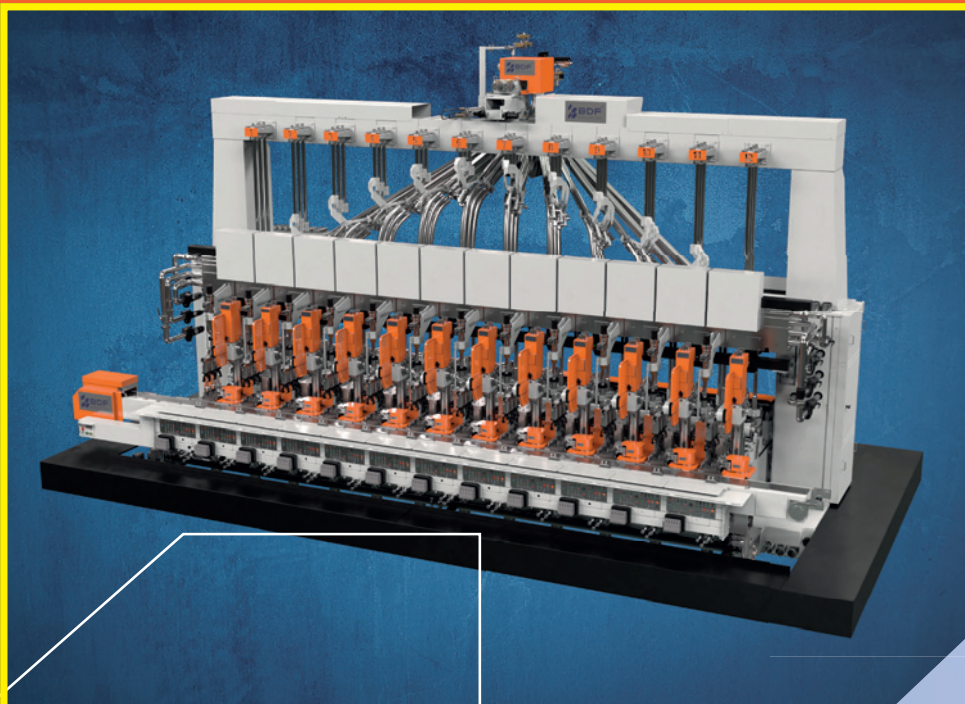


# glass machinery world plants & accessories

BI-MONTHLY INTERNATIONAL MAGAZINE FOR GLASS MANUFACTURING



YEAR 37 • ISSUE NO. 2/2024



IS PARALLEL  
ADV 8050

8-10-12 SECTIONS AND TANDEM  
IS-P: DG 6 1/4" - TG 4 1/4"

IS ANGULAR  
ADV 1050-8050

6-8-10-12 SECTIONS AND TANDEM  
IS 4 1/2": SG-DG-TG 3"-TG 3 1/2"  
IS 5": SG-DG-TG 85MM  
IS 5 1/2": SG-DG  
IS 6 1/4": SG-DG-TG 4 1/4"

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SPECIAL FEATURES

**FORMING**  
**ANNEALING**  
**COATING**

Zeta 20-12 reveals **EUROMATIC**'s big vial engineering mastery

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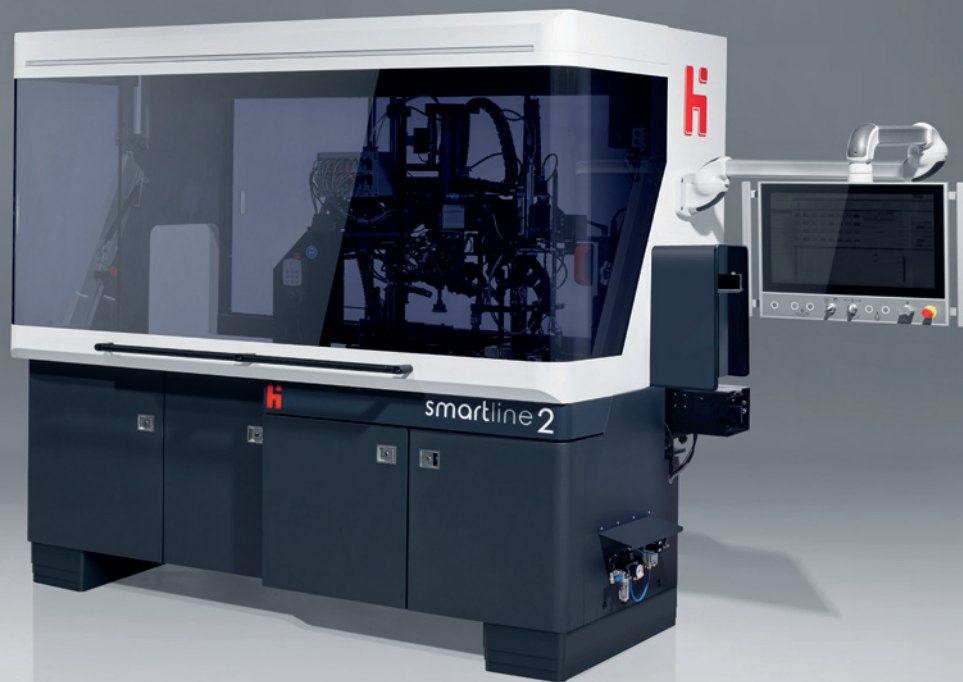
SooSeok chooses **STARA GLASS** furnace for sustainability and performance

The enhanced efficiency of **HEYE**'s BlankSideRobot

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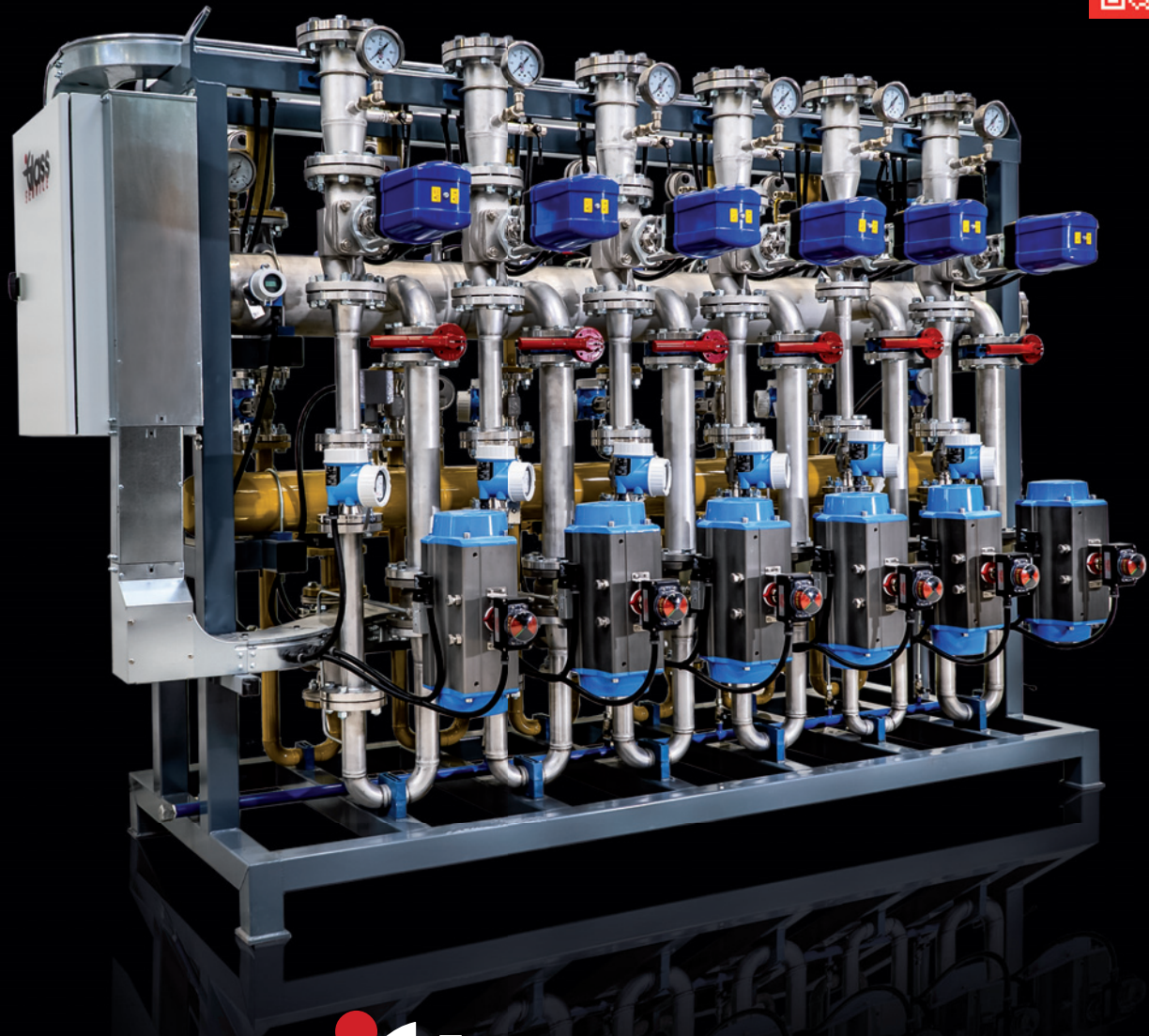


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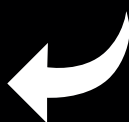
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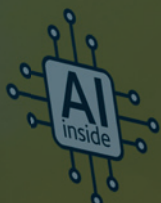
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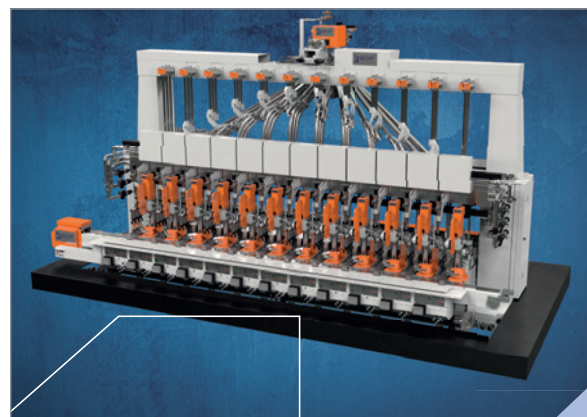


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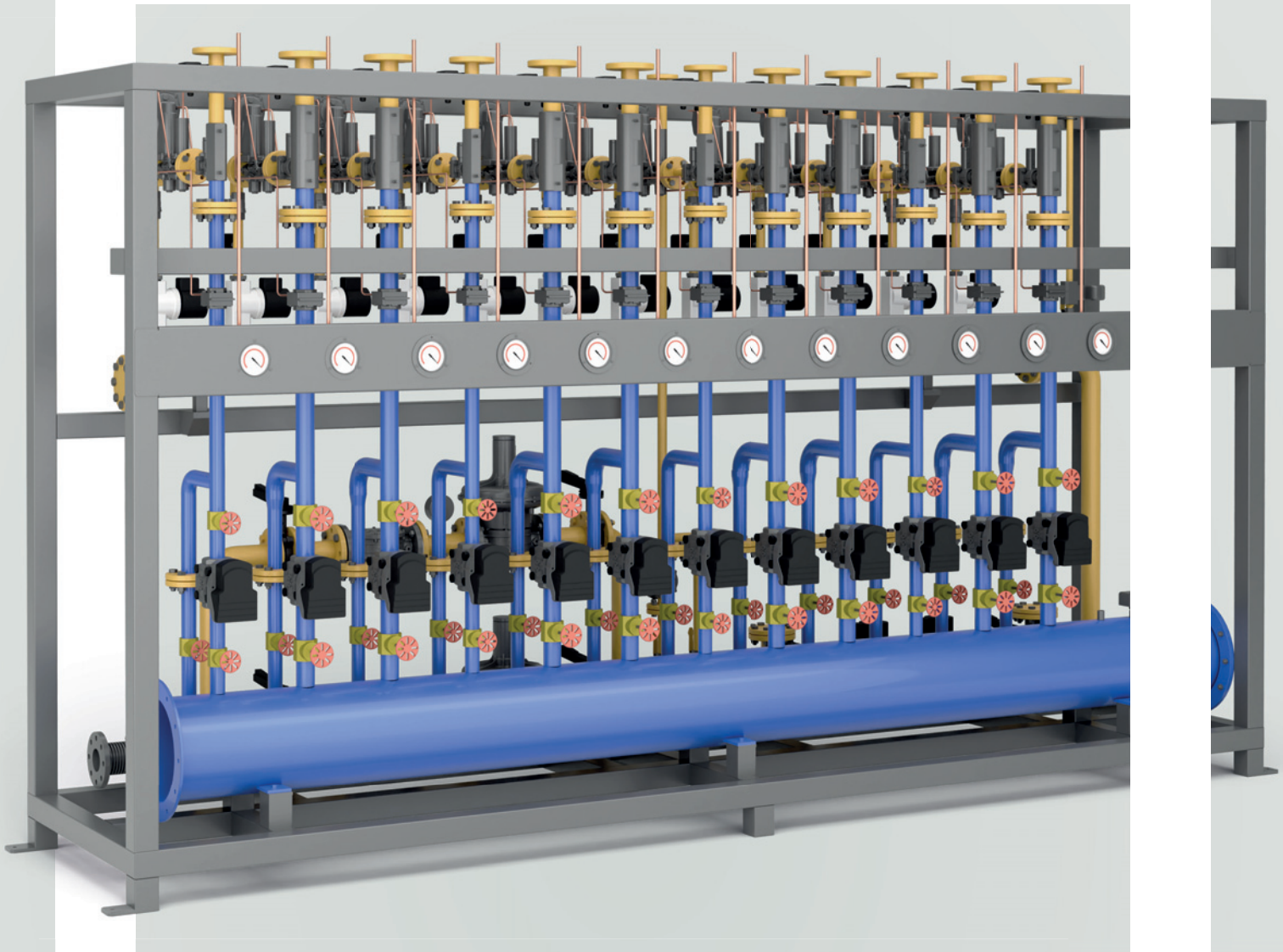


