glass machinery world plants&accessories

BI-MONTHLY INTERNATIONAL MAGAZINE FOR GLASS MANUFACTURING

YEAR 33 • ISSUE NO. 3/2020

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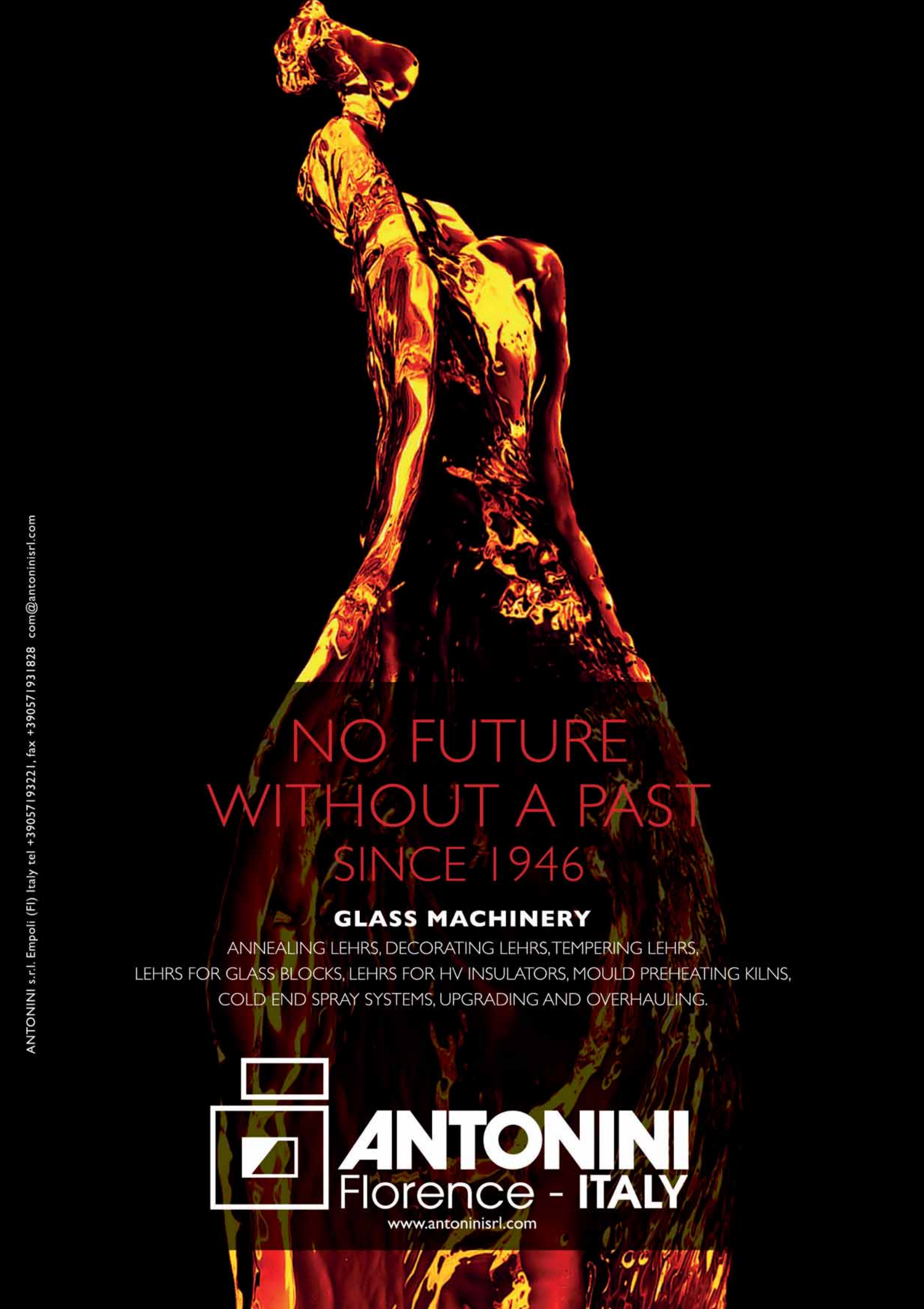
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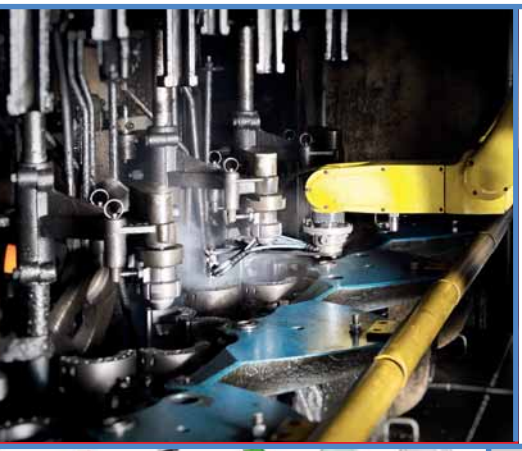




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2020 FAIR CALENDAR

The magazine will be distributed at the following Trade Fairs

issue	exhibition/conference	date	venue	deadlines
2020 1	GLASSMAN ASIA	Postponed to 15-16 June	SEOUL South Korea	
	COSMOPACK	Postponed to 3-6 September	BOLOGNA Italy	
2020 2	CHINA GLASS	Postponed	SHANGHAI China	
2020 3	INTERPACK	Postponed to 2021	DÜSSELDORF Germany	
	GLASSMAN LATIN AMERICA	Postponed to 19-20 November	MONTERREY Mexico	
2020 4	XXXIV INT'L ATIV CONFERENCE	Postponed to 13-14 May 2021	PARMA Italy	
	MIR STEKLA	Postponed to 7-10 June 2021	MOSCOW Russia	
2020	Glass Industry Directory NEW CONTENTS			Editorial files: 12-06-2020 Deadline Adv files: 26-06-2020
2020 5	GLASSTEC	20-23 October	DUSSELDORF Germany	Editorial files: 07-09-2020 Deadline Adv files: 21-09-2020
	ALL GLASSTEC EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE GLASSTEC PREVIEW			
2020 6	CONFERENCE ON GLASS PROBLEMS	26-29 October	COLUMBUS (OH) USA	Editorial files: 02-10-2020 Deadline Adv files: 16-10-2020
	GLASSTECH ASIA	17-19 November	BANGKOK Thailand	

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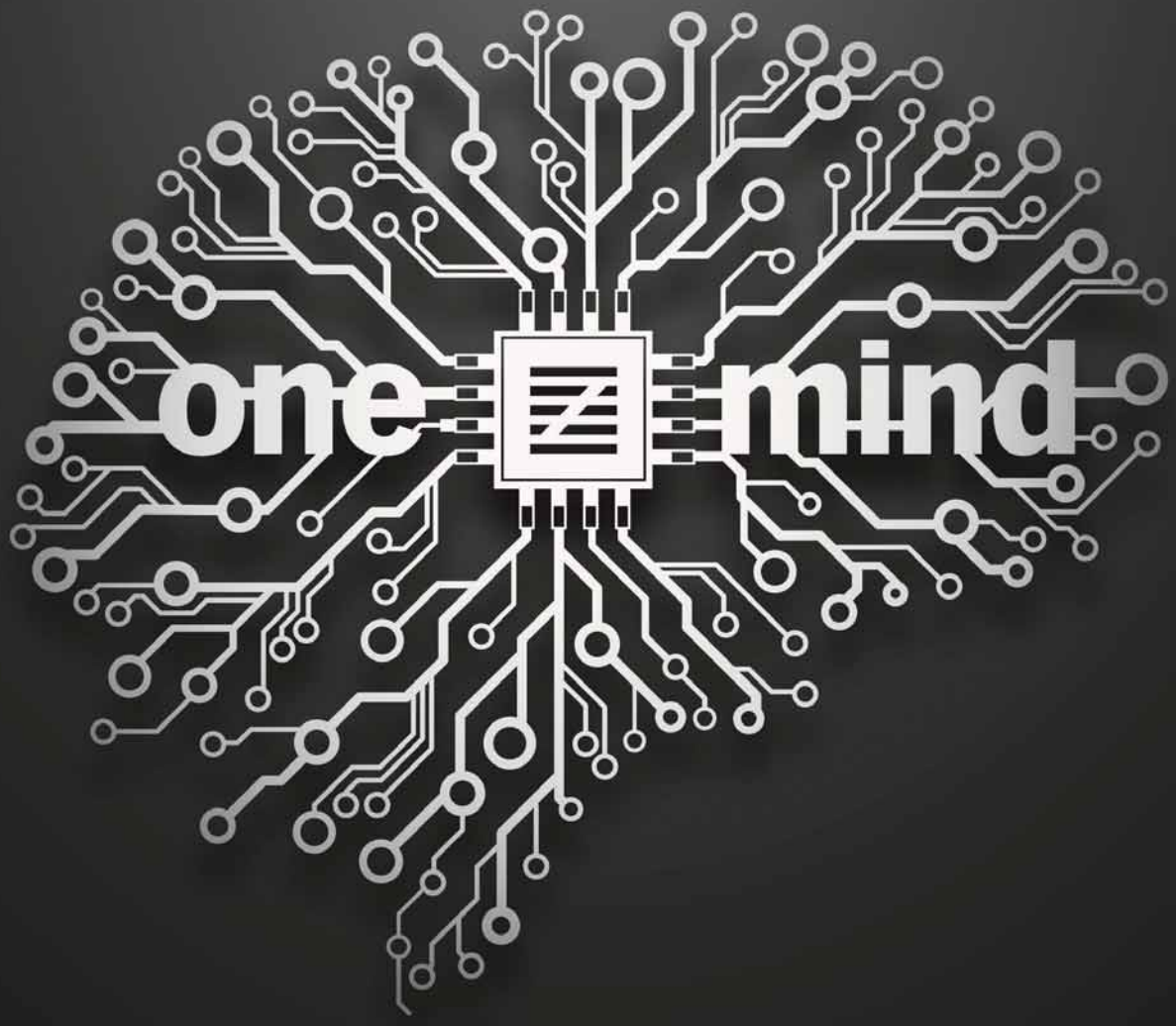

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REVIMAC

Intelligence with strength, Industry 4.0 ready

Revimac has just released an update on its three axis RSS100 Servo Stacker consisting of a new gearbox and servo motors to suit a major update on the software interface. This update is now granting speeds up to 22 cycle per minute.

The RSS100 Servo Stacker is based on a three-axis scheme. The combined motion of the three brushless servomotors, operates with movement very close to human arm and fore-arm motion, and allows for operations of approaching, pur-suit, loading, and back cycle, always maintaining full control in each phase. Through the user-friendly interface it is intui-tive for the personnel to customize curves and movement profiles to fit any type of glass container.

The push bar on the RSS100 Servo Stacker can be safely and quickly replaced thanks to its dedicated “bar change” cycle, which folds back the arms and rotates the main beam by 90°, getting the bar in an easy position for maintenance.

TECHNICAL DETAILS

max. Number of cycles: 22/min.
speed limit: 1200 mm/sec.
max. Ware height: 500 mm
max. Pursuit stroke: 1000 mm
max. Loading stroke: 500 mm
position accuracy: top speed 0,9 mm
position accuracy: low speed 0,5 mm

With the machine in this position, the space in front of the annealing lehr is completely free, allowing cleaning and maintenance operations not only for the stacker, but also for cross conveyor and annealing lehr.

With the new self-learning function, the stacker will auto-matically manage the loading profile with few inputs and phase the loading curve by detecting the speed of the IS machine.

The control cabinet (to be placed inside the air-condi-tioned control room) contains the Motion Controller con-nected to an industrial PC, which functions as an HMI (touch screen 15”).

The main characteristics of the operator interface are:

- Preview loading curve simulation
- Simplified management of the loading curve by setting 4 commands only (approach speed, pushing speed, start and end position)

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HORN

Progress on expansion of new building wing at headquarters

HORN Glass Industries AG in Plössberg, Germany, has announced that progress in ongoing on the expansion of new building wing at its headquarters.

At the moment, the workers are smoothly plastering the inside and outside of the masonry and completing the electrical installation, with all components in the building having digital accessibility. Whether lighting, heating, blinds, locking and alarm systems, everything can be controlled digitally. Even subsequent conversions within the building are easily possible.

Another important fact: the system is not cooled by air conditioning, but by component activation. Pre-installed pipes with cold water cool the rooms without draught or noise. The integrated ventilation system ensures a pleasant room climate thanks to constant but unobtrusive air circulation.

60 employees will find a new vocational home in the complex. Smaller office units, fitted for 2-3 people, instead of open-plan offices, enable the teams to create an inspiring and productive working atmosphere. The project is scheduled to be finished by mid 2020.

WWW.HORNGLASS.COM/EN

FORGLASS

Highly customised batch plant for Saint-Gobain ISOVER

The **Saint-Gobain ISOVER** plant in Chemillé, France was constructed some 10 years ago, and the company recently decided to expand its glass wool production by constructing a second furnace.

Calculations showed that the capacity of the batch plant was sufficient to supply both furnaces. What was needed was an additional line for transporting the mixed batch to the new furnace, fully integrated with the existing control system. To complete this technologically challenging project, Saint-Gobain chose **FORGLASS**.

FORGLASS designed, constructed and delivered the technology line consisting of batch transport together with the control system, custom-tailored to seamlessly integrate with Saint-Gobain's existing automation. FORGLASS also designed and installed a special filtration system for the new line.

The new line had to blend in with the overall architecture of the factory. Additionally, no modifications of the building and existing structures were allowed, so FORGLASS had to design all of the components of the new line to not only be delivered through existing openings of the building, but to also fit with and around existing equipment.

Thanks to FORGLASS' work, the Saint-Gobain ISOVER plant in Chemillé was able to start the new production line on time.

WWW.SAINT-GOBAIN.COM/EN/ISOVER

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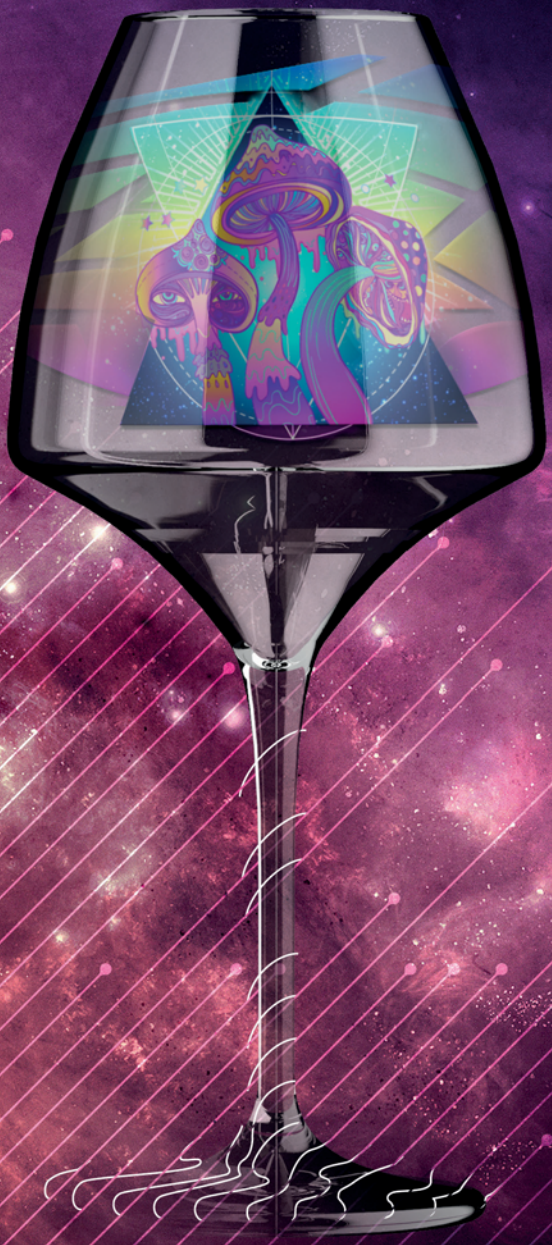

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VETROPACK AUSTRIA

Payments reported

Vetropack Austria GmbH anticipated a payment of arrears on canal dues to the municipality of Kremsmünster of approximately EUR 4 million. The company has now found that annual reports to the authorities regarding effluent quantities and air emission values of the Kremsmünster plant were not correct. At no time has there been any danger to health and the environment.

In the years 2010 to 2019, the annual reports transmitted to the competent authorities were incorrect. The municipality of Kremsmünster, Upper Austria, as the competent fiscal authority for canal dues, and the district governor's office (Bezirkshauptmannschaft) of Kirchdorf, Upper Austria, were informed accordingly.

The comprehensive documents and expert reports (DI Roland Hohenauer, Büro Dr. Lengyel ZT Ltd, and DI Reinhard Ellinger, Laboratorium für Umweltanalytik Ltd) that have now been handed over to the municipality of Kremsmünster and to the district governor's office of Kirchdorf demonstrate that all applicable threshold values for both substances contained in effluents and air emissions were observed, and for the major part even clearly undercut, in the years 2010 to 2019.

How and why the transmission of incorrect values came about is not clear yet. The internal investigations in that respect are still underway. It is certain, however, that the management was not aware of the transmission of incorrect values and has taken all necessary steps to remedy these shortcomings immediately after being informed about the situation.

Vetropack Austria GmbH deeply regrets that incorrect values were reported to the authorities and is now working at full speed to establish compliance with official notifications.

WWW.VETROPACK.COM

AGR INTERNATIONAL

Sales office in Japan opened

As the packaging markets in Asia and the surrounding region continue to expand, **Agr International** has recognized significant growth in demand for its quality management and process control equipment for glass and plastic containers.

This is evidenced by an ever expanding customer base in this region, and the establishment of an office in Japan, headed by Mr. Satoshi Okura, is intended to meet this growing demand with a direct sales and service operation centrally located in the region, utilizing factory-trained Agr personnel. The office in Japan will primarily focus on the needs of the growing plastic container industry but will also lend support to the glass container and filling industry within the region.

Mr. Okura holds a graduate degree in Business Management from Canadian International College, he is a veteran within the Glass and Plastic industry and has extensive business experience in South-East Asia.

Mr. Okura brings with him experience with Agr equipment that extends over sixteen years, before accepting this opportunity, he held positions with Agr distributors servicing the Japanese market handling Agr and TopWave equipment for the plastic industry as well as Agr's glass equipment in the container industry.

Agr Japan, under Mr. Okura's direction, will provide sales and service support for Agr's complete line of products. The new office is part of the Agr Bangkok Ltd. Territory and the overall Management will be provided by Mr. Martin Küestner.

Agr International Inc. develops and manufactures a full line of laboratory and on-line testing/quality and process management devices for glass and plastic containers and similar products. American Glass Research, a division of Agr International provides a wide range of testing, training and consultative services to the worldwide glass industry. The Agr headquarters and main manufacturing facility is located in Butler, PA, USA.

WWW.AGRINTL.COM

ALLIED GLASS

Spray line investment

Allied Glass is expanding its decoration capability with a new spraying line dedicated to the decoration of premium spirit bottles, offering the ability to coat the glass with eco-friendly water-based sprays.

The new line can spray the whole bottle, or only specific parts with one or more colours. A full range of gloss, matt, semi matt, opaque, translucent and clear lacquer paints are to be available and specific colours can be requested according to Pantone references, thus giving the possibility to achieve many different effects for premium spirit bottles.

"This dedicated spray line will enable Allied to expand on the decorative effects we offer, which more and more of our clients require," said Gary Steen, Head of New Business at Allied Glass. "We offer screen printing and single or multi-colour spraying. Brand owners appreciate the value these effects can add to their bottles. Spraying can achieve the impact of coloured glass at less cost and screen printing can be applied over graduated spraying. The range of colours and effects offered by organic printing processes is almost limitless."

