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BI-MONTHLY INTERNATIONAL MAGAZINE FOR GLASS MANUFACTURING



YEAR 32 • ISSUE NO. 6/2019

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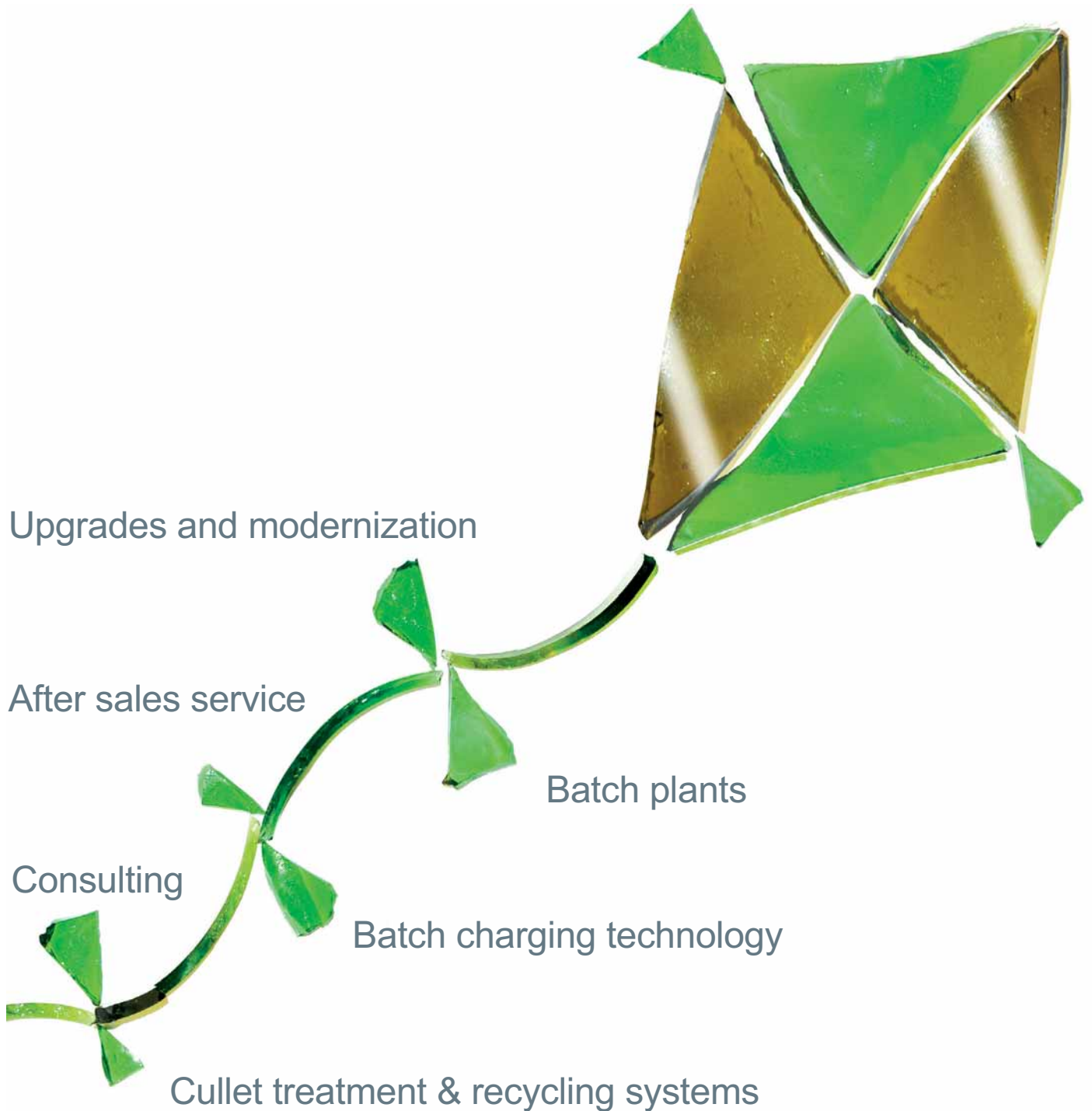
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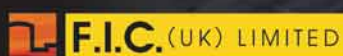
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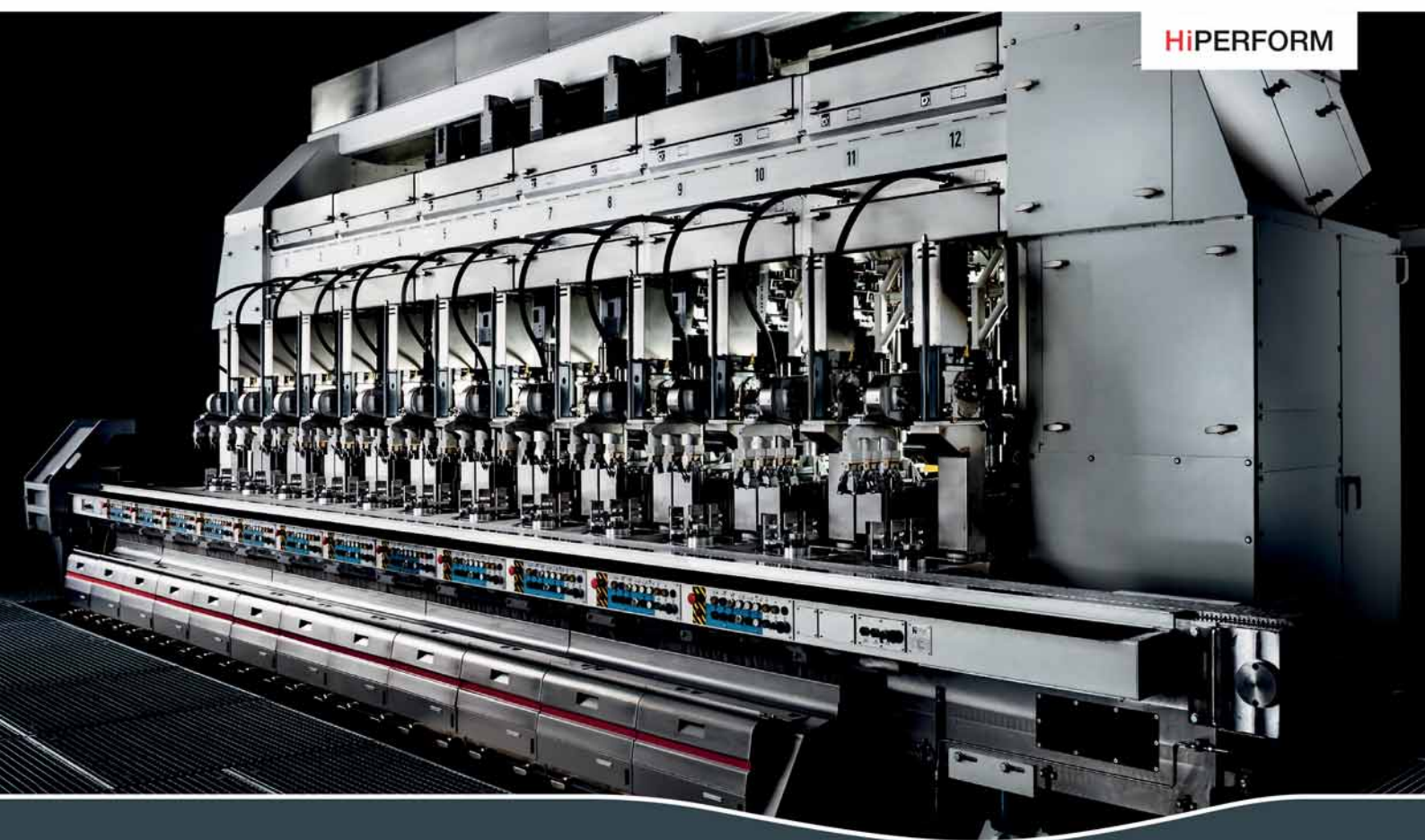
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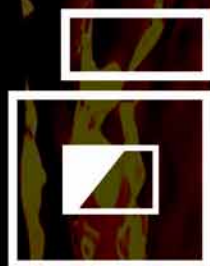
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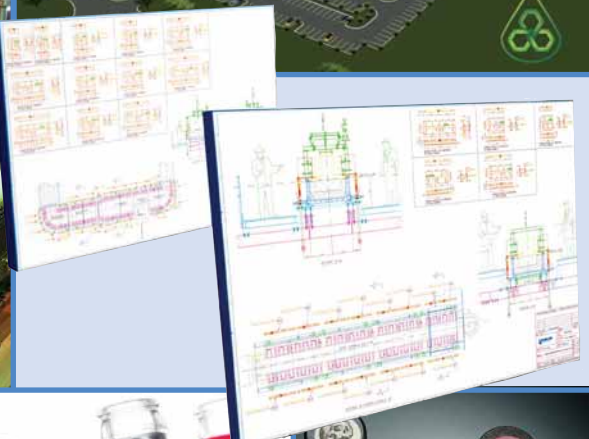
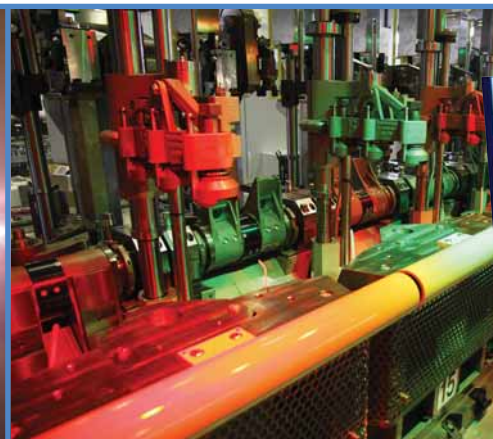
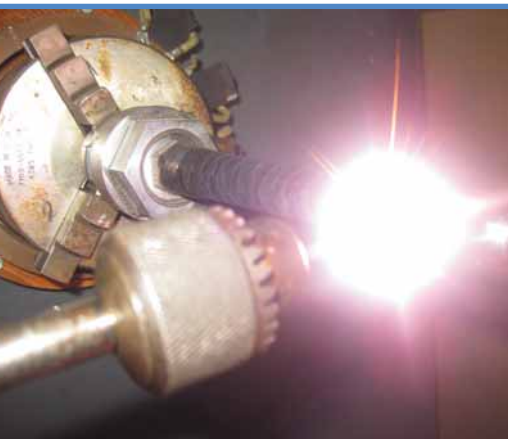
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2020 1	GLASSMAN ASIA	25-26 February	SEOUL South Korea	Editorial files: 10-01-2020
	COSMOPACK	12-15 March	BOLOGNA Italy	Deadline Adv files: 24-01-2020
2020 2	CHINA GLASS	14-17 April	SHANGHAI China	Editorial files: 04-03-2020 Deadline Adv files: 18-03-2020
2020 3	INTERPACK	7-13 May	DÜSSELDORF Germany	Editorial files: 27-03-2020
	GLASSMAN LATIN AMERICA	13-14 May	MONTERREY Mexico	Deadline Adv files: 06-04-2020
2020 4	MIR STEKLA	8-11 June	MOSCOW Russia	Editorial files: 27-04-2020
	XXXIV INT'L ATIV CONFERENCE	24-26 June	PARMA Italy	Deadline Adv files: 11-05-2020
2020	  <p>Glass Industry Directory 2020 NEW CONTENTS</p>			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
	<p>ALL GLASSTEC EXHIBITORS ADVERTISING IN THIS ISSUE ALSO RECEIVE A FREE GLASSTEC PREVIEW</p>			
2020 6	CONFERENCE ON GLASS PROBLEMS	26-29 October	COLUMBUS (OH) USA	Editorial files: 02-10-2020
	GLASSTECH ASIA	November	SOUTH EAST ASIA	Deadline Adv files: 16-10-2020



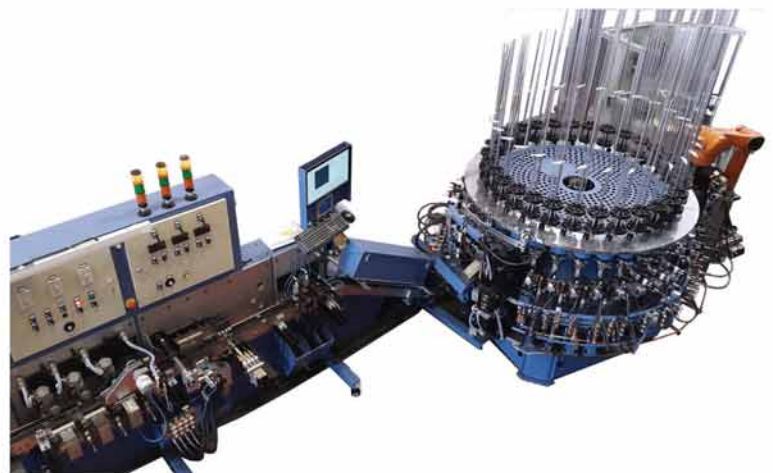
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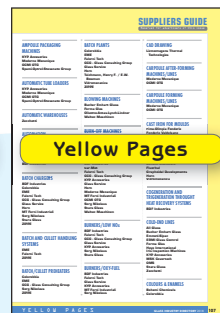
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Glass Industry