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issue	exhibition/conference	date	venue	deadlines
2024 <b>1</b>	<b>MIR STEKLA</b>	27 February 1 March	MOSCOW Russia	<b>Editorial files:</b> <span style="background-color: #FFD700;">22-01-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">29-01-2024</span>
	<b>COSMOPACK</b>	21-23 March	BOLOGNA Italy	
<b>FEATURED CONTENT: RAW MATERIALS - BATCH CHARGE - REFRACTORIES</b>				
2024 <b>2</b>	<b>CHINA GLASS</b>	25-28 April	SHANGHAI China	<b>Editorial files:</b> <span style="background-color: #FFD700;">15-03-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">22-03-2024</span>
	<b>FEATURED CONTENT: FORMING - ANNEALING - COATING</b>			
2024 <b>3</b>	<b>GLASSMAN LATIN AMERICA</b>	15-16 May	MEXICO CITY Mexico	<b>Editorial files:</b> <span style="background-color: #FFD700;">05-04-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">12-04-2024</span>
	<b>PACKAGING PREMIERE</b>	21-23 May	MILAN Italy	
	<b>GLASS TECHNOLOGY CONFERENCE</b>	27-29 May	AACHEN Germany	
2024	<b>Glass Industry Directory</b>	  		<b>Editorial files:</b> <span style="background-color: #FFD700;">07-06-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">14-06-2024</span>
2024 <b>4</b>	<b>ICG ANNUAL MEETING</b>	25-28 August	INCHEON South Korea	<b>Editorial files:</b> <span style="background-color: #FFD700;">22-07-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">29-07-2024</span>
	<b>CONFERENCE ON GLASS PROBLEMS</b>	16-20 September	TOLEDO (OH) USA	
	<b>AFGM</b>	23-27 September	BALI Indonesia	
<b>FEATURED CONTENT: GLASS MOULDS</b>				
2024 <b>5</b>	<b>GLASSTEC</b>	22-25 October	DÜSSELDORF Germany	<b>Editorial files:</b> <span style="background-color: #FFD700;">20-09-2024</span> <b>Deadline Adv files:</b> <span style="background-color: #A9A9A9;">27-09-2024</span>
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	<b>ICG - INTERNATIONAL CONGRESS OF GLASS</b>	20-24 January 2025	KOLKATA India	
<b>SPECIAL ISSUE: POST-GLASSTEC REVIEW</b>				

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SAVERGLASS

## First year of Furnace 13 at the Acatlán de Juarez plant



With its products sold in more than 100 countries around the world, SAVERGLASS serves more than 26,000 customers on three continents. Built to meet the growing demand for high-end bottles for the wine and spirits markets in the Americas, Furnace 13 has made it possible to double the production capacity of the Acatlán de Juarez plant in Mexico. With its seven production lines, including five operational from launch and two more in pre-implementation, this new furnace can produce up to 410 tonnes per day.

The Acatlán site, now operating with Furnaces 12 and 13, has 11 production lines, capable of producing up to 600 tonnes per day, with a target workforce of 900 employees. The total capacity therefore increases to 200,000 tonnes of glass per year (60,000 tonnes previously), an increase of 150 percent of the factory.

This expansion of Saverglass Mexico solidified the plant's position as the largest luxury glass bottle production site in the world.

[WWW.SAVERGLASS.COM](http://WWW.SAVERGLASS.COM)

GMIC

## Funding for electric glass melting research

The Glass Manufacturing Industry Council (GMIC) recently announced that it has been selected by the U.S. Department of Energy to receive USD 3M in funding to research advanced electric melting in glass manufacturing. The research is intended to reduce greenhouse gas emissions and help move the nation toward a net-zero economy. The GMIC project was one of 49 selected, totalling USD 171M in federal funding.

Marie Kistler, GMIC President and Market Manager in Air Products' Americas Strategic Marketing and Development organisation, said: "The submission and selection of the GMIC-led application for DOE funding is a great step forward for the industry. The efforts of GMIC members and partners have led to increased recognition of the glass industry's important role in decarbonizing America's industrial sector and the project results will benefit glass producers across multiple sectors."

Partners on the project team are the Pacific Northwest National Lab (PNNL) in Richland, Washington; RoMan Manufacturing in Wyoming, Michigan; Toledo Engineering Company (TECO), and CelSian, both in Toledo, Ohio.

The project team will bring together extensive expertise in glass manufacturing, electric melting, lab-scale experimentation, computer modelling and engineering solutions. Scott Cooper, Technical Director USA of CelSian, and principal investigator on the project, said: "Electric melting has been successfully used at a commercial scale to make high-quality, industrial glass. However, some challenges have prevented its widespread adoption in higher-volume applications like container and flat glass production. Our project aims to address these challenges, advance electric melting technology for sustainable glass production, and provide viable options for the glass industry's journey toward a lower-carbon future."

Results of the anticipated three-year project will be shared in publications, community outreach efforts and at the annual Glass Problems Conference, organized by GMIC.

[WWW.GMIC.ORG](http://WWW.GMIC.ORG)





STEVANATO GROUP

## Technology Excellence Centers

Selecting the right primary container for an injectable drug or passing a device design verification test are crucial steps in the product development process. So, the pressure is on to get it right the first time. Here **STEVANATO GROUP**'s state-of-the-art Technology Excellence Centers can offer analytical and device testing services to support customers all the way - from early-stage to launched combination products.

Chemical interactions between drug and container could lead to glass delamination, high extrusion forces and other container failures. As such, allowing Stevanato Group to de-risk the container selection can help to advance commercial success.

Stevanato Group's Technology Excellence Centers are state-of-the-art facilities located at the headquarters in Italy and in the biotech hub of Boston, USA. They cover a range of specialized fields including container closure systems and drug-delivery devices. A team of more than forty highly-skilled professionals comprising scientists, engineers, pharmaceutical chemists and biotechnologists are all committed to offering their know-how and enthusiasm to turn a project into an achievement.

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# VIDROMECHANICA

GLASSMECHANICS



AGP-AFRICA

## Third melting line commissioned from SORG

With the commissioning of the N3 plant in the Nigel plant in Gauteng, South Africa, AGP-AFRICA now operates three SORG furnaces - all excellent testimony to SORG Group technology, capability and competence.

Erected as a 'Brownfield Project' in a new building in just 12 months, this regenerative end port furnace has a melting area of 150 square metres and will primarily produce green and flint container glass.

Nikolaus SORG engineered the whole installation, with designs for the refractory, furnace steel and platforms. The scope of supply ranged from combustion air and the waste gas system to gas and diesel emergency heating. Boosting systems (melting, barrier and throat boosters), tank and throat cooling, SCADA WinCC control system, glass conditioning and machine cooling were also delivered. This was rounded off by the working end and four type 340S+® forehearth, each with superstructures, gas heating and cooling systems.

The batch charging is carried out by two EME CPO 650D® machines. EME connected the new furnace to the existing batch house via a redundant batch transport system. This involved additional cullet storage, conveyor systems and the weighing system for feeding EP dust to the batch. All work, including modernising the control system, avoided any disruption to the batch plant.

Steel and refractory construction was carried out by SKS, who also supplied the entire steel quantity of 400 tonnes. SKS received support in safety management, construction site equipment and personnel from its long-standing partner Refraline. The order was successfully completed by the heating up and fill-on with glass, including hot insulation.

[WWW.SORG.DE](http://WWW.SORG.DE)



SGD PHARMA

## New Type I tubular vials range introduced

As a global market leader in moulded glass primary packaging solutions for the pharmaceutical industry, SGD PHARMA recently announced its new range of high-quality Type I injectable vials in tubular glass with the added external low-friction coating developed by Corning - all thanks to an exclusive co-development partnership. SGD Pharma's vial-converting expertise is combined with Corning's® proprietary glass-coating technology to improve pharmaceutical filling-line productivity and speed the global delivery of injectable treatments.

Defective vials can force production lines to stop and more critically may result in recalls and increased manufacturing costs. SGD Pharma's new Velocity® Vial offering reduces the frictional resistance created by glass-to-glass and glass-to-metal contact, helping pharmaceutical filling lines to prevent potential disruptions to the flow of vials, which can include tip-overs,

jams and glass breakages. As a result, there is a reduction in total cost of ownership and an increase in glass quality, making the fill and finish process 20 to 50 percent more efficient.

Vial cracks and glass particle contamination are also a risk to patients, but with SGD Pharma's Velocity® Vials, pharma filling companies will see a reduction in glass particulates of up to 96 percent. Hence there will be minimal risk of glass particulates getting trapped inside vials during fill and finish operations, protecting the end user and significantly improving product quality and safety.

SGD Pharma's Type I tubular glass vials are already compliant with USP and EP requirements and are manufactured and released in accordance with ISO GMP standards. The Velocity® Vial coating technology is available in both clear and amber glass, in standard vial sizes 2R to 20R (though sizes up to 30R can be made available on request) and is compliant with EU and US health authorities.

[WWW.SGD-PHARMA.COM](http://WWW.SGD-PHARMA.COM)



HORN

## Romania subsidiary expands international presence

**H**ORN Glass Industries recently announced the foundation of its new subsidiary, **HORN Rotec S.R.L.**, in Romania. With this strategic decision, HORN strengthens its presence on the international market. Based in Alba Iulia, HORN Rotec S.R.L. is managed by Ioan Dregheciu. He was already employed by HORN Glass Industries AG as project manager before the subsidiary was founded and, thanks to his experience, he is the ideal contact for this role. The newly-founded company will focus on taking over assembly activities for the HORN Group in the electrical sector in order to meet the increasing demand for high-quality electrical installations and services. This will make optimum use of HORN's proven specialist knowledge combined with local expertise.



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VISY

## AUD 50M glass recycling factory upgrade unveiled

**V**isy has unveiled a major AUD 50M upgrade to its glass recycling factory in Laverton, Melbourne, Australia. At capacity, the modernised plant -which was officially opened by Steve Dimopoulos, Minister for Environment of the state of Victoria, and **VISY** Chairman Anthony Pratt- can recycle all of Victoria's recyclable glass.

"This is an important upgrade for both Victoria and Visy on our way to manufacturing new glass bottles and jars made with an average of 70 percent recycled content," said Pratt.

"But we're not simply manufacturers. We're actually in the landfill avoidance because recycling and remanufacturing are important weapons against climate change."

The project will double Visy's glass recycling capability in Victoria, recycling up to 200,000 tonnes of glass annually - the equivalent to 150 bottles and jars for every Victorian, every year.

The investment will also support local industry and local jobs.

The upgrade is part of Pratt's 2021 commitment to invest AUD billion over the ensuing decade to reduce landfill, cut emissions and create thousands of green collar Australian manufacturing jobs. "Using recycled content in glass manufacturing lowers greenhouse gas emissions," said Pratt.

A Visy glass container with 70 percent recycled content uses up to 30 percent less energy to make than a container with no recycled content.

The Laverton factory will use 20 new state-of-the-art optical cameras to sort glass down to 3 millimetres in size, keeping more glass in the circular economy. The old facility could process glass 10 millimetres in size or larger.

Visy will remanufacture the glass into new glass jars, bottles and containers at its factory in Spotswood - the only glass container furnace in Victoria.

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VIDRALA

## Sale to Verallia

**V**IDRALA recently announced that it has reached an agreement with Verallia to sell its Italian subsidiary, Vidrala Italia S.r.l.

- Vidrala's Italian subsidiary operates from one production site in Corsico near Milan, with two furnaces. In 2023, the company generated revenue of EUR 131M and EBITDA of EUR 33M.
- Vidrala Italia supplies approximately three percent of the demand for glass containers for food and beverages in Italy.
- This transaction reflects Verallia's willingness to further invest in a strategic and growing market and reinforce its glass container offering for the food and beverage industry in Italy for the benefit of all its customers

The divestment follows a thorough strategic reflection. It will allow the Vidrala Group to refocus on strategic regions and capture the opportunity to realize the value created in Italy.

With this acquisition, Verallia would expand its capabilities in the Italian market, where the Group would operate seven production sites. Consideration for the transaction amounts to EUR 230M in enterprise value and will be financed by external debt.

Patrice Lucas, Chief Executive Officer of Verallia, said: "This transaction is in line with our strategic plan and reflects our willingness to continue on our profitable growth path, including through targeted acquisitions, allowing us to complement our footprint in strategic geographies and improve our commercial and industrial presence in Italy. We continue to move forward with determination on any value creation opportunity, also for the benefit of our customers, whether through organic or external growth."

Marco Ravasi, Managing Director Verallia Italy, added: "Serving our customers is a priority, which is why I am delighted with this opportunity to continue the development of our activities in the Italian market and to integrate the Corsico production site, which complements our footprint in Italy. We plan to further improve the service to our customers with an even broader product range and continue to grow our business in Italy."

### Information relating to the acquisition

The completion of the transaction is subject to the approval of the Italian Competition Authority under the Italian merger control law and of the Italian Government under foreign investment rules as well as the customary conditions precedent. The Group aims to complete the acquisition between the second and third quarters of 2024.

[WWW.VIDRALA.COM](http://WWW.VIDRALA.COM)



O-I GLASS

## Heat recovery system in Veauche plant, France

O-I is currently leveraging a carbon-lowering heat recovery system at its Veauche, France, plant to advance its sustainability and decarbonization strategy.

Heat recovered from the facility's glass-making furnace will feed a new internal energy distribution network and will supply up to 94 percent of the plant's heating needs.

Through its sustainability roadmap, O-I has set challenging yet attainable goals for energy efficiency technology advancement, along with the sourcing of renewable energy and emissions reduction. As part of our corporate sustainability goals, O-I is targeting 40 percent renewable energy use by 2030 and to reduce total energy consumption by nine percent globally.

In addition to the installation of heat recovery technology at the Veauche facility, O-I also has similar systems in place in Reims and in Vayres, France. The heat recovered from the Reims plant is used to heat homes and residents' water in the local community.

Transformational funds through the French Environment and Energy Management Agency (ADEME) support the installation of the heat recovery system. Technical support for the system is provided through a partnership with ENGIE Solutions. The partnership builds upon a broader agreement with ENGIE, a leading French multinational utility company, to supply O-I facilities across Europe with green electricity generated from solar, wind and hydro sources over a ten-year period.

"This project makes a very tangible contribution to decarbonizing the Veauche site, improves its competitiveness and is in line with the company's overall strategy towards sustainable development," said Walter Ferrer, Managing Director of O-I Glass for South-West Europe.

"With the contribution of ENGIE Solutions' skills in energy performance and the support of ADEME and the French government, it also illustrates our ability to forge strategic partnerships with private and public players. This operation is especially important for us because it can serve as a blueprint for other plants."

[WWW.O-I.COM](http://WWW.O-I.COM)

TIAMA

## Artificial Intelligence now inside inspection machines

TIAMA recently launched its new sidewall inspection machine: MCAL 4 AI. The inspection of hollow glass containers is entering a new era thanks to the implementation of AI inside the MCAL machines.