WWW.ALLIED-GLASS.COM

O-I

Spirit makers produce hand sanitizer in glass packaging

O-I is part of the food and beverage supply chain which has been deemed essential by many governments around the world..

Breweries and distilleries worldwide are pivoting from alcoholic beverages to hand sanitizer during the COVID-19 health crisis, and leaning on glass containers made by O-I plants to package the sanitizer.

Faber Liquors and Jacquin's, Pennsylvania's top two leading production distilleries, are launching what's described as a "massive" production of hand sanitizer. By using alcohol donated by Jacquin's, Faber Liquors is pivoting from making 45,000 bottles of spirits each day to 120,000 bottles of hand sanitizer daily instead. Hospital workers and other first responders get the first choice at distribution.

"Everyone on the frontlines fighting this virus or supporting other life-sustaining activities is in desperate need of hand sanitizer and we didn't hesitate in changing course," said Faber's Ashleigh Baldwin.

Faber is packaging the hand sanitizer in 1 liter glass bottles. The distillery turned to longtime partners, O-I Packaging Solutions in Plano, Texas, for its very large packaging order. The O-I Packaging Solutions team and O-I's plant in Guadalajara, Mexico, moved into high gear to get Faber the bottling supplies it needs to meet the critical demand.

"As a team, many players had to respond quickly to provide the support, from our Plano office to the Mexico plant and the commercial team to make this happen quick," said Susan Mosher of O-I Packaging Solutions. Mosher said the O-I teams are proud to be "providing glass and to be part of something great to help others knowing the end product was going to local hospitals."

Jason Macklow is the founder of Good George Brewing in Hamilton, New Zealand. The brewery is known for its craft beers and pubs in New Zealand; Good George also started dabbling in spirits about a year ago.

When Macklow went to the store to buy hand sanitizer for his team, the shelves were wiped bare. After a customer told him that breweries overseas were making hand sanitizer in response to the shortages, Macklow decided to use his still, which was typically reserved for making gin and

whiskey, to make hand sanitizer. It's called Operation Helping Hands.

Good George makes the Operation Helping Hands hand sanitizer from a recipe supplied by the World Health Organization (WHO). The brewery chose to package it in 946 ml "Made in New Zealand" glass bottles, made by O-I Glass New Zealand. Using glass packaging the brewery was already familiar with meant the team could get the hand sanitizer to market quicker.

The first 1100 bottles went to the brewery's employees, at-risk families and people who work in essential services in the Hamilton community. Good George is now trying to figure out if they can work with suppliers to start distributing.

WWW.O-I.COM

GERRESHEIMER

Robust business model

Gerresheimer AG's stable business model has stood its ground in the current challenging global situation.

Dietmar Siemssen, CEO of Gerresheimer AG, said, "We are a key supplier to the pharma and healthcare industry. In the current situation, our pharmaceutical primary packaging and drug delivery devices are more important than ever. We play a crucial role in supplying the population with medical drugs. This makes us part of the critical infrastructure in each country we serve. Delivering on this responsibility, we do everything in our power, together with our customers and our dedicated workforce, to safeguard our production and hence keep patients supplied worldwide. We confirm our growth forecast for 2020 and continue to work on implementing our growth strategy for the years ahead."

After 2019, 2020 is another year of major capital expenditure at Gerresheimer. This centres on growth projects, building up capacity, process optimization and digitalization. Inhaler production is being expanded at the plant in the Czech Republic. In North Macedonia, Gerresheimer is building a new plant to produce medical plastic systems and syringes. Capacity for primary pharmaceutical plastic packaging is being expanded in China, India and Brazil. The Company is investing in the digitalization of its production and quality processes as well as in smart, connected products.

Gerresheimer generated revenues of EUR 304 million in the first quarter 2020, compared to EUR 309 million in the prior-year quarter. The core business grew slightly, while there were negative effects from the changeover in the business model at acquired Sensile Medical. Business with pharma bottles, injection vials, ampoules and cartridges performed well worldwide, especially in North America. Good revenue growth was generated in the first quarter 2020 with pre-fillable syringes. The first quarter 2020 brought an increase in business with engineering and tooling for new medical plastic products. Revenues from prescription drug plastic packaging for American pharmacies were temporarily down in the first quarter 2020.

Adjusted EBITDA stood at EUR 51 million in the first quarter of 2020, compared to EUR 54 million in the prior-year quarter. Excluding negative effects from the changeover in the business model at Sensile Medical, adjusted EBITDA in our core business was consequently on a par with the prior-year period. Adjusted net income came to EUR 14 million in the first quarter of 2020. First-quarter 2020 adjusted earnings per share after non-controlling interests amounted to EUR 0.43.

Net financial debt stood at EUR 1,053 million at the end of February 2020. Adjusted EBITDA leverage was 3.4x. Gerresheimer successfully secured the refinancing of the EUR 190 million promissory loan ahead of its November 2020 maturity date by way of an agreed bridging loan commitment with a two-year term. A new promissory loan issue to replace the loan commitment is planned as soon as a favorable time window presents itself.

WWW.GERRESHEIMER.COM/EN/INVESTOR-RELATIONS/REPORTS.

GPI, FEVE and FERVER

Reiterating the importance of glass manufacturing

The US Glass Packaging Institute (**GPI**), the European Container Glass Federation (**FEVE**), and the European Federation of Glass Recyclers (**FERVER**) released the following statement to thank all employees for their determination and commitment to keep glass manufacturing supplying essential industries during the COVID-19 pandemic, "The glass container industry, their staff and supply chain partners play essential roles on behalf of food, beverage, and pharmaceutical companies. To guarantee the effective supply of for-sale, in-store packaged food and beverages, the glass manufacturing industry must remain operational as 'essential' throughout the duration of the pandemic. A disruption to the food and beverage packaging industry would greatly impair the public's ability to purchase food and beverages at their grocery store at a time when demand is up considerably, and those outlets remain vital to food security around the globe."

In addition to the various measures that have always been implemented by the members of GPI, FEVE and FERVER to protect their employees and guarantee their safety, additional actions are being taken to ensure their health and well-being as the situation evolves. "Glass manufacturers both in the United States and the European Union work diligently to protect the safety and health of their employees while continuing to ensure the supply of new glass bottles and containers for the food, beverage, and pharma sectors. GPI, FEVE, and FERVER are closely following the guidelines and recom-

mendations published by the World Health Organization (WHO) and other relevant authorities and are monitoring the situation carefully. Employee safety is our first priority and paramount, especially during this uncertain time."

In this context, the waste collectors and the recycling sector are also crucial to ensuring the continued supply of essential glass packaging for the food and beverage industries. Hence the importance of continuing to recycle glass packaging in the appropriate bins. The sourcing of local materials from recycling activities to produce new glass containers will continue to enable the industry to work locally and to maintain its production at a sustained level.

"The role of recycling in the supply chain of glass packaging is crucial. In North America, recycled glass content averages one-third of every new container (1), and in the EU, that content is 52% on average (2). Using recycled glass by leveraging local waste does not only reduce dependency on virgin raw materials but also contributes to both a more sustainable environment and economy. Glass recyclers and manufacturers need high-quality material in order to produce high-quality jars, bottles, and containers. We therefore encourage governments to continue their recycling programs especially during this critical time, so that glass manufacturers can remake new, safe products that support the global health system and our food, beverage and pharmaceutical industries."

"GPI, FEVE, and FERVER remain fully committed to glass manufacturing and recycling. Our organizations stand closely together to continue bringing glass bottles and containers from the factory to the table in this challenging time."

(1) GPI – Precision Consulting

(2) **FEVE – Life Cycle Assessment**

WWW.FERVER.EU FEVE.ORG WWW.GPI.ORG

REVIMAC

Project Myanmar

In 2019, *Siam Glass* selected **Revimac** as supplier of reconditioned section boxes for the IS Machines installed in their plants in Thailand. These new contracts are the result of a continuous fruitful cooperation between Revimac and Siam Glass.

The complete project is about the reconditioning of 46 sections that will renew five IS Machines. Once the reconditioning is complete, specialized Revimac personnel will take care of on-site installation and production start-up.

Being first is always rewarding and for the first glass bottle production in Myanmar (Siriam project), Revimac will supply four IS forming machines complete with Feeders.

WWW.SIAMGLASS.COM

WWW.REVIMAC.COM/EN/

The production plant is a joint venture between the Thai producer OSOTSPA (Siam Glass Industry) and Myanmar Golden Eagle, it will be commissioned during the first quarter of 2021 and will serve mainly the local market.

ARDAGH

Returnable afri cola bottle from

Ardagh Group has worked closely with German cola brand afri cola to produce a new, returnable one-litre glass bottle, to meet the popular cola brand's consumer demand for more glass packaging.

afri cola was established in Cologne, Germany in 1931. In the 1960s, the brand introduced a 200ml ergonomically designed glass bottle shape, that has since become a brand symbol. A 330ml glass bottle followed in 2015 and now the one-litre glass bottle is also based on this iconic shape. The white 'palm tree' brand logo is printed directly onto the glass using the ceramic screen-printing technique. Two main cola flavours will be launched in Germany in April 2020: afri cola and sugar-free afri cola ohne zucker.

Gerd Gründahl, CEO Niehoffs Vaihinger Fruchtsaft GmbH said on the new bottle, "Today, sustainability is incredibly important. Consumers have become more discerning and try to integrate sustainable packaging into their daily routines. This has had a real influence on the packaging of non-alcoholic drinks: our consumers have asked us for a one litre, returnable afri cola glass bottle – a demand which we've met with pleasure."

Six-bottle returnable crates will be available in retail, specialist drink shops and wholesalers.

ARDAGHGROUP.COM/GLASS.

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SCHOTT

Smart Containers: a new era in digitized pharma manufacturing

Vial 10R, lasercode 1x1 mm - the data matrix code on each Smart Container can be as small as 1 x 1 mm, which equals 14 x 14 dots. Image: SCHOTT

In light of the growing need for pharmaceutical packaging innovations and digitalization, international technology group **SCHOTT** is introducing Smart Containers: a concept that enables Industry 4.0 for pharma manufacturers to unlock the power of machine vision and big data analytics on pharmaceutical filling lines.

"SCHOTT Smart Containers enable control over pharmaceutical glass packaging at the most granular level available – the individual unit," said Diana Löber, Global Product Manager Vials at SCHOTT. "We're unlocking a new era in digitized pharmaceutical manufacturing toward real-time release and taking advantage of the latest developments in machine vision and data science."

Each Smart Container is marked with a data matrix code that can be as small as 1 x 1 mm, which equals 14 x 14 dots. Developed according to ISO/IEC 16022, the numeric or alphanumeric machine readable code contains 16 or 24 digits, leading to sextillions of possible individual unique numbers. For vials, the unique identifier is positioned at the bottom, hence eliminating the need to turn the container or install multiple cameras, as it would be the case if the code were placed on the body of the vial.

The code remains stable during the whole fill & finish process including washing, autoclaving, and depyrogenation up to a temperature of 600°C. It resists abrasion, and avoids the risk of particle contamination, a key advantage over solutions which need additional substances for the application of the code. Moreover, in contrast to engraving laser technologies, the data matrix code of Smart Container is applied via melting in order to maintain glass strength. By inextricably linking the code to the container at the earliest possible stage within the entire value chain, SCHOTT Smart Containers offers an advantage over systems wherein the code is attached or adhered at a later stage.

Vial 10R, bottom, lasercode 1×1 mm – the unique identifier is positioned at the bottom of the vial to eliminate the need to turn the container or install multiple cameras. Image: SCHOTT

SCHOTT.COM/SMART-CONTAINER

FORGLASS

FORGLASS

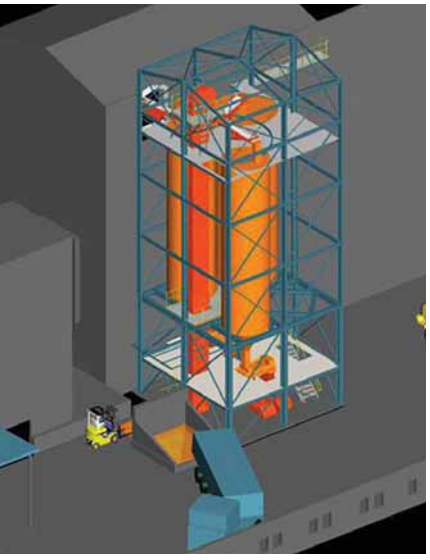
PCR cullet handling system for Stoelzle

FORGLASS, leading glass melting technology supplier, has been selected by *Stoelzle Glass Group* to design, fabricate and install a new system for handling cullet at their Köflach plant in Austria.

The unique challenge presented by the client was to increase the capacity of cullet transport and reduce its overall footprint – at the same time. The new system designed by FORGLASS will handle the unloading of PCR cullet brought in by truck or bucket loader, storing it in three new silos and dosing it directly onto belt conveyors. FORGLASS will also design and construct a steel-framed building for the entire system, which will be attached to the existing batch plant.

The proven technology provided by FORGLASS is based on dedicated equipment for unloading the PCR cullet, crushing it to a predetermined size, then transporting it via vibrating chutes and bucket elevators into the silos, especially designed to handle abrasive materials. Dosing of the material will be accomplished by belt scales, placed directly under the silos.

The client will enjoy the nearly doubled cullet storage capacity and the overall efficiency of the cullet line increased by some 25%. The compact design of the entire transport system will occupy much less space than the old system, and the batch plant will gain the ability to control cullet size, thanks to the new crusher, designed and manufactured by FORGLASS.



WWW.FORGLASS.EU/EN

HEYE

New starwheel inspection machine benefits Stoelzle

Stoelzle Oberglas in Köflach, Austria, has been successfully operating the latest glass container technology from **Heye International** for more than one year: the SmartLine 2 starwheel inspection machine proved to combine speed, reliability and flexibility to deliver accurate results. "Knowing that the SmartLine 2 was brand new, we trusted in the competence of Heye. Our long-term and proven partnership finally led us to go for this new generation of inspection machine," said Gerd Müller, Cold End Manager at Stoelzle. "And we have not been disappointed. The stable software and the modern, future-orientated user interface simplify our daily work tremendously."

Depending on the customer's requirements, various container characteristics can be checked:

- Tightness
- Finish diameters
- Container height
- Finish and shoulder checks
- Bottom and heel checks
- Body checks
- Wall thickness inspection (non-contact)
- Defects on the finish surface (LOF – line over finish)
- Out-of-round, body diameter
- Mould number reading (dot code and alphanumeric)
- Dark check inspection

The latest non-contact inspection features are integrated, as well as a self-learning system for camera-based check detection by Ranger 2.

WWW.HEYE-INTERNATIONAL.COM/

BRITISH GLASS

Glass Focus Awards scheduled for 12 November 2020

British Glass has announced that the Glass Focus Awards 2020 will take place on 12 November to once again celebrate the achievements and success of the glass industry and its supply chain.

The awards will provide a platform to shine a light on the very best designs, workers and initiatives from the glass sector – highlighting the fantastic work that continues and adapts during uncertain and challenging times. Awards will range from design of the year to sustainable practice with updated categories and criteria published in the coming weeks. The awards are open to everyone, British Glass member or not, so everyone across the glass supply chain should start thinking about the initiatives from within your business that could take home this year's trophies.

Dave Dalton of British Glass said, "The Glass Focus Awards are the showcase that displays to each other and the world the best of our industry. Now more than ever it's important to look to each other for best practice, novel and innovative ways we can overcome the challenges we face as a collective. "In these uncertain times is hard to know if we will gather in person for the ceremony in November – but rest assured, however we celebrate, the awards will shine a light on the key products, people and projects of the last 12 months.

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FEVE

Commitment to reducing sand use

Sand is a very important resource for the production of glass containers, however, the European Container Glass Industry is highly committed to reduce its use wherever possible by replacing it with recycled glass and to ensure that when it is used, sand is sustainably and locally sourced, as indicated in the Position Paper from **FEVE**. The industrial sand used for glass production must comply with very strict technical specifications in terms of chemical purity and dimension. This is different from low-quality sand taken from beaches or riverbanks generally used for construction which contains too many impurities. The industrial sand is abundant in nature and it represents less than 1% of the 50 billion tonnes of sand extracted per year. Its extraction is strictly regulated by EU, national and local legislation and by no means it can be the object of illicit trafficking. Extraction permits guarantee its sustainable sourcing as well as the rehabilitation of the quarries at the end of the extraction period. The European glass industry privileges the proximity of supply to the producing plants so that long-distance transport can be avoided and environmental and cost impacts minimised. Recycled glass is the main raw material used by the industry. One ton of recycled glass replaces 1.2 tons of sand and other virgin raw materials. Glass is a permanent material, endlessly recycled in a closed-loop and therefore the main resource of its own production. Today on average, in the production batch goes 52% of recycled glass, avoiding the depletion of more than 7 million tons of virgin sand per year. Technically glass bottles may be produced with up to 95% of recycled glass. The only limit to its use is availability and quality.

WWW.FEVE.ORG


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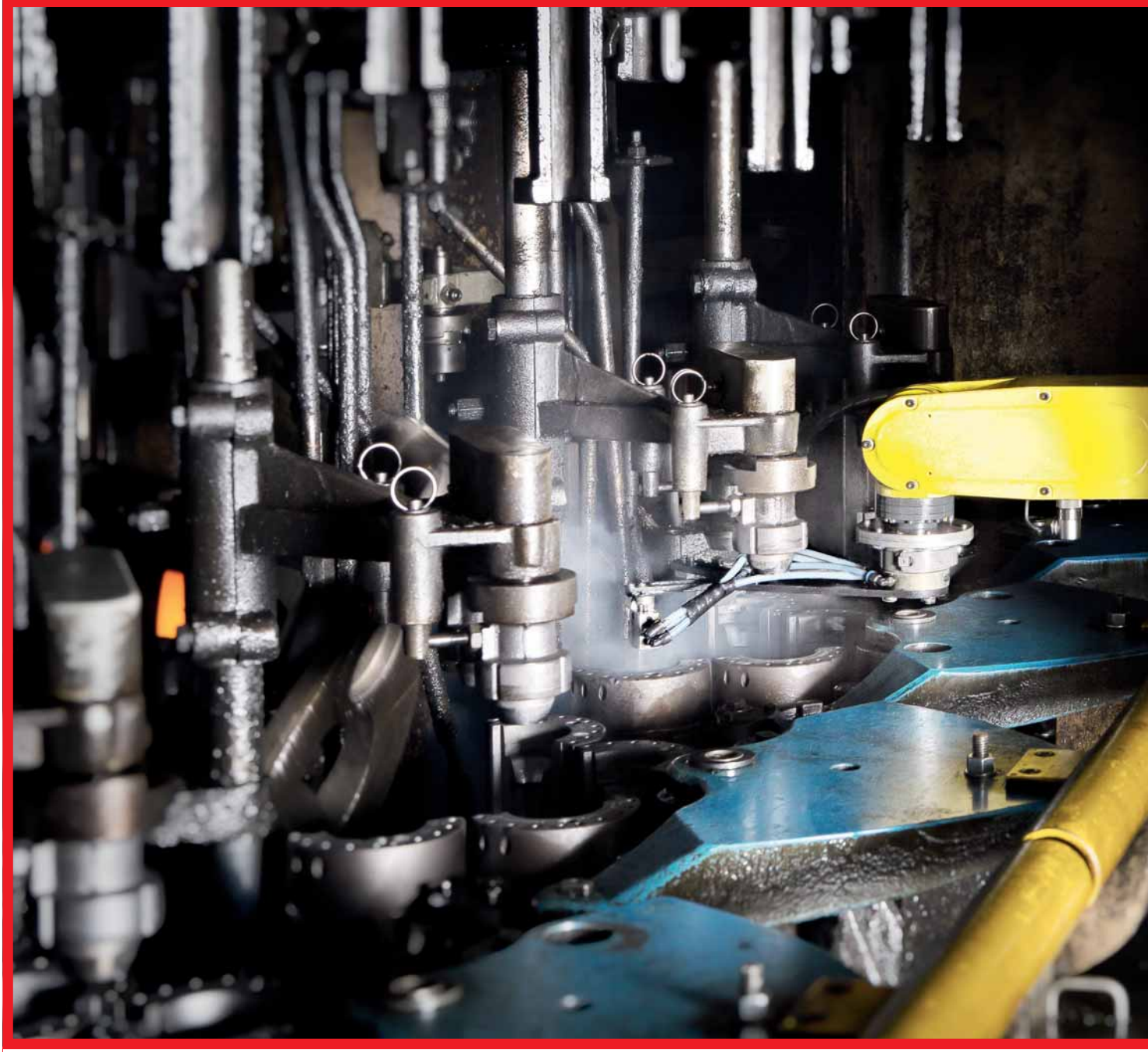

HEYE

First swabbing robots for China

Shandong Jingyao Glass Group Co Ltd has invested strongly in the high speed production of lightweight bottles in recent years. As well as supplying bottles for China's iconic Tsingtao beer, the company has emerged as an important source for such global brands as AB InBev, Carlsberg, Heineken and Snow Beer.