Directory 2020

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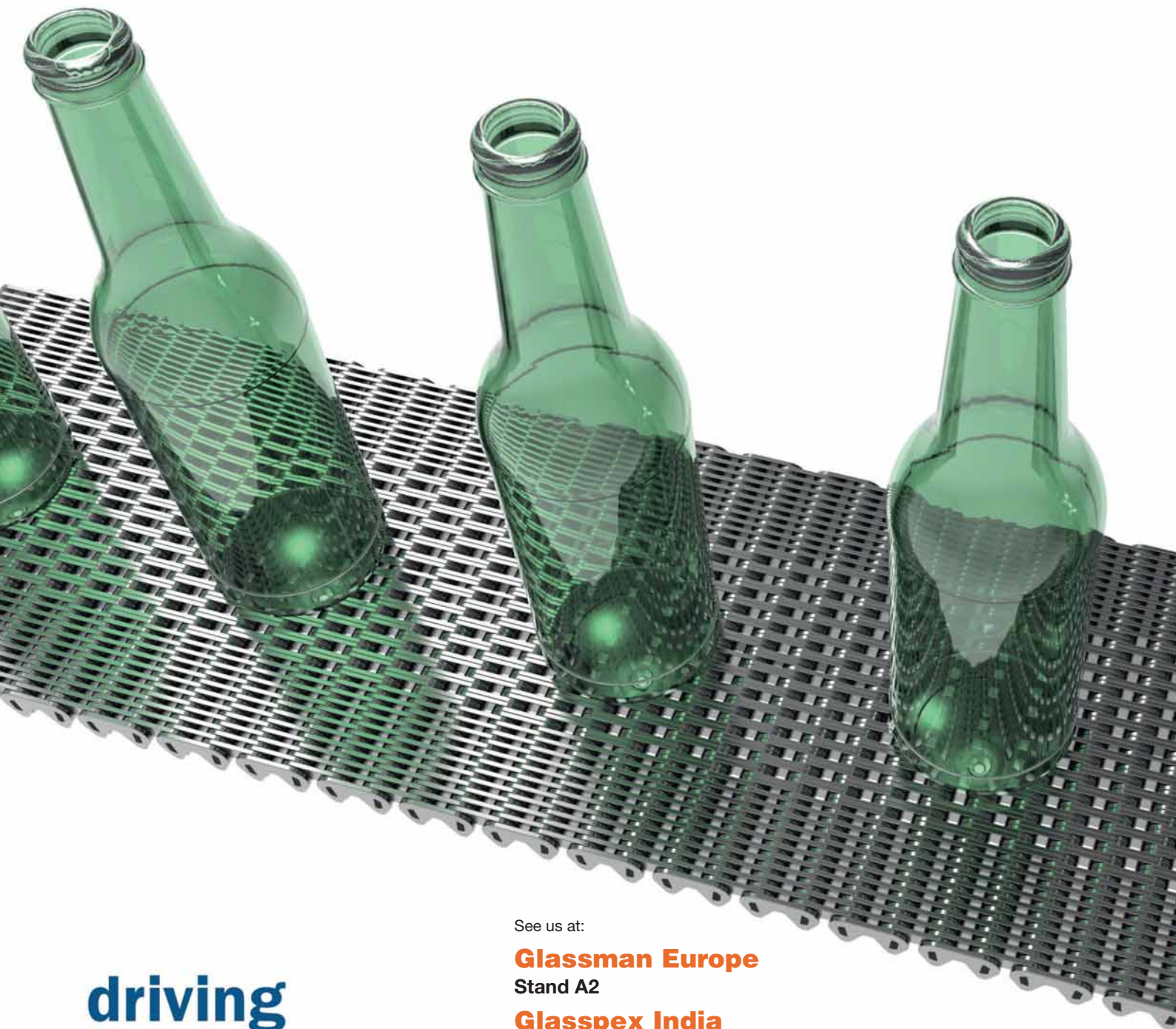


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BA GLASS

Over EUR 200 million investments for Bulgaria plants



Portuguese glass packaging manufacturer **BA Glass** plans to invest some EUR 205 million in expansion of its production capacity in Bulgaria over five years, with the majority of the investment to be made in 2020 and 2021.

BA Glass intends to build two new furnaces to double production capacity in Bulgaria, where it currently operates two furnaces: in Sofia and Plovdiv.

BA Glass acquired Bulgaria's *Drujba Glassworks* from Greek glassmaker *Yioula* in 2017. *Drujba Glassworks* was subsequently renamed to *BA Glass Bulgaria* and delisted from the Bulgarian Stock Exchange.

Since then, BA Glass has already invested in several projects at its Plovdiv plant, including the replacement of the old furnace with a new one, which has 70% larger capacity – 120,000 t. The new furnace, which became operational this year, is expected to help the company increase its output in the country from 330,000 t. of glass packaging in 2018 to 340,000 t. this year and 380,000 t. in 2020.

BA Glass Bulgaria turned to a net profit of around EUR 19 million in 2018 from a net loss of EUR 3.2 million the year before. The company's sales revenue last year grew to EUR 126 million from EUR 113 million in 2017.

In 2018, BA Glass Bulgaria generated 31.6% of its sales revenue on the local market and 68.4% from exports.

The company exports its output to over 20 countries in Europe.



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CHINA GLASS 2020

Next year's show in Shanghai

China Glass 2020 will be held at Shanghai New International Expo Centre (SNIEC), from 14-17 April, taking up seven indoor and three outdoor exhibition halls. Various subjects will be displayed and allocated among the 10 exhibition halls: E1 for international brands, E2 for glass production, E3 for tempering furnace and refractory materials, E4 – E7 for deep processing equipment and domestic glass, outdoor exhibition halls for raw and auxiliary materials.

The total exhibition area will exceed 90,000 square meters. It is expected to attract approximately more than 900 enterprises and more than 40,000 professional visitors in the glass

industry. On 25 May this year, the 30th China International Glass Industrial Technical Exhibition (China Glass 2019), organized by the Chinese Ceramic Society and contracted by Beijing Zhonggui Exhibition Co., Ltd., was brought to a successful conclusion.

905 manufacturers from 28 countries and regions participated in this exhibition, including 665 domestic manufacturers and 240 foreign manufacturers.

International industry organizations including the Mechanical Engineering Industry Association (VDMA), Italian Glass Processing Machinery and Accessory Supplier's Association (GIMAV) and Dame Associates, Inc. organized their member companies to participate in China Glass 2019 in the form of nation pavilion from Germany, Italy and the US. China Glass 2019 attracted 34,329 visitors from 66 countries during the four days event, including 30,279 domestic visitors and 4050 international visitors.



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900+ Global Leading Manufacturers

China International Glass Industrial Technical Exhibition, established in 1986, held alternatively in Beijing and Shanghai once a year. With development in over past 30 years, China Glass is the most commercially valuable platform for global glass industry in the fields of exhibition, technology exchange and business negotiation.



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BORMIOLI PHARMA

Renovations at San Vito al Tagliamento plant

Bormioli Pharma has unveiled its renovated plant in San Vito al Tagliamento, in north-eastern Italy. The plant expansion features a brand new furnace and two new production lines, significantly increasing its operating capacity.

Attendees at the ceremony included Sergio Emidio Bini, Councillor to Productive Activities and Tourism of the Friuli-Venezia Giulia region, and Antonio Di Bisceglie, Mayor of San Vito al Tagliamento municipality.

The investment, which amounted to a financial commitment of over EUR 20 million, will, when fully operational, lead to the increase of the production capacity from 30 tons/day to 110 tons/day, with the possibility of adding a third production line to extend the plant's maximum capacity to up to 150 tons/day.

The new plant, featuring cutting-edge technologies in different areas, has been designed to ensure a high operational flexibility and to allow to operate with different formats and



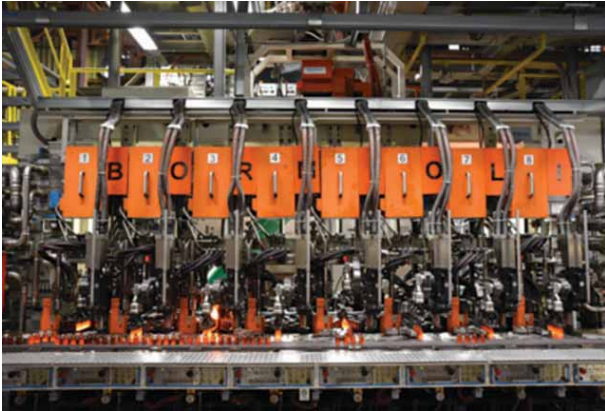
production technologies. In addition to high standards of energy efficiency, the plant now features a system of prevention and safety as well as an emission control mechanism of absolute excellence.

To support the investment in the production site, Bormioli Pharma has implemented a substantial plan to hire new resources, which has resulted in an increase of about 50 percent in the workforce. This enabled the company to hire about 50 workers, who have already been involved in training sessions. "The decision to invest in the renovation and development of our plant in San Vito responds to the company's growth plans and the need to improve our level of service, further reducing lead times and ensuring product availability even during periods of periodic maintenance of our production site in Bergantino. The construction of this plant further confirms the company's ability to improve continuously, through the integration and development of its technological skills on production processes," said Andrea Lodetti, CEO of Bormioli Pharma. "With the inauguration of the new plant, we have strengthened our position, further establishing the company as a partner of excellence in the global pharmaceutical industry."

In addition to the expansion of the production site in San Vito, Bormioli Pharma has recently announced the acquisition of the German company Remy & Geiser, specialized in closure and dosing systems, as well as tubular glass vials, further confirming its growth and internationalization strategy.

Bormioli Pharma is a plastic and glass pharmaceutical packaging company based in Parma. Acquired in November 2017 by





the Triton investment fund, the company produces about 5.5 billion pieces a year and employs about 900 people, 120 of which – when fully operational – are based in the San Vito al Tagliamento plant.



WWW.BORMIOLIPHARMA.COM

VIDRALA

Offer to sell MD Verre plant to Saverglass

The Executive Management of **Saverglass Group** has acknowledged an unilateral offer from the Spanish glass manufacturing **Vidrala Group** for the sale of 100% of shares in its Belgian subsidiary **MD Verre**.

The MD Verre factory is located in Ghlin, near Mons in Belgium and was acquired by the Vidrala Group in 2017. It operates two furnaces and produces 155,000 tons of glass a year, employing 257 people.

Saverglass Group's Management has expressed its interest in this offer which could quickly reinforce the production capacity of its current plants, enabling them to better respond to the growing demand for high-end bottles for Wine and Spirit – their area of expertise.

The Management has begun a process of consultation with the Group's Staff Representative Bodies concerning the interest expressed in this project.



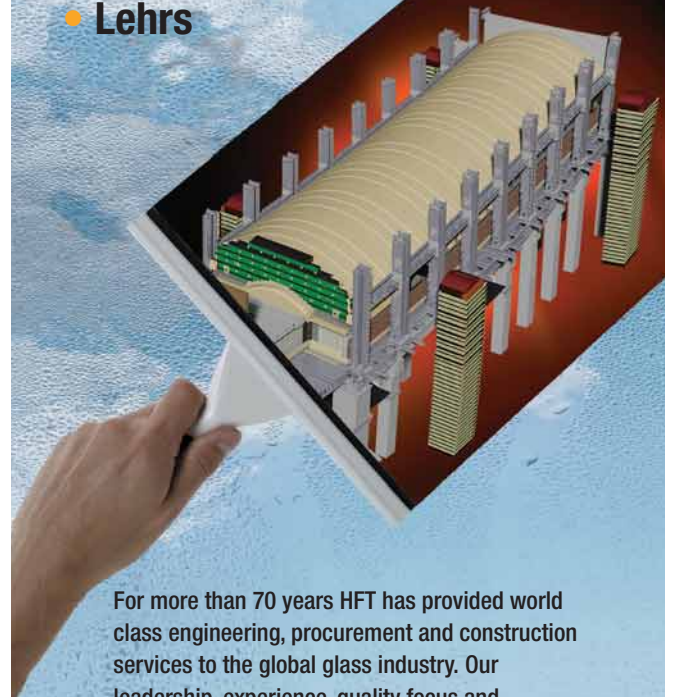
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FOSBEL

SmartMelter® Certified Partner Program

Fosbel Inc., a world leader in furnace refractory maintenance services, is enhancing its audit and inspection services to include SmartMelter® radar technology, Fosbel will be the first company to join the SmartMelter® Certified Partner Program. "I am very grateful for the speedy adoption of SmartMelter® radar technology in the glass industry as the new standard for monitoring the health of glass furnaces," said Yakup Bayram, PaneraTech CEO.

He added, "As the demand grows, our partnership with Fosbel enables us to reach even more customers with some of the best technical talent in the world. Fosbel, for many decades, has shown to be one of the top maintenance and audit firms. Adding them to our certified partner list is a testament to our commitment to deliver not only the best technology to our customers, but also an integrated inspection solution from a respected partner. We are calling this exciting new service SmartAudit™."

The Certified Partner Program allows furnace audit and repair providers to incorporate SmartMelter® radar technology into their audit, inspection and maintenance programs, combining visual, thermal, endoscopy and radar scans in a SmartAudit™. This significantly improves visibility of furnace health, as SmartMelter® has been proven to detect vulnerabilities one to three years before visual and thermal indications. The program enhances risk management by providing deterministic data for furnace maintenance decisions.

Fosbel has a history of innovation in refractory repairs, including ceramic welding and hot bottom repair, the introduction of SmartAudit™ service will expand its innovative services and offer clients a comprehensive view of their furnace condition.

"Fosbel is excited about adding SmartMelter® radar technology to its well-established global inspections and audit offering," said Bob Chambers, Fosbel Managing Director, Americas. He continued, "This partnership allows glass manufacturers to obtain full furnace diagnosis through non-destructive technologies measuring glass containment refractories."