The MCAL 4 AI revolutionizes the performance of inspection machines and drastically simplifies their usage:

- It maximizes defect detection performance and runs inspection of the entire container, reducing the exposure to critical defects.
- Thanks to a better identification of acceptable defects like brush marks, black spots or mould seams, wide amounts of

sellable containers can be kept.


- By providing a meaningful glass-type name to all defects, AI provides insights to understand and adjust the glass making process.
- Only two simple parameters are required to set it up, making it faster and easier to proceed job changes compared to standard vision algorithms.

Every new MCAL machine is now able to run high-speed production inspection with artificial intelligence. In addition, all existing MCAL machines can also be retrofitted with AI.


[WWW.TIAMA.COM](http://WWW.TIAMA.COM)




## Heat Recovery at Veauche, France Plant



Recovered heat will cover **94% of plant's heating needs**



Installation marks **significant step in decarbonizing** Veauche operations



Compliments **existing heat recovery** at other O-I plants, France



GLASS SERVICE

## ES III™ global triumph: Over 400 installations worldwide

**G**LASS SERVICE a.s. (GS) has been at the forefront of the Glass Industry 4.0 and AI revolution for several years, showcasing its expertise through the implementation of its Model Based Predictive Supervisory Expert System ES III™ and NIR furnace camera, along with unique AI vision software.

Currently, GS has surpassed 400 installations worldwide. Remarkably, in certain European countries, over 50 percent of all glass furnaces are now under full ES III™ control. This encompasses various sectors, including float, container, tableware, fibreglass and special glasses. Furthermore, ES III's utilization downstream is steadily increasing, with approximately 300 forehearth installations already in operation. Stay tuned for more exciting developments to be unveiled in the near future.

One of the company's customers provided testimony illustrating the advantages of ES III™, such as full automatic furnace and forehearth control, energy optimization, cost savings and significant reductions in carbon emissions achieved by maximizing the utilization of larger electric boosting systems.

A Technical Plant Manager shared their experience with ES III™, stating: "We have now deployed ES III™ across all nine of our feeders. With over 26 job changes per week, operators previously had to manage numerous zone temperatures, making ES III™ an invaluable asset. In the past, this task would have required a feeder specialist, a role most plants no longer have. Here we have observed several benefits:

- improved system reproducibility
- reduced human interaction, minimized risks of errors
- achievement of temperature targets and stabilization post-job changes
- consistent and uniform temperatures at the feeder end resulting in enhanced gob weight and bottle formation, thereby positively impacting product quality
- energy savings
- reduced risk of reboil and feeder corrosion due to uniform firing
- and increased operator availability for other tasks, such as feeder maintenance"

[WWW.GSL.CZ/](http://WWW.GSL.CZ/)





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HORN

## Sustainable glass melting furnace built for Ambev

**B**razil-based brewing company Ambev is to build a sustainable container glass plant in Carambei in the state of Paraná, Brazil. The plant, which will produce bottles for renowned brands such as Stella Artois, Beck's and Spaten, is currently under construction. Additionally, it will supply Ambev breweries located across several states, including Paraná.

The premium glass melting technology provider **HORN Glass Industries** will equip the new plant with a technologically advanced and environmentally friendly glass melting furnace with an output of 400 tonnes per day of bottles, together with three forehearths for glass conditioning. It will manufacture container bottles in flint, amber and green colours.

HORN's E-fusion power-boosting technology will allow the furnace to produce the maximum pull on all three colours with 6 percent or even up to 20 percent electrical

share. Furthermore the furnace will be capable of operating on either natural gas, LPG or biofuels and will employ state-of-the-art technology to achieve superior energy efficiency.

The forehearths will feature the HORN glass-conditioning system GCS 301-advanced design, allowing for the application of a wide range of gob temperatures to produce the bottles. The system contains a special designed cover block with indirect centreline cooling. This cover block allows separate areas along the control zones into boundary areas to heat the glass, particularly at the side of the forehearth and a central section to guide direct cooling air. The GCS 301-advanced system offers high flexibility with its left/right heating system and uses high-performance insulating refractories for superior glass conditioning. HORN will be responsible for the supply of the container glass furnace, all refractory materials, steel construction, E-fusion power boosting, auxiliary equipment, supervision, manpower for construction and tools for installation and commissioning. The contractual scope also includes theoretical and practical training, as well as production support for 60 days in the post-commission period.

Ambev, a subsidiary of Anheuser-Busch Inbev, also known as AB Inbev, opened its first glass plant in Rio de Janeiro in 2008. Here too the furnace was built by HORN. Ambev's portfolio consists of more than 30 beverage brands such as Budweiser, Brahma and Michelob Ultra, having its footprint in 19 countries. It employs more than 30,000 people in Brazil.

[WWW.HORNGLOSS.COM](http://WWW.HORNGLOSS.COM)



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RATH GROUP

## Acquisition of 33 percent stake in Avanee Refsol India



**R**ATH GROUP acquired a 33 percent stake in Avanee Refsol India as part of its Evolution 2030+ strategic growth plan. Production is being set up in Visakhapatnam, state of Andhra Pradesh, India, together with the partners of Avanee Refsol. Production is scheduled to start at the beginning of 2025. An annual capacity of 20,000 tonnes of refractory products is projected in a two-stage plan.

In addition to a capital investment, RATH will contribute its expertise in specialty products for refractory applications. “Our specialists from the RATH Group will play a key role in selecting the machines and production processes. In addition, RATH will provide on-site training for employees,” said Ingo Gruber, Chief Technical Officer of Rath AG.

Andreas Pfneiszl, Speaker of the Executive Board, explained the reason for the investment in India: “RATH has defined three main goals in its Evolution 2030+ strategic growth plan: sales growth, increasing profitability and introducing new products and total solutions for our customers. Our customers are no longer located solely in Europe and the USA - we are increasingly able to offer our solutions worldwide. This requires access to larger production capacities outside our current production sites. The investment in India will enable us to reach the Asian growth market better and faster.”

Alexandra Rester, CFO of RATH AG, added: “With this investment in completely new machines and our proximity to the future markets, we can make a significant contribution to sustainability.”

[WWW.RATH-GROUP.COM](http://WWW.RATH-GROUP.COM)

AGP-EUROPE

## Second solar plant launched in the Netherlands

**A**rdagh Glass Packaging-Europe (AGP-EUROPE), an operating business of Ardagh Group, has announced that a major solar power plant at its facility in Moerdijk, the Netherlands, is now supplying renewable electricity on-site, to reduce the facility's carbon footprint by an estimated 725 tonnes of CO<sub>2</sub> annually. Ardagh Group has partnered with independent solar energy specialist Zoncoalitie, and energy supplier Eneco, to deliver the solar plant at Moerdijk - the second AGP-Europe on-site solar project, and the third in the Netherlands for Ardagh Group.

This project, which contributes to Ardagh Group's strategy to use 100 percent renewable electricity by 2030, follows the launch of the company's first solar power plant in the Netherlands, which has been supplying the AGP-Dongen facility since September last year.

Annelene Ikemann, Sustainability Director, AGP-Europe, said: “The Moerdijk solar installation is expected to generate over 2,500 MWh of electricity per annum, which is another step closer to achieving our target of using 100 percent renewable electricity across our AGP-Europe facilities by 2030, using a mix of on-site and off-site installations.”

Eneco's Senior Solar Project Developer, Jeffrey de Rooij, said: “We are delighted to partner with Ardagh and Zoncoalitie to deliver this on-site solar project - another step towards decarbonising by replacing conventional electricity production with sustainable solar energy.”

Adriaan Copper, Commercial Director at Zoncoalitie, added: “We are proud to see Ardagh Glass Packaging's second major solar project go live in the Netherlands, thanks to the excellent teamwork between AGP, Eneco and Zoncoalitie.”

More installations are expected to follow.

[WWW.ARDAGHGROUP.COM](http://WWW.ARDAGHGROUP.COM)



O-I GLASS

## Lighter weight, lower carbon wine bottle hits France

**O**-I GLASS has announced the launch of a light-weight glass wine bottle with reduced carbon impact in the French market - the latest proof point in O-I's pursuit of its approved SBTi (Science Based Targets Initiative) target to reduce greenhouse gas emissions 25 percent by 2030.

Validated by the Carbon Trust, the innovative lightweight glass wine bottle, named Estampe, is a result of O-I's vision to be the most sustainable producer of sustainable glass packaging.

The Estampe bottle weighs about 390 grams, which is below the average of wine bottles in the French market. The R&D team at O-I developed Estampe to leverage greater recycled content, up to 80 percent or more on average - well above the current European average of 50 percent recycled content.

To maximize the credibility and overall sustainability of Estampe, O-I worked with the Carbon Trust to achieve the first validated, eco-designed 75 centilitre bottle to meet their criteria for low carbon packaging. The residual footprint offset by the purchase of carbon credits supports such things as orchard planning in France and reforestation projects in Brazil.

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ARGLASS

## Investment secured for second cutting-edge facility

**G**lass container manufacturer **ARGLASS** has secured over USD 230M in capital to build a second furnace on its campus in Valdosta, Georgia, USA. Here Arglass raised a combination of structured equity and debt to finance the construction. Projected to be completed in Q2 2025, the new facility is expected to be capable of producing over 350 million sustainable glass containers annually. This state-of-the-art manufacturing plant will embody the future of glass with a fully-integrated production network, driven by AI-integrated real-time data monitoring, predictive modeling and fully-automated, closed-loop production and quality assurance systems. Such advances will allow the new facility to produce up to eight different glass container types simultaneously for maximum flexibility - enabling smaller production runs, faster reaction to market demands, lower inventory levels and reduced investment in moulds.

These cutting-edge capabilities are planned to be backed by some of the most extensive sustainability infrastructure of any glass manufacturing plant in the world. The plant is expected to be powered by a hybrid gas, electric and hydrogen oxy-fuel furnace capable of melting 490 metric tonnes of glass per day. An additional five megawatts of power will be provided by a solar power installation.

Other sustainability measures include the use of green hydrogen to reduce CO2 emissions, a closed-loop water system to minimize industrial waste and an on-site post-consumer glass recycling plant. The recycling plant will provide post-consumer glass cullet for use in the production of new containers. Arglass also produces glass using its proprietary Arglass Biogenic® glass composition, which replaces traditionally mined material with a naturally renewing, carbon-negative biogenic component gently harvested from the ocean.

The construction, which is expected to begin as soon as possible, will be supported by the Valdosta Lowndes Development Authority and the Georgia Department of Economic Development. Arglass plans to hold a groundbreaking ceremony for the new plant on the company's campus in Valdosta.

Investment bank Jefferies acted as financial advisor for Arglass. Orion Infrastructure Capital (OIC) and several other major institutional investors provided funding.

[WWW.ARGLASS.US](http://WWW.ARGLASS.US)

GROUPE POCHE

## Partnership to source renewable energy

**P**ursuing its 'Sustainable Beauty' CSR roadmap, and in line with its decarbonization plan, **GROUPE POCHE** recently teamed up with ABO Wind, a major player in the development of renewable energies worldwide, by signing a 20-year Power Purchase Agreement. Through this agreement, Groupe Pochet is acting to reduce its impact on the planet by sourcing green energy and securing the long-term purchase price of electricity. A major project under the decarbonization plan, the electric furnace -which will be operational by the end of this

year- will be partly supplied by green energy from the future photovoltaic plant.

Here Groupe Pochet is committed to sourcing its energy both locally and in France - and other similar projects will see the light of day in the coming months.

### **Bold innovation for a sustainable future**

Groupe Pochet is convinced that innovation means going beyond products and processes to build meaningful partnerships with its entire ecosystem - all while opening up to the world and pursuing its transformation.

"In pursuit of our decarbonization plan and our goal of reducing our CO2 emissions by 50 percent by 2033, this long-term power purchase agreement will enable us to produce sustainably for Luxury Differently," said Benoit Marszalek, Pochet du →



← Courval's Director of Operations. "Today, to ensure energy sovereignty in France, it is essential to accelerate the deployment of renewable energy production plants. This park will therefore add to our existing photovoltaic capacity.  
Said Benoit Clouet, Managing Director of ABO Wind Sarl:

"We're delighted that this electricity will be used by a French family business. In this way, the CPPA will help to electrify part of Pochet Group's electricity needs. It's a long-term relationship that we're establishing today."

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O-I GLASS

## CEO Andres Lopez to retire

O-I Glass recently announced that Andres Lopez will retire as Chief Executive Officer, effective May 15, 2024, following a nearly 40-year career with the Company. The Board has been working with an executive search firm to identify O-I GLASS' next CEO as part of the Company's long-term succession planning process. Andres is committed to supporting a seamless transition of responsibilities to his successor. Andres joined O-I in 1986 and has held numerous leadership positions across the Company's global operations before being named CEO in January 2016. Under his leadership, O-I has been significantly transformed into a more capable, resilient, agile and disciplined organization. Among other achievements, he successfully led the completion of a business portfolio optimization programme, strengthened the balance sheet, delivered several inorganic and organic expansion projects and integrated sustainability into the business strategy. During his tenure, the Company has focused on innovation, exemplified by initiatives such as the development of its MAGMA and ULTRA technologies. This transformational journey has enabled O-I to deliver strong financial results and lay the foundation for long-term profitable growth.

"It has been a privilege to serve as CEO of O-I for these past eight years and to work alongside such a talented team for the entirety of my career," said Andres Lopez. "We have made significant progress on our transformational journey and are well-positioned to meet the evolving requirements of the packaging market and capitalize on emerging trends. Indeed, I am extremely proud of what we have built together as we advance new standards in sustainable glass manufacturing. O-I has a bright future and I believe that breakthrough innovations like our MAGMA technology are just the beginning."

In connection with his retirement from the Company, Andres will step down from the O-I Board of Directors at the Company's 2024 Annual Meeting of Stockholders to be held on May 15, 2024.

[WWW.O-I.COM](http://WWW.O-I.COM)

INDICOR & AGR

## Acquisition announced

O A leading diversified industrial company providing specialized, mission-critical technologies to customers across a variety of niche markets, INDICOR recently announced the acquisition of AGR International, a leading provider of quality and process control technologies serving beverage packaging customers globally. Agr provides technology and services that support global glass and plastic packaging customers in ensuring their quality, productivity, and sustainability goals are met. Agr's technology includes laboratory and in-line equipment and automated process systems that allow customers to meet the quality management needs of container manufacturers and brand owners.