STRONG COLLABORATION

As part of the company's ongoing investment programme,

Germany's Heye International GmbH has supplied three swabbing robots and Press Duration Control PDC equipment to China's leading beer bottle producers as part of their expansion programme. The swabbing robots are the first to be installed by Heye in the country.

Shandong Jingyao Glass has worked closely with Heye International to install China's first automatic swabbing robots and to guarantee that machine operators are properly trained to operate the equipment effectively. The robots deliver zero rejects and avoid section stops during swabbing. Compared to conventional swabbing methods, up to 75 per cent of lubricants can be saved.

The glassworks in Linyi City, Shandong Province features four melting furnaces and 16 high speed production lines, with a combined nominal capacity of 1000 tonnes per day. Some of the world's most advanced Narrow Neck Press and Blow process glass container production technology is operated at the site, including a series of advanced Heye International IS machines and associated equipment.

PROCESS OPTIMISATION

According to Heye's Andy Lee, improved operator safety is assured, with stable and repeatable volume, thickness and location of swabbing provided, making more time available for operators to focus on production optimisation. "Installation and commissioning of the three robots and associated process controls was successfully realised in close collaboration with the customer," he confirmed.

Shandong Jingyao Glass has also invested in a PlantPilot information technology solution from Heye International and initiated a technical assistance agreement with the production technology specialist to improve and optimise NNPB technology at the site. ■

FEVE

‘Close the Glass Loop’ platform to boost glass collection and recycling

ON THE ROAD TO 90 PER CENT GLASS COLLECTION

The European glass packaging industry is setting up Close the Glass Loop – an industry-wide initiative to boost glass collection for recycling rates to 90 per cent by 2030 in the EU. The initiative comes as a response to new EU net recycling targets for glass packaging, fixed at 75 per cent by 2030.

Today, over 76 per cent of glass packaging placed on the European market is collected for bottle to bottle recycling. Separate collection schemes for glass bottles and jars are mainly organised through bottle banks, which have proven themselves to be the best system. However, with notable difference in recycling efficiency and consumer attitudes between

Continuing on its mission to provide consumers and the glass industry with good reasons and initiatives to recycle glass, FEVE has announced the creation of Close the Glass Loop, in an aim to have 90 per cent glass recycled by 2030. one of its most recent member is UNESDA Soft Drinks Europe – representing the European soft drinks industry.

countries, there remains work to be done to collect more and better glass upfront, to ensure the remaining 24 per cent of glass packaging which is not yet recycled is put back into the loop.

That's where Close the Glass Loop comes in. National action plans are being shaped as we speak. Some value chain partners have already confirmed their support: FERVER - the association of glass recycling companies in Europe; EXPRA - the Extended Producer Responsibility Alliance; as well as PROsPA - the Producer Responsibility Organisation Packaging Alliance and, last but not least, UNESDA Soft Drinks Europe.

DEPOSIT RETURN SYSTEMS: PERFECT FOR REUSABLE PACKAGING BUT NOT A 'ONE SIZE FITS ALL' SOLUTION

Don't be fooled by media buzz around 'Deposit Return Systems' (DRS) – far from being new systems for reusable packaging as many believe, they are just another collection system for recycling one-way bottles. They're also an inconvenience: instead of using household recycling bins or neighbourhood bottle banks, new DRS recycling systems would require people to transport all the glass packaging they want to recycle back to the shop or supermarket. What's more, DRS schemes work based on the high rate of unredeemed deposits so ultimately, consumers will end up paying a lot more than the producers.

When it comes to recycling glass packaging, convenience is king – and it's much more convenient for consumers to recycle glass via home or neighbourhood collection systems. Yet despite the well-established collection schemes already in place which have been proven to achieve very high recycling rates, some DRS recycling schemes are determined to include one-way glass at any cost. Everywhere they are installed, DRS schemes take value from household collections and rely on the consumer to pay a large share of their running costs – not the producer. FEVE recently commissioned a report from Oakdene Hollins to look into the impact of the introduction of DRS as an alternative collection system to recycle glass packaging and the results are not good.

SUSTAINABLY SOURCED SAND

Sand is a vital resource to produce glass containers. But not all sand is the same. Two big categories of sand need to be distinguished: construction sand and industrial sand. The kind of sand used in our plants is industrial sand: this has nothing to do with beach, desert, river or marine sand used for construction, which in some cases has been the subject of illicit traffic. The industrial sand we use in our plants has very specific chemical properties and equates to just one per cent of the amount of sand used today for all industrial processes (including glass, oil and gas, foundries, and chemical industries). Its extraction is strictly regulated, and our suppliers must comply with very rigid permit requirements.

On top of that, whenever possible we reduce sand use by replacing it with recycled glass in production. Glass is a permanent material, endlessly recycled in a closed-loop and therefore the main resource of its own production. One ton of recycled glass can replace 1.2 tons of sand and other virgin raw materials. Today, the average production batch contains 52 per cent recy-

GLASS COLLECTION AND RECYCLING

cled glass, avoiding the depletion of more than 7 million tons of virgin sand per year.

EUROPEAN SOFT DRINKS INDUSTRY JOINS 'CLOSE THE GLASS LOOP'

UNESDA Soft Drinks Europe – representing the European soft drinks industry – is the most recent member of Close the Glass Loop.

"We are proud to join the Close the Glass Loop platform. It is a strong initiative and a step in the right direction towards making Europe's Economy Circular. Its objectives are in line with our theme of 'Circularity works, let's all give it a chance', and we are glad to be involved in building its foundations," says Nicholas Hodac, UNESDA Director General. "By contributing to an increased collection and endless recycling of glass packaging we help to drive sustainability throughout our value chain. Recycled glass is essential for the container glass industry. It means a more resource-efficient production process and more sustainable glass packaging solutions for our member companies."

The Close the Glass Loop initiative aims to unite the container glass value chain under a multi-stakeholder European programme but also crucially to support national level action plans. UNESDA's company and national association members will cooperate with national glass value chains across Europe to improve the collection and recycling of glass packaging. The Close the Glass Loop national action plans will drive sustainability throughout the whole value chain.

"We are delighted to have UNESDA's support and collaboration to reach the full potential of our Circular Economy model predicated on the endless recycling possibilities of glass. Soft Drinks are a key customer for our industry and are frontline in persuading consumers to recycle more and better together," stated Adeline Farrelly, FEVE Secretary General. "The collaboration with UNESDA members is a key milestone in our pathway to 90 per cent collection target and towards a climate-neutral glass packaging industry."

FEVE
The European Container Glass Federation

FEVE – The European Container Glass Federation

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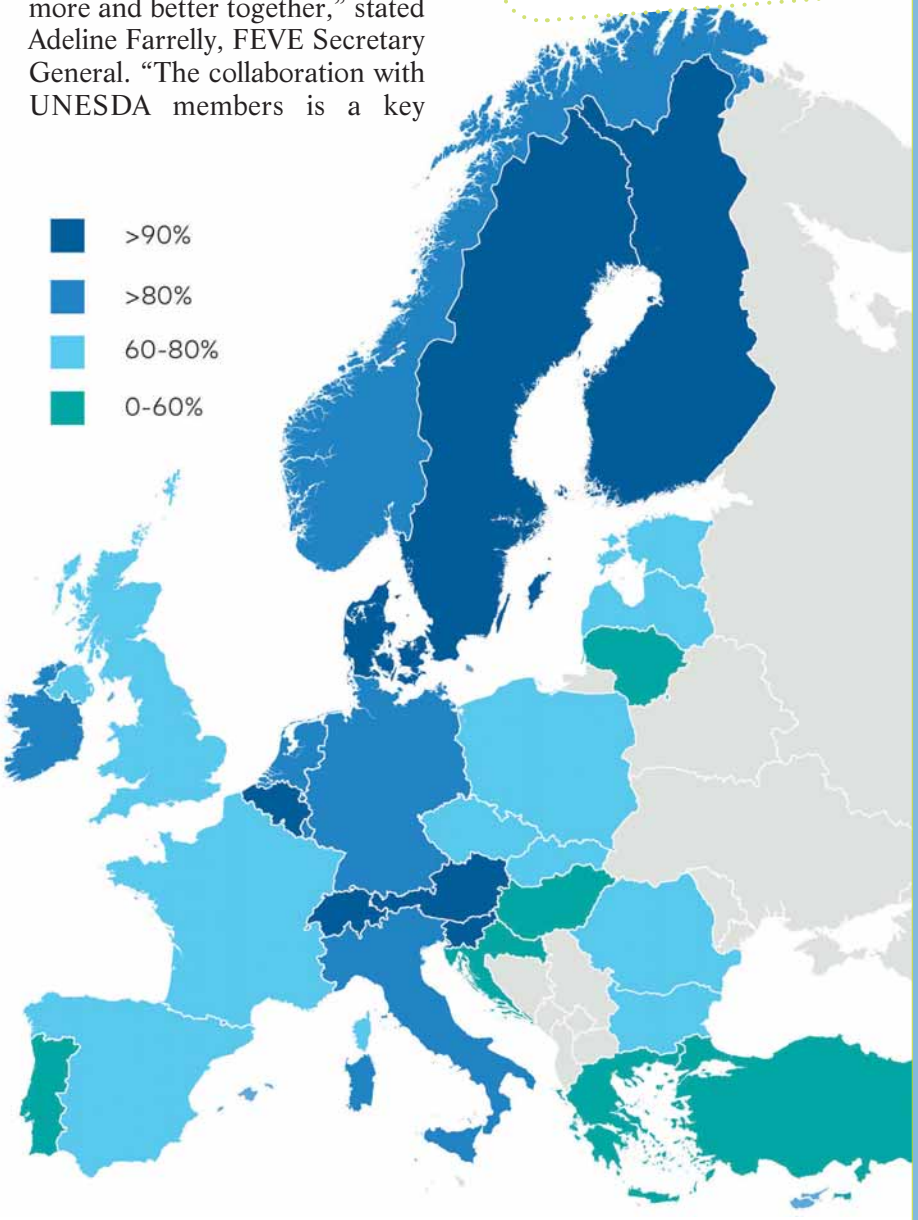


TIAMA HOT SYSTEMS

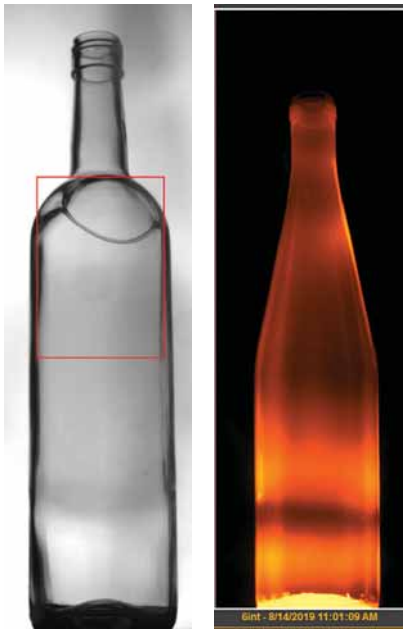
A full range of sensors at the hot end

In this article we take a look at how Tiama – one of the hot-end's major players – is continuing to develop new modules of its HOT systems, part of the smart factory concept developed to provide key information regarding the process from the gob to the formed articles.

Lucie Jouve
Hot-End Product Manager
TIAMA

Tiama has always been known for its visions and carousel machines but for several years now, Tiama has also become a major player in the hot end area of the plant.

Starting by developing the I-Care, Tiama then chose to buy GeDevelop and to integrate the Tiama HOT mass into its hot-end product catalogue, with hot-end inspection being a key and strategic point for the hollow glass industry, Tiama accelerated its developments and launched its new expertise called Monitoring, with the Tiama HOT systems, a new range of hot end machines.



**Birdswing detected by the Tiama HOT eye (left)
Tiama HOT form (right)**

Today, the Tiama HOT systems range is composed of five modules, and four of these are online systems positioned along the entire hot end process, starting at the gob level, after the shear cut and until the annealing lehr. They can all operate independently. This modular approach enables customers to meet their specific needs according to their production issues. Modules can be added step by step by customers to take the time to understand how each machine works in order to facilitate their ownership by operators. Several production lines all over the world are already equipped with all the sensors of the Tiama HOT systems range.

TIAMA GOB FORMING CONTROL SOLUTION

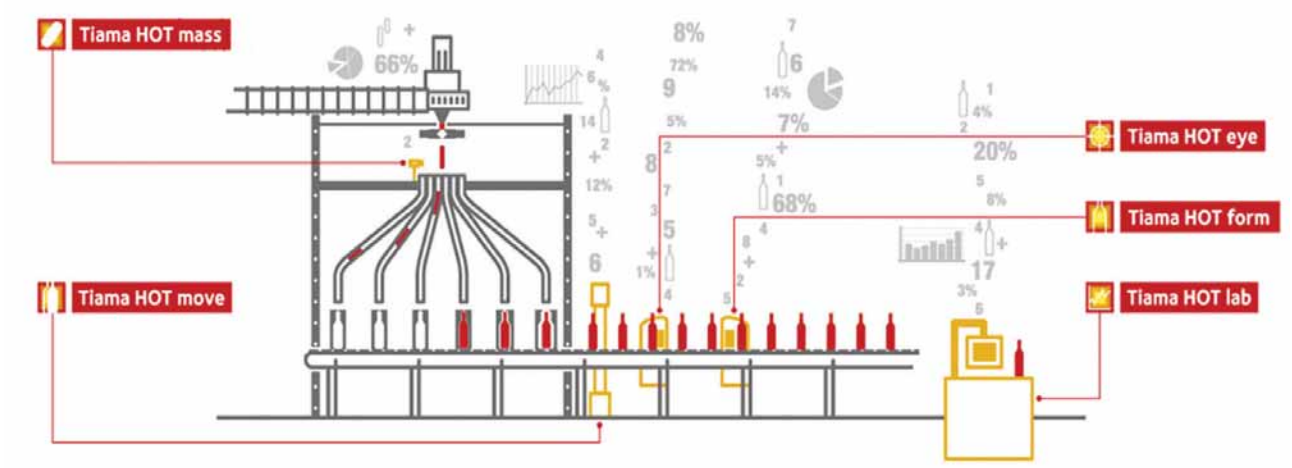
The Tiama HOT mass is installed just under the shear cut and is composed of one or more cameras providing information on the weight, shape and temperature of the gobs. The system operates with closed loops which automatically adjust the weight of the gobs by acting on the tube and the needles. This weight stabilization allows better control of the process limiting the creation of certain kind of defects. The system also monitors the shape of the gobs by providing information on their length, diameter and tilt. All these data are available for each gob and refreshed in real time.

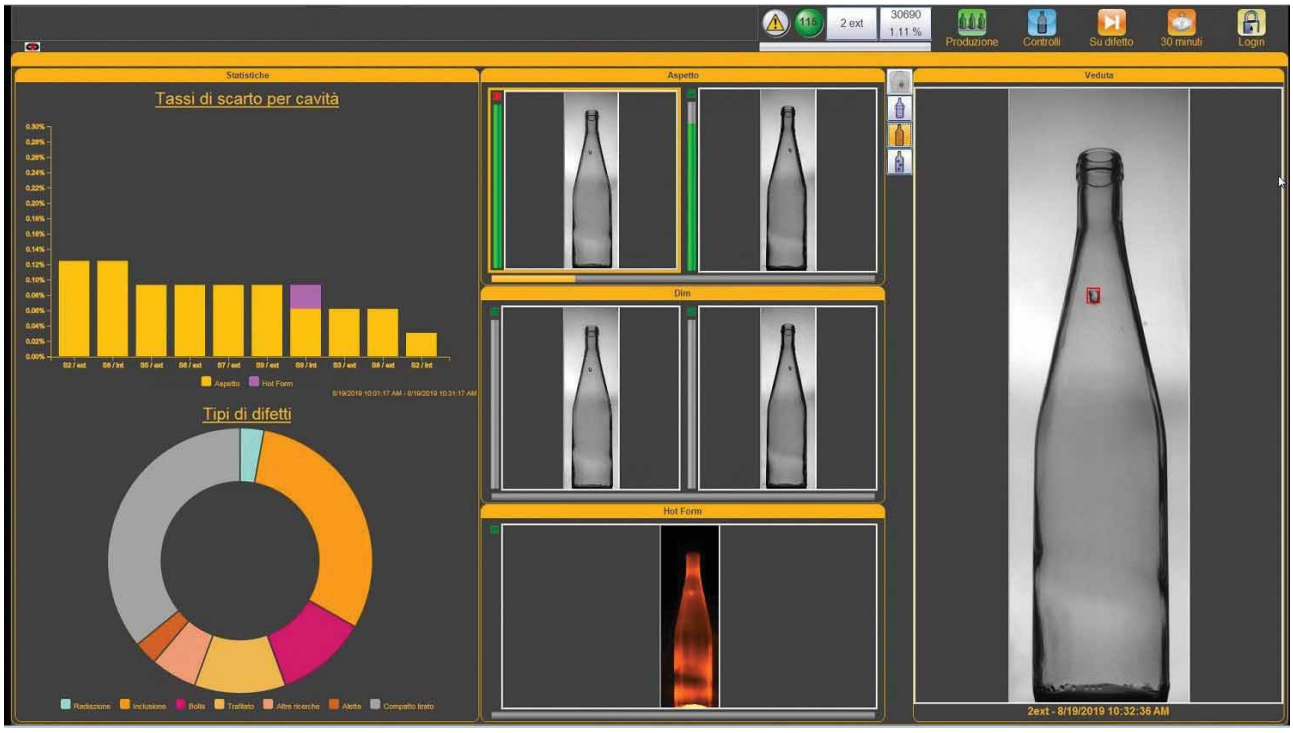
TIAMA HOT END DEFECT RECOGNITION SOLUTION

The Tiama HOT eye is equipped with two high definition cameras integrated inside two metallic tubes and a light source, flashing articles on the conveyor with infrared light not to disturb operators working on the line. The main functions of the system are the detection and recognition of critical defects and the dimensional analysis of the containers. By using high-definition matrix cameras, smaller defects will be detected, and dimensional measurements will be more accurate compared to infrared camera measurements. The Tiama HOT eye benefits from Tiama's cold end experience by running the same algorithms than the mcal4 sidewall inspection which allows the recognition of critical defects. For the dimensional, the system can provide measurements of verticality, height and diameters. In addition, alarms have been integrated into the system, making sure that operators will be alerted directly when a critical defect has been recognized.