"This technology, added to our service portfolio, facilitates risk management and actionable maintenance activities. We are very excited to partner with PaneraTech on this very innovative program as SmartMelter® radar technology has proven to be the new industry standard in inspection of glass tanks."

Fosbel will begin offering SmartAudit™ services effective January 2020.



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AIR PRODUCTS

Cleanfire® presented at 80th GPC



Air Products highlighted its latest Cleanfire® oxy-fuel burner solutions at the 80th Conference on Glass Problems (GPC) in Columbus, Ohio.

Conference attendees had the chance to learn about the latest innovations in the company's line of Cleanfire® oxy-fuel burner technologies, which can help glass manufacturers increase glass production, reduce fuel consumption, improve glass quality and reduce emissions.

The Air Products Foundation donated USD 100 (up to a total of USD 15,000) to the Ceramic & Glass Industry Foundation (CGIF) for each visitor at the company's suite. This is the third consecutive year Air Products has made a contribution to

CGIF to foster innovation by the next generation of ceramic and glass professionals.

In addition, Dr. Michael J. Gallagher, senior principal research engineer for combustion technology development at Air Products, presented "Synchronized Oxy-fuel Boost Burners for Zero-Port Performance Optimization in Float Glass Melting Furnaces" as part of the Conference's Melting and Combustion Technical Session.

Dr. Gallagher discussed an advanced burner technology that is capable of automatically adjusting flame properties – particularly length, luminosity and momentum – in float glass melting furnaces to maximize oxy-fuel performance benefits.

He will share both the methodology and beneficial results of field implementation of synchronized oxy-fuel boost burners, a development that combines Air Products Process Intelligence technology with the company's recently commercialized Cleanfire® HRx™ burner.

Air Products has been supplying oxy-fuel technology to the glass industry since the mid-1970s. The company operates a state-

of-the-art Advanced Clean Energy Laboratory that facilitates the development and full-scale testing of actual combustion systems using a full spectrum of gaseous, liquid, and solid fuels from customers. Located in Allentown, Pa., the Clean Energy Lab enables remote monitoring of real-time combustion tests from locations around the world.



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EMS GROUP

Acquisition of Zecchetti

In an ever-more plastic-free world, **EMS Group** is the new global leader in the 'cold end' sector of the glass industry. A goal first announced a year ago, when setting up the group that produces palletizing and depalletizing lines, packing and handling of empty and full multi-material packaging. A goal reached now with the announcement of the acquisition of **Zecchetti Srl**. The announcement came just a few days before the Cibus Tec trade show in Parma, Italy, where the companies of the EMS Group exhibited together with a new coordinated image to confirm the merger. Alongside Zecchetti, the Group also includes four brands of the Emilian 'packaging valley': Emmeti and Mectra in Montecchio Emilia (RE),



Giovanni Ronconi, EMS President

where the headquarters of the group are located, and Sipac and Logik, in Fontevivo (PR).

This new Group member is located just 500 metres from the headquarters of the EMS Group, and was, until now, the Group's most important competitor with the best performance in terms of growth in the cold end of the glass sector, thanks to a highly aggressive commercial strategy.

For the EMS Group, this merger means a growth in turnover of EUR 130-200 million, and an increase in the number of employees from 290 to 400.

The acquisition of Zecchetti, above all, results in a global expansion of the customer base, particularly in the US, Latin America and Asia-Pacific.

"Growth," explained Giovanni Ronconi, president of the EMS Group, "which will enable us to become market leader in the cold end of glassworks, expanding our range of products, technologies and services for our clients."

"The hollow glass sector, dominated by four top international players, and which is already growing," continued Ronconi, "as a consequence of the progressive move away from plastic tied to consumer choices and ecological brands."

Positioning itself as a leader in this sector therefore means benefiting from the maximum impulse provided by the green revolution.

Zecchetti, founded in 1960, supplies turnkey automation solutions for the transport and palletization for empty glass and PET bottles. The company is also specialized in automated storage and retrieval systems (ASRS), thus expanding the technology and know how of the EMS Group. As of now, the Group can provide clients from all sectors with solutions that are ever more complete.



ZECCHETTI.IT



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VERALLIA

Inauguration of new installations in Lagnieu

Olivier Rousseau, General Manager of Verallia France, gathered many customers at the Lagnieu plant to celebrate the reconstruction of one of the plant's two furnaces, specialized in the manufacture of glass food containers.

The company invested EUR 24 million to rebuild the furnace and modernize the lines of this site which serves both craft and multinational companies.

This new glass furnace, which alone produces about 2 million jars per day, has been completely rebuilt and the 5 production lines it supplies have been

modernized. This reconstruction provided an opportunity to use the latest technologies and more modern materials, in particular to improve the energy performance and environmental impact of the facilities, in line with the Group's environmental commitments. For example, this new furnace has a new combustion control system that promotes its homogeneity and therefore reduces hot spots, which emit nitrogen oxides.

This modernization also improves the reliability of the installations, the quality of the production and contributes to improving the working conditions of employees. The work also provided an opportunity to deploy an ambitious training program of more than 1,000 hours, organized around the use of modernized machines, occupational safety, production quality and industrial excellence, one of Verallia's priorities.

At the inauguration, Michel Giannuzzi, Chairman and CEO of Verallia, said, "With this new equipment, the Lagnieu plant has a state-of-the-art industrial tool to manufacture glass containers for food, which is a market in which Verallia believes and invests over the long term. This modernization illustrates our sustained investment policy, which allows us to maintain the operational excellence of our production facilities, and this project is fully in line with our objective to establish ourselves as the preferred supplier of glass packaging."



VERALLIA.COM

GTS

Exclusive poster released for pharmaceutical vial anatomy and classification

Following the success of its unique glassmakers' periodic table **Glass Technology Services**, has unveiled another free resource – this time focusing on pharmaceutical vial anatomy, classification and their applications

Developed for pharmaceutical clients, the poster clearly defines the terminology, anatomy and features of the moulded and tubular glass primary packaging formats commonly used across the pharmaceutical supply chain.

The resource includes a table summarising the applicability of glass container types based upon

the general recommendations of the European (Ph. Eur) and United States Pharmacopoeia (USP), together with a summary of properties of Types I, II, III and new glass types that have recently entered the marketplace.

A copy of this unique new resource may be requested from the Glass Technology Services website.

Gareth Jones, Operations Director at Glass Technology Services, said, "We often support clients by verifying pharmacopoeial durability and dimensional specifications, investigat-



ing product failures and carrying out delamination propensity studies, so often aid clients in understanding the terminology used across different glass formats – so the poster fits perfectly with many of the requests we receive.

“The pharmaceutical sector represents a large percentage of our customer base and, as with the Glassmakers’ Periodic Table for the manufacturing sector; we wanted to thank them with a specifically designed resource to celebrate our

rebranding process. “We hope that this will be a useful tool for packaging technologists and QA professionals throughout the supply chain.”

The ‘vial anatomy and classification’ poster has been designed by the experts in glass to provide beginners and experts alike with a detailed resource that they can refer to during their work with pharmaceutical packaging.



WWW.GLASS-TS.COM

PENNINE



**INDUSTRIAL
EQUIPMENT**

PENNINE INDUSTRIAL EQUIPMENT

New trainee international sales engineer

Pennine Industrial Equipment has announced that Will Law has recently joined the firm as their new Trainee international sales engineer. Will has recently graduated from Sheffield Hallam University with a First-Class Honours degree in Material Engineering and is looking forward to eventually doing business in and around Asia as well as the rest of the World. Although Will is new to sales, he is looking to bring new insight to Pennine and hopes to build strong relationships with new and existing customers.



PENNINE.ORG

VIDROMECANICA®

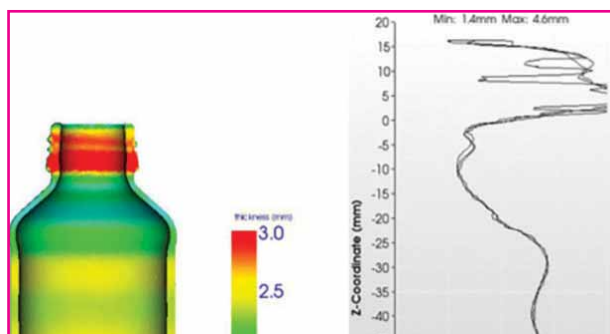
GLASS MACHINERY TECHNOLOGY



GERRESHEIMER Lightweight yet stable

By simulating the glass-moulding process digitally, Gerresheimer is reducing the development time for glass containers

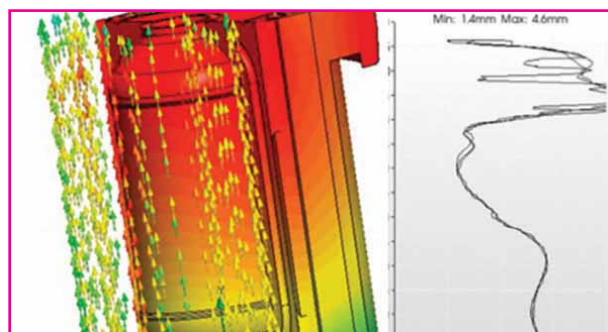
Glass production begins with engineering the mould, the more accurately the moulds are designed and made, the greater the quality of the bottle.



Result of the process simulation – analysing variations in glass wall thickness

A perfect and even distribution of glass is the key to success when it comes to ensuring the robustness and sustainability of these highly sensitive products. Gerresheimer employs innovative simulation software for this purpose, this adjusts the production parameters using CFD (computational fluid dynamics) as a basis, which improves the products and reduces development time.

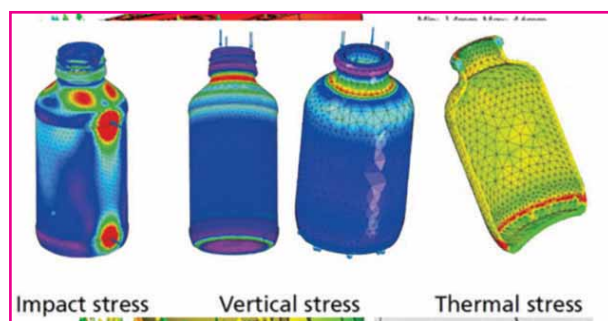
“Our customers are demanding sustainable and therefore lightweight yet stable products,” said Philipp Amrhein, Manager of New Product Development & Mould Design at Gerresheimer in Lohr. To ensure it’s in the position to meet these requirements, the company is using simulation software developed to calculate sturdiness and simulate the production process for moulded glass. The moulding production process and design of the moulds are being optimized, taking account of all the chemical and physical parameters of the glass. CFD simulations are also being used to optimize the respective process, which reduces stresses in the glass container and is an effective way to improve the quality of the production process.



Designing mould cooling

While getting a stable production process used to require lengthy empirical testing, this can now be achieved in just a few minutes using computer-based simulation software, more or less at the touch of a button. The results are then immediately transferred directly to the three-dimensional CAD software for mould design via interfaces and used directly by the mould-processing machines to create mould tools. The simulation software also reduces development time by up to 70%.

The well-known finite element analysis (FEA) method is used to determine which stresses arising from the production requirements work on the glass containers. These results can be used to prevent weaknesses even before the items have been sketched out. The computer-based simulation of the moulding process and the product requirements from day-to-day mould design are now part and parcel of operations. As an element of Gerresheimer’s continuous improvement process, it is essential.



Analysing stresses using FEA sturdiness calculations



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IRIS INSPECTION MACHINES

20% sales growth reported

It has been an exceptional year for French inspection solutions specialist **IRIS Inspection machines**, recording an impressive 20% improvement in sales for 2019. Growing global demand for the company's non-contact glass container inspection technology has required manufacturing capacity to be doubled during the final quarter at IRIS headquarters on the outskirts of Lyon. This expansion has been made possible by the acquisition of additional premises and the relocation of production/assembly operations last year and by hiring additional, multi-lingual engineers. At the heart of this significant business increase is the success achieved by NEO EVO5 and EVO12 inspection machines in recent months. This Industry 4.0-compatible equipment has received widespread glass industry acceptance, generating multiple orders, in particular from European and Latin American glass packaging producers. 320 machines throughout the world are already running NEO software, with excellent customer feedback generated by the innovative defect approach adopted. Glassmakers are particularly impressed by the accuracy and user-friendliness of the technology adopted.



The equipment delivers valuable features that help glass container producers to save time during the manufacturing process. Every setting has been designed to be handled by the machine itself, making the equipment less dependent on human operators.

Evolution NEO recognises the article and its exact shape, automatically drawing the inspection zone. This simplifies job changes and reduces the human error factor. The equipment allows operators to follow defect rejection rates, while also bringing their immediate attention to the most significant information analysed by the machine. In addition, within its statistical tools, Evolution NEO integrates a helpful set of different data, including time, mould number, images etc.

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



WWW.IRIS-IM.COM



HORN

Tin bath casings shipped

At the end of September 2019, four tin bath casings, each weighing five tonnes, were shipped to one of **HORN's** international customers.

The driver and the HORN materials logistics team had to work with exceptional accuracy to load the tin bath casings onto the truck and to move them safely out of the shipping hall and the HORN factory premises.

The tin bath bottom casing is used as a support tank for the bottom refractories. It is designed to expand on heated up

temperatures without flexing or distorting. When operating the hot tin bath it needs to be air-cooled continuously at the underside and at the lower side walls.

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



WWW.HORNGLASS.COM



NAMPAK

Sale of glass business

South African packaging manufacturer **Nampak** has sold its glass business to *Isanti Glass 1* and **SABSA**, a local subsidiary of beer maker **AB InBev** (AB InBev), for approximately ZAR 1.5 billion.