"AGR is a terrific business with clear niche market leadership, mission-critical solutions, deep customer intimacy, and a commitment to supporting their customers' quality and sustainability needs," said Doug Wright, CEO of

Indicor. "This acquisition demonstrates Indicor's disciplined capital deployment strategy of partnering with high-quality, leading businesses that compound Indicor's long-term financial returns."

AGR's management team will continue to lead the business from its Butler, PA, USA, headquarters. AGR's name, brands and operational footprint will not change as a result of the transaction. The business will be led by AGR's President, Sudha Jebadurai.

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VETROPACK

## Consultation on the future of Swiss plant to begin

**V**etropack Group recently announced that it will start a consultation process on the future of its Swiss production site in Saint-Prex, Vaud.

More than a century old, the Saint-Prex production site has been the subject of numerous changes and substantial investment over the decades, more than CHF 50M since 2010 alone. But despite these efforts, the site -the Group's only one in Switzerland- is suffering from its small size, the constraints of its location in the heart of a densely-urbanised area, and its lacking competitiveness in a market that has become increasingly difficult. Its profitability is no longer guaranteed.

These are issues that have been of concern to the Group's management for several years. A decision on the future of the site is necessary now, as the site's current melting furnace is due to be replaced because of its age. This would require an investment of at least CHF 30M - which is economically not feasible under the current conditions.

In view of these developments, **VETROPACK's** Management Board and Board of Directors have undertaken in-depth analyses of the situation. This has now led to the opening of a consultation process, which could result in the closure of the production site if no other viable alternative can be found.

The position of the Board of Directors and Group Management is based on a comprehensive assessment of production, including an examination of the optimisation potential.

Vetropack still generates around 40 percent of its sales to Swiss customers with glass packaging from Saint-Prex. In the case of a closure, these customers would be supplied by other Vetropack plants in neighbouring countries - particularly Austria and Italy.

A closure of the plant, which could take place in the second half of 2024 based on the current situation, would also mean the loss of the majority of the around 180 jobs.

In accordance with the legal requirements for consultation processes, employees will be given the opportunity in the coming weeks to comment on the situation and eventually submit alternative proposals. These will be thoroughly examined and evaluated by the Board of Directors before a final decision is made.

[WWW.VETROPACK.COM](http://WWW.VETROPACK.COM)





O-I GLASS

## Plants in Gironcourt and Reims, France to be upgraded

**O-I GLASS** has announced that the company is investing EUR 95M in two of its French glass packaging production facilities. As a continuation of its modernization investment programme, these significant investments aim to upgrade the sustainability, flexibility and productivity of its operations in Gironcourt-sur-Vraine and Reims. This investment is consistent with O-I's recently updated ESG roadmap which is aligned with their previously announced capital spending plan.

In Gironcourt, where the plant recently marked its 120th anniversary, EUR 55M will be invested in close cooperation with one of its key customers to rebuild a furnace and equip it with innovative GOAT technology (Gas Oxy Advanced Technology).

This innovative approach, already successfully implemented last year at the O-I plant in Vayres, France, uses a mix of gas and oxygen to heat the furnace. In combination with a newly installed heat recovery system to pre-heat raw materials and recycled glass, the new installation is expected to reduce CO2 emissions by up to 18 percent.

In addition to the furnace upgrade, a production line at the plant will be modernized to further increase flexibility and capacity. An average of about 80 percent of the plant's raw materials is scrap and locally recycled glass, underlining the circular and local nature of glass packaging.

In Reims, O-I completed a EUR 40M investment for a major upgrade including the full renovation of one of the plant's two furnaces and a production line, as well as the installation of all-new equipment. On top of multiple operational benefits, this also resulted in an overall energy reduction of about five percent.

The Reims plant, which celebrated its 150 years anniversary in 2023, is a model for O-I's overall sustainability efforts. An average of about 90 percent of its raw material consists of scrap and locally recycled glass. (cullet) The high cullet rate is a major contributor in reducing the plant's CO2 emissions by about 60 percent and fine particle emissions by about 80 percent. Since the 2019 investment, waste heat from glass packaging production has been recovered to be used in domestic homes in the local community.

The plant serves a highly diverse customer base serving more than 1,000 customers in France. It is able to produce bottles in three colours and in sizes ranging from 0.2 litre to Magnum. It produces 300 million bottles a year for the Champagne, Burgundy, Loire Valley and Alsace markets.

[WWW.O-I.COM](http://WWW.O-I.COM)



VERALLIA & EDISON ENERGIA

## Green energy supply agreement

After fruitful collaboration over the past three years, **EDISON ENERGIA**, the Edison Group company involved in the sale of electricity and gas to businesses and families, signed a multi-year Power Purchase Agreement (PPA) with **VERALLIA**. Beginning this year, the PPA will allow the company to significantly reduce CO2 emissions: savings until the end of the contract (scope 2) are expected to be around 170 thousand tonnes. The energy supplied – equal to over 350 GWh – will come from a mix of renewable sources from various plants in Italy: a new photovoltaic system in Viterbo will be the primary source. In recent days, during the CSR Suppliers Award – the recognition given to the suppliers who have stood out most for their sustainable commitment during the year – Verallia awarded Edison Energia as one of the three best partners last year. Verallia has long decided to play a leading role in the transformation of the packaging sector, intensifying its actions – the 46 percent reduction in emissions by 2030 – and strengthening the circular and virtuous dimension of glass packaging.

“We’re delighted to have signed this agreement,” said Marco Ravasi, CEO of Verallia Italia. “It allows us to make our sustainability commitment concrete and continue in the decarbonisation process through the use of renewable energy. Indeed this partnership is part of our Group’s broader strategy to increase the share of renewable energy and follows a first PPA already signed by Verallia in Europe: a further step towards the ‘2030 Science Based Targets initiative’ for the reduction of CO2.

Said Massimo Quaglini, CEO of Edison Energia: “The agreement signed with Verallia confirms Edison Energia’s commitment to supporting customers in the process of decarbonizing consumption. We make the experience gained over the years as a primary operator at a national level available to our industrial customers, focusing on quality of service, flexibility and personalized contracts: our goal is to be a reliable partner that accompanies them on a virtuous path and that encourages sustainable consumption choices with reduced environmental impact.”

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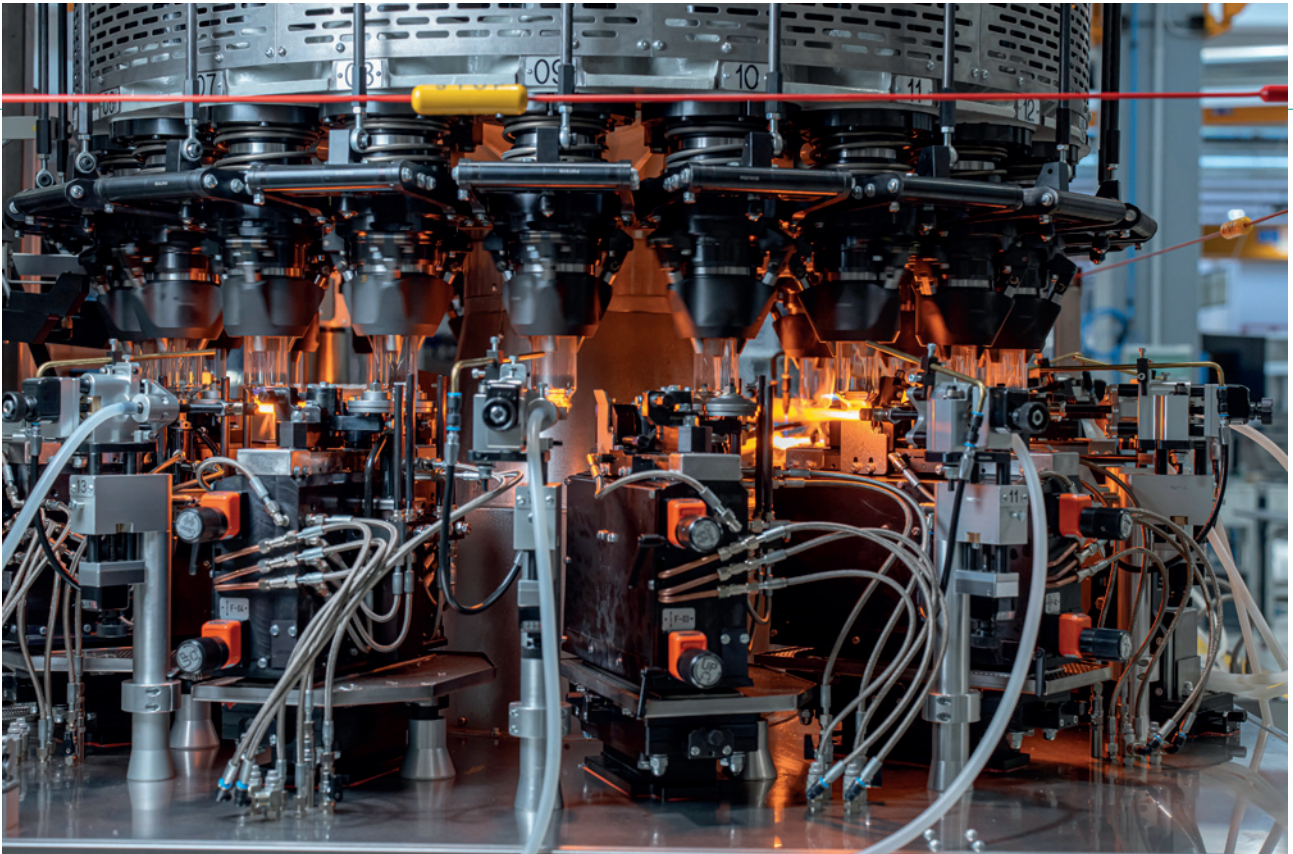
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# Zeta 20-12 reveals EUROMATIC's big vial engineering mastery

Extending its products portfolio for index glass vial container production from glass tubing, EUROMATIC's latest development strives to increase both process performance and vial quality by cost-effectively offering maximum flexibility and efficiency during forming.



**G**lass converter manufacturers worldwide constantly aim to increase process efficiency and productivity of container production while increasing the quality of pharma containers. Energy consumption reduction and environmental sustainability, too, have become key factors in the glass industry. Based on the successful Zeta 16-10 and Zeta 18-10



concept, which has made waves in product quality and innovation, coupled with experience gained over the years, the new Zeta 20-12 is also poised to become an important reference for big diameter vial forming in the industry, both for aluminium seal finish, neck finish with blow back and screw neck.

### KEY FEATURES

The main characteristic of Zeta 20-12 is its ability to form big tubing diameters, an evolution within the forming machine family that's suited to smaller glass tube diameters, signalling a major success for Euromatic's index forming equipment over the last 20 years. Zeta 20-12 considers, as glass tubing diameter, the 30,0 to 50,0 mm range (with other working ranges available on request), while vial overall heights range from 55,0 to 110,0 mm.

This equipment maintains the main characteristics of other Euromatic forming machines like tube economizer and forming stations with servo drive. There is no glass-to-glass contact throughout the cycle. Neither is there pre-conveyor handling

when taking the forming out.

Being able to set a 2700-piece hourly production capacity - despite the large diameter of the tube and wall thickness - makes performance truly impressive. Here the fluid refrigerator unit will cool down and maintain internal plug and plug lubricating oil temperature constant. Included too are visual inspection systems (hot-end, geometrical dimensions of the internal diameter, total length and the cosmetic inspection) developed by Euromatic engineers, which offer an interesting total ownership cost resulting in easy-to-use, cost-effective design. A primary goal of the Zeta 20-12 unit has been that of simplifying fine setting and management for operators, whether for normal operations or job changes. Therefore, every part of the machine has been upgraded with new solutions to dramatically reduce the change over time. The section layout has been studied and adjusted in the design to ensure the best configuration, granting easy access to the operators as well as maintenance, standard for all Euromatic products.

### AFTERFORMING LINE

Based on the Euromatic conveyors, as well as the company's annealing oven and packing unit concepts, all proven by over 40 years' experience, the integration of new devices for vial pick and place ensures significant savings on air consumption. Furthermore, the innovative index concept of a movement requiring no chiller to cool down the index system makes electrical consumption of the entire vial production unit very interesting in comparison with other solutions out there in the market. ■



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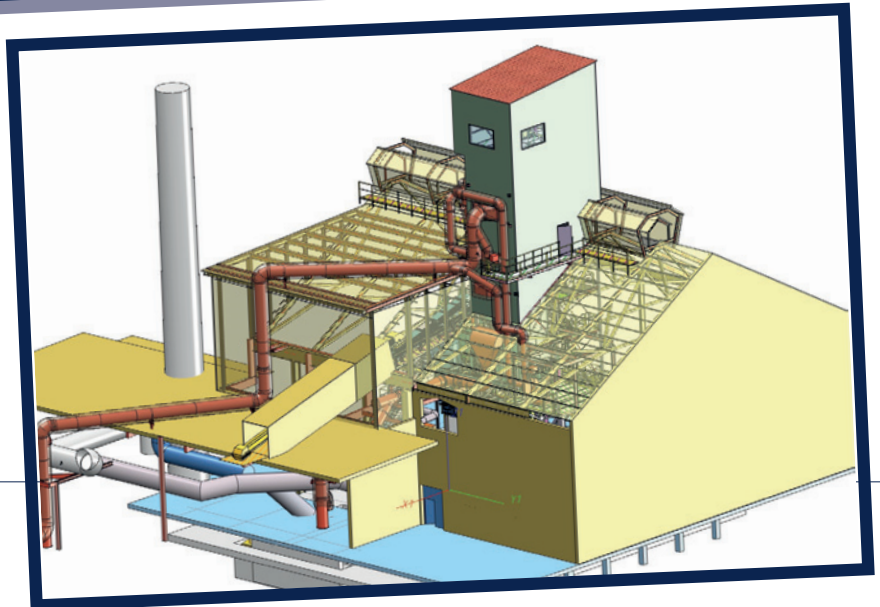
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# Electric charging hailed and two Zippe batch and cullet preheaters commissioned in 2023

Though electric charging of Zippe Industrieanlagen GmbH furnaces add to the company's ongoing in-house innovations, the success stories hardly end there - two of its ABPneo™ next generation batch and cullet preheating systems were commissioned by European container glass producers that had placed orders during the pandemic.

