize your production—just like we have done for hundreds of furnaces all over the world.

Contact us to put the skills and experience of our global team to work for you. Optimal melting takes one key ingredient: Us.

To make glass better, put us in the mix.