Nampak representatives has previously stated that selling the glass business would enable the company to focus on the



metals business, which generates more than 60% of the company's trading profit.

In its 2018 annual report, Nampak announced their decision to dispose of the glass business to improve the company's financial performance. Other steps included reducing overhead costs and consolidating plastic plants.

Nampak Glass operates three furnaces at its manufacturing facility in Roodekop, Gauteng. It has a sales and marketing presence in the Western Cape. The division serves a broad market of local and multinational customers in the beverage and food industries.

Isanti Glass 1 is 60% owned by investment firm Kwande Capital, while SABSA Holdings owns the other 40%. Kwande, which was established in 2010, focuses on investing in companies with high growth potential in sectors such as manufacturing, oil and gas.

SABSA is the holding company of SA Breweries and a wholly owned indirect subsidiary of AB InBev.



WWW.NAMPAK.COM



SOCABELEC

Selected by Hite Jinro for its South Korea plant

Hite Jinro is one of the leading beer and soju producers in South Korea, their glass container production plant in Jinju will be rebuilt in February 2020.

The reconstruction of the furnace of the Jinju plant is also an opportunity to use the latest and best technology in the production of glass containers.

Automatic swabbing is one of the areas in which Hite Jinro Ind. wants to invest in order to guarantee the highest level of productivity and after a long investigation process, including visits abroad to meet other users to get their feedback, the **Socabelec** swabbing-robot has been selected.

Customer satisfaction, reliability of the robot, on-the-fly swabbing without stopping production, without rejecting containers, as well as a high level of safety for operators working together with the robot, were the main criteria in Socabelec's favour.

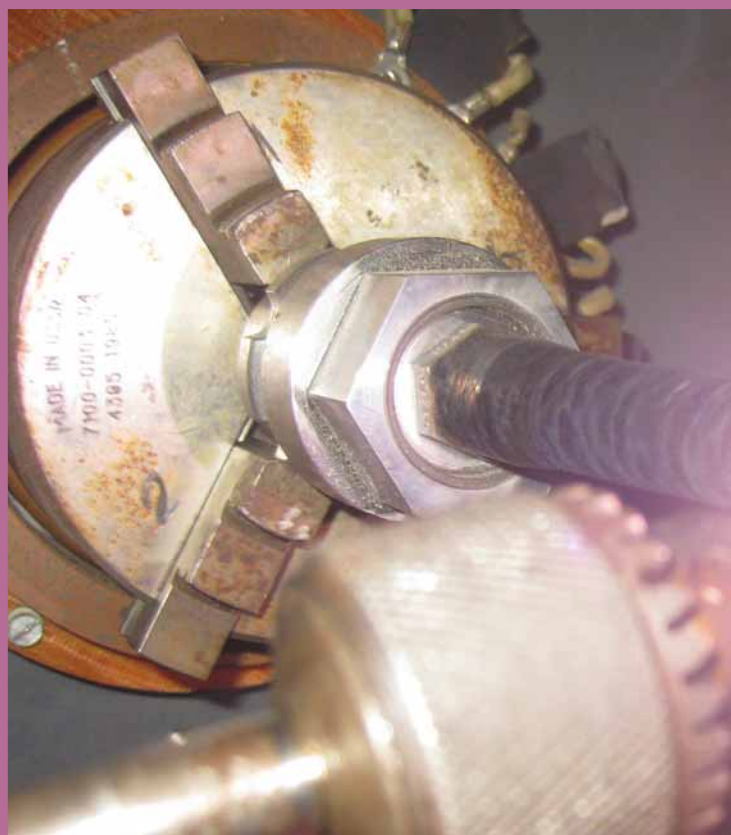
The robots will be installed on IS machines supplied by *Bucher Emhart Glass*.



WWW.SOCABELEC.COM



The CEOs signing the contract
(from left: Mr. Lim
CEO Hite Jinro,
Mr. Veri CEO Socabelec)



EDI

application in increasing durability of glass moulds elements

This article shows how, thanks to the continuous work of The Chisinau Glass Factory and the State University of Balti, a graphite layer deposited on the surface of the transverse plate simultaneously performs a series of functions that include anti-wearing protection, also increasing refractability, and much more.

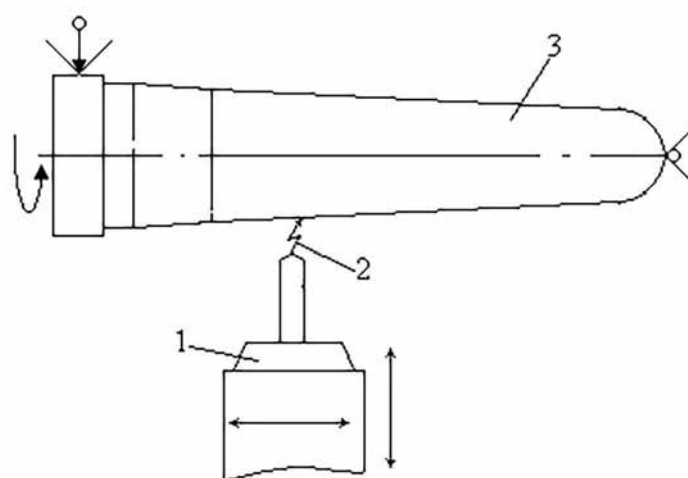


Fig.1. Scheme of electrode distribution in the processing with electric discharges in impulse: 1 – cathode, 2 – plasma canal, 3 – anode

The Chisinau Glass Factory and the State University of Balti have been working actively together on the increase of durability of glass moulds since 2010. Led by Professor Topala Pavel and a team of scientists, together with engineer Cosovschi Pavel, Chisinau Glass Factory, results were achieved in partial

surface hardening simultaneously serving as ointment in solid state, the result being the increase of machined items functional performances with the formation of graphite pellicles on their active surface by applying electrical discharges in impulse (EDI).

It is well known that after a few hours of functioning the

equipment and parts do not possess the same indices of exploitation, their technical state gets



Fig. 2. General view of the transverse plates of glass moulding forms: a) unprocessed; b) processed through electric discharges in impulse

worse and repairs are needed to lead the machines or parts back to normal functioning for a determined period of time.

The parts and machine aggregates wear out during the working process, which leads to changes in geometrical dimensions, form, weight, and properties of superficial layers; sometimes this can also lead to the appearance of cracks, bends, torsions, distortions and breaking.

Thus for normal functioning, the parts must have functioning security which means the ability of a part or product to work according to its destination, with a minimum of costs, and within the given period and conditions of exploitation. Functioning under difficult conditions of exploitation the machines and parts possess functioning security closely related to crack uniformity and the modification of structure and physico-chemical properties of materials, especially on the superficial surface layer.

Graphite deposit and superficial layer hardening, with the help of electric discharges in impulse, are based on the electric erosion effect and polar transfer of the tool-electrode material on the surface of the electrode – a part subject to the action of thermal and electric fields in the interstice.

Due to the fact that the Chisinau Glass Factory faces a number of problems concerning the durability of parts that are components of glass moulding forms, namely the appearance of such defects as zones of tearing the material out of the transverse plate body (because of the adherence of the moulded material on the transverse plate surface followed by the mechanical action of the tool-machine), deformation of the transverse plate peak (due to the sliding of the glass mass on it, also shown through the appearance of scratches and cracks); marks of surface burns (because of insufficient cooling and the process of heat accumulation in the body of the transverse plate). The above considerably influences the decrease of durability of parts making up glass moulding forms, particularly of transverse plates functioning under the most difficult conditions.

We therefore aimed at increasing the durability of cast iron transverse plates by forming graphite pellicles on their active surface, accompanied by hardening of the metal substratum.

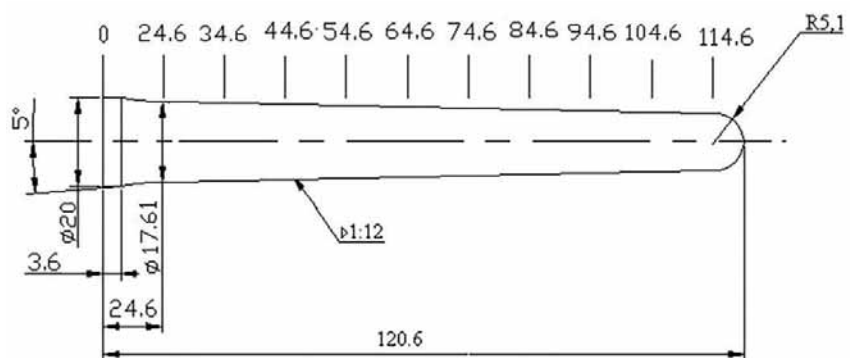
This method of processing is realised through the application of electric discharge impulses in a regime of subexcitation. The tool-electrode is made of graphite and connected to the generator discharge circuit of current impulse as cathode.

MATERIALS AND METHODS OF EXPERIMENTAL INVESTIGATIONS

The diagram of the technological process of graphite deposit simultaneously accompanied by hardening the active surface of the transverse plate by applying electric discharges in impulse is presented in Fig. 1.

The interstice between the tool-electrode and the processed part was invariable throughout the processing ($S = 1\text{mm}$). The tool-electrode may be removed as required in the directions presented in the diagram. Anode 3 presents the part (the transverse plate Fig. 2a) that was fixed and centred with a rotating peak under the influence of the tool-machine device. When, due to the high power impulse generated by the supplying source inducing unit, the electric circuit between the piece-electrode and the tool-electrode, the interstice is perforated, accompanied by the formation of the conductivity

Fig. 3. The sketch of the transverse plate and the points in which the measuring started beginning with zero



canal through which the energy of the power impulse accompanied by the formation of the plasma canal is emitted. As a result of the interaction between the plasma canal and the surface of the tool-electrode, the graphite erodes and is transferred to the piece surface where the graphite pellicle is formed. Modifications of the physico-chemical properties in the processed superficial layer take place simultaneously under the deposition pellicle.

The glass moulding form transverse plate is made of cast iron, the tool-electrode represents a bar with the diameter equal to 3mm made of electro-technical graphite of the type MPG-6. Previously experiments carried out on steel demonstrated that the micro-durability of the affected layer increases considerably.

In order to obtain the minimal roughness of a uniform graphite pellicle and high durability of the transverse plate surface, the following processing regime was selected: the charging power of the condenser battery of the current impulse generator $U_c = 200$ V, the size of the interstice $S = 1$ mm, the condenser battery capacity $C = 600$ μ F, the frequency of current impulses $f = 10$ Hz, the number of passes $n = 2$, the energy accumulated

on the condenser battery $W_c = 12$ J, the energy emitted in the interstice $W_s = 4.8$ J.

A universal microscope was used to measure the level of wear as it allows measurement with an error of $1\mu\text{m}$. To begin with we measured the diameter in ten points of two newly produced transverse plates establishing the sign point zero. A transverse plate was covered with a graphite pellicle and subjected to dimensional measurements in the same ten points as in the newly produced one; the procedure was repeated after the transverse plates were included in the glass product fabrication flux in Chisinau Glass Factory. For the newly made transverse plate (sample 23) 39900 cycles (75 hours). The cycle frequency constitutes $\nu = 8.75$ cycles per minute. The temperature of the glass drop 1129°C ; the glass used was of the BT-1 type whose chemical composition according to the standard SM GOST R 52022-2004.

RESULTS AND ANALYSIS

The analysis of processed surface morphology has shown that

physico-chemical changes on the surface do not excel micrometric sizes. Except for the initial components of the processed material, a considerable quantity of carbon (about 90 per cent) has been found. The analysis of transversal microfilig microstructure shows that part of the carbon transferred onto the piece surface diffuses in its depth at depths of micrometer order. We can suppose that new phases are being formed including those of carbides of alloy components used to manufacture the piece and of those of graphite on its surface. These lead to physico-chemical modifications of the part material and of those of exploitation.

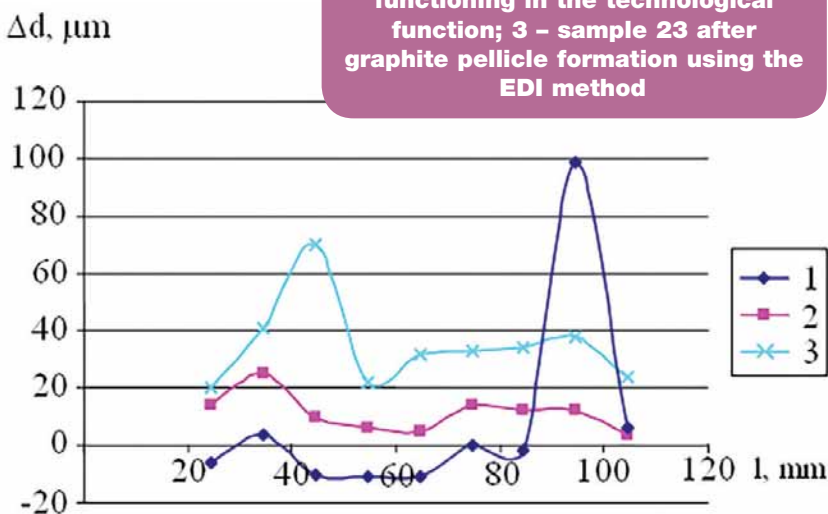
In the paper, transverse plates were tried under real conditions of exploitation and it was stated as a result that the transverse plates of moulding forms on whose active surface graphite pellicles were formed functioned in 57600 cycles during the absence of form and dimension modifications.