**A**USTRIA  
 A project was realized in Austria that involves the next generation batch and cullet preheater ABPneo™ for a regenerative melting furnace which produces coloured container glass. Fired with natural gases, the furnace has an average output of 130 t/d. The furnace is fired with natural gas. Using exhaust gases with a temperature







of approx. 450°C, it is possible to heat up batch and cullet to approx. 180-200°C. Through this process, the customer saves a significant amount of energy, as well as any related costs. Here the proportion of cullet is 60-70 percent.

The preheater was installed as a retrofit at a regenerative furnace with one doghouse. Here, to ensure smooth integration and commissioning, close cooperation with the customer was very important. The rebuild was realized by modifying the batch transport system during ongoing operation within a very short schedule. Indeed the customer is very satisfied with such close cooperation during this phase, which also had Zippe delighted to be able to be of support in reducing both CO2 emissions

and energy consumption.

### GERMANY

A further ABPneo™ cutting edge preheater was commissioned in Germany for another major European container glass producer. In this major refurbishment, too, the batch transport, furnace silo area and batch charging system were all integrated. To ensure efficient batch charging of an enclosed doghouse situation, Zippe installed the new Vibrotube® charger to enhance the energy balance.

Exhaust gases with a typical temperature of approx. 450°C are used to preheat batch and cullet values up to 200°C. The proportion of cullet glass is 70-80 percent.

The preheater was installed at one doghouse at a regenerative

furnace which is equipped with two doghouses - the second of which serving as a standby unit. Installation and commissioning were both mainly realized during operation of the old, later of the new furnace. First results show significant reductions of energy consumption.

A batch and cullet preheater can be planned as an integrated element of batch processing, but also as a retrofit at some later point in time.

As a pioneer of this technology, Zippe continues to refine its capabilities to offer its customers most advanced systems which help to lower melting costs, reduce emissions - all while increasing energy efficiency and plant productivity.

### ZIPPE ELECTRIC FURNACE CHARGING

The use of regenerative energies

## SUCCESS STORIES



is gaining ever more traction in the industry - not only with a view to protecting the environment but owing also -and in particular- to the uncertain supply of fossil fuels. Here's why the glass industry will always be using more electric furnaces going forward. Zippe has long shown itself fully aware of the changes, which is why it can offer the suitable charger for any electric

furnaces - whether they be rectangular or polygonal.

When it comes to using electric furnaces, it is important to always cover the complete surface with batch and cullet to ensure energy saving. Here Zippe chargers can handle the task, problem-free.

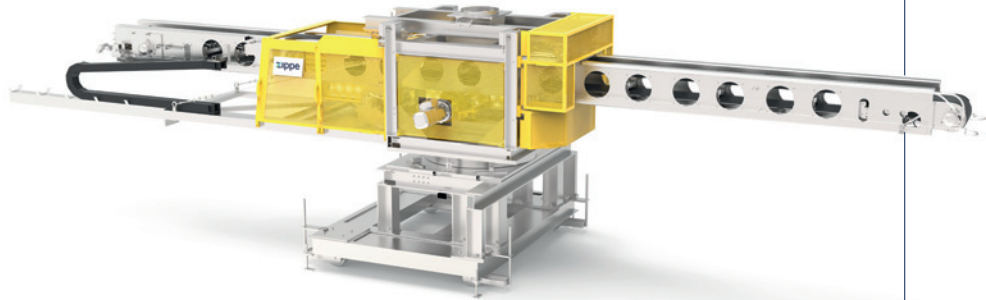
The company's cold top batch charger is designed to move a vibratory tray feeder or a conveyor belt on two axes - depending upon the customer's requirement. For use on polygon furnaces, the charger is additionally equipped with a belt conveyor which can be moved by means of a servo-driven slewing drive. This guarantees that every spot of the furnace is reached.

Here, at a glance, are the advan-

tages of the Zippe cold top batch charger:

- Energy saving by homogenous batch distribution on the complete furnace surface;
- The batch charger can be used individually for furnace capacities of 400 kg/day up to over 400 to/day for all electric furnaces;
- The adjustable charging capacity is optimally adapted to the furnace by a glass level measuring system. Here, batch charger safety installations and programming options for traversing the furnace surface in different charging patterns, both correspond to the very latest state-of-the-art developments. ■

Front part CT - Batch charger conveyor belt



Zippe Cold Top Charger

**zippe**

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# Advanced **PNEUMOFORE** air solutions deliver sustainable hollow glass manufacturing

In this issue of Glass Machinery Plants & Accessories, Engineer Daniel Hilfiker unveils PNEUMOFORE's green path to low life cycle cost and minimal environmental impact by offering an overview of his company's durable, high-efficiency compressors and vacuum pumps.

**A**t the heart of a glass factory, bottles come to life where the gob enters the mould at the IS machine. In this process, compressed air and vacuum play a major role, dictating the speed and quality of the hollow glass moulding. The continuous availability of pneumatic energy is a veritable pillar of 24/7 glass production. Industry experts carefully choose equipment, taking into account the total Life Cycle Cost, with a keen focus on electric power consumption and maintenance costs that spans decades. With



**Pneumofore UV50 Rotary Vane Vacuum Pump - One of the preferred vacuum pump models in worldwide glassworks**

## INNOVATION

a view to seamlessly navigating this intricate landscape, here are some key guidelines for steering clear of operational issues.

### COMPRESSED AIR AND VACUUM DYNAMICS

Whereas vacuum is optional in hollow glass production, compressed air remains crucial. Pressure requirements are typically set at 3,5 bar(g) - occasionally reaching 7 bar(g) in specific operations. In glassworks, the ambient air is far from being pristine, thus requiring the use of pneumatic machinery equipped with effective filters. In line with the average durability of furnaces, which can withstand up to two decades of operation, equipment should share a similar or even longer lifespan and should be designed for longevity - even in round-the-clock operation.

### POWER HIERARCHY

In the energy consumption hierarchy of a glasswork, the fur-

## AUTHOR BIO

Daniel Hilfiker is the President of Pneumofore, an Italy-based company that has been designing and manufacturing both compressed air and vacuum systems for industrial applications worldwide since 1923. He represents the third generation of Swiss engineers at the helm of the company, which continues now in the centenary legacy of pioneering innovative solutions for pneumatic equipment in glassworks. This commitment reflects the company's dedication to sustainability, efficiency and enduring excellence in the ever-evolving landscape of hollow glass manufacturing.

nance ranks highest as it's powered by either gas or electricity. But compressors follow closely behind. In an era where climate awareness is constantly rising and CO<sub>2</sub> emissions are directly related to power usage, selecting highly-efficient equipment becomes mandatory. That said, the durability of compressors remains a critical aspect that must be taken into consideration, with the support of clear expense schedules for both rou-

tine and extraordinary maintenance over the years.

### COMPARING TECHNOLOGIES WITH RELIABILITY

Today high-capacity air compressors and vacuum pumps are flooding the market, even if their technical data sometimes challenges scientific logic in favour of pure sales propaganda. But facts are facts and references of equipment installations run-



Pneumofore UV50 Vacuum Pumps for Glass Production in Thailand

ning trouble-free for decades are what to look for when durability is required. Testimonials from customers with long-term running machines offer insights into maintenance costs, efficiency in the long-run as well as spare parts availability. Choosing equipment with prolonged efficiency and durability reduces the need for costly overhauls and it turns out to be the most convenient and sustainable choice over time.

### CALCULATING LIFE CYCLE COST

Durable equipment that keeps the efficiency constant year after year has to be the preferred solution. Furthermore, overhauling must be avoided as much as possible as it can be exorbitant. Capital expense costs for new machinery require long approval protocols as they are strictly controlled by the purchasing and accounting departments. In contrast, running costs like maintenance and power consumption fall within the yearly budget and they are hard to be verified in advance, despite the fact that they are the largest expenses over the years. Therefore, it is essential to adopt a more comprehensive approach in decision making - taking total Life Cycle Cost into account, which adds purchase cost, maintenance and energy consumption, together with calculation of the total Cost of Ownership.

## ABOUT PNEUMOFORE

Founded in 1923, Pneumofore manufactures vacuum pumps and compressors for industrial applications worldwide. The company's compressors and vacuum pumps are found worldwide, whenever customers require extraordinary reliability and constant performance over time. A leader in Rotary Vane technology, Pneumofore solutions focus on efficiency, durability, minimal Life Cycle Cost, and an elevated respect for the environment.

### EFFICIENT VACUUM SOLUTIONS

Pneumofore UV50 Rotary Vane Vacuum Pump is a preferred model in worldwide glassworks. This vacuum pump stands out by boasting 75 kW for 2.700 m<sup>3</sup>/h in its standard, fix- speed version. Though the nominal installed power may initially seem high, this unit reveals an oversized electrical motor which ensures an extended bearing life and an improved ventilation. Furthermore, operating in the designed optimal range it does not use the motor's safety factor. Quite the opposite, in equipment that uses the safety factor, the electrical motor lasts only as long as the warranty - soon becoming a component subject to 'forced replacement' or 'forced overhauling'. Here Pneumofore philosophy is in contrast with the 'Programmed Obsolescence' approach, a practice prohibited by law - at least in Europe. The company's commitment to durability is extended to

other essential components such as the Air-End, the cooling system and the electrical panel, thereby ensuring longevity and constant efficiency over decades of continuous operation.

### OPERATIONAL INDEPENDENCE AND RELIABILITY

Last but not least, those companies that facilitate the OEM (Original Equipment Manufacturer) independence shine in the spotlight, empowering the glasswork's internal service teams to operate autonomously and maintain equipment efficiently. In a factory, where downtime translates into significant costs, having reliable equipment is a key factor and even more important when it concerns the five vital energy resources within a glass factory: electricity, water, gas, compressed air and vacuum. ■



**Pneumofore High-Efficiency Air Compressors for Glass Production in China**



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1923-2023

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# VPI Instruments on identifying air leaks and cutting energy costs

Within various industries, addressing compressed air leaks equals efficient energy-use. As CEO of VPI Instruments Pascal van Putten observes, today's detection methods include ultrasonic tools and compressor monitoring, which means they can now independently repair leaks and reduce pressure - all while ensuring savings, driving profits and advancing sustainability.

**C**ompressed air is used in factories all over the world to control machines, processes, and pneumatic equipment. It is a safe and easily available medium which can be used in all possible places via hoses and pipes. However, against all the advantages one huge disadvantage looms when we consider compressed air as numbering among the most expensive energy carriers. It explains why many companies try to reduce costs with compressed air leakage management and monitoring. However,

many out there can still save significantly more on compressed air costs. Here the simple detection and repair of leaks would be a good place to start. Immediately that results in an energy gain of 10 to 20 percent - with savings that can even reach 50 percent following expansion with compressed air monitoring and optimization.

#### **WHY COMPRESSED AIR IS SUCH AN EXPENSIVE ENERGY CARRIER**

As CEO of VPI Instruments Pascal van Putten explains:

“When compressing atmospheric air to a pressure of 90 to 100 psi, 75 percent of the electrical energy absorbed in the compressor is lost as heat. Pressure loss and leaks, among other things, ensure that the electrical efficiency of the entire compressed air installation is only 7.5 to 15 percent. This can be improved, and you would expect companies to do everything they can to achieve this. Yet this is not the case and every year billions of dollars in energy are wasted worldwide, simply because so many compa-

**The VPFlowScope M is Industry 4.0 ready - simultaneously measuring (bi-directional) thermal mass flow, pressure, temperature and total flow**



panies neglect to repair leaks and to optimise the efficiency of their compressed air installation.”

### **HARDLY SUSTAINABLE**

Approximately five percent of all electrical energy used worldwide is converted into compressed air - in the industry this is even ten percent. The generation of this enormous amount of energy contributes to CO2 emissions and climate change. For this reason alone, it is sensible and even necessary to reduce compressed air consumption. In addition, companies simply increase their earnings if they improve the efficiency of their compressed air installation.

### **LEAKAGE MANAGEMENT: LOW HANGING FRUIT**

Addressing compressed air leaks is a critical, yet often overlooked aspect of optimising energy efficiency in industrial settings. Despite its simplicity and relatively low investment requirements, detecting and repairing leaks can yield significant cost savings. Here van Putten underscores the straightforward nature of leak detection and repair: “It is absolutely not complicated and does not require high investments to start detecting and repairing leaks. Let me give some

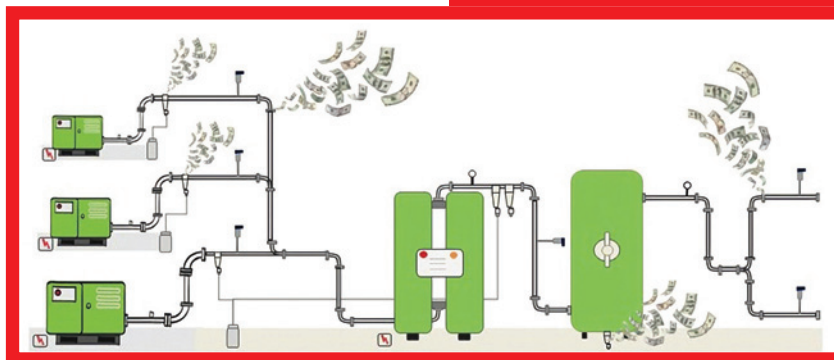
examples of the costs of leaks from an installation that operates 8,760 hours/year. System pressure is 100 PSI and electricity costs come to USD 0.10 per kWh. Ten holes of just 1/16” cost the company USD 10,500 per year. With ten holes of 1/8” costs increase to USD 41,900. And in practice we often encounter hundreds of leaks of all different sizes - also larger than one eighth”. So you can imagine what the total financial losses in that case will be. To detect and repair the leaks you will spend a few thousand USD on a simple measuring system and parts such as gaskets, hoses, and quick couplings. We therefore call leaks the ‘low hanging fruit’ in compressed air installations. Easy to detect, easy to repair - and all while producing immediate financial profit. Companies often have an external agency carry out a leak audit in which all leaks found

in the factory are marked with TAGs. It is not uncommon that when the auditor returns to the factory a year later, the TAGs he applied are still there. So, nothing has been done about it while the costs continue as normal!”