TIAMA HOT END INFRARED RADIATION MONITORING

The Tiama HOT form uses one or two infrared cameras and measures the infrared emissivity of articles on the conveyor to identify problems with glass distribution or temperature. Thus, defects such as thin glass or uneven bottom can easily be identified through the Tiama HOT form. The system also provides statistical data to identify production drifts at the early stage of the process. The operators can then immediately re-adjust the IS machine and avoid the creation of defects, which represents a real production gain. In order to limit the footprint on the production line, the camera





Tiama HOT form and Tiama HOT eye main screen

Installation with the Tiama HOT eye, Tiama HOT form and Tiama HOT move

of the Tiama HOT form can be integrated into one of the tubes of the Tiama HOT eye. Both sensors have been designed to resist to the harsh environment of the hot end area and require little maintenance.

The Tiama HOT eye and the Tiama HOT form are both made up of cameras that take images and collect data from the articles. They provide real-time data to the operator on the current production and allow him to quickly identify process issues before articles arrive at the cold end and pass through the inspection machines. They can then react immediately and lehr time is saved. Both systems are synchronized with the IS machine enabling the images and the various data supplied by the sensors to be linked to the sections and cavities of the IS machine. In the event of a drift, the operators know directly where problems arise on the IS machine.

TIAMA HOT END ARTICLE POSITIONING MANAGEMENT

The Tiama HOT move is another module installed at the

output of IS machines, which monitors the transport of articles on the conveyor and provides information on the positioning of the articles in both directions. The system also rejects the stuck or fallen articles on the conveyor to avoid jams in the hot end coating hood or in the annealing lehr, saving time and improving the overall safety of operators.

AUTOMATIC STATISTICAL DIMENSIONAL MEASUREMENT OF HOT BOTTLES

The Tiama HOT lab is an offline system, and is the fifth module of the range. It enables laboratory measurements at the hot end and saves time during job change. Indeed, it is possible to carry out laboratory measurements directly without having to wait for the articles to reach the cold end. In particular, the Tiama HOT lab is able to perform dimensional, thickness and weight measurements. During production, it allows to identify issues on the current production and to solve problems before the operators receive the cold end feedback. A robot arm can also be installed on the machine so that measurements can be carried out automatically, thus saving time for operators.

SMART FACTORY AND BIG DATA ANALYSIS

Tiama HOT systems provide key information regarding the process from the gob to the formed articles. The systems provide a full range of data that can be used in order to have a global overview of the plant, from the hot-end to the cold-end.

A number of big data analysis projects have been carried out on lines equipped with all Tiama HOT systems sensors. The data provided by the systems could be correlated with different parameters of glass processes and IS machines, allowing to improve production by reducing certain defects thanks to better process control.

The Tiama HOT systems are fully part of the smart factory concept developed by Tiama called YOUniverse in which its five fields of expertise are all necessary to move towards smart factories. Traceability, inspection, intelligence and services are all very important in the Tiama strategy, and monitoring is key for the YOUniverse to live. ■

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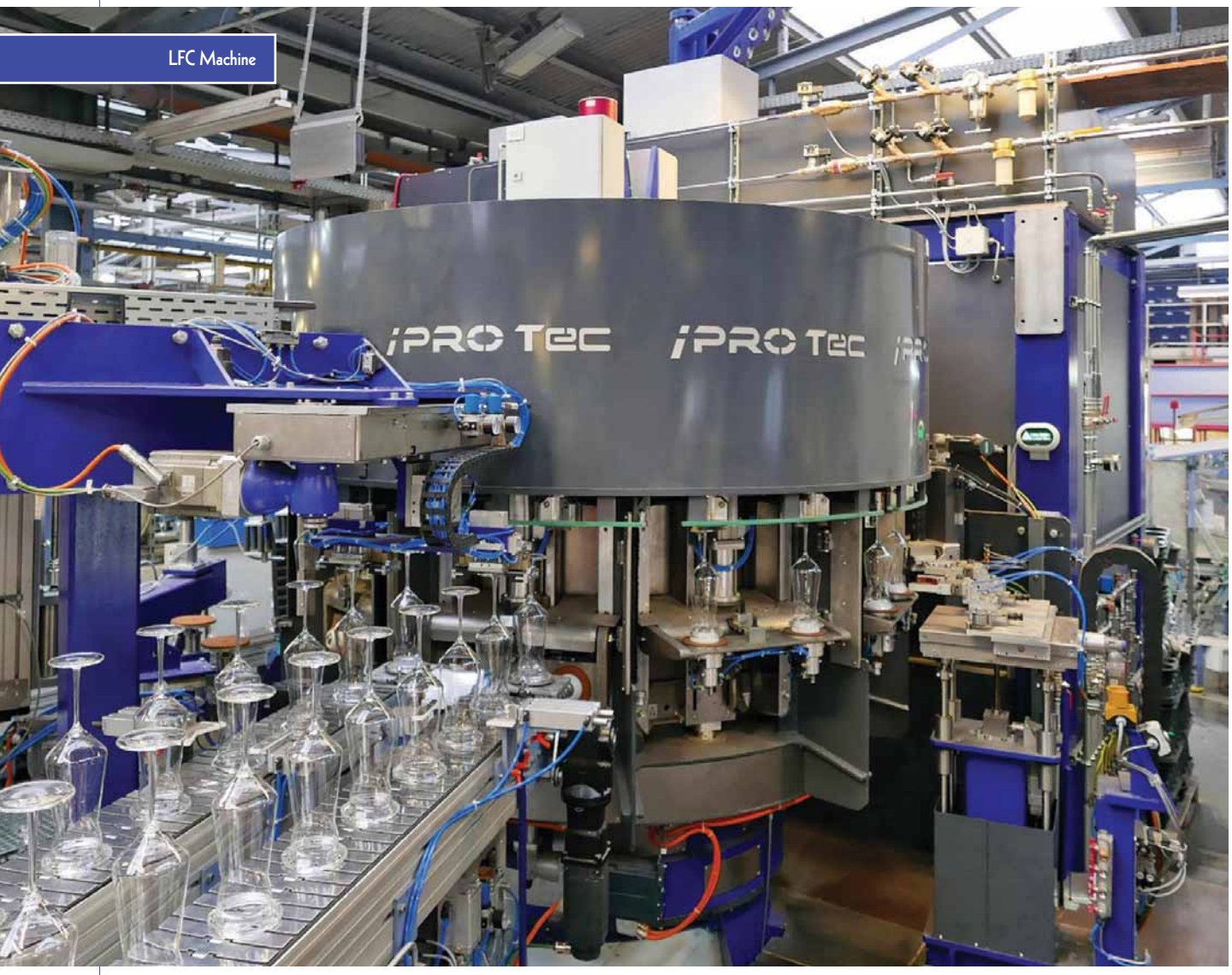
LFC crack-off – a new revolution in moil cutting



LFC Machine

This article gives an overview of traditional glass cutting technologies, comparing them to the newest Laser Filament Technology applied by IPROTec GmbH to Stemware Moil cutting.

After years of development, based on in-field experience matured at Schott-Zwiesel plant, first on traditional cutting processes then on conventional Laser cutting process, IPROTec GmbH (the Engineering company of ZwieselKristallGlas Group) is now launching to the market its new high range Laser Crack-off machines, based on Laser Filament Technology, suitable for any type of glass composition, forming process, cold and hot area operation to perform a top quality moil cutting.

This process has been already successfully implemented and proved in Zwiesel as well as at premises of other IPROTec GmbH customers.

TRADITIONAL CRACK-OFF PROCESSES

The nowadays used conventional technologies for cutting off the moil can be split into two different main groups:

a.) Cutting off the moil of 'cold glasses' after the annealing lehr. This type of process is typically performed with mechanical- or laser type crack-off machines, with the following process steps:

- 'scratching' of the later cutting surface via CO2-Laser or mechanically (scoring wheel);
- 'cutting off' the moil via thermo-shock;
- 'grinding' of the cutting surface;
- washing and drying of the glass to eliminate grinding residues;
- melting of the sharp cutting edges in order to form the required mouth rim ('rounding').

The biggest disadvantage of this technology after cutting off the moil is the need to grind the surface. Because only grinding wheels can be used, this procedure can be considered as an absolute mechanical process. The grinding of very big glasses with a large stem and a thin wall thickness in particular, leads to increased breakage. In order to obtain clean glasses, washing to eliminate the residues after grinding is needed. The use of abrasive and water, as well as additional water treatment, lead to much more work and, therefore, higher production costs.

Furthermore, a second production machine to melt the mouth rim is needed after grinding. Increased space requirements, labour and maintenance costs are the consequence.

b.) Cutting off the moil of 'hot glasses' before the annealing lehr, typically performed with burn-off machines, and attempted with a CO2-Laser Cutting machines a few times.

Burn-off cutting process steps:

- preparation, move the article to the right level;
- heat up, a narrow zone is warmed-up by the burner;
- cutting the remaining thin glass film by the burner;
- cut edge melting;
- cooling.

This thermal process lead to an unstable cutting process that is sensibly effected by burner design quality and maintenance, gas/oxygen pressure and flow regulation, type of manifold for fluid distribution. So many parameters to be controlled are causing unstable processes that only skilled operators and accurate maintenance can partially compensate. On top of that, the rims appear quite thick and sometime variable from one side to the other, and when the moil is separated by the article there is always a 'lip' that remains as the last part of separation and that is very difficult to eliminate.

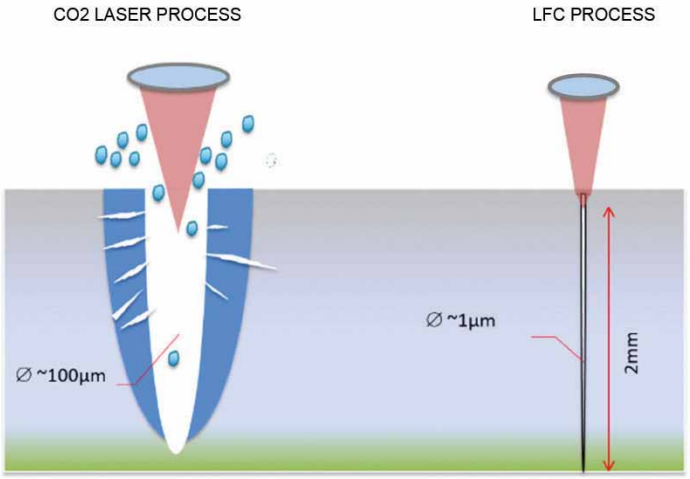
Consumption of Gas and Oxygen and number of burners and their maintenance are also quite expensive compared to a Laser Crack-off machine.

CO2-Laser cutting process steps:

- preheating of the later parting line via burner;
- heating of the parting line via CO2-Laser until plasticity range of the material is reached;
- 'pull-off' of the moil through an external force until the moil and the glass are separated;
- melting of the mouth rim in order to get the required contour ('rounding').

This thermal process leads to a number of significant disadvantages. The basic prerequisites to pull off the moil as equally as possible in order to get an exact moulded parting plane are, on the one hand, the uniform viscosity distribution of the material and, on the other, constant wall thickness distribution in the cutting area. Good quality and a minimum deviation of tolerances concerning wall thickness distribution, as well as geometric tolerances (concentricity, ovality…) must be secured during the manufacturing process by the previous machines (blowing machine, press machine). However, manufacturing processes often cannot consistently provide the required high product quality and accuracy. As a consequence, this leads to bad quality and lower production yield.

By using a CO2-Laser, problems often appear with evaporation from the glass. This evaporation then leads to the deposition of condensation on the surface of the glass. For this reason, in these machines, glasses are mostly handled with the moil on the top. Another disadvantage is the grabbing of the moil during separation of the glass. Grabbing of the moil can lead to little pieces of broken glass which fall into the bowl and which can lead to faulty products. Another essential disadvantage is the limitation of the attainable mouth rim quality. It is very challenging for this technology to create very fine and



LFC process compared to CO_2 process

Article after LFC cutting

delicate mouth rim contours. The final result of this thermal process is often a thick and bulged mouth rim.

NEW LASER FILAMENT PROCESS

The previously described disadvantages of the two conventional process technologies can be eliminated/avoided with the new iPROTec GmbH 'LFC' machine for cutting off the moil of transparent tumblers or stemware. The machine, which makes use of a special laser, can be placed in the cold- or hot end of the production line according to the selected configuration.

The major advantage of this new LFC-Technology is the contactless cutting off of the moil. Because the used cutting method is a 'cold' and contactless process, neither mechanical nor thermal stress influences the glass material. This "contactless" cutting method improves quality and production yield, eliminates the use of grinding tools as well as of washing water and reduces to the minimum the need of glazing.

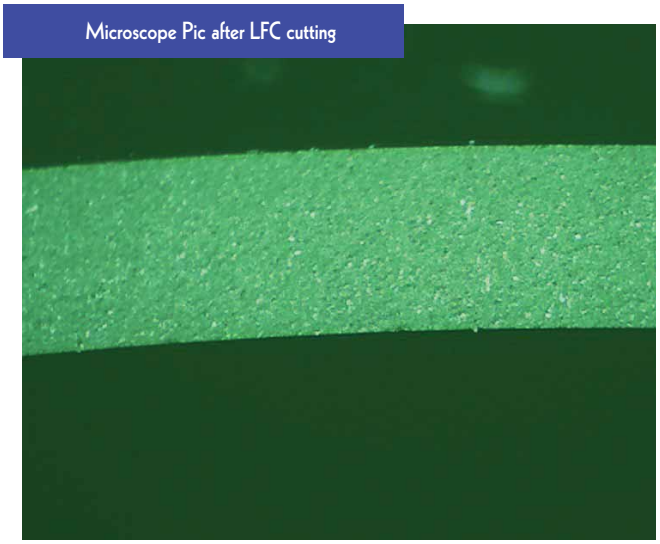
Further advantages are the total absence of sensitivity about wall thickness and article ovality .

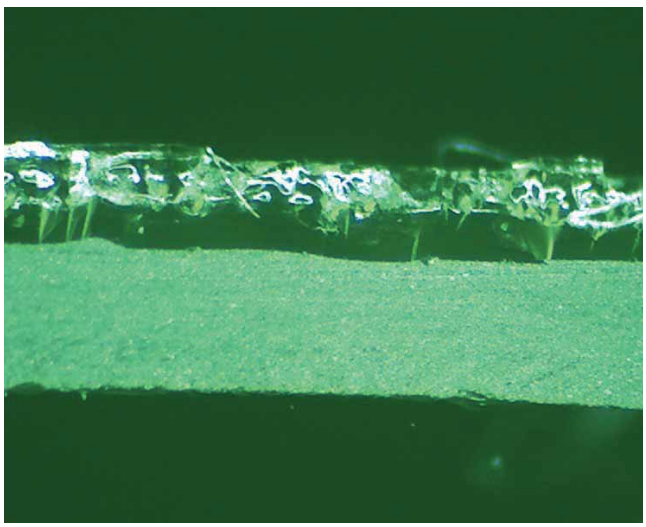
The LFC generally works with a special laser technology. During the laser process, thousands of small holes (diameter of 1 hole ≈ 2 µm), the so-called filaments, are placed at equal distances in a line of 360° at the height of the later rim (perforation). This means the moil and the rest of the glass are connected via small sections between the filaments. If the moil has to be cut off from the goblet for example, some energy in the form of heat is needed. The short time of heating the perforated area leads to a dilatation of the glass diameter, the demolishing of the small sections between the holes and, subsequently, to the cutting off of the moil.

The existing cutting surface after separating the moil from

Microscope pic after CO_2 cutting

Microscope Pic after LFC cutting





the glass in the LFC is very fine, plain and free from breakouts. The high and perfect quality of the cutting surface allows the customer to create, depending on particular requirements, a very fine or stronger formed mouth rim. Furthermore, a reduction of mouth rim faults leads to higher production yield, without any additional grinding and washing.

Hot- and cold-end configurations

This process can be applied both at the cold- or hot end of the line. In the case of the hot end, the machine is equipped with two more sections (a total of 10 sections) to obtain fine rim glazing.

In the case of the cold-end solution, the machine has 8x3 or 9x2 sections, with a rim polisher positioned after the LFC.

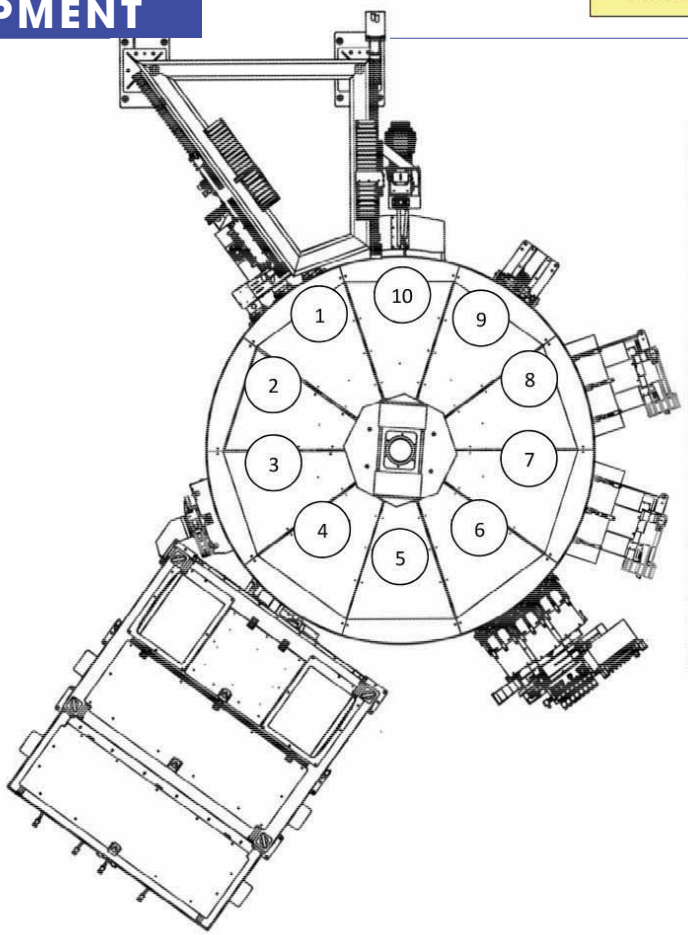
LFC workflow

The operations performed by the LFC start in Section 1, when the articles arrive at an index conveyor standing upside-down. In this section, a servo controlled loader then inserts the articles in the upper chuck of the LFC machine where they are looked with grippers or vacuum according to their shape

In Section 2, the bottom chuck is closed to fix the articles, followed by glass measurement, which is carried out in Section 3. The glasses are then moved to Section 4, which is the laser chamber. This laser chamber is ray-proof when the rotary table is in its final position, ensuring that no laser rays can leave the chamber. After the glass rotation has started, the laser processing heads move towards the glasses with self adjustment.