Thus experimental investigations in the technological cycle were performed to compare the wear of transverse plates of glass moulding forms. Two transverse plates were subjected to trial, one of them covered with graphite through electric discharges in impulse, the second unprocessed, the presentation is shown in Fig. 3.

After the piece was covered with graphite, the transverse plate diameter increased approximately by $35\mu\text{m}$ compared to the initial diameter, that is, as a result we have graphite deposits with average thickness of about $35\mu\text{m}$ on the surface under the form of pellicle.

If we investigate sample 19 that was not processed through EDI before and after functioning in the technological cycle we notice that its diameter in some points decreases by approximate-

Fig. 4. The dependence of the transverse diameter on the length of its active part for: 1 – sample 19 after functioning in the technological function; 2 – sample 23 after functioning in the technological function; 3 – sample 23 after graphite pellicle formation using the EDI method



THE WEAR SIZE OF THE TRANSVERSE PLATES SUBJECTED TO EXPLOITATION

Transverse plate diameter, mm					The measuring interval, mm	Δd1	Δd2	Δd3
Before processing		After processing with EDI	After functioning in the technological cycle					
Nr.19	Nr.23	Nr.23	Nr.19	Nr.23				
17,61	17,586	17,606	17,604	17,6	24,6	-0,006	0,02	0,006
17,206	17,171	17,212	17,21	17,196	34,6	0,004	0,041	0,016
16,82	16,78	16,85	16,81	16,79	44,6	-0,01	0,07	0,060
16,42	16,387	16,409	16,409	16,393	54,6	-0,011	0,022	0,016
16,023	15,99	16,022	16,012	15,995	64,6	-0,011	0,032	0,027
15,61	15,586	15,619	15,61	15,6	74,6	0	0,033	0,019
15,22	15,19	15,224	15,218	15,202	84,6	-0,002	0,034	0,022
14,83	14,792	14,83	14,929	14,804	94,6	0,099	0,038	0,026
14,42	14,397	14,421	14,426	14,401	104,6	0,006	0,024	0,020



ly 11 μm . Sample 23 is studied from three points of view, at the initial stage, then after the application of electric discharges in impulse, and, finally, after it was subjected to wearing. After the transverse plate was subjected to processing through EDI its diameter increases within admissible limits, (Fig. 4, curve 3) due to graphite deposits on its surface. Investigating the part after it has functioned in the above described regimes, a decrease of its initial diameter is visible in all cases (Fig. 4).

Fig. 4 shows us that, besides the decrease of the transverse plate diameter (19), its increase is sometimes noticed and this may be explained by the adherence of the glass mass to the active surface of the transverse plate. This phenomenon was not practically observed in the case of part 23 covered with the graphite pellicle. This proves that the graphite layer deposited on the surface of the transverse plate simultaneously performs more functions: anti-wearing protection, it excludes adherence of the glass mass to its surface, it is an ointment in solid state, and increases the part refractability. After measuring the wear of the transverse plate covered with

graphite after functioning in the technological cycle (for 75 hours) in Chisinau Glass Factory we can notice that dimensions along the active length have not reached the initial quota, while the transverse plate (19) has suffered dimensional wearing of about 10 Δm on certain areas, while on the other areas the initial dimensions have increased on account of the glass mass adherence. Comparing the obtained results concerning the dimensional wearing of the transverse plate with and without graphite deposits we may state that those with graphite deposits possess some reserve of functioning before they reach the initial dimensions and, of course, a considerable reserve before reaching the value of admissible technological wear.

The information in the Table shows that the difference between the transverse plate diameter after functioning in the cycle (without graphite deposits) and the dimensions of the transverse plate with graphite pellicle formed by applying EDI, the wear of the latter is a little higher. This may also be explained by the fact that if the action of the plasma canal of electric discharges in impulse with the part surface results in the formation of some



micro-irregularities which probably induce the increase of wearing and disappear after a period of its interaction with the glass mass; what remains is the physico-chemically modified superficial layer with high properties of exploitation which possess high resistance to wear.

CONCLUSIONS

The results of our experimental investigations allow us to conclude that:

- the graphite layer deposited on the surface of the transverse plate simultaneously performs more functions: anti-wear protection, it excludes adherence of the glass mass to its surface, it is an ointment in solid state, and increases the piece refractability;
- the formation of metal carbides with increased resistance to wear is possible under the graphite pellicle on the active surface of the transverse plate;
- the formation of graphite deposits on the active surface of parts of glass moulding forms doubles their durability at least. ■



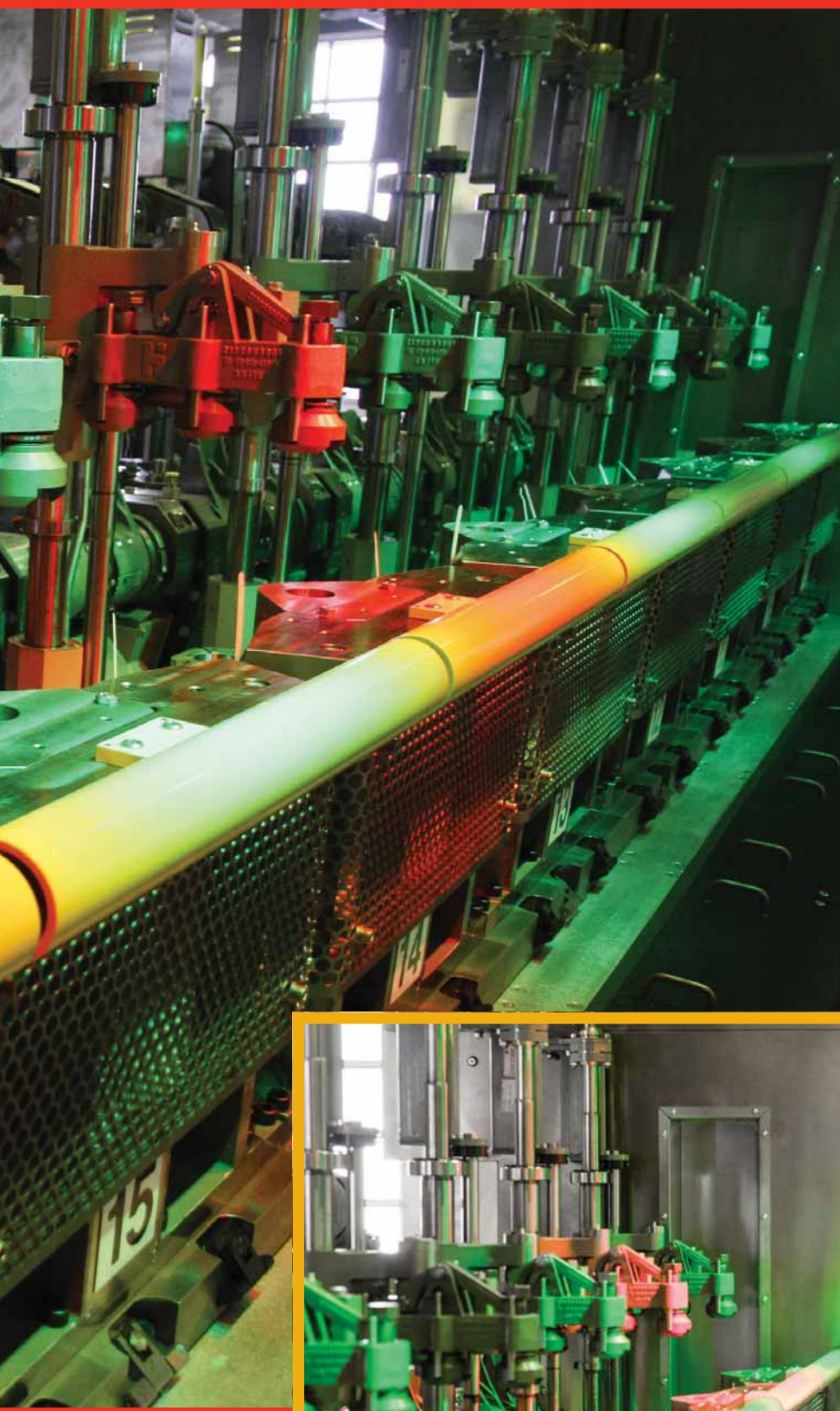
HEYE INTERNATIONAL

status lighting delivers safety and life cycle benefits

In addition to providing pure white light illumination for the blank side, Heye International also offers colour status lighting for its lat-

est generation of SpeedLine IS machines. This colour status lighting (coloured RGB status lighting with an option for white lighting) has been supplemented

by a further function that, in addition to its security benefits, also significantly increases the usefulness of this option. This enhancement relates to the



"The latest generation of IS machines can be equipped with sophisticated status lighting to provide enhanced safety, while also increasing mould life expectancy. This status lighting is a coloured RGB-section lighting that changes colour depending on the current status of a section."

Wilfried Seidensticker
Hot End Product Manager
HEYE INTERNATIONAL



Heye International's coloured RGB status lighting with white lighting option provides enhanced safety, while also increasing mould life expectancy



the operating state. Thereafter, the interval begins to count again, until re-lubrication of the blanks or neck-rings is displayed again.

WHICH IS MACHINES CAN BE EQUIPPED WITH STATUS LIGHTING?

Coloured RGB status lighting with white lighting option is available for all SpeedLine IS machines that

are equipped with modern machine control and HMST control.

Via this added safety benefit, the operator has access to another useful tool to support daily work routines in a simple way. Furthermore, by maintaining a regular lubrication interval, optimum mould lifetime is guaranteed. ■

equipment's lubrication (swabbing) cycle.

Effectively, the lighting is mounted in the blank side control panel and in its simplest form (white light only), illuminates the section for work that needs to be undertaken there, including job changes, equipment exchanges etc. Initially, the coloured RGB status lighting with an option for white lighting took into account the opportunity to increase operator safety. With the coloured lighting, the operator can visually identify the different operating states of the machine/section.

Without illumination, the section is in normal production mode. By a further defined assignment of different colours, the operator is shown further possible operating states. This includes:

- Section stop activated.
- Start phase (reset actuated).
- Start up and operation without gobs.
- Special 'cold blank mould' programme.
- No communication between status lighting and control (failure).
- Special 'lubrication cycle' programme.

WHICH LUBRICATION PERIODS CAN BE SELECTED?

The 'lubrication cycle' function gives the operator additional support when carrying out daily work routines. By blinking in an assigned colour, the function shows that the lubrication of the blank and/or the neckring is necessary after a defined time interval. The time interval can be stored in the HMST (Heye Modular Servo Technology) control, either in the form of minutes or after a certain number of processed gobs.

CAN SWABBING OF NECKRINGS BE INDICATED SEPARATELY?

The necessary swabbing of both the blank mould and neckring is indicated to the operator by a colour-coded light that flashes in each station. Flashing frequency increases as the specified interval is exceeded.

The flashing is stopped by the operator pressing the 'blank lubricating' button, before lubricating the blank mould and/or the neckring and pressing the button again, returning the station to



smart plant

hey international

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ARGLASS

flexibility, efficiency
and sustainability



FIRST US GLASS PLANT

During a recent presentation of Arglass' ground-breaking ceremony, José Arozamena, a member of the family-owned investment company Cambium, spoke about the joint venture partnership with Japan-based Nihon Yamamura Glass to create Arglass, to serve customers' needs for flexibility, efficiency and customization and help reduce the need to import glass bottles from international glass plants. Production at the plant will focus mainly on high-quality glass con-

Arglass, LLC, a glass container manufacturing company set up thanks to a joint-venture between privately-owned investment company Cambium, and Nihon Yamamura Glass, will create more than 150 jobs and invest USD 123 million to build its first US glass container manufacturing plant in Valdosta-Lowndes County, Georgia.

GLASS MANUFACTURING



tainers for the spirits, wine and beverage industries.

According to Andrea Schruurer, VLCDA Executive Director, the new plant will create 150 jobs, with USD 123 million in capital investments, all made possible also thanks to backing from key community partners.

CEO and COO of Nihon Yamamura Glass Koji Yamamura spoke about his company's belief that the location of the plant is ideal thanks to its potential, which will lead to rapid growth.

"With our highly-trained workforce, unmatched logistics network, and pro-business climate, the Peach State has solidified its reputation as a top competitor for manufacturing investment in recent years. Without question, this announcement is a great addition to our success story," said Governor Brian P. Kemp. "This new facility will generate exciting opportunities for hard-working Georgians throughout the region, and we are grateful that Arglass chose to begin operations here in Georgia."

Georgia Department of Economic Development (GDEcD) Director of Advanced Manufacturing Ashley Varnum

represented the Global Commerce division in partnership with the Valdosta-Lowndes County Development Authority and Georgia Power.

"We are very excited to welcome Arglass to Valdosta," said GDEcD Commissioner Pat Wilson. "This is an incredible win for the region, and with Valdosta's prime accessibility and a quality workforce that is second to none, I am confident that all of the company's needs will be met."

"We are pleased Arglass has chosen to build their manufacturing facility in Lowndes County," said Tom Call, former chairman of the Valdosta-Lowndes County Development Authority. "Arglass will create more than 150 jobs in our area. We are looking forward to the opportunities that this new industry can bring to our local community and residents."

"I am extremely pleased to welcome Arglass to Lowndes County and into our diverse group of industries," said Bill Slaughter, chairman of the Lowndes County Board of Commissioners. "Creating quality jobs for our residents is a top priority for local officials. We know that Arglass is committed to outstanding cor-

porate citizenship as it becomes a major employer in our community." The company will operate a state-of-the-art facility that incorporates the latest glass forming technology and cutting-edge environmental controls for a reduced environmental footprint.