### **PREVENTING PRODUCTION DOWNTIME**

Apart from the financial benefits, there is also another and perhaps even more important reason to ensure that the compressed air system functions optimally and efficiently. In many factories a reliable compressed air supply is crucial for the continuity of many production processes. The right amount of flow and pressure determine the correct operation of production machines. However, leaks contribute to

**Every second many dollars will disappear into thin air if compressed air leaks are not repaired.**



## RESOURCE STEWARDSHIP

## CELEBRATING 25 YEARS PIONEERING ENERGY SAVINGS AND ENHANCING EFFICIENCY

A global pioneer in energy monitoring and measurement solutions, VPInstruments recently marked its 25th anniversary following a quarter-century of contributions to sustainable energy practices.

Since its establishment in 1999 the company has been a leader in providing insights in energy efficiency and management - thanks to easy-to-use solutions that are trusted by professionals worldwide.

VP Instruments' 4-in-1 flow metres, power metres, dewpoint sensors and monitoring systems have all empowered diverse industries - including food & beverage, automotive, glass and consumer goods. Today, insights from the company's instruments help customers to slash up to 30 percent of their compressed air and technical gas usage. To honour this significant milestone, VPInstruments is set to host a series of internal and external activities throughout the year. Notably, the 'Energy360 Conference 2024', scheduled to take place from 18-20 September. Open to professionals and enthusiasts alike, the event will be providing a platform to discuss industry trends and advancements in energy management. Grateful to its customers and partners for their continuous support, VPInstruments reflects today on its journey - all while remaining committed as ever to delivering sustainable solutions for energy savings.

pressure loss. Insufficient pressure can not only lead to machine downtime but also affect the quality of products. Errors in packaging or inconsistent texture/taste of foods can inevitably lead to costly recalls - not to mention damage to a company's image. In addition, if pressure

drop is incorrectly diagnosed as an equipment defect, there is a chance that investment in new equipment will be required. This entails (unnecessary) additional investments that could have been better utilised elsewhere. Optimising compressed air sys-

tems not only increases energy efficiency. It also establishes the foundation for a reliable and well-performing production process.

### LEAK DETECTION METHODS

When a hydraulic line leaks somewhere in the factory and the puddle of hydraulic fluid on the floor continues to spread, it is evident the problem is solved as quickly as possible. Not so with compressed air leaks. After all, being 'just air' there's no emergency situation - they will take care of it someday. Postponement leads to cancellation and the financial and (possible) operational consequences of such a nonchalant attitude will now be clear.

There are various techniques and leak detection methods to quickly and easily detect leaks in compressed air systems, ensuring minimal disruption to operations and maximum cost savings. A few follow here:

- Ultrasonic leak detection. This is a commonly-used method for locating compressed air leaks.
- Ultrasonic detectors can capture high-frequency sounds produced by air leaks and make them 'audible' to humans, allowing maintenance teams to accurately locate, mark and repair the source.
- Compressor monitoring. A widely-applied additional method for detecting (the risk of) leaks is to carefully check/monitor the compressor. This method compares the current performance of the compressor with the achievable/expected performance according to specification. Structural deviations in a negative sense can directly indicate leaks.
- Venting test. This method measures the time it takes for a compressed air system to reach a specified pressure drop. If this is carried out periodically,



**Ultrasonic detection makes it possible to identify the location of leaks very accurately. The leaks are then marked pending repair.**



a trend-based insight can be obtained into the overall system efficiency.

- Trend analysis. The use of flow metres and monitoring systems provides valuable data about possible leaks. By analysing the measured and trended data, it becomes possible to identify areas within the plant where significant changes have occurred over time or acutely. This may be caused by (sudden) leaks. This 'suspicious zone' can then be specifically examined using ultrasonic measurements.
- Downtime consumption. There are still plenty of factories that do not produce during the weekend. That said, they nevertheless see their compressors kick in during the weekend.
- Measuring compressor power consumption during downtime is a very good indicator of the amount of leaks in a factory.

Leaks in compressed air systems can occur anywhere. They often occur at couplings and in (older) hoses. But also with (incorrectly mounted or corroded) pipes, fittings, filters, regulators and lubricators (FRLs). Leaks can also occur in production lines at control and shut-off valves, flanges, cylinder rod gaskets and thread seals.

### BUDGET RESPONSIBILITY

"It is crucial that the maintenance team can independently carry out leakage repairs without the need for approval 'from above' every time," Van Putten emphasises. "After all, this has a very slowing and demotivating effect. It would be useful to introduce a guideline stating that repairing something that costs less than three to six months of energy waste can be carried out immediately and without formal approval. In addition, the savings accrued after repairs in the sub-

## ABOUT VPInstruments

Offering industrial customers easy insight into energy flows, VP Instruments believe that industrial energy monitoring should be easy and effortless to enable insight, savings and optimization. The company's products are recommended by leading energy professionals worldwide and offer a complete measurement solution for compressed air flow, gas flow and electric energy consumption. Its monitoring software VPVision can be used for all utilities - enabling customers to see where, when and how much they can save. Today VP Instruments products can be found all over the world. The company serves all industrial markets, including automotive, glass manufacturing, metal processing, food & beverages and consumer goods.

sequent period can be added to the energy savings budget. This creates a self-sufficient, cyclical fund within the organisation, with the result that solving leaks and further optimising the compressed air network will make an essential contribution to increasing profits."

### PRESSURE REDUCTION

After leaks have been resolved, it is important to analyse and optimise the compressed air installation in a targeted manner. With the help of permanent monitoring, for example, the current compressed air consumption is measured and monitored, and changes are signalled in a timely manner. VPInstruments has developed the real-time VPVision monitoring system that, in combination with VPFlowScope flow, pressure and temperature metres, provides the information that allows a maximum cost-effective compressed air system to be achieved. For safety reasons, an overly-high working pressure is often set, for example seven bars. But is that necessary? Sometimes machines that require high pressure have long been replaced. By reducing the pressure in small steps and monitoring the system and machine performance full-time for correct operation, it is often possible to reduce the pressure

by 14.5 to 21 PSI. Here it is useful to remember that every 14.5 PSI pressure reduction means a seven percent reduction in energy costs - while there are no costs to try this out. ■



**With VPVision (here with 6 flow metres) the entire compressed air network can be monitored and optimised, covering power, flow, pressure, temperature, dew point and more.**



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# 50 years of THIMON glass packaging excellence



**A** family company founded in 1968, Thimon is still celebrated for having pioneered the first machine capable of wrapping palletized loads - a veritable feat that had it making waves in the sector back then.

## TEAM MAGIC

Today it comprises a team of 80 - all dedicated to creating end-of-line machines specially designed to meet customer needs. Indeed, Thimon can manufacture any number of packaging solutions on the market today, and also supplies all the handling equipment

and peripheral systems (load straighteners, shuttles, stackers)... everything from palletiser output to storage or dispatch. The company has mastered packaging technologies for all markets while offering the benefit of over 50 years' experience. By accompanying its customers every day and seeking out the best solution in every situation, Thimon continues to develop its expertise constantly.

## SHRINK HOODING

Among all the packaging processes available, automated shrink hooding is the better solu-

tion in terms of speed, robustness, total tightness, protection and full respect of the glass products. Here, for the glass market, the main concern is to ensure that Thimon provides its customers with a solution that can keep its sensitive products safe and intact throughout their transport or storage.

The shrink hooding processes are particularly safe for the glass industry thanks to shrinking systems with hot air and gas supplies meeting the most severe standards of the market.

Solutions the company has dedicated to the glass industry offer:

Serving various industries, THIMON specialises in automated shrink hooding, particularly for the glass sector - ensuring optimal throughput, excellent seal and safety. With over a half-century of experience, the company continues to innovate, holding more than a hundred patents.



- Optimal throughput thanks to the non-stop working capacity of its machines (more than 70 pallets per hour);
- Excellent seal on five to six sides and impermeability for products (against water, dust, UV rays, etc.) for advanced preservation in case of long-time outside storage and severe weather conditions;
- Superb control of hot air while shrinking to ensure complete safety;
- Exceptional packaging result by eliminating folds;
- Savings on consumables and

- energy, thanks to the quality shrinking guaranteed for the thinnest and most demanding films on the market;
- A capacity up to nine film rolls depending on the machine;
  - Particularly simple and fast film feed path management;
  - New user-friendly Thimon human-machine interface.

#### CEASELESS INNOVATION

Thimon's specific eight-point guidance system, which allows for load covering without having to touch the products. Here the amount of packaging used is optimised, guaranteeing film savings of more than ten percent as compared to other pallet hooding machines on the market.

Thimon's teams are driven by a constant research of innovation as they strive to find the best possible response to customer market issues. Since its creation, the company has filed more than a hundred patents and continues to innovate every year to develop the solutions of tomorrow. ■



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## ABOUT THIMON

Serving all industries, Thimon has been designing machines for packaging palletised loads in stretch or shrink film. For more than 50 years. For spiral wrappings, hooding, full-web wrapping and handling systems, the company's multi-technology expertise enables it to advise customers objectively on the most suitable solution for their needs. A well-known expert in the glass industry, Thimon is widely-referenced worldwide.

# Glass container manufacturers empowered - all thanks to FAMA



For some time now, the glass container market has experienced a decline in demand, which has seen companies reducing their budgets for capacity expansion, automation - and even maintenance.

## PROVIDING CUSTOMIZED ANSWERS

FAMA has a deep understanding of the challenges faced by glass container manufacturing companies - seeing an opportunity to offer

them ways to extend the life of their current assets without requiring significant capital investment. For a while now the company has been providing tailor-made solutions, boasting a dedicated team of experts that are unafraid to get their hands dirty. Indeed its technicians have encountered and resolved numerous client issues, recognizing the serious implications of failing to address faults promptly - which can significantly impact both productivity and profitability.

## MAKING A DIFFERENCE

Here FAMA strives to become the number one service centre in America, offering engineering services, technical assistance, scopes, tenders, audits, schedules and supervision - all to instal furnace services, IS machine installations, general repair, beam beds, machine services, peripherals, dosing, conveyors, dosing equipment and -most importantly- on-site support. In its pursuit to become the premier service centre in America, FAMA

FAMA is transforming the glass container industry by offering tailored solutions without hefty investments. Ambitious to become America's premier service centre, the company provides comprehensive engineering, technical support and on-site assistance - all to redefine industry standards while ensuring long-term success for glass manufacturers.





stands ready to support glass container manufacturers every step of the way as it seeks to become a trusted partner in overcoming challenges, optimizing operations and ensuring long-term success - all so that, together with its clients, the company can redefine industry standards while setting new benchmarks for excellence.

**TAILORED SOLUTIONS  
DRIVING INDUSTRY  
TRANSFORMATION  
WITHOUT HEFTY  
INVESTMENTS**

All said, however, no excellence could ever come without a proud history. Looking back over that trajectory, one will see that FAMA was born as Vitro’s subsidiary for in-house machinery manufacturing. Indeed, being focused on glass container manufacturing, the company can supply both specialized machinery and equipment for group companies. Founded in 1943 -and so during World War II- it was able to store industrial machinery and equipment over the years, which soon led it to become self-sufficient. With its eyes set on

the future, FAMA now boasts 81 years of experience in manufacturing specialized machinery and equipment for the glass container industry. Ever since its establishment, it’s been scouting out new ways to optimize its container production processes with in-house technology. In 2015, it expanded globally, offering integral solutions for the glass industry. Fama has a labour force of more than 400 employees. Its 85,000 m2 workshop has over 40 conventional & CNC machines for manufacturing tooling, parts, structures and more. It also has its own foundry for gray & ductile iron, with four induction furnaces and a casting capacity of over 600 tons/month. The company includes a division that’s specialized in automation projects for the glass industry, among others. Fama has manufactured 93 IS machines and has participated in the design of 29 furnaces for customers throughout the Americas.

**EMPOWERED CUSTOMERS**

With over 80 years of consistently improving its work culture, FAMA has implemented both machinery

developments and designs - always with a view to empowering its customers with high productivity equipment, efficiency and mechanisms that can prove themselves reliable, continuously in operation and durable over time. The company has configured production lines through the integration of high technologies - achieving highly-productive lines of elevated versatility in order to maximize installed capacity while reducing dead times and maintenance stoppages. ■

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# Glass Industry



## Directory 2023

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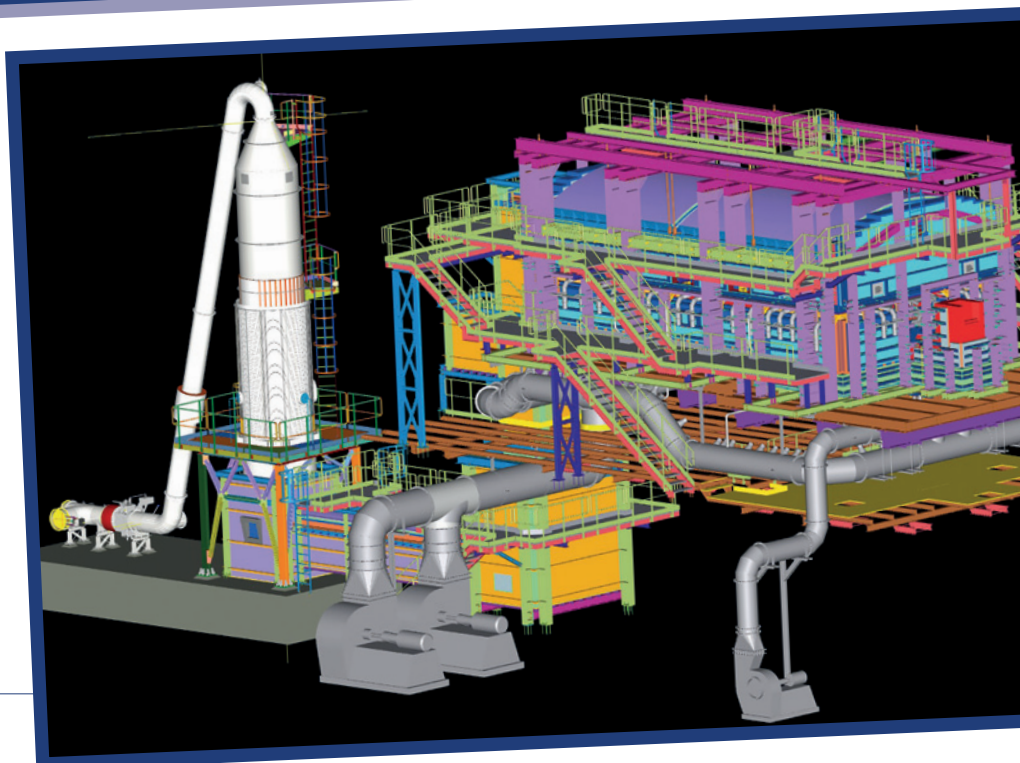
# SooSeok chooses STARA GLASS furnace for sustainability and performance

Incorporating both its stellar oxygen combustion technology and hydrogen fuel capabilities, STARA GLASS collaborated recently with Soo Seok Group of South Korea to design a high-capacity furnace for pharmaceutical-grade glass production.