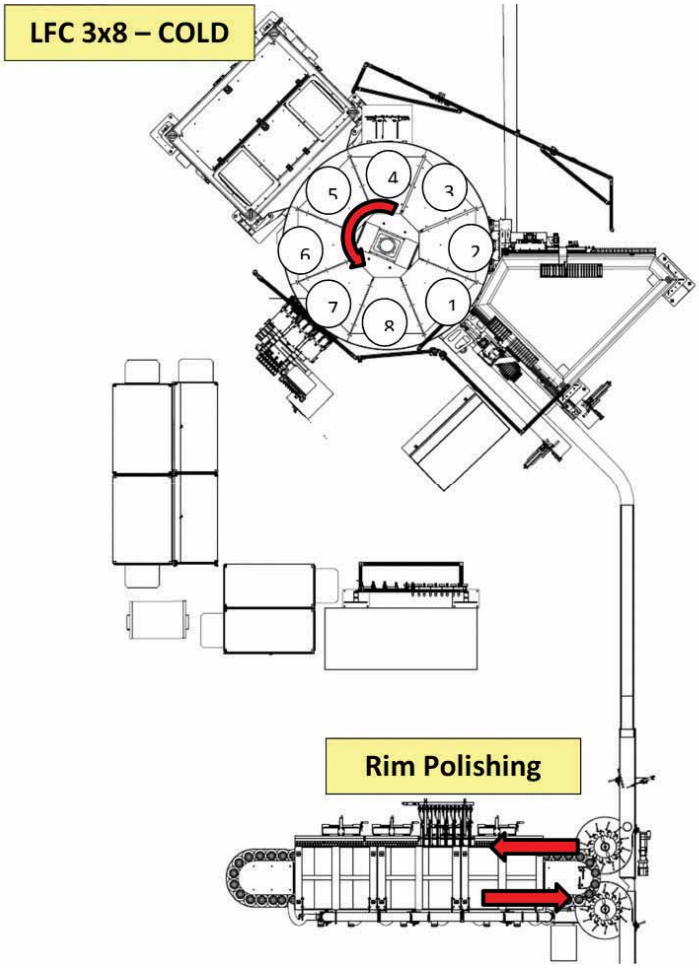
The average time that is required to perform a 360° laser cut with a standard glass is about 0.5 seconds. With one laser process (360°) at the moment a wall

LFC 3x10 - HOT

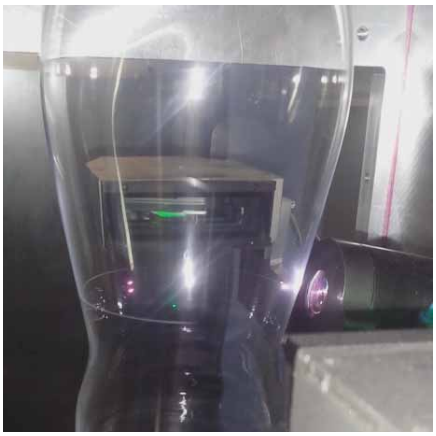


1. Loading
2. Moil chucks closing
3. Geometry measurement of the article
4. Laser unit
5. Moils chucks opening
6. Burner unit
7. Rim Polishing
8. Rim Polishing
9. Moil detection
10. Unloading

LFC 3x8 – COLD



1.Loading
2. Moil chucks closing
3. Geometry measurement of the glass
4.Laser unit
5.Moil chucks opening
6.Burner unit
7. Moil detection
8.Unloading



filament line in the glass (after the laser process)

Moil separation by thermal shock

Rim Glazing after LFC cutting

thickness of up to 2.6 mm can be cut.

In Section 5, the three chucks of the lower station are opened so that the moil is free.

After indexing to Section 6, three burner units are moved in from the outside. The flames of the burners have to be at the height of the filament line. The short thermal impact of the flame thereby caused dilatation of the diameter which, in turn, leads to the blasting off of the moil. The moil can now fall directly down to the cullet conveyor for broken glass.

Sections 7 and 8 are involved in the finishing of the mouth rim (in hot-end configuration). This operation is performed on rim–polisher machine in cold-cutting. Due to the high cutting quality and precision, very little rim glazing is required.

Section 9 (or 7, according to configuration) ensures and detects moil drop-off.

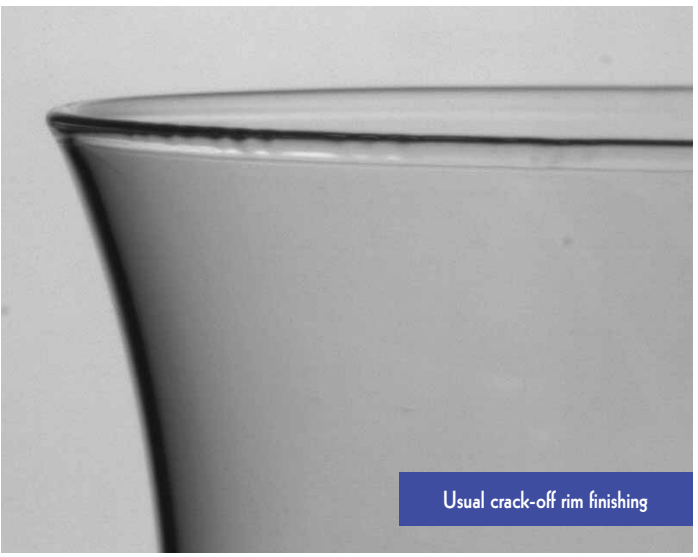
The unloading of the glasses is carried out in the last section, where the unloading unit moves from the outside into the machine. After taking the glasses via vacuum at mouth rim, the unloading unit moves back again into transfer position and turns the glasses 180° downwards in order to place them on the conveyor belt.

The glasses without moil on the conveyor belt can now be transported directly to the annealing lehr or to the rim melting machine, according to the selected configuration.

LFC PROCESS ADVANTAGES

the main quality advantages of the LFC process can be seen in the following figures, as follows:

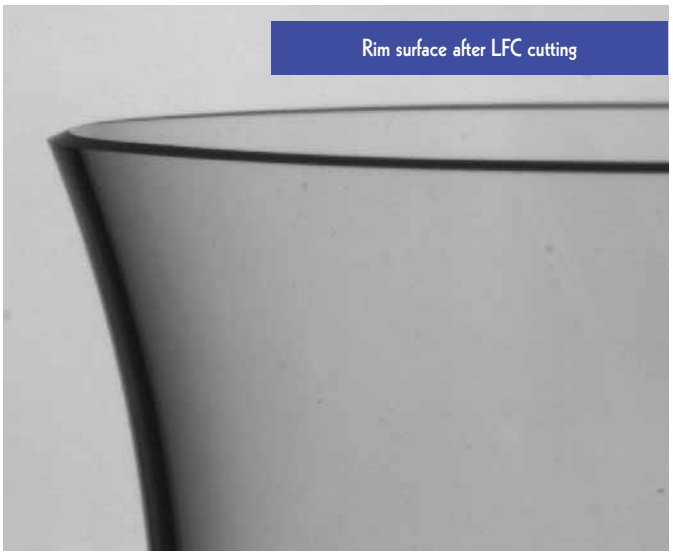
- high rim quality (no chipping/ micro cracks);
- no grinding and water usage needed;
- minimal rim glazing required after cutting;
- better cutting quality compared to traditional mechanic or traditional laser cutting machines;
- much better rim quality compared to BO machine;
- less operation and maintenance cost compared to CO2-laser machine and BO machine;



Usual crack-off rim finishing

Usual BO rim finishing

CUTTING DEVELOPMENT



Rim surface after LFC cutting

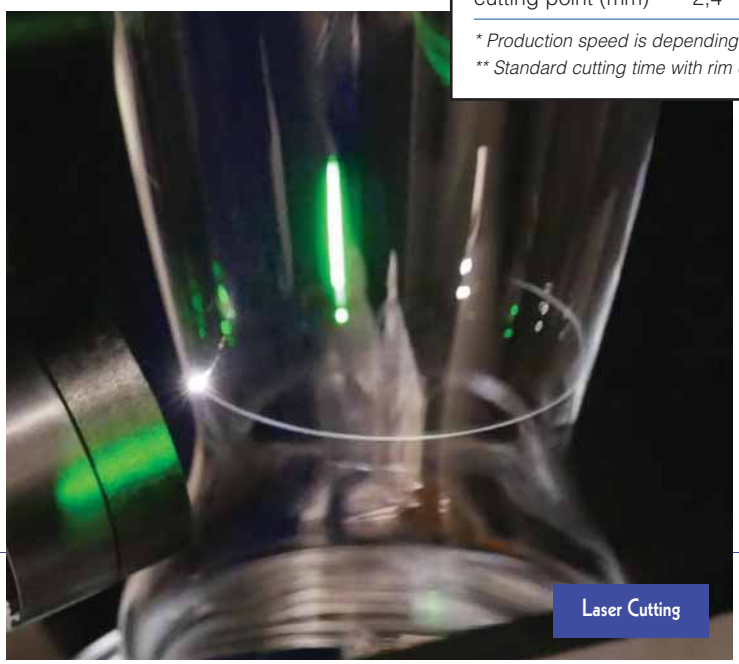
Rim surface after LFC cutting and polishing

- contactless process (no thermal/mechanical stress);
- possibility to use at cold- and hot-end;
- possibility to use with any type of glass composition;
- possibility to use with any forming process (Press&Blow or Blow-Blow);
- non-sensitive regarding wall thickness distribution;
- non-sensitive regarding ovality;
- non-sensitive regarding bent glass;
- no condensation (no thermal cutting process);
- no additional tempering for process required;
- maximum process stability and repeatability. ■

LFC TECHNICAL SPECIFICATIONS

	LFC 9-2 Cold (1 Laser)	LFC 8-3 Cold (1 Laser)	LFC 8-3 Cold (2 Laser)	LFC 10-3 Hot (1 Laser)	LFC 10-3 Hot (2 Lasers)
Laser sources	1	1	2	1	2
Process type	Cold	Cold	Cold	Hot	Hot
Stations /Sections	2x9	3x8	3x8	3x10	3x10
Max production speed *	52	60	80	60	80
Cutting time (sec) **	0,5	0,5	0,5	0,5	0,5
Stations pitch (mm)	350	265	265	265	265
Machine station diameter (mm)	2207	2480	2480	2880	2880
Max mouth rim diameter mm	120	120	120	120	120
Max article gross height (with moil) mm	350	350	350	350	350
Max article net height (without moil) mm	300	300	300	300	300
Max wall thickness at cutting point (mm)	2,4	2,4	2,4	2,4	2,4

** Production speed is depending from article shape and diameter*
*** Standard cutting time with rim diameter of 70-100 mm. Cutting time is depending from article diameter*



Laser Cutting

iPROTec Innovative Process Technology

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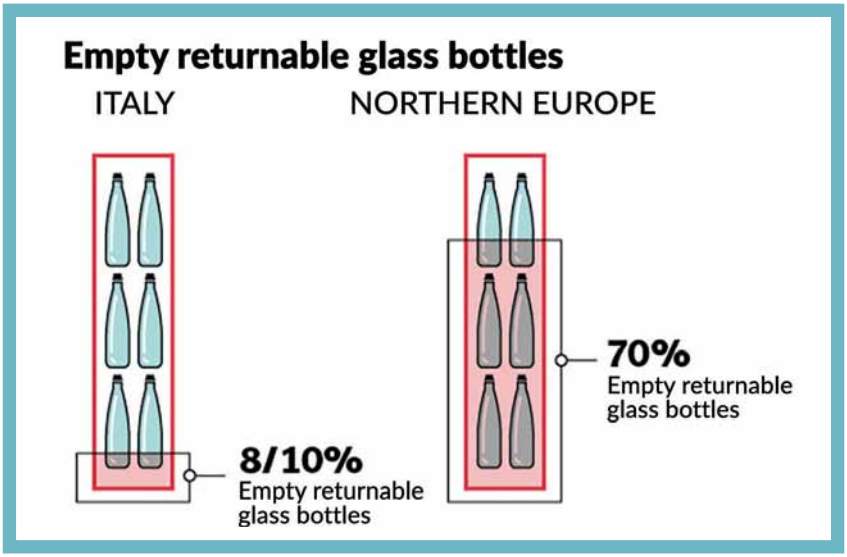
ALMOST EUR 1 MILLION SAVED EACH DAY – WITH RETURNABLE GLASS BOTTLES

Returnable glass bottles for mineral water serve a twofold purpose: they reduce the environmental impact and their use creates golden business opportunities. In this article we take a look at a recent survey carried out by Italian journalist Milena Gabanelli, published in one of Italy's most important newspapers – Corriere della Sera.

SAVING IS POSSIBLE

How does using returnable glass bottles save EUR 950,000 a day? This is the case study in Italy, where the heaviest mineral water drinkers can be found. It is estimated that a single Italian drinks 224 litres of water per year. This amounts to 11 billion bottles yearly, 16 per cent of which are glass bottles. Only 8-10 per cent of these glass bottles are returnable. What about glass bottles that are not returnable? They are mostly produced from recycled glass. This is a common production practice, which costs bottle producers almost EUR 1 million euros a day. How is that possible? Let's take a look at the figures.



THE FIGURES

In 2018, an amount of 2.47 billion tons of glass was placed on the Italian market to produce glass bottles for various purposes. The percentage of recycled glass was 76.2 per cent. The glass production process normally requires 1 kg of fuel oil to obtain 1 kg of glass. The percentage of fuel oil used to operate the melting furnaces is 75 per cent. In the case of mineral water glass bottles, 1.67 million bottles were recycled. This corresponds to 1.06 billion kg of glass. How much is needed to produce this amount of glass? The answer is 5.9 million oil barrels, which corresponds to the staggering amount of almost EUR 950,000 a day. This figure refers only to mineral water glass bottles. The amount would spike to greater figures if all multi-purpose glass containers were included in the picture. Saving is possible, and saving figures are considerably high.

REDUCING ENVIRONMENTAL IMPACT

Businesses, governments and individuals are all interested in keeping the environment clean and in promoting a rational utilization of energy resources. It is indeed a shared responsibility that needs to be shouldered collectively, and with full awareness of all the alternative solutions. How is making use of returnable

glass bottles a smart and practical solution to reducing the impact on the environment? Firstly, there is the sustainable possibility to reduce the use of fuel oil, which is a predominant element in the production of recycled glass. Recycling is indeed a way to respect the environment, but the implementation of returnable glass bottles is a valid and sustainable solution that in conjunction with glass recycling creates a winning approach.

Secondly, the environment would benefit from using returnable glass bottles thanks to the reduction of carbon dioxide emissions. The reduction lays in the fact that it would diminish road transport by cutting daily trips by 50 per cent, from four trips down to only two. Thousands of trucks will no longer hit the road. Generally, in the recycling process, the bottles need to be transported from the location where they are dropped off by the end-user consumer to a second location, normally a treatment plant, where all the collected glass materials are gathered and sorted. From this location, the glass is taken to two other locations where it is respectively crushed and melted. Moreover, road transport is needed to take the newly produced bottles to where it will be bottled.

Last but not least, the environment would benefit from using more glass bottles for mineral water thanks to the reduction of plastic bottles produced and employed for this purpose. In Italy, 84 per cent of the bottles used for mineral water are plastic bottles. Only 10-15 per cent is recycled, and the rest ends up:

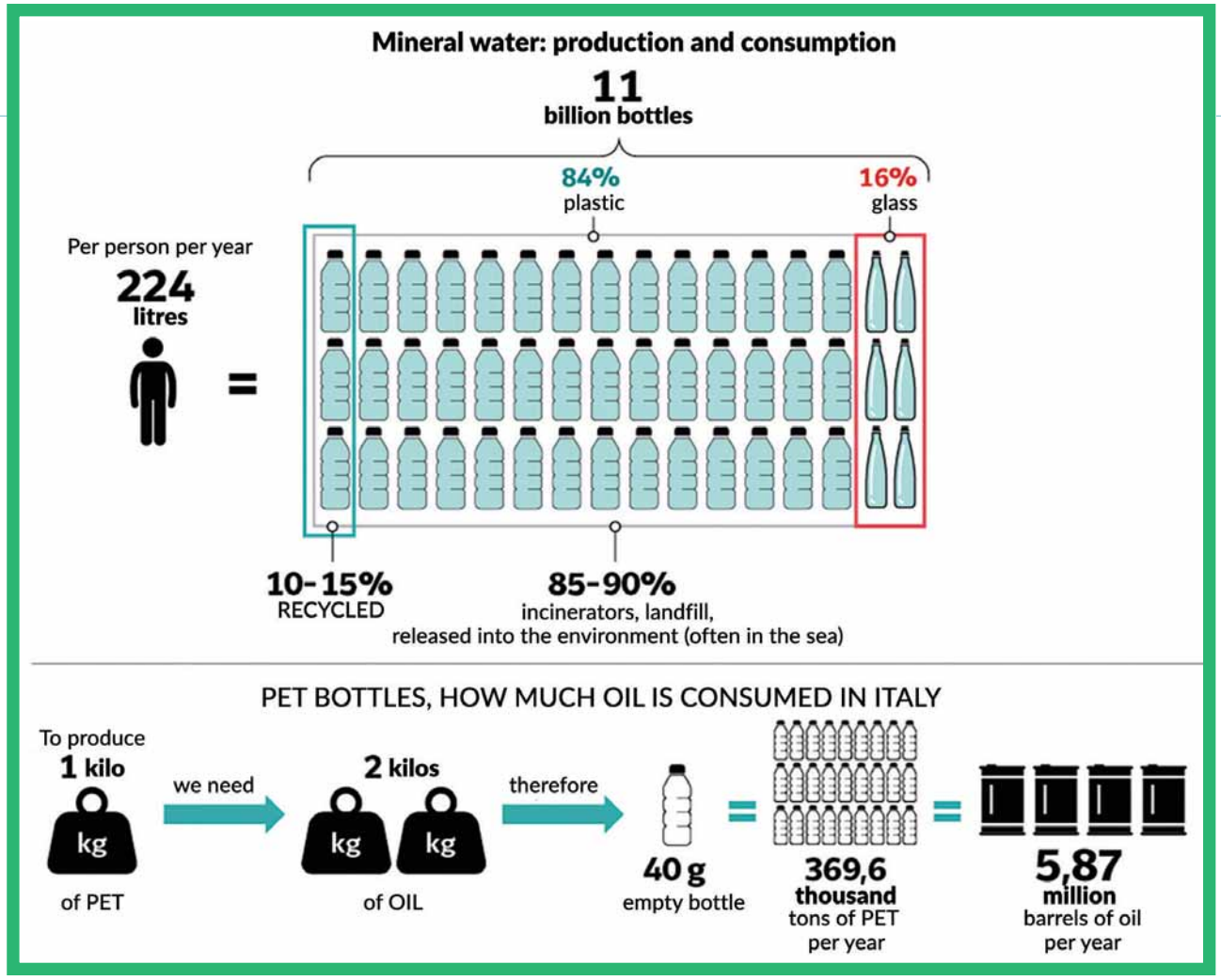
- being burnt in waste-to-energy plants for thermal destruction, or
- being discarded in landfills or elsewhere in the environment.