The facility, located in Valdosta, Georgia, will serve as the company's first US plant, creating glass products based on the company's founding principles of flexibility, efficiency, and sustainability. Valdosta's highly-skilled workforce, affordability, educational infrastructure, and close proximity to markets along the East Coast were determining factors in Arglass's location decision for its speciality manufacturing operations.

THE PLANT

With this new plant, Arglass' goal is that of being the plant of choice for the spirits and beverage industries. As the first new glass plant in America in over a generation, Arglass will serve customers looking for flexibility, efficiency and customization, not being met by US manufacturers or international glass suppliers right now. The plant has, in fact, been designed taking



**Koji Yamamura, CEO and COO
of Nihon Yamamura Glass**



**José Arozamena,
CEO Arglass**



**Andrea Schruurer,
VLCDA Executive Director**

into account the best available proven technology and layout to provide for high quality, highly flexible and efficient production. Moreover, the plant is within easy reach of the primary spirits producing regions in the country, improving lead times and logistics costs, with production capacity: 100,000 metric tons per year/265,000,000 units per year, with key milestones as follows:

1. construction kick-off: 12 August 2019
2. furnace start-up: Q4 2020
3. full operation: Q1 2021

CUSTOMIZED PRODUCTS

Arglass was founded to be the most flexible, efficient and sustainable glass container manufacturer in America. Its state-of-the-art plant has been designed to produce custom bottles and jars without the very large-volume commitments required by others. Arglass design department can work with customers to develop their own custom bottles or jars with brands, logos or crests in

almost any shape and colour to fit brand needs and goals.

“THE ONLY FLEXIBLE AND EFFICIENT GLASS CONTAINER MANUFACTURER IN AMERICA”

This is the description that Arglass gives itself in an industry largely focused on products that require long production runs, offering the glass container market a superior alternative based on three important principles: flexibility, efficiency and sustainability.

Flexibility

The plant has been designed and optimized from the ground up to achieve a high degree of flexibility without sacrificing efficiency. Plant design, based on the ‘European model’ of highly flexible plants, will enable Arglass to produce both small and large runs at competitive prices.

Moreover, the company is investing in best-in-class, state-of-the-art machinery and equipment, including innovative quali-



GLASS MANUFACTURING



ty assurance systems which allow for greater automation, quality control and process management.

Efficiency

The plant has been designed so that downtimes due to change of moulds or colours are minimized, and will:

- be capable of efficiently producing from two to twelve sections in double and triple gob configurations;

- offer a wide range of glass colours thanks to its feeder colouring capabilities eliminating the need for colour campaigns.

In addition, the plant will also have full in-house decoration capabilities to improve efficiency, reduce handling and logistics

costs, thus optimizing time to market.

Sustainability

Arglass will operate a state of the art oxy-fuel furnace with best-in class environmental controls for a reduced environmental footprint. The plant has been designed to achieve air emission levels that are significantly lower than the most stringent requirements set by the EPA. Closed loop water systems eliminate almost 99 per cent of water consumption, which prevents process water going into the waste stream, in compliance with Arglass' sustainability principles.

Arglass is also continuously working to increase the use of cullet, which is an integral part of

its sustainability model.

Arglass' goal is to transform the glass container market in the United States by creating a network of next-generation manufacturing plants that will be at the same time Flexible, Efficient and Sustainable. ■



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CHINA GLASS 2020

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COMPANY PRESENTATION

TECSIGLASS:

a new player in glass furnaces

The company presented in this article – Tecsiglass – is a general contractor and sole counterpart for its clients, providing them with emergency and scheduled work, in the shortest time possible, thanks to the experience of its technicians and managers.

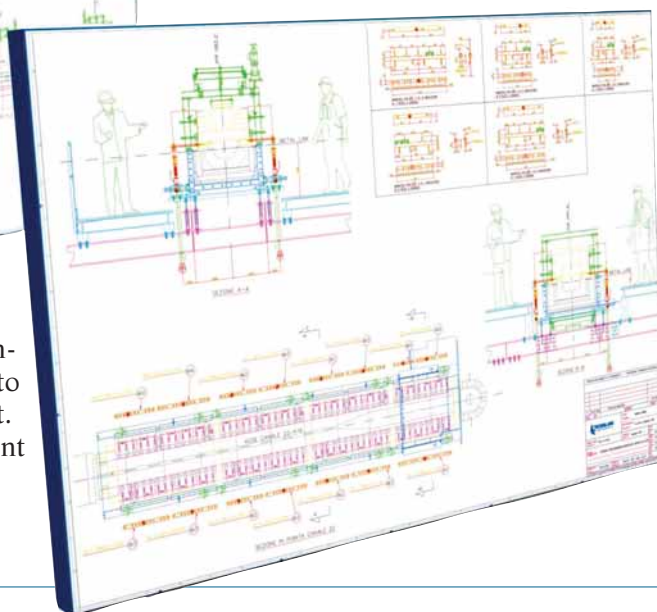
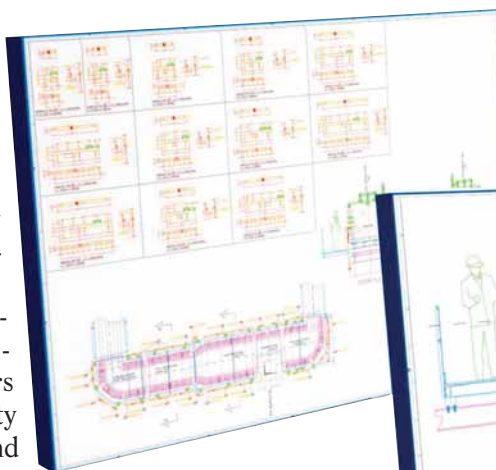
Tecsiglass - Tecnologie e Sistemi per l'Industria del Vetro (Technology and Systems for the Glass Industry) - is an Italian company, based in Rome, specialised in the design, planning and construction of glass furnaces and factory plants.

Tecsiglass managers, technical experts and partner companies have more than 25 years experience for the vast majority of the glassmakers in Italy and at international level.

Tecsiglass' role is that of general contractor and sole counterpart for clients, thus minimizing risks and costs linked to the need to coordinate various suppliers on the same project.

In particular, the company's Design & Planning Department has thorough expertise for:

- factory lay-out;
- refractory design;



Furnace Demolition



Forehearth construction



Forehearth construction



Chambers Construction



Superstructure Furnace

- furnace reconstruction;
- carpentry and metalwork;
- plants;
- pre-heating.

HOT WORKING AND MUCH MORE

The company also takes part in various R&D projects, in partnership with experts and universities. Moreover, Tecsiglass also has an emergency stock of refractory materials available for its clients' needs, along with a hot-repair team available 365 days a year, both for emergency and scheduled work, ready to carry out work in the shortest time possible

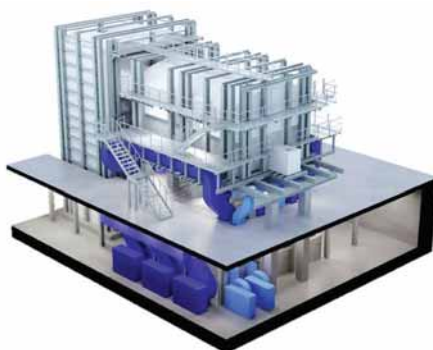
for the following operations:

- plating;
- spout changeover;
- sealing;
- refractory replacement.

FURNACE RECONSTRUCTION

The work on each and every construction site is coordinated by a project manager, who supervises and coordinates integration between the various activities - design, construction and assembly.

Tecsiglass technical team and project manager, together with its partner companies, ensure that the project is carried out flawlessly, in compliance with timing requirements and safety regulations.



MAIN PROJECTS IN 2019:

Bormioli Rocco, Altare plant, reconstruction of a furnace completed at the end of March.

Bormioli Pharma, San Vito plant: design and construction of a furnace, including structural work and installations. Reconstruction work from mid-May.

Bormioli Pharma, Bergantino plant: design and construction of a furnace, including structural work and installations. Reconstruction work starting as of September.

DESIGN

Tecsiglass design work starts right from the basic studies to create detailed projects, in constant contact with customers. The experience gained over the years shows that good projects reduce risks and construction time.

The company designs:

- plant lay-outs;
- refractory structures;
- carpentry and metalwork;
- electrical-instrumental systems;
- specific systems and plants;
- software development;
- use and maintenance manuals. ■



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STEKLARNA HRASTNIK

Innovative technology and know-how - respecting the environment.



Steklarna Hrastnik has been making top quality glass products for over 150 years and, today, dedicates its expert knowledge to specific production programmes – special glass

packaging and glassware. These programmes are made possible thanks to important investments in research and development, which also involve a proprietary R&D centre for new materials,

where research on nano-materials is carried out, along with the development of automated production processes.

In addition, Steklarna Hrastnik has, since 2013, been producing



The development of new technologies in glassworks also involves R&D and respect for our environment. In this article, we find out how Steklarna Hrastnik is doing this - increasing the quality of the glassware it manufactures, while reducing the environmental impact of its production processes.



glass using a state-of-the-art furnace, using so-called 'oxy-fuel' technology that improves the power used/production amount ratio, reduces environmental impact and raises glass quality.

MEETING CLIENTS' NEEDS - A KEY COMPETITIVE ADVANTAGE

In its continuous work to respond to client demands, Steklarna Hrastnik offers:

- the design and manufacture of glass products;
- the manufacture of glass products according to existing blue-prints provided by clients; or
- cooperation with clients with regards to the development and design of glass products, which are then manufactured at Steklarna Hrastnik.

The production of smaller quantities are also part of these key advantages.

INNOVATIVE TECHNOLOGY AND KNOW-HOW

Our innovative technology and know-how combine to rank Steklarna Hrastnik among the leading glass companies in the world.

Our technology is highly advanced in three main areas:

- glass melting;
- production procedures;
- product quality control.



COMPANY UPDATE

Glass melting

At the start of 2013, a technologically advanced glass melting furnace was put into operation - with increased capacity and significantly enhanced energy efficiency. The furnace is driven by an advanced system for natural gas combustion with pure oxygen (Oxy-Fuel Technology), and is a product of Steklarna Hrastnik know-how and that of the supplier - SORG. Using oxy-fuel technology contributes to a better quality of glass and, at the same time, the significantly increased energy efficiency of new furnace has also contributed to a reduction in environmental impact.

Production processes - automation

Steklarna Hrastnik has a number of production lines for blow-blow, press, press-blow and manual production, with the manufacture of tableware and packaging glass being automated. Steklarna Hrastnik is continuously working to achieve further automation and an increased optimization of production processes, particularly in the field of product quality control, following its strategic goal of top quality products.

Creating glass is a challenging technological process carried out with chemical and physical procedures. The two most important factors are temperature and time. Currently, Steklarna Hrastnik is very advanced in:

- cooling of glassware and tools;
- flame polishing of glass products.

Steklarna Hrastnik is specialized in the development of tools, with strong teams dedicated to the development of tools for all product lines, thus further guaranteeing the quality of end products.

Decoration at Steklarna Hrastnik is achieved through a number of techniques:

- injection (often of challenging patterns);



- decoration by hand (using pre-printed decals);
- glazing.

Product quality control

Product quality control is carried out by a control line for the optical detection of defects in glass products. Thanks to the use of state-of-the-art equipment for product testing, the company offers supreme quality,

both from a technical and design perspective.

UPGRADING AND CONNECTING PROCESSES FOR INCREASED PRODUCTIVITY

During 2019, Steklarna Hrastnik continued its work on the upgrading of its ERP system, which is one of the main projects on the path of the transforma-



tion of Steklarna Hrastnik into a smart factory. The project is being implemented under the name SHINE. The new ERP system will enable integrated connections between various business departments and the simultaneous optimisation of processes, which will additionally increase the effectiveness of the glassworks and contribute to customer satisfaction. A large

project team of 45 Steklarna Hrastnik employees and the outsourced project contractor, Askit, is included in the implementation of activities.

Parallel to revamping its ERP system, Steklarna Hrastnik is introducing a new document management system and connecting several parallel production processes. This also includes the production management sys-

tem, which represents an important support to operations, and is largely the result of development work by one of the company's employees.

Digitalisation at the forefront

In production, digitalisation is already running at a level where Steklarna Hrastnik initially wants to separate the business network from the production network. The second step includes the aim to connect all machine sensors to a joint SCADA system, whose role is to supervise and steer various technological processes via the computer. The third step is the setting up of a new MES (manufacturing execution system) and its connection to the revamped/new ERP system, all so as to accelerate the implementation of our processes, while ensuring even greater quality and value of the results of our work.

Real-time monitoring for even shorter response times

By upgrading and optimising processes and the business and information system in relation to the additional MES project, the company will obtain a good basis for real-time monitoring of data and performance indicators, enabling to respond even faster and to make informed decisions.

Performance indicators for every process and every customer separately

All system upgrades will enable to monitor KPI for each business field, for joint processes through several business fields, and operations with customers and various suppliers (especially tools suppliers).

Monitoring diverse operating parameters in real time will provide substantial competitive advantages. Furthermore, the upgrading and connecting of systems sets the basis to use the advantages which will be brought

COMPANY UPDATE



by artificial intelligence in the future.

SUSTAINABILITY AND CORPORATE SOCIAL RESPONSIBILITY

Sustainability and corporate social responsibility in all fields of activity are among Steklarna Hrastnik's key commitments, which is also confirmed by the company's investments in the best available production technology in the transition to Industry 4.0, which will improve its energy efficiency and additionally reduce its ecological footprint.