**S**outh Korean group Soo Seok has a long industrial history that developed from the 70s of the last century - coming triumphant to the Third Millennium after having consolidated a formidable group of industry leaders.

## BEGINNINGS

After commencing operations under the name Yonhap Glass Industry Co Ltd, the group was incorporated under its current name into a subsidiary of Dong-A Pharmaceutical. A company that manufactures food supplements, general medicine and over-the-





counter pharmaceuticals, it developed thanks to growth and diversification. Currently that includes a complete range of glass containers, PET bottles, various material closure systems and laminated corrugated cardboard boxes for packaging. Over the past ten years SooSeok has followed a growth path that's led it to move its current production plant of glass containers from Gyeonggi-do to its new site in Dangjin. Construction of the new production plant now opens a series of perspectives and issues - all required by the customer and related to the challenges of our times. These include a reduction in the emission of harmful pollutants in the atmosphere, reduced CO2 production, a general reduction in fuel consumption and an opening up to new technologies that can carry sustainable, high quality production forward.

### PARTNERING FOR SUCCESS

This forms the basis of Soo Seok Group's collaboration with Stara Glass S.p.A, an Italian company that for 70 years has been targeting the market of glass manufacturers with engineering solutions, services and innovation - all aimed at supplying furnaces and distribution channels, which, in accordance with the technical requirements defined by SooSeok, are now executing the project while focusing on oxygen combustion technology. Here Stara Glass has been tasked with supplying the melting furnace. This will see it supporting a commitment to basic engineering while detailing all furnace components and equipment - from the choice and supply of the refractory materials that compose it to complete supervision of the construction and commissioning. Designed for the South Korean customer, the new furnace has a daily capacity of 220 tons of glass and is set to produce amber glass for high-quality containers aimed at the pharmaceuti-



cal market. These will be obtained through oxy-combustion burners as well as a significant contribution of electricity distributed through an appropriate boosting system.

### DESIGN

Developed by Stara Glass, the design includes preparation of the furnace such that it is able, in a future, to incorporate the upcoming S.U.G.A.R. technology. Once installed, and through the steam reforming technique, that will allow the SooSeok furnace to produce Hydrogen fuel independently - thereby recovering some chimney exhaust gas and so significantly reducing energy consumption. All supplied equipment from the raw material loading system to the fuel distribution ramps to the temperature, pressure and oxygen measurement instrumentation complies with the plant's stringent legal regulations. Here the process control system is based on the most modern automation technology - state-of-the-art in terms of controllers and SCADA supervision system, based upon redundant computers and connected to

a remote network that can provide all the necessary assistance and maintenance services. Flanked by engineers from SooSeok and Stara Glass working side-by-side, the project has been supported by Trevis Corp. which, playing the role of local agent while managing all project logistics, has given great satisfaction to both parties. An ambitious project that's set to come to life in the first part of 2024, this joint effort is primed now to offer its leading role to the Asian market. ■

**STARA GLASS**

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# The enhanced efficiency of HEYE's BlankSideRobot

With its precise swabbing and minimal lubricant usage, HEYE's BlankSideRobot revolutionises glass container production – offering 24/7 reliability and multi-weight capability. It has an integrated design, safety features and LED indicators – all ensuring efficient operation while making it an optimum solution for various production processes and glass types.

**F**urther enhancing the efficiency of the glass container production process, the cutting-edge blank side swabbing robot comes as the latest addition to Heye International's line-up of equipment advancements. The Heye BlankSideRobot's compact design eliminates the need for extra control cabinets as the entire control system is seamlessly integrated within the robot and the set-up section. Furthermore, Heye engineers have paid great attention to the oil supply system – adding key emphasis upon minimizing the distance for oil supply.

## LUBRICATION

By having the lubricant container directly mounted in the robot housing, the lubricant supply line to the spray nozzles has

been significantly shortened. This brings the crucial advantage that the hose line is considerably shorter – thereby preventing sedimentation of the graphite particles out of the emulsion. It also ensures a permanently consistent emulsion mix and clogging of the supply lines is avoided. The redesign of the spray tool and its attachment to the robot arm have significantly increased the spray tool's lifespan and operational safety. The robot's integrated LED strips not only offer a clear visual representation of its operating status but also serve as a convenient way to monitor the lubricant level in the tank.

## OPERATING PRINCIPLE

The robot moves along a track mounted on the overhead beam – ensuring that the floor remains



free from obstacles while allowing for seamless mould changes without any interference by the robot. Heye IS machines are prepared for the installation of the Heye BlankSideRobot. Due to the sturdy mounting of the robot on the overhead beam, the effect of vibration is eliminated. By excluding vibrations the lubrication points are always precisely targeted. The robot sprays an emulsion into the opened moulds on the blank side. 'Swabbing on the fly' is another key advantage - eliminating the need for production downtime. Short spraying cycles with a small amount of lubricant avoid the need to reject bottles after swabbing. In conjunction with a servo

invert mechanism, a special programme for lubricating the neck rings can be used.

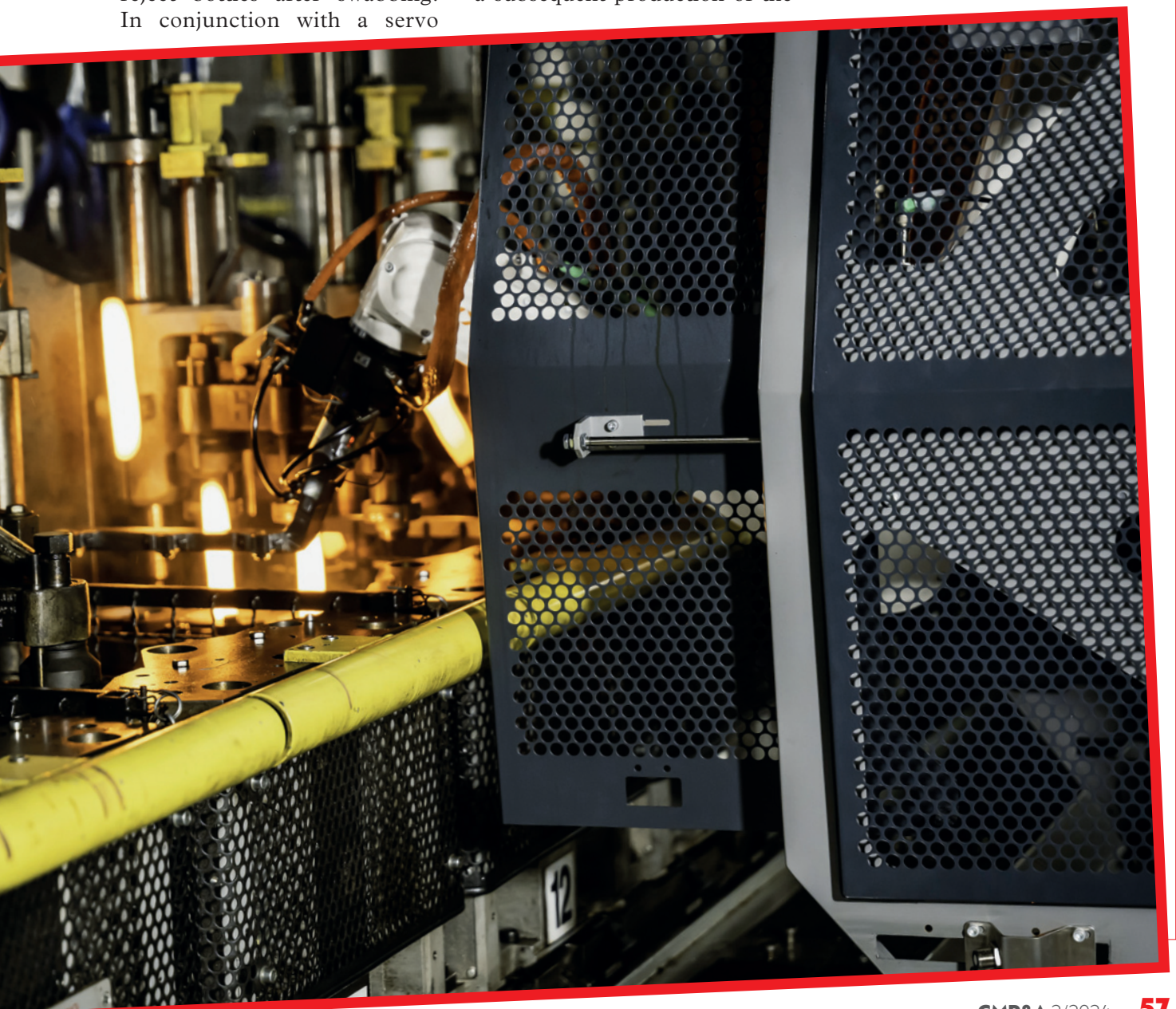
### SET-UP

Another notable advantage is the robot set-up process, which is realised using a set-up section located in front of the IS machine. Here a significant benefit is the integration of the control system within the set-up section, which eliminates any need for additional control cabinets. The operator enters the coordinates of the motion profile and sets the movement speeds. Once the job is saved in the article database, it can be recalled and re-applied during a subsequent production of the

article. In multi-weight operation, the Heye BlankSideRobot can handle up to four different mould and finish jobs simultaneously - optimising it for product testing purposes.

### HEALTH AND SAFETY

Particular attention has been paid to the safety of both the system and the user personnel. When it comes to system safety, the focus is on detecting and preventing robot-inverter collisions while using a non-destructive tool. The first stage is collision avoidance, where the SpeedLine's invert mechanism stops as soon as the swabbing robot enters the



## GLASS CONTAINERS



potential collision area. The second stage involves collision detection. If a collision does occur, the section will automatically stop to avoid any additional damage. The third stage involves the use of a 'non-destructive' lubrication tool. Heye International uses a breakaway magnetic coupling. If there is physical contact between the invert and the lubricating head, the front part of the tool disconnects from a magnetic coupling on the lubricating tool. A safety rope, similar to the wheel tethers used in Formula 1, prevents the lubricating tool from falling uncontrollably into the machine. The safety of the personnel is guaranteed by several equipment features. Firstly, the robot's housing protects the operator from contact with the moving robot arm. The entire unit (hanging on the overhead rail) is equipped with sensors. When the robot starts its lubrication cycle, the area in the direction of travel is monitored by sensors. Should someone enter this area, the Heye BlankSideRobot stops automatically. In addition, the retractable panels prevent the

operator from reaching into the IS machine past the robot. The robot's integrated LED strips indicate the operating mode, the direction of travel, the countdown to the robot's start and the oil level in the oil tank.

#### ADVANTAGES

With Heye's cutting-edge robot technology a glassmaker will experience the following benefits:

- Precise and on-time swabbing with minimised lubricant consumption
- 24/7 consistent and reliable swabbing performance
- Multi-weight production possible (different articles on

one machine)

- Oil storage tank and oil mixing unit both integrated in the robot
- Short piping and less wiring
- Magnetic coupling between the spray tool and the robot arm
- Seventh axis (decoupling) for manual robot relocation along the production line
- Neck ring swabbing (in combination with a servo invert)
- Clear display of operating status by LED lights
- Easy-to-use touch panel for programming and set-up

The Heye BlankSideRobot can be easily integrated into a Heye SpeedLine. It is suitable for all production processes (Blow & Blow, Press & Blow and NNPB), as well as for round and non-round articles in any glass colour. ■

**h** heye  
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## ABOUT HEYE INTERNATIONAL

Based at Obernkirchen, Germany, Heye International GmbH is one of the international glass container industry's foremost suppliers of production technology, high performance equipment and production knowhow. Its mechanical engineering has set industry standards for more than six decades. Extensive industry expertise, combined with the positive attitude and enthusiasm of Heye International employees is mirrored by the company motto 'We are Glass People'. Its three sub-brands HiPERFORM, HiSHIELD and HiTRUST form the Heye Smart Plant portfolio, addressing the glass industry's hot end, cold end and service requirements.



# FORMING



# ANNEALING



# COATING



# SPECIAL FEATURES

Coatings

## A great AGR coating measurement asset for glass containers



With its dual-headed design and automated operations, AGR's Combined Coating Measurement System (CCMS) will efficiently measure tin oxide coatings on both the finish and body areas of glass containers. It offers precision, versatility and operational ease - all whilst ensuring compatibility and providing comprehensive, colour-coded test data for enhanced operational excellence.

### **C**ONTAINERS: ENSURING THE CORRECT AMOUNT OF COATING

Agr's Combined Coating Measurement System (CCMS) device provides operators with a one-stop, single operation testing station for measuring tin oxide coatings applied to the finish and body regions during the production process.

#### HOW IT WORKS

Featuring a fully-automated measurement approach, the CCMS utilizes Agr's proven reflective coating measurement technology as a foundation. By incorporating several technological advances in combination with automation, the company's CCMS measures quickly and precisely by performing one operation, which is more than can be said for many similar systems.

Features incorporated into the CCMS include:

- Finish and/or body measurements in just one operation
- Dual head design
- Universal hold-down mechanism
- Automated test or spot check operation



- Secure Linux-based operating system
- Industry 4.0 ready
- Software-based calibration
- Advanced electronics for better precision

### MEASURING TWO SEPARATE LOCATIONS SIMULTANEOUSLY

To achieve maximum precision on finish and body measurements, dedicated measurement heads for each of the finish and body regions are integrated within the CCMS. One head is optimized to operate with the precision necessary for the limited area of the finish region. The second is configured to cover the larger area of the container, the body. The advanced electronics of the system, in conjunction with dedicated measurement heads for finish and body, make it possible to precisely identify the presence

of minute amounts of coating in the finish region while measuring heavier coating levels applied to the body of the container- all in one operation.

### SYSTEM OPERATION

Once a container is loaded into the system, the CCMS is designed for fully automated operation. Measurement head positioning, including vertical height location, container rotation and capture of measurement data are all performed in single progression. Jobs can be created to measure the body or finish regions - individually or in combination.