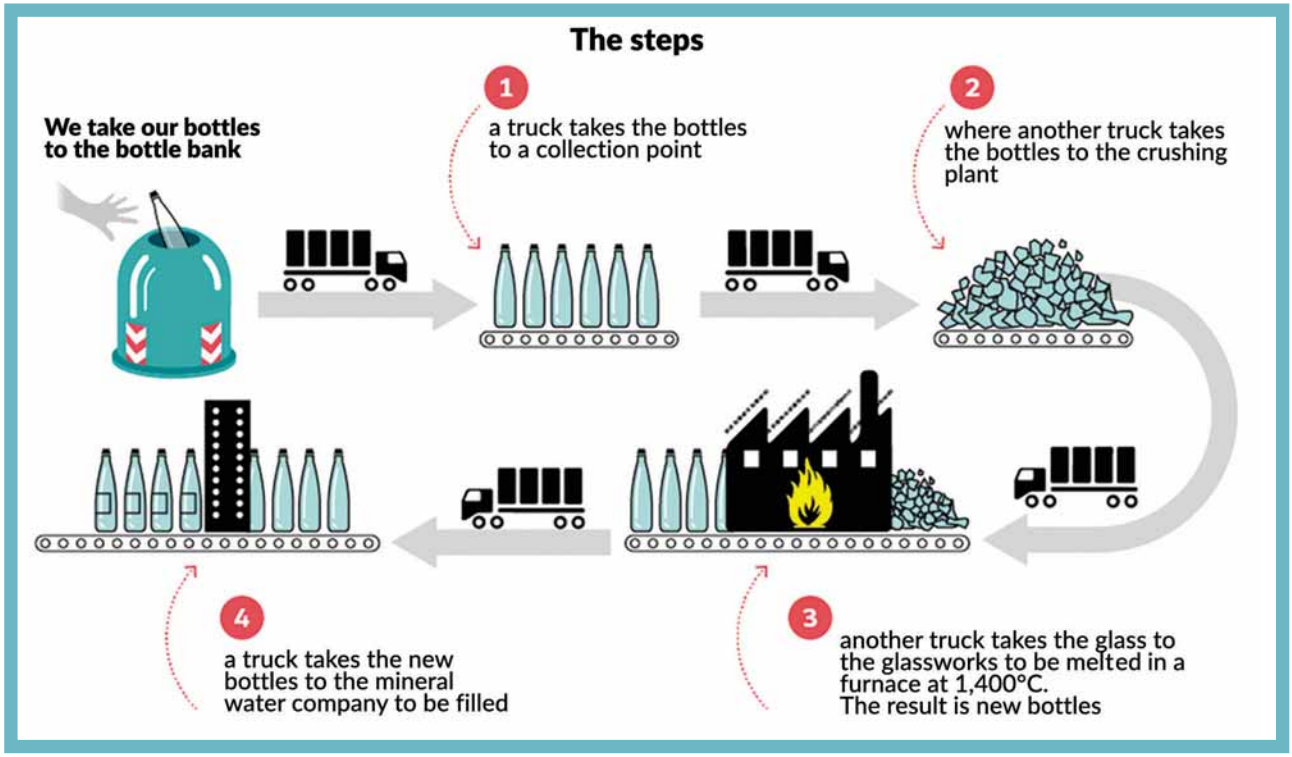
Sadly, plastic containers are found in the ocean. Over time, bottles and other plastic products are broken down into smaller and smaller pieces called microplastics. Unfortunately, microplastics are small enough to be ingested by sea animals. Using more glass containers, including returnable ones, would definitely reduce the environmental impact.

GOLDEN BUSINESS OPPORTUNITIES

Recycling or reusing? Both are profit-making activities. Glass bottles for mineral water can be reused. Various business opportunities are connected to this solution. A brief glance at the process employed for reusable packaging will highlight these opportunities.

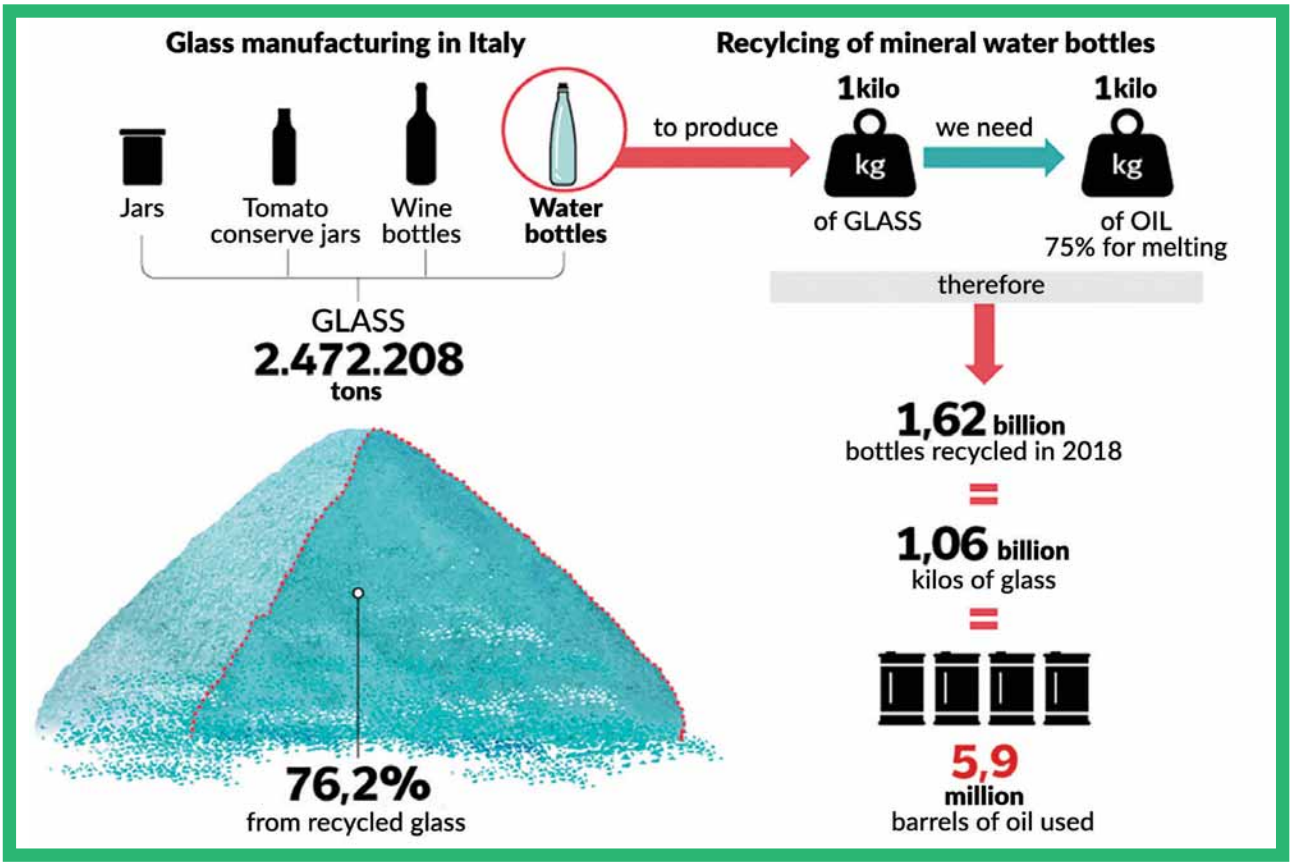
In this process, a retailer nor-





mally collects empty bottles or accepts bottles returned by their customers. Then the bottles are delivered to the plant and sterilised. The water is bottled, ready to be dispatched to the retailers on the territory. This cycle can be safely repeated up to almost 30 times. Reusing glass bottles is, in many cases, more advantageous. Producers only need to invest in industrial glass washing machines to be placed in their production plant, near the water source. Reusable glass bottles are

RETURNABLE GLASS BOTTLES



an example of reusable packaging, and it is the ideal solution in those cases where the transport distance from the filling site to the supermarket is within a short range.

Production costs drop and savings increase. In addition, the production of glass washing machines is a correlated business sector to explore.

Retailers would have to invest in efficient stocking solutions and optimised logistic solutions to better manage their spaces while they accept and handle returned glass containers. In addition, retailers must return money to the consumer and sort out the containers. Reverse vending machines are the ideal automated solution to assist retailers in this process. All these solutions represent lucrative business opportunities connected to returnable glass bottles.

THE CHALLENGE

At times, the lack of awareness of both the environmental and business advantages offered by this solution render people reluctant to implement or support initiatives correlated to the use of returned bottles. For example, in 2017, the Italian Ministry of Environment initiated an experimental programme that involved the use of returnable glass bottles and a data management system designed to obtain important information to be used for a feasibility project. The aim was to explore the technical, financial, and environmental aspects of this solution. Unfortunately, public establishments, such as bars, restaurants, and hotels, did not adhere and support the program. It inevitably failed. Even shops offering biological and natural products, which make use of returnable glass bottles, did not collect and accept returned empty containers.

MAKING THE WISE CHOICE

In specific situations, reusing glass containers is indeed the best way to go. Environmental and business advantages come to the fore. All are players in this game. Consumers, retailers, producers, and governments should teach by example, promoting and making wise decisions. Choosing to buy water in a returnable bottle, and supporting the process by bringing it back, are small decisions that can decisively have huge positive effects on the carbon dioxide emissions. Using this solution can create and expand specific business sectors, including glass washing and reverse vending machines, storage and logistic solutions – just to name a few. Saving a sizeable amount of money is also an advantageous sub-product that cannot be underestimated.

The next time you are thirsty, will you choose a glass or plastic bottle? And when you drink your favourite water from a glass bottle, will you recycle or reuse? Make the wise choice! ■

The role of renewable energy in increasing efficiency while reducing energy consumption

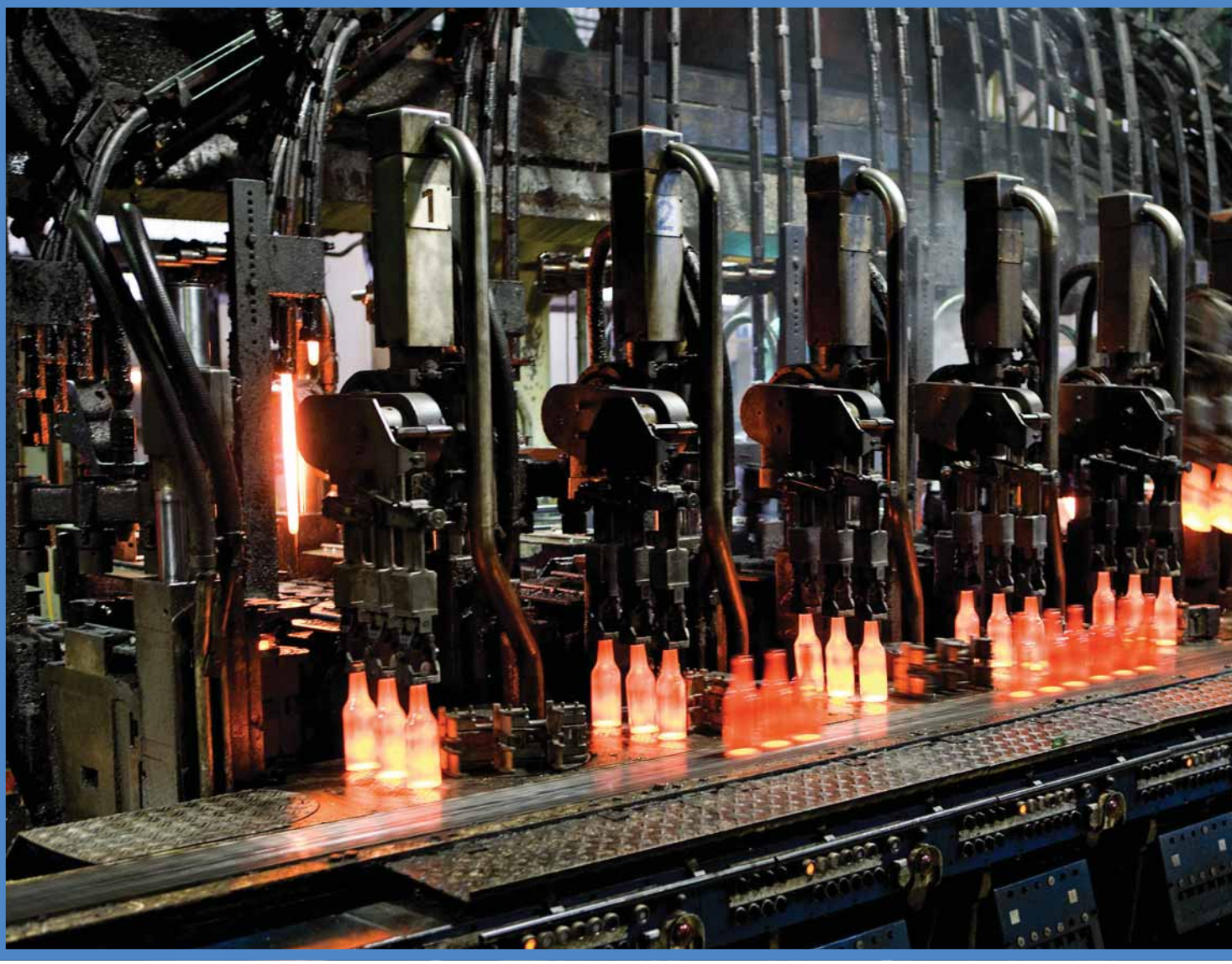
Glass production is highly energy-intensive. This is why this industry is constantly looking for ways to increase efficiency and reduce energy consumption at the same time. The use of renewable energies will therefore also play a role at glasstec 2020 as well as at its special show glass technology live held in Düsseldorf from 20 to 23 October 2020.

The input materials for glass production: 60% cullet, 29% sand, 5% soda, 4.5% lime, 1.5% dolomite and feldspar. Illustration: Bundesverband Glasindustrie

The production of glass or molten glass, to be precise, is doubtlessly very energy-intensive. The approximately 6,800 tons of glass produced in Germany in 2015 consumed almost 18.50 terawatt hours of energy. By comparison: in 2019 the entire power generation in Germany amounted to some 607-terawatt hours. Almost 273 million tons of CO2 were emitted just from power generation in this country.

At 44 per cent container glass accounted for slightly less than half the energy consumed in glass production. Approximately 29 per cent of energy was used for manufacturing flat glass and another 11 per cent for processing it. The remaining consumption was accounted for by fibreglass and special glass production. The lion's share of energy required at just under 80 per cent takes the shape of process heat, which is predominantly obtained from natural gas. Additionally, electricity is needed for electrically propelling machines and electric boosting for melting.

In glass production temperatures must be kept constant. This is the only way to ensure the sustained high quality of the



Glasstec, 20-23 October 2020 in Düsseldorf International Trade Fair for glass – Production, Processing, Products

For years the high percentage of international exhibitors and top ratio of decision-makers among its visitors has been the hallmark of glasstec. This trade fair is the platform for premiering innovations in all areas of the glass value chain from production and processing to finishing and final applications. The right feel for trends and tomorrow's topics are also reflected in the extensive programme of side events. With this glasstec asserts its position as the leading international trade fair for all things glass.

From 20 to 23 October the Messe Düsseldorf Exhibition Centre will see glasstec 2020 being held as the world's No. 1 trade fair for the material that is glass. In 2018 the trade fair registered 42,306 visitors from 126 countries to whom 1,276 exhibitors from 50 countries presented their latest products, machines, developments and visions.

finished products according to the Federal Association of the Glass Industry (Bundesverband Glasindustrie e.V. (BV Glas)). Against this backdrop a constant energy supply of sustained quality is imperative because glass production is a non-intermittent process 24/7 365 days a year.

In the wake of the on-going energy transition and desired decarbonisation, various alternatives to natural gas are currently being considered and studied. In Germany, for example, one container glass producer will build the first hybrid oxy-fuel melting tank, which can be operated with 80 per cent renewable energies. The aim is to save 50 per cent CO2 emissions in melting. The project was initiated by the European container glass industry and is funded by the EU. BV Glas has launched a project on the national level that looks at whether hydrogen is suitable (Power to X) for being added to, or even replacing natural gas.

Looking at these red-hot glass bottles it is evident that glass production is highly energy-intensive. Photo: The Federal Association of the German Glass Industry

Even the use of biogenic fuels based on biogas, for example, could be considered but is challenging due to the high demands made and need for consistent quality.

HIGH DUST POLLUTION ASSOCIATED WITH PRODUCTION

On top of this, glass melting also produces fine dust as a result of waste gas scrubbing and fine grains when reclaiming cullet. In Germany the percentage of waste glass reused ranges from roughly 60 per cent for white glass to almost 95 per cent for green glass. As a matter of principle, glass is a material that can be recycled 100 per cent time and again without any loss of quality.

The resulting dust, however, could not be molten and used for production so far because this would have caused plenty of dust in the combustion and regenerator chambers and, hence, led to process disruptions and damage to the plants. As part of an environment innovation programme a solution was found for this and a plant was funded at a Bavarian glass manufacturer for the beverage and food industry. In this plant the fine dust is compacted into briquettes and then introduced fully automatically into the melting tank with cullet and primary raw materials. This reduces waste by some 25,000 tons annually and saves about the same amount of primary raw materials.

Just as important as climate protection and sustainability including compliance with the Paris Climate Accord is, of course, maintaining competitiveness and/or the further economic growth of this industry. To reconcile both of these objectives there are various strategies and concepts such as the 'IN4climate.NRW' initiative launched by the North Rhine-Westphalian government or the energy efficiency network 'GlasNET 2.0', a network of companies in the glass industry under the umbrella of the Energy Efficiency Network of the Federal Government.

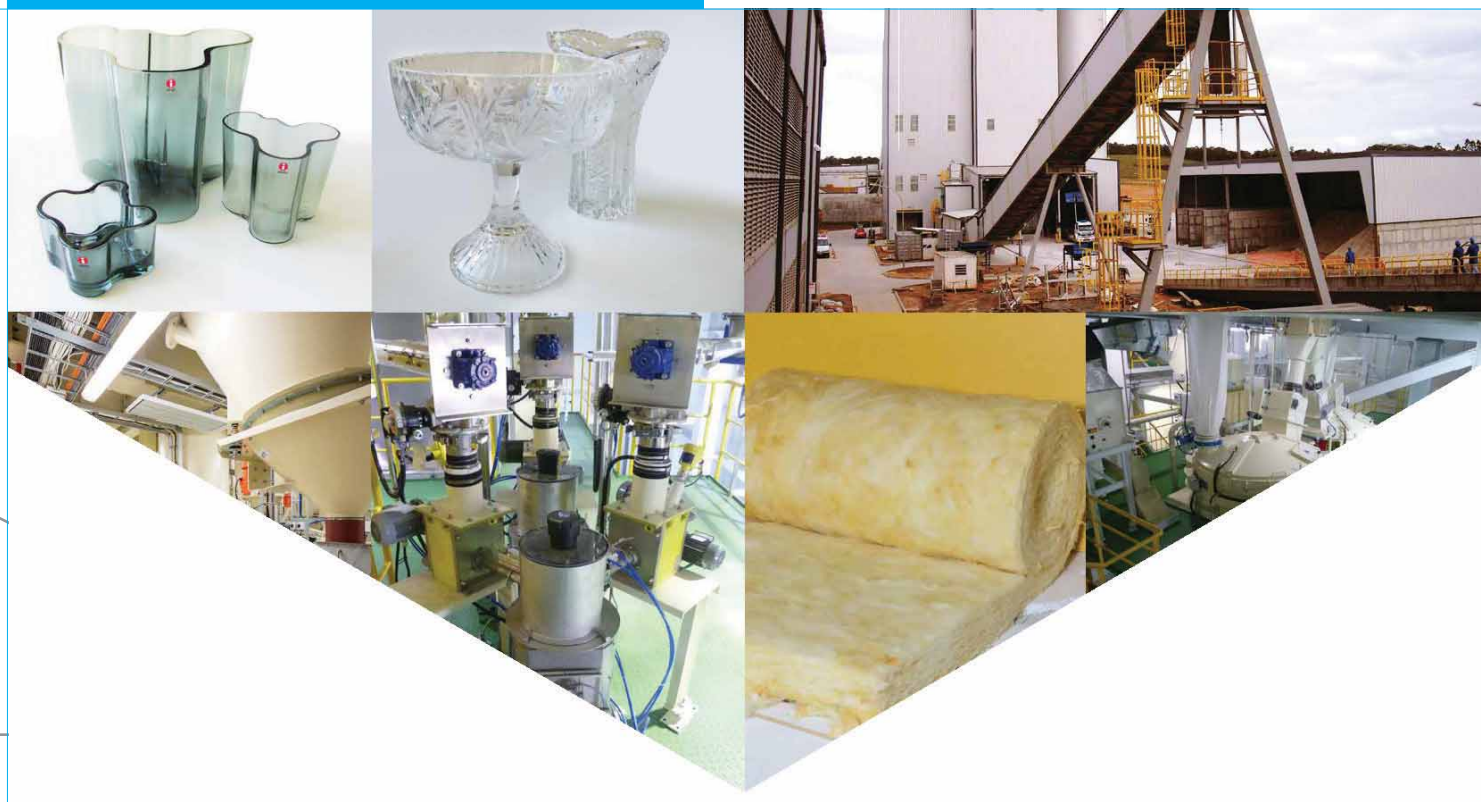
SHORT-TERM FINE-TUNING OF RECYCLING PROCESSES

A crucial component for improving environmental protection and sustainability is a continued expansion of the recycling industry. Here, the aspect of resource savings also comes into play. Despite fully operational material cycles glass recycling still has some fields that require exploring from scratch. A case in point is the following example of a large-scale plant erected to break down cathode ray tubes from TV sets.