Reducing ecological footprint with new solutions

Steklarna Hrastnik's commitment to responsible environmental actions is also evident from its indicators of sustainability. Investing in innovative solutions associated with the utilisation of waste heat, replacing fossil fuels with environmentally friendlier resources, increasing the utilisation of melting furnaces and other solutions have enabled the glassworks to reduce energy consumption per ton of melted glass by 10 per cent in 2018 compared to 2017, while CO₂ emissions were reduced by 6 per cent, NO_x emissions per ton of melted glass by 40 per cent, and water use by 50 per cent.

Together with its partners, the company is continually searching for new solutions. The recently installed solar power plant will



be connected to the hydrogen production plant – a part of a pilot device that will produce a pure, carbon-free source of energy – hydrogen. This will develop new technologies for melting glass using hydrogen and the resulting decarbonisation of fuel, which will consequently reduce Steklarna Hrastnik's carbon footprint. The company is also planning to install another 400 kW solar power plant, which will allow the glassworks to generate three per cent of the electricity consumed in the plant. ■



HRASTNIK 1860

**STEKLARNA
HRASTNIK 1860**

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SCHOTT GLASS

investing and expanding

With the increasing demand for glass tubing, SCHOTT Glass India is investing in a new unit at its existing manufacturing site at Jambusar, Gujarat. The company also aims to expand its presence in China. Thus it is on an accelerated growth path.

Glass tubing

Over the years, the Indian pharmaceutical industry has continued to have a growing role and significance in the global pharma markets. Similarly, we have also seen several global players investing or partnering with Indian firms, as a result of the ruling government's industry-friendly policies. One such instance is of German-origin glass tubing manufacturing specialist company SCHOTT's investment of approximately INR 180 crore through its Indian subsidiary SCHOTT Glass India to set up a new pharma tubing tank facility at its existing manufacturing site in Jambusar district, Gujarat. The

GLASS TUBING



Jambusar plant currently is a production hub for SCHOTT pharma tubing for Asia, and through its 100 per cent subsidiary in India, has one manufacturing site in Jambusar, and sales offices in Mumbai and Pune. Construction of the new facility is ongoing and it is expected to commence commercial production by early 2020.

The company, which has been present in India for around two decades, it started its business operations in 1998 by acquiring a company producing pharma tubing in Jambusar. Recalling the initial days with the company 20 years ago, Dr Patrick Markschlaeger, Executive Vice President, SCHOTT, Business Unit Tubing highlights, “We started our journey in India by bringing in our best technologies to turn the existing site into a world-class manufacturing site. For us, there couldn’t have been a better place than Gujarat in terms of work atmosphere, infrastructure and access to raw materials, including energy.” Since then, it has grown from strength to strength and the new facility in Jambusar is the most recent feather in its cap.

GOVERNMENT IMPETUS

It also explains why they chose to set up their new manufacturing facility as well at Jambusar. Markschlaeger says, “The state government has been very supportive of the pharma industry in

Gujarat, which is evident from the growth of the sector in the state.”

He further elaborates, “With the introduction of the Goods and Services Tax (GST) last year, things have become more streamlined, and Gujarat has become even more lucrative as a manufacturing hub. In fact, according to the Indian Drug Manufacturers’ Association (IDMA), Gujarat contributes to around 33 per cent of the national pharma production, and this share is expected to move up to 40 per cent by 2020. We feel encouraged by the current Indian government’s ‘Make in India’ and ‘Vibrant Gujarat’ initiatives that are supporting companies like ours to strive for better infrastructure and ease of doing business.”

PARTNERING PROGRESS

The company’s recent business expansion plans also support the government’s ‘Make in India’ campaign and ‘Vibrant Gujarat’ initiatives, as the company’s new facility will generate more investment and employment in the state. Markschlaeger informs, “We currently have around 350 employees and 100 contract workers working at the plant in Jambusar. The new tank will provide jobs for at least 70 additional local workers.”

Moreover, the upcoming facility will play a key role in the company’s plans to tap the Asian markets. The company is very

‘gung ho’ on growth as it believes that there are tremendous opportunities for growth in this segment and industry reports confirm this fact. As per a market research report by Grand View Research, the global pharma glass packaging market size was estimated at USD 12.84 billion in 2016. It is projected to witness a CAGR of 6.3 per cent from 2017 to 2025 and India is one of the key markets for pharma glass packaging markets in Asia. These numbers reveal that there is a huge requirement for the glass tubing in the pharma sector, and SCHOTT Tubing has a major role in meeting these requirements. Markschlaeger informs, “In general, SCHOTT Tubing has a significant market share in the global pharma tubing sector, in which India has a vital role to play.”

The company’s presence of nearly two decades in India has established it as a trusted partner for major pharma companies and helped it grow despite the entry of other solutions. But, how do they plan to continue being a leader in this space? So, which are the products and solutions that provide the company with a competitive edge over its peers and how are they right to meet the constantly evolving demands of the pharma industry?

AN ECLECTIC PRODUCT PORTFOLIO

For ages, the Indian pharma

packaging market was dominated by the glass packaging, which has also witnessed considerable competition from plastic manufacturers over the years. So, how has SCHOTT ensured that its clientele continues to prefer their glass solutions? Why should they choose glass packaging over plastic solutions?

Markschlaeger answers these questions and says, “An unmatched combination of our high-quality production standards, truly global footprint and technological expertise has established SCHOTT as a market leader, globally as well as in India.”

He further elaborates on a few of their renowned and widely-used products, “When it comes to choosing a suitable primary packaging for drugs, pharma companies have relied on FIOLAX pharma containers for over 100 years. This type I borosilicate glass features high hydrolytic resistance, hence preserving the efficacy of medicine and reducing the risk of a poten-

tial drug/container interaction. It is because of its specifications that borosilicate glass is used to package a number of drugs including highly sensitive drug formulations.” Thus, its existing products and their quality have continued to keep their clientele happy and content.

Moreover, it has adopted newer technologies from Germany to meet the growing demands of the Indian market. Markschlaeger points out, “India serves as an ideal example for Industry 4.0 – the current trend of automation and data exchange in manufacturing technologies. The Indian plant showcases main elements of a ‘smart factory’ through path-breaking technologies such as perfeXion. For example, last year, SCHOTT implemented perfeXion in Jambusar - the new era of quality processing to achieve exceptional quality control standards for its FIOLAX pharma glass tubing. perfeXion uses state-of-the-art cameras and lasers to pinpoint potential defects along the production line.

By harnessing big data, we have moved from a statistical sample-based quality-control process to 100 per cent inspection of each FIOLAX tube.”

SCHOTT’s pharma packaging experts also see a few trends in the primary packaging industry itself. For example, an increase in formulations with sensitive and complex molecule structures, e.g. biotech drugs, which require innovative packaging solutions to ensure drug stability. Another trend shaping the industry is the move from hospital to home care to enable patients to self-administer the drugs in an environment they feel most comfortable in. Such patterns require the containers and subsequently the tubing to have highly accurate dimensions, especially regarding the inside diameter. We achieve this through perfeXion, which allowed us to step into a new era of quality processing.”

GROWTH STRATEGIES FOR INDIA

With these products, the company has captured significant market presence in India, and with its recent INR 180 crore investment at Jambusar, it intends to increase its production capacity by 50 per cent. The increased capacity will not only cater to the increasing domestic demands but also to the need for high-quality pharma glass tubing in other Asian markets.

Markschlaeger explains about the features of the new facility and its advantages, “With an additional tank facility, SCHOTT will also build new construction for energy supply, workshops and warehouse. Additionally, there will be an expansion of storage for energy, engineering and logistics infrastructure within the plant. With our production capacity set to increase by another 50 per cent through the new plant, we look forward



GLASS TUBING

to the coming years for catering to the industry's increasing requirements (both domestic and international) for quality pharma packaging glass material. As part of the production network within SCHOTT's Tubing business unit, the new tank will be built and equipped with all latest state-of-the-art machinery as used in all other tubing factories worldwide."

However, glass manufacturing is a process which requires continuous power supply. And hence the design of its new facility also has a provision for solar power generation to meet its requirements and complement electric power supply. Commenting on the company's investments on solar power panels, Markschlaeger says, "It involves heavy investment, but the state government is encouraging companies to do so and it will add value to our facility as well. It will help us in fulfilling the customers need without any interruption."

Summing up the company's expansion plans for the Indian market by this year end, he says, "For pharma tube production, the Jambusar plant is considered as a manufacturing hub for its demands in the fast-growing Asian markets. This is a big advantage for our India activities in terms of investment, lead time and availability of a trained workforce."

GOING FORWARD

While it is fortifying its pres-

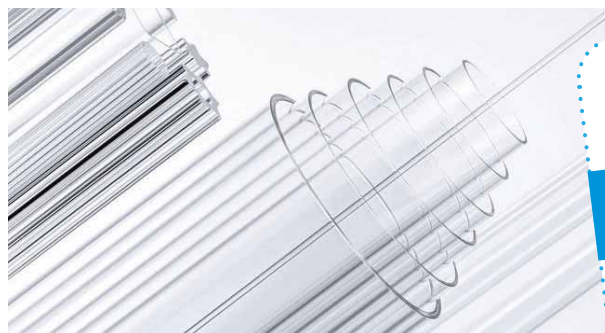
ence and foothold in the Indian market, SCHOTT has also signed an investment agreement to build a production site in China to further meet local needs there. Thus, the company has an ambitious growth plan in place, and is on an accelerated path to progress.

HOW DO PERFEXION & FIOLAX REALLY WORK?

PerfeXion, process control and integrated data management system works as an integrated network for real-time collection and evaluation of the data. More than 100,000 data tags per minute are collected in this system. All this generates valuable data for controlling and stabilising the tubing production process. Talking more about the features of perfeXion, Markschlaeger says, "We now offer an improved product with superior auditability and traceability for the pharma industry. This also allows us to customise the specification of the glass tubing according to specific needs of the container format. perfeXion uses state-of-the-art

cameras and lasers to pinpoint potential defects along the production line.

SCHOTT also offers pharma glass tubing products and services to its regional and international customers. Its main product, FIOLAX borosilicate glass tubing, has grown to become the gold standard 'raw material' for glass containers in the global pharma industry. Revealing more about the concept of FIOLAX tubing, he highlights, "Our main product, FIOLAX borosilicate glass tubing, has grown since 1911 to become the gold standard 'raw material' for glass containers in the global pharma industry. Known for unmatched quality, our packaging material is the first preference for most of India's leading pharma companies. Thanks to its high hydrolytic resistance, FIOLAX neutral glass tubing preserves the efficacy of medicine and reduces the risk of interaction with packaging to a minimum." FIOLAX is used to manufacture high-quality vials, syringes, ampoules and cartridges, which are then filled with injectable drugs. ■



SCHOTT
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by Usha Sharma, and
first published by
Express Pharma.

ARDAGH GROUP

creating value through innovation

INNOVATION

Passion for innovation and creativity are the qualities which have positioned Ardagh as a world-leading packaging business, also thanks to an innovation programme that harnesses the power of a cross-functional team, which includes members from key regions and business functions. Ardagh's focus is on being reactive as well as proactive and the company drives an innovation agenda across new product

applications, process and sustainability improvements.

The result is creative thinking throughout the organisation, from design to delivery, so each integral part of the business feels the benefit and customers reap the rewards.

INNOVATION IN LIGHTWEIGHTING

Many bottles today are up to 50 per cent lighter... Twenty years ago a typical 330ml beer bottle

With a mission of being the market leader in glass innovation and the first choice partner for innovation projects, Ardagh – in this article – shows us just how it is working to reach this important goal, also with the long term development of new products, processes and technologies.

Glass packaging solutions





weighed 330g; Ardagh now produces a number of 330ml glass beer bottles that weigh 165g.

Using cutting-edge design software and manufacturing precision to distribute weight more evenly around the container's surface, Ardagh produces containers that are significantly lighter and stronger than they were in the past.

INNOVATION IN DESIGN

Ardagh Group uses a wide range of technologies for adding value to brands at its design facilities located in key regions across Europe and the US.

Sculptured embossing

Ardagh is now taking the quality of embossed features on the surface of a glass bottle or jar to a completely higher level of detail. The process uses a haptic device to manually sculpt details on the surface of the glass container enabling the designer to add artistic flair to achieve real-life embossing. A wide range of different textures, features and other enhancements are made possible by allowing the designer to tug, pull, carve and smooth the 3D model by hand in ways which are not possible with conventional embossing.

This real-life sculpting tool is a great example of crossover innovation; the design team adapted technology used in the chocolate moulds industry to suit the specific requirements of container design.

The results have been stunning, and not just in the context of product aesthetics. Sculptured embossing recreates an almost perfect 3D reproduction of the original artwork, which removes any undercuts and sharp edges from the moulds in manufacture, thereby eliminating production defects that were previously associated with complex emboss-



ing or engraving. The result satisfies everyone in the process and delivers not only a significantly enhanced product appearance, but also a better quality finished product.

DESIGN

Glass is one of the most enduringly natural and attractive materials. Ardagh has combined these qualities with the skill and experience of its designers to create striking bottles and jars for a range of food and beverage brands in over 20 colours.

In recent years, the demand for unique shelf stand-out has led Ardagh to produce ground breaking glass bottle designs, many of them winning prestigious awards in recognition.

DECORATION

Ardagh is passionate about innovation through glass decoration, dedicating time and energy to researching what really matters to consumers, and pushing the boundaries of what can be

achieved technologically, creating endless possibilities for adding value to brands:

- colours;
- sleeving;
- hand application;
- embossing;
- surface texture transfers.