The introduction of modern displays using LCD, LED, plasma and 3D technology entailed a rapid replacement of old CRT TV sets and monitors over the past years – and, hence, over 160,000 tons of used sets per year. Today, there are only small quantities of CRT sets being discarded but in this day and age we are confronted with the question of how to find a meaningful exploitation of the coated glass tubes that are usually treated as hazardous waste. In the mid-1990s ZME Elektronik Recycling GmbH already commissioned a plant that could sort up to 500,000 tubes and allocate the materials to the respective glass types for further reclamation. The plant was something special because systems for treating and cleaning cathode ray tubes, so-called de-coating lines, were not available as standard solutions in machinery and plant engineering. The experience gained back then served as a blueprint for engineering a bigger and more modern plant commissioned in 2007.

The aim of television tube recycling was to retain the raw materials included in the glass matrix such as lead, barium, strontium etc. Today, these raw materials are increasingly extracted and the tubes are practically de-coated. Reusable picture tube glass only requires a very low energy input for re-melting and therefore saves between 10 per cent and 15 per cent of the heating energy required. What's more, meaningful recycling helped to remove television tube glass from other 'recycling paths' such as road building or construction and also rendered landfill superfluous.

This example shows that practically every technical development requires its own recycling concept. ■



LAHTI GLASS TECHNOLOGY

Proven technologies lead to process expertise

Lahti Glass Technology Oy was formed from the glass division of Lahti Precision in 2018. The new company is part of Zippe Group, global leader of Batching Plant and Cullet Treatment Technologies. Lahti Glass Technology brings to the group its expertise in dosing weighing and mixing technology, helping customers succeed in their own production by working closely together, finding the best solutions for their actual needs, ensuring the lowest cost of ownership.

The production of high quality glass begins in the batch plant, where the raw materials are precisely dosed, weighed and mixed to form homogeneous batches. Lahti Glass Technology's compact and reliable batch plants incorporate field proven machinery and the latest technology and automation solutions, thus allowing for ease of maintenance, and overall low operating costs.

WEIGHING TECHNOLOGY

The roots of the company are in weighing technologies. Mass and force measurement utilizing strain gauge load cells and weighing instrument for accurate signal conversion form the core of expertise of Lahti.

Core components are used for hopper scales for raw material weighing which, along with dosing feeders and advance process control, guarantee precise and consistent batch preparation. The controls contain sophisticated features for automatic pre-act value change, when raw material flow properties change due to moisture. This means cut of material flow to the scale exactly at correct moment eliminating tolerance errors.

This dynamic feature results in unbeatable accuracy of dosing.

FIBRE

Lahti has developed unique, completely pneumatic batch plant technologies for reinforced fibre glass production. The company's know-how is based on fluidisation technology, which enables material transfer by using only a

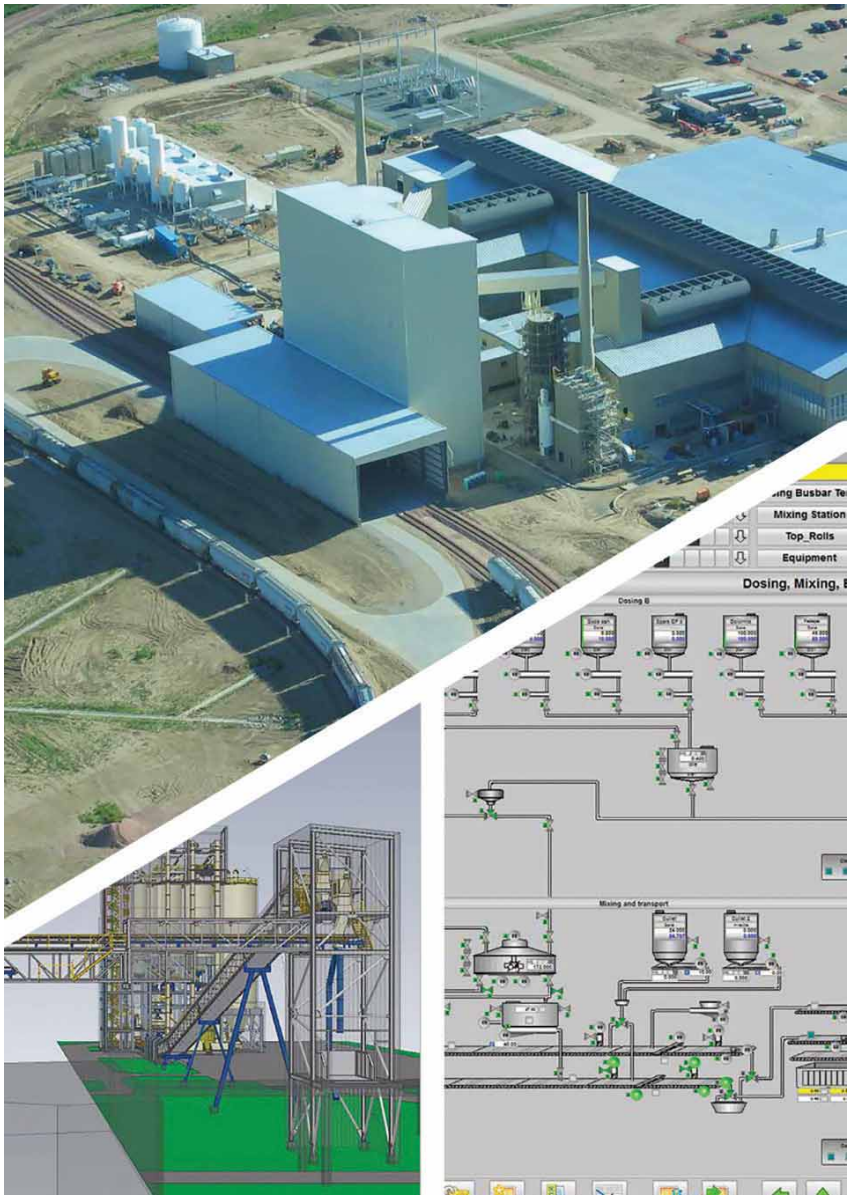
Being skilled in technology that ensures the quality of raw glass materials is not an easy task. But Lahti Glass Technology shows us how this is possible, thanks to its unique batch plant technologies, along with capabilities including all phases of engineering and construction for greenfield, brownfield, and modernization projects.

small quantity of compressed air in low pressure.

Traditional screw feeders are replaced with air slides and double dosing valves, which are the only moving parts. Mixing takes place in a unique pulsating pneumatic blender, after which the batch is transported pneumatically to the furnace silo. This unique technology allows for simpler layouts, easier maintenance, and reduced operating costs.

Through cooperation with a key client, Lahti originally pioneered an innovative system to recycle fibre forming waste, which does not require energy-intensive grinding and incorporates simple transport systems – thus ensuring low operating costs, high yield and availability, and very quick payback times.

The company's capabilities include all phases of engineering and construction for greenfield, brownfield, and modernization projects. The scope can flexibly vary to meet specific client needs – from the supply of key components and control systems, to the entire scope of the batch plant and related fibre recycling systems.



TABLEWARE

Additives for bright colours and ultra-clear glass are commonly needed in tableware production. Precise minor ingredient dosing can be secured by using Lahti Glass Technology's solutions, which can form an automatic or semi-automatic premix system or direct addition of the additives to the batch mixer. Careful design minimises contamination due to wear or material leakages.

INSULATION WOOL

The use of glass collected from households and industry, which is then purified and used as a raw material in glass wool production, is a growing trend. Lahti Glass Technology has – jointly with its customers – developed batch plant technology that is flexible in cullet usage. These plants utilize Lahti's own dos-

COMPANY OVERVIEW

ing belt scale technology, which allows for a large range capacity – thus maintaining good cullet dosing accuracy.

COMPANY SKILLS AND SERVICES

- Complete deliveries of batch plants and cullet systems
- Dosing and weighing systems and components
- Control systems and components
- Cullet processing and cullet return systems
- Waste fibre glass recycling systems
- Batch plant modernizations and control system upgrades
- Energy efficiency improvements
- Wide range of services
- Material intake systems available to meet customer requirements.

PROCESS EXPERTISE ENABLED BY PROVEN TECHNOLOGIES

Material intake

- Material intake systems available to meet customer requirements:
- Train wagon discharge downwards to drive on hopper
- Bulk truck discharge with effective dust receiving units
- Big bag unloading unit connected to daily hopper or pneumatic transport unit
- Dust free breaking and discharging of small bags in protective cabinet
- Effective vibratory feeders or screw feeders for receiving hopper discharge
- Robust bucket elevators for lifting raw materials to the silo top
- Specially lined chutes and diverter gates as well as rotating distributors for transfer on silo top to silos
- Controlled security operations to guarantee correct material discharge to each silo

Batch and cullet transport

Transport systems for secure batch and cullet transport to the furnace:

- Mechanical conveying systems comprising of belt conveyors and /or bucket elevators
- Magnets, metal detection and rejection of contamination to protect the furnace
- Chutes and diverters with liners designed for low wear and even flow
- Pneumatic batch transfer alternative for dry batch to furnace hopper
- Cullet dosing applications integrated to the transfer line that enable all time cullet feed

Mixing

Homogeneous mixing result secured with dedicated glass batch mixers:

- Lahti MBV – series mixer
- Specifically designed for glass batch mixing
- Excellent batch homogeneity
- Easy maintenance due to simple construction
- Low wear rate of mixing tools and liners
- Low energy consumption
- Water and steam injection gears for wetting and heating batch

Ability to integrate other mixer

brands according to clients' preferences. Lahti Pneumatic Blender/transporter for fibre and special glass production.

Raw material storage

Optimized silo dimensioning based on customer requirements:

- Silo volumes to meet daily storage needs taking into account powder flow properties
- Steel or concrete construction
- In-line or tower type construction
- Application of the most suitable silo discharging techniques to enable mass flow in the silo

Dosing and weighing

Application of the most suitable dosing equipment and scales for different materials to obtain the best dosing accuracy for each raw material:

- Bin activator or fluidisation elements to enable even and steady silo discharge
- Screw feeders, vibrating feeders, belt feeders, double dosing flaps and fluidisation hoses for dosing depending on raw material properties
- Application of hopper scales with or without auto test silos equipped with load cells

- Application of cup scales for minor ingredient weighing
- Application of belt scales for cullet dosing

Furnace hopper systems and furnace charging

Consistent and reliable furnace charging:

- Level controlled shuttle conveyor for float furnace hopper filling
- Daily hoppers mounted on load cell for accurate level control
- Engineered hopper discharge prevents blockages
- Zippe float furnace chargers
- Special furnace chargers applying loss-in-weight technology
- Swan neck type emergency charging systems

Factory cullet return and external cullet handling

Robust cullet handling systems for the most reliable operations:

- Internal cullet return
- In-line breakers and receiving hoppers
- Secondary breakers to enable correct cullet size
- Oil, heat, wear resistant belt conveyor depending on application
- Water cooling scraper conveyors for hot end
- Bottle and cullet crushers for internal and external cullet depending on application
- All cullet contacting surfaces wear protected with nickel free liners

Dust suppression

Complete system expertise to ensure the cleanest environment:

- Individual dust filters or centralized dust evacuation depending on application
- Correctly sized and balanced dust suction ductwork and filtering area
- Burnley baffles, conveyor skirt boards, dust hoods, winnow-

ing towers, dust seals and precisely designed details comprising a complete package to reach dust free environment

Control systems

Reliable, safe and easy to use plant automation:

- Field instrumentation to secure safe operation and adequate signalization
- Hardware based on worldwide brands to follow customers' preference
- Software developed to satisfy the most demanding reporting needs; Batch Information Management System (BIMS)
- Connectivity to enterprise resource planning (ERP), such as SAP
- Weigh controller selected to achieve advanced connectivity, speed and accuracy
- Operator interface with comprehensive graphics and user intervention in several operation modes
- Advanced security features and interlocks to prevent human error
- Remote and wireless access via VPN connectivity

FLAT AND SPECIAL GLASS

Float glass

Float lines originally established the glass industry's most demanding requirements for dosing and weighing accuracy, along with mixing homogeneity. In addition, robust, reliable cullet return systems are essential.

Lahti has repeatedly satisfied such needs with all major global, regional and local float glass producers. The company's capabilities include all phases of engineering and construction for greenfield, brownfield, and modernization projects. The scope can flexibly vary to meet specific client needs – from the supply of key components and control systems, to the entire scope of the batch plant and cullet return system.

Low iron glass

Very high transparency is one of the most critical requirements in solar applications. Special attention for iron contamination in raw materials, which reduces transparency, should be taken care of in a Batch Plant dedicated for low iron glass production. Lahti has a special design for material flow, special materials for contacting surfaces and raw material purification fulfilling such requirements. Modification of an existing batch plant is also possible for low iron production.

Ultra thin glass

Glass production for smartphones, tablets, flat TV sets and other electronic devices requires special technology, which starts from the batch plant, which has special features compared to a standard plant. Valuable raw materials and ingredients are exclusively protected against contamination. Segregation of the batch is avoided by automatic batch container transfer replacing conventional batch transport.

Borosilicate, technical and art glass

Lahti Glass Technology's expertise in batch plants also covers technical glass production; sodium silicate glass, borosilicate glass, foam glass and funnel glass.

OTHER SERVICES FOR GLASSWORKS

Engineering

- Plant layout design using 3D modelling
- Static calculation and load data for foundations
- Basic and detailed design of silos and building
- Assembly and installation drawings and part lists
- Engineering of process electrification and control hardware
- Engineering of process control software and HMI/Scada

Supervision and coordination

- Project and site operations
- Supervision of mechanical and electrical installation

Start-up

Process machinery

- Testing and calibration
- Setting up and testing of the control system and instrumentation

Training

- Maintenance and service personnel, as well as operators

Spare parts

- Spare part recommendations, supplies and support

Upgrading and modernisation

- Upgrading of control systems in light
- Major upgrading during cold repair of the furnace
- Extension and capacity increase of the batch plant

Pre-inspection services

- Audit inspection of all batch plant machinery to improve production performance and reliability
- Detailed inspection report with recommendations for instant repairs and spare parts or before cold repair. ■

BEATSON CLARK

Virtual Reality software revolutionises machine training

Software is ever more a fundamental part of any industry. In the glass sector, it is used in almost all areas of glassmaking. This article gives us an idea of how this virtual world can also help in training operators to use the highly complex machines that make glass containers.

Founded in 1751 in Rotherham South Yorkshire, Beatson Clark is proud of its long heritage. Originally manufacturing glass containers for the Pharmaceutical industry, we diversified into the Food & Beverage markets during the 1970s and 1980s.

Both the food and beverage ranges have become hugely successful for the company, with the food sector now being its largest market. However, Beatson Clark still remains the UK's largest manufacturer of pharmaceutical glass containers.

WORKING ALONGSIDE VRMT

New recruits at leading glass manufacturer Beatson Clark are training to operate complex production machines using pioneering new virtual reality technology.

The South Yorkshire company has been working with virtual reality experts VRMT to develop a new training system to help staff understand more detail about the glass-making process.

The training program recreates a lifelike 3D virtual model of the factory and allows new IS machine operators to fully understand the bottle forming process and identify faults.

"We have been working closely with VRMT for several months to develop the program, which is the first of its kind to be used by a glass manufacturer anywhere in the world," said Trevor Phillips, Production and Engineering Director at Beatson Clark.

"Trying to learn the glass

forming process from a book, or even on the shop floor, is difficult because the trainee cannot see exactly what is happening, so it takes quite a while to grasp.

"Because the virtual machine is highly visual the trainee becomes immersed in the program – rather like when you're engrossed in a good movie – and it becomes easier to recall what has happened.

"Currently the VR programme is training machine operators, but in future we can also use it to provide detailed refresher training for existing staff."

Tony Pawinski from VRMT added: "Trevor showed great vision in the early days and immediately saw the future potential of VR for revolutionising IS training, not just for machine operators new and old but also for a whole raft of personnel who are indirectly involved with the production of glass containers.

"This includes support staff such as Karen Scholey, buyer at Beatson Clark.Even customers can now be safely shown the complexity of glass bottle manufacturing and discuss it with more clarity.

CASE STUDY: KAREN SCHOLEY, BUYER AT BEATSON CLARK

Trevor Phillips: "I was interested to see how quickly someone could learn, from having no knowledge of the forming process at all to being able to explain how it works without any help. Karen Scholey, our buyer, volunteered.

"Firstly I showed her our real single-section training machine and various pieces of mould equipment. I then asked Karen questions about the section and found that she could not remember what we had talked about.

"Then she went onto the virtual machine and I took her through the program so that she could actually see the forming process. I then slowed the section down to a quarter of its normal speed and talked her through what was happening.

"We spent 45 minutes on the VR machine, after which Karen could write down what was happening step by step. She also explained when re-heat times started and ended and could quite easily identify each piece of mould equipment.

"A week later I asked Karen to take me through the process again, which she did with ease. She said that she simply visualised the section again, like recalling a film or TV programme she had watched, and she could still explain what was happening and why."

Karen Scholey: "As someone with no previous knowledge of the glass-making process I found the VR training to be an excellent way of learning.

"It is now one week since my training and I am surprised how much I can still recall!"

VRMT

Virtual Reality Machine Training was formed in 2018 by co-owners Tony Pawinski and Mark Henshaw to supply the glass bottle manufacturing industry with a unique software tool to help improve training without any effect on production whilst working in a safe environment.

Work started in 2016 after the reaction of delegates to a previous VR endeavour that was

shown at the glasstec event that year, which was followed by the building of an Individual Section machine in the virtual world. This software would eventually become the centre of the whole VRMT business.

In 2017, VRMT collaborated with a local glass manufacturer in South Yorkshire to help refine the application and test the functionality with multiple users which enabled the application to really start taking shape.

After continual development and bringing on further programming knowledge, the latest version of the software was unveiled at glasstec 2018, and was met with tremendous enthusiasm from many glass bottle manufacturers.

VRMT is now supplying multiple glass manufacturing businesses with its unique VR application and are continually adding and improving features. ■

IRAN'S CONTAINER GLASS INDUSTRY

Rajeev Jetley

Iran has been one of the most talked about country in recent months – even if mostly for negative reasons, first and foremost, the ongoing Covid-19 pandemic. Glass Machinery Plants & Accessories presents an overview of country's container glass industry for the beverage industry in this feature.

THE IRANIAN BEVERAGE MARKET

With a population of almost 80 million, Iran is one of the largest countries, economies and beverage markets in the Middle East Asia region. The country has one of the most advantageous strategic locations in the region, and shares land borders with Turkey, Armenia, Azerbaijan, Turkmenistan, Afghanistan, and Pakistan. Its coastal borders open to the Caspian Sea in the North, and the Persian Gulf and Gulf of Oman in the South.

Food and Beverage is a very

important category in terms of household expenditure in Iran. In fact, the most recent information available in this area shows that in the period 21 March 2018 – 19 March 2019 gross expenditure per urban household on F&B was about EUR 2,453, 23.60 per cent of total urban household expenditure.