DECORATION

Ardagh is also developing packaging that continually improves customer experience, with endless possibilities:

- embossing;
- screen printing;
- colour coating;
- powder coating;
- thermochromic inks;
- aromachromic inks;
- pressure sensitive labelling;
- steam sleeving;
- metallic effects;
- satin etching;
- hand application.

Innovative effects - powder coating

This latest glass packaging coating innovation involves the application of powder rather than the traditional method of coating using wet paints. In this process, the powders are electro-statically charged and then attracted to the surface of the earthed glass containers. The use of powder instead of paint allows for a wide range of different visual and tactile effects including hammered, metalised, terracotta, sparkle, snowflake and acid etch.

In addition to an enhanced visual and tactile appeal this process provides a more robust or durable finish, and is also safe and sustainable using 100 per cent organic products, with no VOCs.

Ardagh's mission

With its Regional Design Centres, Ardagh is con-



tinuing to focus on new product development in response to customer needs and demands. At the same time, its Central Technical Services, Operational Excellence Group & Quality Teams work on technical process innovation to optimise efficiency, improve quality and reduce costs.

Last but not least, Ardagh's Core Innovation Team makes good use of market trends and consumer insights to drive new ideas, working with Group R&D Teams all the way. ■

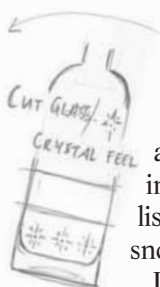
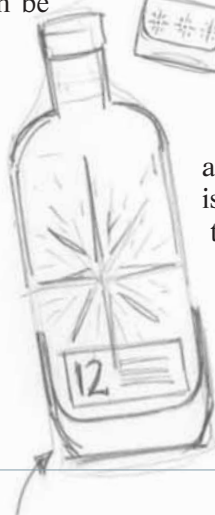
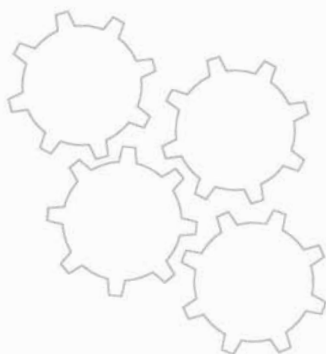


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BURNERS/OXY-FUEL

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CAD DRAWING

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Technologies

CARPOULE AFTER-FORMING MACHINES/LINES

Moderne Mecanique
OCMI OTG

CARPOULE FORMING MACHINES/LINES

Moderne Mecanique
OCMI OTG

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KYP Accesories
MSK Coverttech
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GPS - Glasproduktions-
Service
Horn
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Olivotto-Antas-Lynch-
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VMA
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MSK Coverttech
OMS
Ramsey Products
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Renold
Thimon
Zecchetti

CONVEYOR BELTS

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Luben Glass
Olivotto-Antas-Lynch-
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Pennine
Ramsey Products
Regina Catene Calibrate
Renold
Revimac-Bottero
Vidromecanica
WBT
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CONVEYOR CHAINS & SPROCKETS (HOT- END)

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Pennine
Renold
Revimac-Bottero
Ramsey Products
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COMPANY PROFILE

BEATSON CLARK

the past, present and future
of glassmaking



Businesses come and go but very few can look back on a history that spans almost 270 years. One such company is Beatson Clark, which first manufactured glass in South Yorkshire in 1751 and which two and a half centuries later is still based on the same site where it all started.

FROM THE BEGINNINGS TO THE 21ST CENTURY

The story of Beatson Clark began when John Wright, Aaron Walker, Mr Hirst and Dr John Pearson leased land from the Earl of Effingham to build a glassworks in Masbrough by the side of the new canal, taking advantage of convenient supplies of coal and water. In 1783, John Beatson from Emley leased the glassworks and established the family business, putting his son and nephew in charge. The firm of Beatson Clark remained in the hands of the same family for the next two centuries until it finally became Beatson, Clark & Company Ltd in 1910.

Fast forward to the 21st century and Beatson Clark is now the largest manufacturer of pharmaceutical glass containers in the UK, with over 330 employees and an annual turnover of GBP 50 million. In the intervening years it has diversified its customer base and now most of the bottles and jars it manufactures are for the food and beverage sectors including brewing and spirits.



SUPPLYING BOTTLES AND JARS TO THE PHARMA AND FOOD INDUSTRIES

“We supply bottles and jars to some of the world’s best known pharmaceutical manufacturers including Boots, Thornton and Ross, Bell’s, Seven Seas and Reckitt Benckiser,” said Marketing Manager Charlotte Taylor.

“In the 1970s we began supplying customers in the food and beverage industry, and nowadays

food is our largest market, but pharmaceuticals are still a very significant sector for us.”

For many years, bottles were produced at the plant using the traditional mouth-blown method, but at the start of the 20th century modernisation of the glassworks began and by the 1970’s Beatson Clark was fully automated. The demands of the First World War brought about a number of changes, demolitions and extensions at



COMPANY PROFILE



the factory, and when the war was over such alterations and modernisations were essential for future-proofing the business.

CONTINUOUS IMPROVEMENTS IN QUALITY AND CUSTOMER SERVICE

Since then Beatson Clark has been committed to improving quality and maintaining excellent customer service, and over the past decade it has invested GBP 22 million into the business.

“Consistent investment in new machinery and technology allows us to remain a market leader in the glass packaging industry,” said Charlotte.

“Providing the highest quality service for our customers is integral to the core values of the company. We aim to be flexible, responsive and supportive, and new technology allows us to further improve our already high standards.”

PROTECTING THE ENVIRONMENT

As well as priding itself on providing the best customer service, Beatson Clark is also passionate about ensuring the company remains as environmentally friendly as possible. The glass industry uses a significant amount of recycled materials and also creates very little waste. Beatson Clark uses glass generated by its onsite recycling plant to make new bottles and jars, bringing the total recycled content of its containers to approximately 40 per cent.

Charlotte said: “Glass is infinitely recyclable, so it can be endlessly reprocessed with no loss of strength or quality. A study recently found that European consumers rank glass as the most environmentally friendly packaging product, with 45 per cent of consumers choosing glass packaging because of its green credentials. Recycling one bottle can



save enough energy to power a television for an hour and a half!

“Glass has been around for thousands of years and its impeccable environmental characteristics mean that it is likely to remain the packaging of choice for many years to come.”

THE LOCAL COMMUNITY

In addition to its commitment to the environment, Beatson Clark also likes to help the local community. In February the company donated a total of GBP 12,000 to two Rotherham charities – Rotherham Hospice and Bluebell Wood Children’s Hospice – to help towards their day-to-day running costs.

Lynn Sidebottom, Director of Sales and Marketing at Beatson Clark, presented the two charities with their cheques and said: “We’re always looking for new ways to give something back to the community, and following a successful year for the company our owner John Newman wanted to donate some of our profits to worthwhile local charities.

“These hospices are such a worthy cause and their work benefits us all. We couldn’t be hap-



pier to make these donations and we look forward to continuing our close partnership with Rotherham Hospice and Bluebell Wood in the future.”

TRAINING AND APPRENTICES

The company is also dedicated to training the new generation of practitioners; it currently employs 10 apprentices and an additional eight key managers who are completing their Level 3 Supervisory Apprenticeship.

Earlier this year, one apprentice was recognised for his passion and confidence by being awarded Maintenance Apprentice of the Year at a ceremony staged

by AMRC Training Centre in Rotherham.

Twenty-one-year-old Alex Bywater started as a mechanical engineering apprentice at Beatson Clark in October 2016 and having completed his Mechanical Engineering Apprenticeship (level 3) has been employed as a trainee. He was nominated for the award by his NVQ assessor and had to give a 10-minute presentation in front of a panel of judges. He was presented with his award by BBC Look North TV presenter Harry Gration.

Richard Hastings, Site Mechanical Engineering Manager at Beatson Clark, said: “Alex has



COMPANY PROFILE



become a valued member of my team. He is a forward-thinking young man with lots of ideas and will be an asset here at Beatson Clark."

Alex commented: "I'm very proud that I won and am now a full time Trainee Plant Service Technician. The support from Beatson Clark has been good – just trusting in my ideas and knowledge is a lot more than many other companies would do."

"I believe the factor that won it for me was my cyclone project. This started out as college work but is now slowly being implemented into the mixing shop."

Over the last two and a half centuries Beatson Clark have gone from strength to strength and its achievements look set to continue. The key to their success is, as it has always been, flexibility, innovation and the high quality of its products.

Not many firms can boast a pedigree as long as theirs, so here's to another successful 270 years! ■



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GRAND VIEW RESEARCH

why you should switch from plastic to glass containers



WHY GLASS CONTAINERS ARE BETTER THAN PLASTIC

Packaging of products or goods is essential for storage, long-distance transportation, distribution, and delivery to consumers. For pharmaceuticals, personal care items, and food and beverages products, glass pack-

aging is highly preferred. Glass retains the flavour and quality of the food product without disturbing its taste. In addition, its high-quality properties such as chemical inertness, reusability, sterility, corrosion, heat resistivity, and transparency, make it suitable for diverse applications.

Glass packaging offers an aesthetic demand to the product. It

This report from Grand View Research takes us through the pros and cons of glass vs plastic for food containers, not only with regards to the ever more important ecological aspects of our planet, but also how glass containers protect the food they contain and, therefore, our health.



GLASS VS PLASTIC

is a non-crystalline, solid that is produced from natural raw materials such as limestone, alumina, and silica. The shape, colour, and size is achieved through numerous molding procedures depending on the use. Glass is commonly used as a packaging material in several industries such as food, pharmaceutical, alcoholic and non-alcoholic beverages, and personal care. Furthermore, there is no contact between the glass and the product packed inside since it is a non-porous and impermeable solid.

Rising awareness about the pollution caused by single-use plastics has led to a decline in sales of plastic packaging accompanied by increasing adoption of glass containers, which are considered trendier and also environmentally-friendly.

MARKET PERFORMANCE OF GLASS PACKAGING

As per the report by Grand View Research, Inc., the glass packaging market is poised to rise to a valuation of USD 68.4 billion by 2020 with alcoholic beverages sector occupying the major market share. It accounts for 44.9 per cent of the total revenue share and is anticipated to retain its dominance over the forecast period owing to its aesthetic appeal as compared to plastic.

Beer was the second largest application segment and is anticipated to grow at considerable rate over the coming years. The segment is anticipated to gain momentum on account of rising demand from younger genera-



tions, mainly in Asia Pacific and Eastern Europe.

ADVANTAGES OF GLASS CONTAINERS

Glass containers are cleaner than plastic ones

Plastic containers cannot be washed in the dishwasher or in hot water since the material releases harmful substances and chemicals. Glass containers are easy to clean as they don't absorb stains, germs, and food. Glass containers can be washed in a dishwasher as well as hot water since they can be easily sanitized at high temperatures.

Glass containers do not capture smells

Plastic containers frequently get stained by the food items stored in them and also catch the smell and flavour of the food. Glass is nonporous and hence doesn't absorb the smell and





■ Alcoholic beverages (excluding beer) ■ Beer ■ Food & beverages ■ Pharmaceuticals ■ Others

Image Source: Grand View Research

stains of the food item. This characteristic makes glass containers perfect for packing all kinds of food items. Moreover, the glossy side helps keep the food fresh for a long period of time.

Microwave heating

Almost all food grade glass food containers are microwave safe. Though many plastic containers are microwave safe, the heat in the microwave can lead to plastic releasing toxic chemicals, which can mix with the food and turn harmful.

Transparency

A glass container makes it easy to see the food items stored in it without removing the lid. This looks organized and makes it easier to manage the food in the fridge.

Glass holds heat better than plastic

Since plastic is a good conductor of heat, they lose heat fast leading to quick cooling of the food item. However, glass

holds the heat for a longer period of time thus keeping the food hot.

Glass is safer than plastic

Glass containers are considered safer than plastic since plastic releases chemicals that can mix with the food and have hazardous effect on life. This usually occurs when hot food is put into a plastic container. Glass containers are also free from leakage and hence prevent food spill.

TOP EMERGING TREND

The emerging trend in the glass packaging market is the rising demand for eco-friendly packaging products in industries such as food and beverage and pharmaceutical, and technological advancements to make glass containers light, easily portable, and compact. The beverage industry holds the highest market share in the glass packaging mar-

ket. The emerging trend in the beverage industry is the alcoholic beverage market, which is facing a tough competition from metal packaging sector in the form of cans. However, use of glass in the packaging of premium products will lead the sector to retain its market share in the forecast period. This trend is anticipated to be observed across different beverage products like coffee, juices, tea, non-dairy beverages, soups, etc.

SUMMARY

Glass containers are long-lasting and can serve for a longer period of time as compared to plastic containers. They are safe for freezing, preheating, and microwaving. The new varieties of glass such as tempered glass and Pyrex are expected to improve the durability of the product. ■

DIFFERENCE BETWEEN GLASS AND PLASTIC CONTAINERS

Glass Containers	Plastic Containers
Can be recycled (Eco-friendly)	Cannot be recycled
Microwave safe	Not all containers are microwave safe
Maintains taste, quality, and flavour of the food	May change quality, taste, and flavour
Does not react with food	Reacts with food
Increases the shelf life of food	Cannot increase the shelf life of food
Food grade quality	Not food grade quality
Cleaner than plastic	Not as clean

GRAND VIEW RESEARCH

This article was prepared by the team of Grand View Research, Inc., a U.S. based market research and consulting company providing syndicated research reports, customized research reports, and consulting services. To help in making informed business decisions on glass packaging market, the team offers market intelligence studies ensuring relevant and fact-based research.



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Annual Guides



1990

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