Iran maintained its position as one of the Middle Eastern countries with relatively high per capita consumption of carbonates in 2018, with 34 litres of carbonates consumed per capita during the year. This is related mainly to the strong demand for cola carbonates. Even the rather unique political situation of the country has not stopped the two US based multinational carbonates giants Coca-Cola and PepsiCo from remaining active in Iran, targeting the majority of Iranian households.

Carbonates are one of the most popular beverage categories in Iran, with almost all carbonates sold in Iran being produced locally. The key multinational brands such as Coca-Cola and Pepsi have their syrup concentrates imported, from which they then produce carbonates at their local factories, located mainly in Mashhad, Tehran and Shiraz. The only key domestic carbonates brand, Zamzam, is produced by the state-owned company Zamzam Beverage Co, which belongs to Bonyad Mostazafan and Janbazan.

Major beverage producing companies – Khoshgovar Mashhad Company, Zamzam Beverage Company, Neysun Shargh Company, Sasan Company, Ashi Mashi Group, Eram Noush Company, Shemshad Noosh Company and Coolack Shargh Company – together account for 94 per cent of the beverage market in Iran.

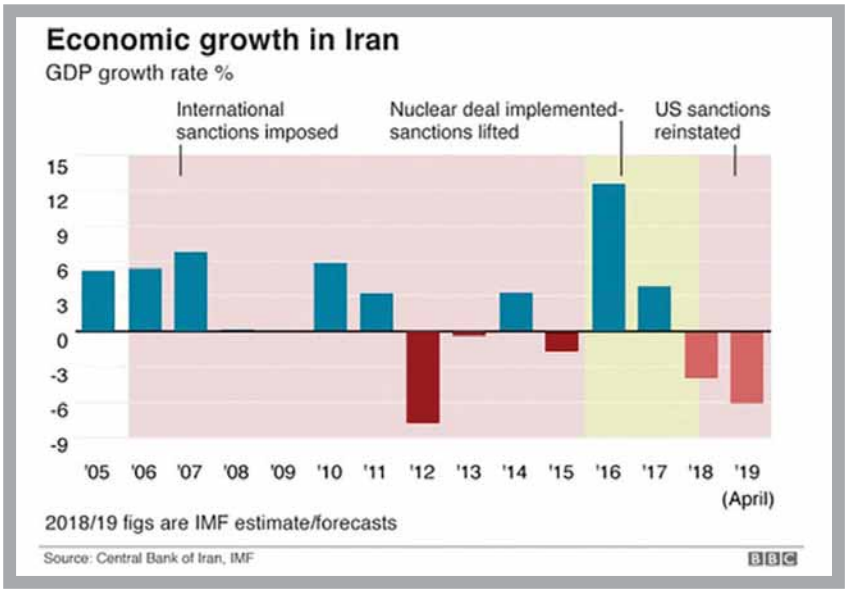
Growth in the beverage industry in Iran has been achieved in spite of the many limitations which are imposed on sales of some of the key sub-segments. For example there is a complete ban on carbonated beverages on consumer advertising channels such as billboards and television advertising campaigns due to health concerns over obesity and diabetes. This means that growth in carbonates continues to be hampered mainly by widespread negative publicity regarding the negative health implications of products containing a lot of sugar. Three main alternatives, which are widely accepted as replacements for carbonates, are bottled water, Doogh and non-alcoholic beer, usually flavoured non-alcoholic beer.

Iran has experienced a relatively high rate of inflation during last few years and this has negatively influenced beverage consumption. The cost of production and raw materials has increased dramatically over this period, which has left the key suppliers of beverages with no choice but to increase their prices.

THE IRANIAN CONTAINER GLASS INDUSTRY

The Iranian container glass industry is primarily driven by food, beverage and pharmaceutical industries. Being a Muslim country, alcohol consumption is prohibited due to religious beliefs, and non-alcoholic beverages account for more than 50 per cent of the total container glass demand in the country.

During the second part of the last decade, most container glass producers underwent expansion and technology upgradation as a result of relaxation in economic sanctions. Moreover, as there was no capacity expansion in this industry for a number of years, the huge opportunities, high returns and margins attracted new players and additional production capacity. Increased rivalry resulted in price discounts and, as a result, margins for most container glass manufacturers have come under pressure.



ECONOMIC SANCTIONS AND IMPACT ON THE IRANIAN CONTAINER GLASS INDUSTRY

Economic sanctions on Iran imposed by the US, which lasted for most of the last decade have had a deteriorating effect on beverage consumption and indirectly on the container glass industry in Iran. The country did, however, experience a brief period of economic optimism during 2015 and 2016 that fuelled financial growth and foreign investment. After generations of economic isolation, Iranians were hopeful of a future that would see their country become a bigger player in the global marketplace. However, a second wave of economic sanctions by the US in the year 2018 dashed the hopes of an economic recovery, which could have brought higher consumption of beverages in the country.

US sanctions have also limited the exports of glass containers from Iran to a large extent as exporters are facing long delays in receiving payment for their shipments. Since most international purchases are in US currency, Iranian container glass producers have been facing great difficulties in sourcing some of the key raw materials needed in container glass production. Scarcity of foreign exchange has also limited the ability of country's existing glass producers and new entrants from acquiring the latest technology from European technology suppliers.

MAJOR CONTAINER GLASS PRODUCERS FOR THE BEVERAGE INDUSTRY

Iran has a total of 12 container glass producers. Out of these, seven glass producers cater to container glass demand of the beverage industry. The remaining five manufacturers are purely pharmaceutical glass producers.

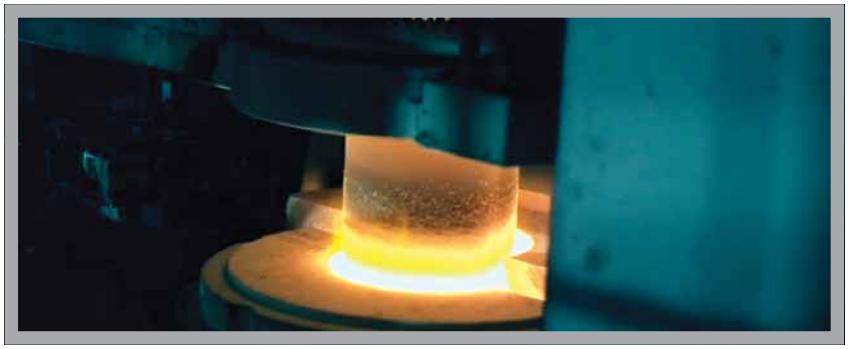
Company	Location	Installed Capacity - TPD
Nafis Glass	Takestan	360
Hamadan Glass	Qazvin	300
Shishe Va Gaz (Shoga)	Tehran	310
Takestan Glass	Qazvin	150
Mina Glass	Tehran	400
Crystal Iran	Abhar, Qazvin	90
Daroo Shishe (Sina Glass)	Tehran	250

TABLEWARE CONTAINER GLASS PRODUCERS FOR THE BEVERAGE INDUSTRY

Hamadan Glass Company

Hamadan Glass Company (PLC), a public company, has been engaged in container glass production since 1982. Located in the Hamadan province, the company supplies glass containers to major beverage producers in the country. Located on an area of 40 acres of land at the 12th km of the Hamadan-Tehran road, Hamadan Glass claims to export a sizeable part of its output to neighbouring countries such as Iraq, Azerbaijan and Turkmenistan.

The company has a designed capacity of 300 tons per day of glass containers with two furnaces. The first furnace has a designed capacity of 170 tons per day and four production lines. The second furnace, with a designed capacity of 130 tons per



day, was established in 1999, and feeds three production lines.

The factory produces the various types of beverage bottles in 200 ml, 300 ml, 450 ml, and 600 ml sizes. The company also prints logos on beverage bottles as per requests from customers.

Hamadan Glass has been planning to expand the designed capacity to 165,000 tonnes for past several years with an investment of USD 64 million. Recent economic sanctions have, however, stopped the company from going ahead with this expansion.

SHISHE & GAZ GLASS COMPANY

Popularly known as Shoga, state controlled Shishe & Gaz Glass Manufacturing Company is the oldest container glass producer in Iran. Tracing its history back to 1960, Shoga is based at the Shamsabad industrial township of Tehran. Shoga caters to container glass demand of the Iranian beverage industry.

Shoga commenced its production in 1960 with a 40 ton per day furnace, which, at that time, was considered a huge capacity. Subsequently, the installed capacity of this furnace was increased to 70 tons per day and later another furnace with a capacity of 90 tons per day was added by the company.

In 2013, Shoga commenced operations of its new state-of-the-art plant, producing light weight glass bottles. With an installed capacity of 150 TPD, this plant was planned and executed keeping in consideration the growing popularity of lightweight glass bottles in the domestic and regional markets.

TAKESTAN GLASS

Takestan Glass is located in an Industrial area in Takestan City. The company produces glass containers for beverage and food industries, and has an installed capacity to produce 150 tons per day of glass containers.

Takestan Glass shifted its production technology from Blow & Blow to Narrow Neck Press & Blow (NNPB) in early 2015, making it one of the few producers of lightweight glass containers in Iran. The company claims to have reduced the weight of glass bottles up to 35 per cent after adapting to this technology.

Takestan Glass' sister concern Behin Pooyan is one of the main mould manufacturers in Iran. Established in 2002, Behin Pooyan Sanat meets the demand of glass moulds of Takestan Glass, as well as that of the local market.

NAFIS GLASS – MOFID GLASS

Based in Takestan, Nafis Glass, which started container glass production in 2016, has a designed capacity to produce 360 tons of container glass per day. Nafis Glass's sister concern, Mofid Glass is one of the leading producers of pharmaceutical glass in the country. Nafis Glass' management had made provisions to install two furnaces at this plant.

MINA GLASS COMPANY

Mina Glass Co. was established in 1968 with aim of providing bottles for the Pepsi Company. The company began its activity with a furnace of designed capacity of 35 tons per day and two producing lines. Later, the company added a second furnace, which increased capacity to 160 tons per day through five production lines.

In 2016, Mina Glass added a third furnace with a designed capacity of 240 tons per day, taking the overall designed capacity of the company to 400 tons per day. This expansion positioned Mina Glass as the largest container glass producer in Iran on the basis of designed capacity. ■

XPAR VISION

Automating multiple tasks at the blank side

XPAR Vision, a private held, independent company from the Netherlands, is specialized in innovations of advanced sensor and robot technology for the global container glass and tableware industries. In this article, the company provides our readers with information regarding a revolutionary concept of automating multiple tasks at the blank side – the BlankRobot.

FORMING PROCESS STABILITY

XPAR Vision develops, installs, implements, services and maintains hot-end sensor and robot technologies, with products and services that help to improve the forming process performance and quality control for the global container glass and table ware industries.

The company is, and has always been, in the forefront in the 'fight' against variation in the forming process, starting from the year 2000, when the company presented its first generation InfraRed (IR) camera systems to the glass container industry.

Over the years, with the seventh generation of IR-system software, XPAR Vision is still a 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 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). Today already several closed loop controls are available for gob weight, blank mould temperature, ware spacing and vertical glass distribution.

BLANKROBOT – AUTOMATING MULTIPLE TASKS AT THE BLANK SIDE

In addition to the hot end sensor systems XPAR Vision introduced the BlankRobot, a revolutionary concept of automating multiple tasks at the blank side. Besides automatic blank and neck ring swabbing the BlankRobot will deliver automatic delivery adjustment and in-section diagnoses, made possible by extremely precise swabbing with a new patented lubricant.

Ultra-low frequency swabbing results in minimized impact to the forming process, to less lubricant consumption, less pollution and increased health and safety. The concept is based on the exclusive partnership between XPAR Vision and LubriGlass

GmbH. This innovative solution is suitable for all forming processes (Blow & Blow, Press & Blow and NNPB) and for round and non-round ware in each glass colour.

OPERATING PRINCIPLE

The BlankRobot automatically swabs blank moulds and neck rings by applying the special LubriGlass lubricant in an extremely precise way. The specific properties of the lubricant allows to extend the swabbing interval to two to three hours. Consequently the consumption of lubricant is minimized to less than three per cent of the amount needed for manual swabbing. The BlankRobot operates autonomously by a predefined program. It communicates with all IS-Machine models and is combined with the IR-D system which observes and if needed rejects any impacted containers after the swab operation. In between the two to three hours swabbing cycle the BlankRobot is able to do more automated tasks: automatic adjustment and alignment of gob delivery components (e.g. deflector) and in-section diagnoses are added functionalities.

OPEN DATA INTERFACE

XPAR Vision enables open data connections to standard and proprietary Production Information Systems to present and correlate real time hot end information with other production data from furnace, feeder, cold-end inspection and laboratory systems. Uniquely XPAR Vision teams with other suppliers to ensure bi-directional communication with hot end and cold end equipment.

TECHNICAL CHARACTERISTICS

- The BlankRobot incorporates a reliable Fanuc robot
- Section-by-section transport along a stable rail-carriage construction
- The BlankRobot is protected by unique carriage housing which prevents any possible contact between the moving robot arm and line operators.
- Close range sensors stops movement instantly to avoid contact with any person for human safety
- The BlankRobot user interface is provided on touchscreen tablet format
- Reliability and serviceability for maximized uptime

CAPABILITIES

- Extremely precise application of lubricant
- Ultra-low frequency swabbing – more than three hours
- Increased health and safety for man and machine
- Clean machine (minimal lubricant consumption)
- No exposure for personnel to hazardous fumes and smokes
- Multi gob support
- Multi product support
- All glass colours
- Round and non-round ware
- Blow-Blow process support
- Press-Blow process support
- Wide Mouth Press & Blow process support
- NNPB process support

SWABBING SYSTEMS REVIEW

In the following part of this article all currently available technologies for automatic swabbing for blank mould and neck rings are discussed and reviewed.

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 are 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

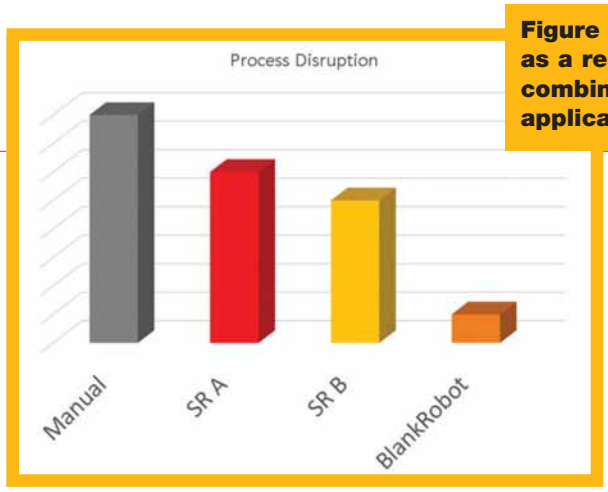


Figure 1: Process disruption as a result of swab interval, combined with accuracy of application

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 and safety.

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 meantime. With alternative equipment, more frequent swabbing is required and in higher and less accurate application (weak quantity control and/or poorly controlled application), disturbing the forming process and thus bottle quality significantly more.

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, result in poor repeatability and consistency when swabbing. Here, swabbing robots do much 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).

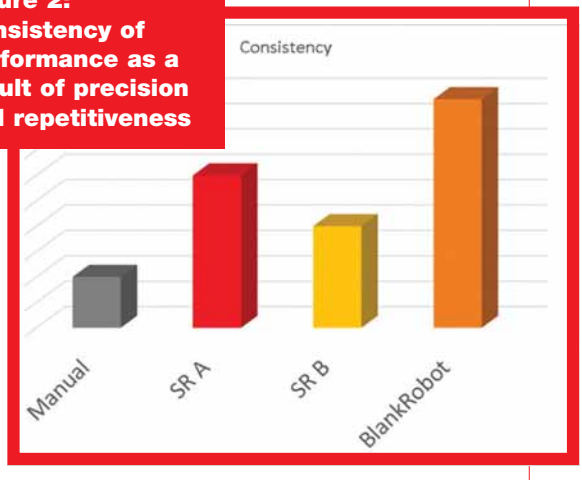
LUBRICANT CONSUMPTION

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 to each mould set used with a dedicated robot movement

Figure 2: Consistency of performance as a result of precision and repetitiveness



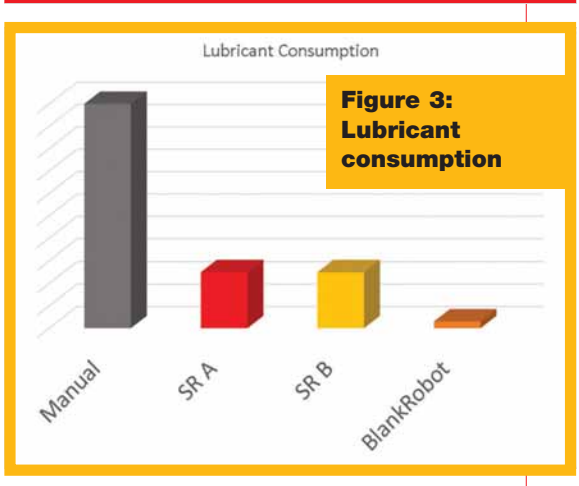


Figure 3: Lubricant consumption

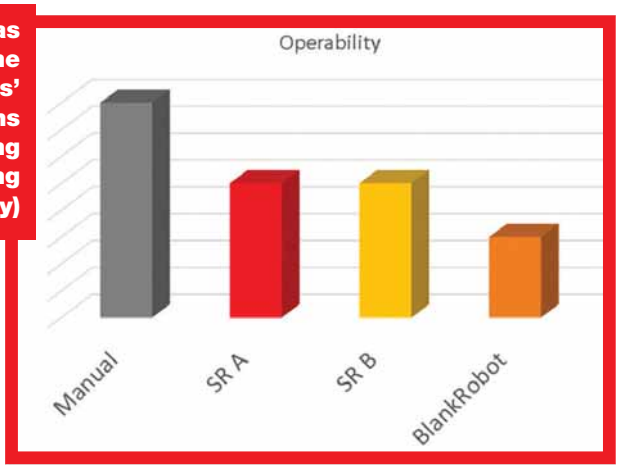


Figure 4: Operability as a result of set-up of the system and workers' access to sections without interfering automatic swabbing (swab frequency)

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 again 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 much lower extent. these health risks occur but at a much lower extent.

Operators no longer have to be near the swabbing action carried out by the robot and are therefore not exposed to hazardous fumes. Taking this into account with the oil consumption and swab interval, the comparison becomes clear again. The factor of safety come 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 compared to other robots' swab frequencies every 5-20 minutes. 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 to swabbing makes the selection obvious. Additionally, to perform new functions, additionally 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! ■

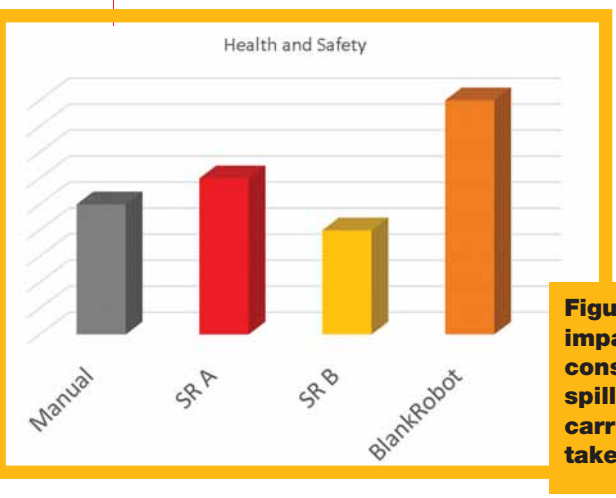


Figure 5: Health and safety impact as a factor of lubricant consumption, accuracy (less spillage) and swab interval. Also carrier cases (if present) are taken into account

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