### DETERMINING THE TEST MODE

For additional operator convenience, the system offers two testing modes. The 'spot test' measurement mode affords the operator the ability to take a quick spot measurement on a single container location. The 'job-based' test mode provides the operator with the ability to create and store jobs that can be used to measure multiple containers of the same type. In this mode, each measurement is performed at the same locations on the container body and/or finish, as defined by the job, on every container in the set.

### MEASURING DATA RECEPTION

A wealth of test data is provided by the CCMS. Measured values are presented in easy-to-

understand, colour-coded graphic format for each test in progress to permit operators to readily identify measurements that fall outside of acceptable ranges. Job-based numerical results are also available in spreadsheet form, detailing the min/max/average data for each measurement (height and angle) for both body and finish regions on every container.

### OPERATIONAL EFFICIENCY

The CCMS incorporates a Linux-based architecture and operating system to manage the continuous, multi-function operations of this system. Linux is used for its ability to run efficiently on the embedded computing platform that manages the CCMS test operations as well as its proven stability, security and long-term availability.

### DETERMINING COMPANY-PRODUCT COMPATIBILITY

The CCMS is based on years of scientific measurement techniques for glass containers. It combines Agr's innovative, proven coating measurement approach with state-of-the-art electronics, operating system and automation technology. Agr offers a complete line of products for the measurement and testing of glass containers. Its products are designed to assist container producers, converters and fillers stay competitive while meeting the increased quality demands of today's changing world. ■



**Agr**<sup>®</sup>

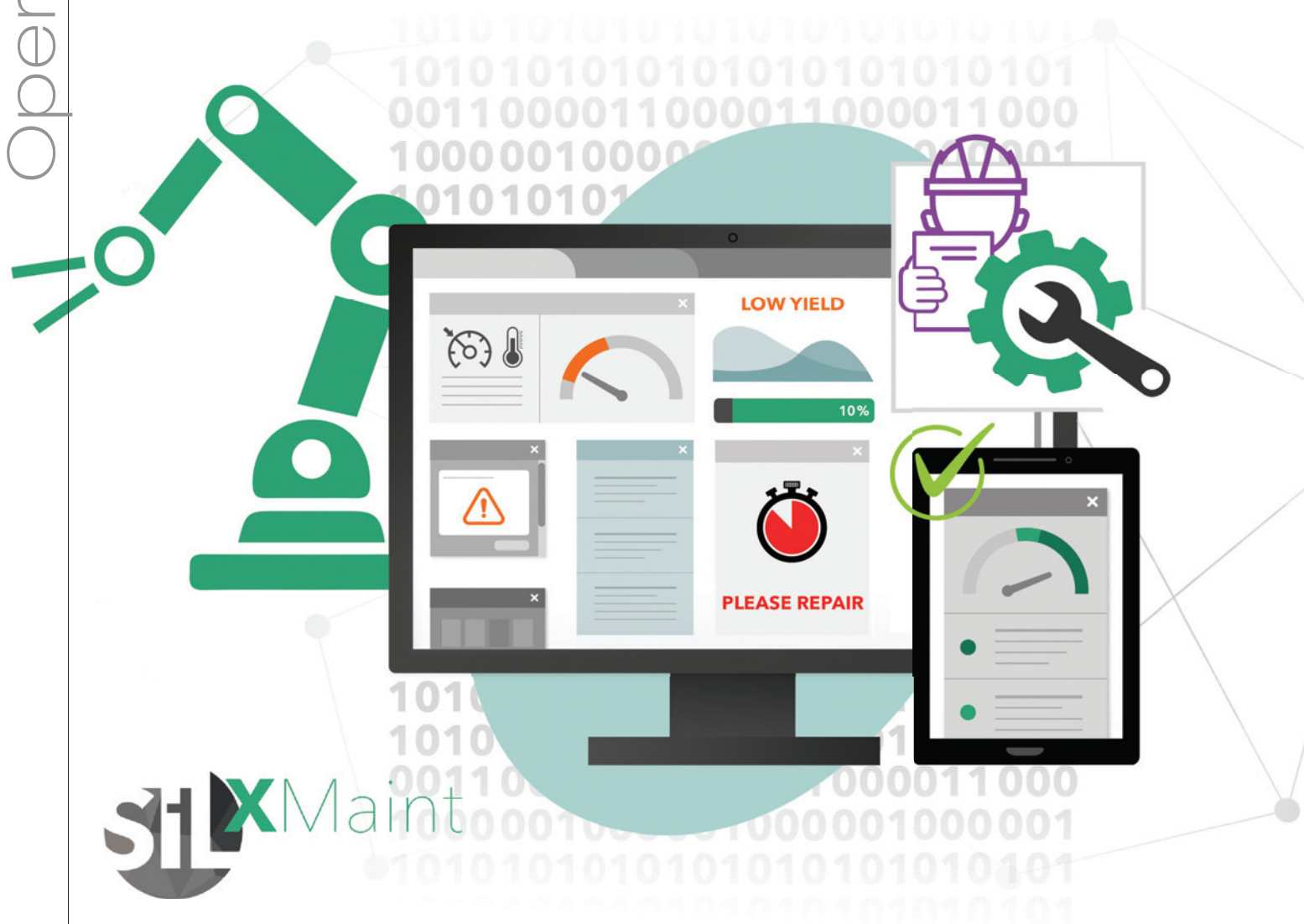
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# SPECIAL FEATURES

Operational efficiency

## Enter VERTECH's SILXMaint: predictive maintenance for optimised performance



**SIL**XMaint



VERTECH's SIL, a comprehensive Manufacturing Execution System for glassmakers, recently introduced SILXMaint for predictive maintenance. As module ensuring real-time monitoring of mechanical parts, SILXMaint optimizes budgets while providing insights for informed decisions - thereby enhancing overall glass manufacturing performance.

For almost 30 years, leading industry player Vertech' has been answering the unmet needs of today's glassmakers with a complete production management system called SIL. A highly comprehensive M.E.S. (Manufacturing Execution System), SIL gathers plant data from raw materials to palletizer - offering a 360° view of the glass manufacturing plant thanks to six different modules. Here's where Vertech' shows the benefits of its latest SILXMaint modules.

### INTRODUCING SILXMaint

A truly efficient tool, SILXMaint provides real time status for such mechanical parts as arms and pushers. In this way it contains all necessary information related to the usage of these parts. It displays all the productions in progress and in coming, so the operator will be able to secure them - ensuring they have

the parts in order to face any critical issue.

In any glass factory the maintenance budget is an important expenditure item, with IS machine part management coming as particularly complex and critical. Based on commercial information, replenishment of parts can be easily scheduled with SILXMaint. The plant will secure the availability of parts needed for each production - assigning them properly. Indeed the operator will organize repairation and dimensional controls based on the production forecasts and availability of parts. Indeed for new job order preparation, SILXMaint will allow for time saving.

### DATA OPTIMISATION

Displayed upon dashboards, data offers reporting tools to users that are both real-time and historical. Also, production can meet its

full capacity thanks to optimized maintenance operations. Here SILXMaint will transform available data into helpful insights that lead to informed decisions as well as better business results. The new module enables the identification of maintenance costs associated with each production - all to ensure glassmakers keep their maintenance costs under control. ■

Vertech'

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The screenshot displays the Vertech' SILXMaint software interface. It features a dashboard with multiple equipment cards and a central 'History' window. The equipment cards show details such as Code k, Equipment number, Reference, RefTypeCavity, Set, Duration, and Nb of mountings. The 'History' window provides a detailed view of events on equipment, including dates, event types, information, and operators.

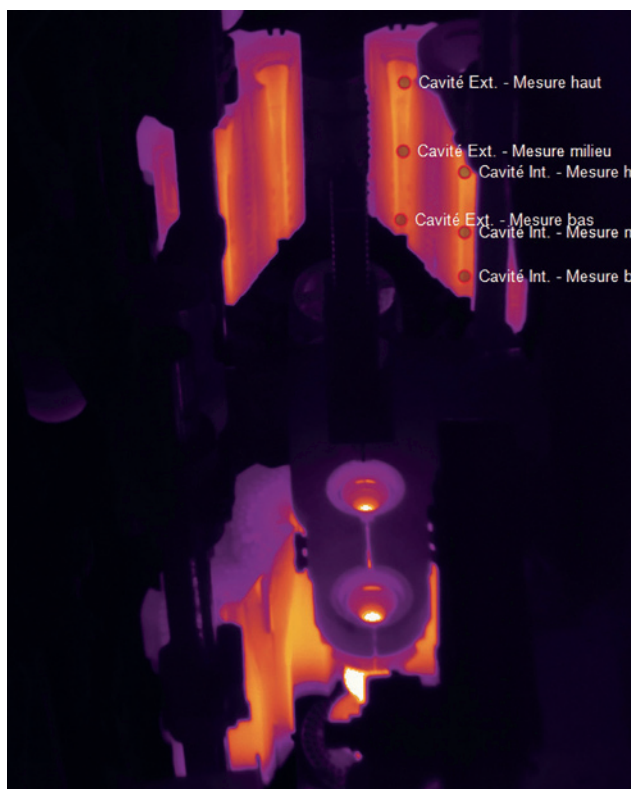
Date	Event type	Information	Operator
12/29/2023 9:17 AM	Unmounted	Cause: Checks(Shoulder/Beed/Heel) Mounted time: 0h1mn	Vertech VERTECH
12/29/2023 9:16 AM	Mounted	Cavity: Line 14, S10G2 ARTS ARTS Production order: ForResort	Vertech VERTECH
8/21/2023 3:21 PM	Change state	From Internal repairation to Available	Vertech VERTECH
1/11/2023 1:51 PM	Change state	From Available to Internal repairation	Vertech VERTECH
1/11/2023 1:51 PM	Change state	From Internal repairation to Available	Vertech VERTECH

# SPECIAL FEATURES

Temperature Control

## All-new KONATIC Spyro system already making waves

Putting blank and blow mould temperature control under the spotlight, glass container manufacturing expert Peter J Firth looks into the performance repeatability that's built into the design of KONATIC's super low maintenance system, Spyro





**T**alk to any respected glass bottle-making expert and they will tell you that stability is of paramount importance. ‘Stability’, in this case, means the stability of conditions under which the glass containers are made. Indeed stability is an absolute necessity for high-quality and high-efficiency production output - something all glass plants want to achieve.

Stability does not happen by accident. It has to be created and maintained. Thankfully, new technologies are bringing more stability to the conditions under which glass production is made. Hence, giving Glass Plants the opportunity for a higher output of quality glass container production.

### KONATIC LEADERSHIP

At the forefront of taking advantage of such new technologies and delivering benefits to glass container plants, Konatic is a prime example of the kind of company the glass container industry needs to thrive. Several years ago, with its Smart Gob system, it initially focused on creating better gob stability with camera monitoring of gob shape, as well as automatic control of gob weight for any IS Machine forming process (BB, PB, & NNPB).

Having created stable gob conditions, the next logical area of focus is to create stable blank temperatures. This area of control is hardly a novelty to the glass industry. However the way Konatic is currently doing it is certainly new. A defence of that conclusion follows later on in this article. For now, what needs underscoring is that, despite being new, it is already proven by multiple IS Machine installations.

To begin the story on this topic right at the beginning, having no automatic control of blank temperatures, it is necessary for manual measurement to be taken by using some form of infrared thermometer. In my experience, the results vary significantly from one person to the next when trying to take the same reading. This makes setting up blank temperatures manually very difficult.

With NNPB production in particular, the correct setting of the blank temperatures has a significant impact on production efficiencies, due to the impact on glass wall thicknesses. This includes side-to-side blank-half temperature control and the average blank temperature. The other forming processes of PB and BB are also sensitive to having correct blank temperatures held constant.

Irrespective of the forming process, a target of around 475 degrees celsius cavity surface temperature at the middle of each blank half is usually aimed for. Running much higher or lower will potentially yield hot- or cold-related blank defects.

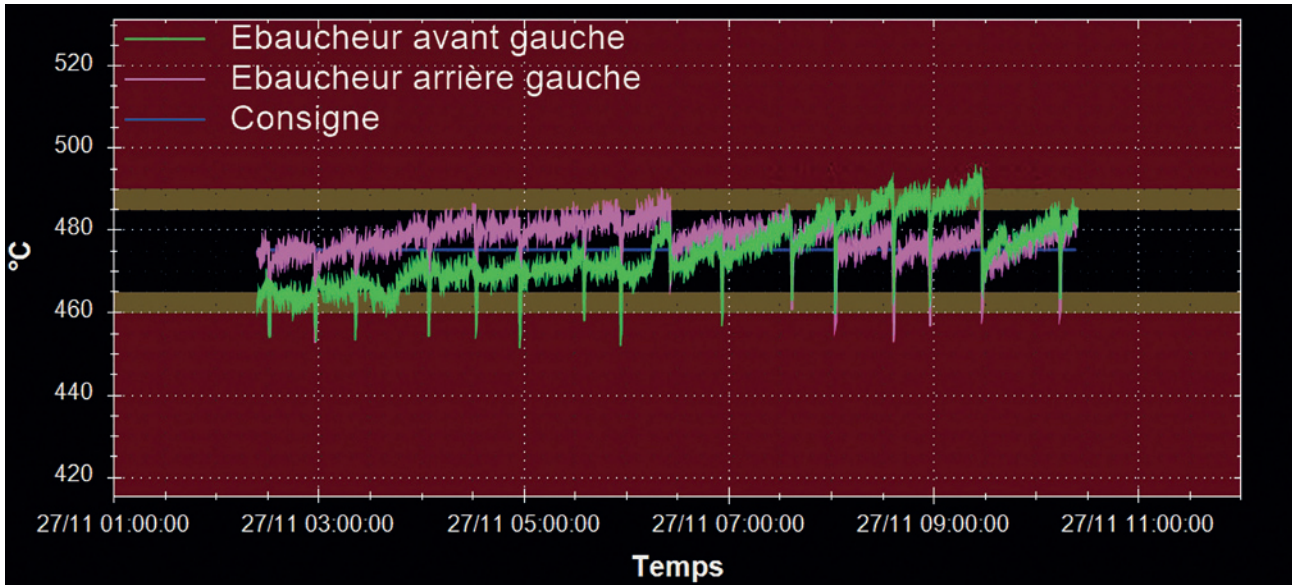
### EARLY TRACTION TOWARDS INNOVATION

Because of this, automatic control of blank temperatures was initially developed several decades ago. Originally, blank temperature automatic control was achieved using thermocouples inserted into dedicated holes drilled into the blanks that end half-an-inch (12.5 mm) from the glass contact surface of the blank mould, at the centre of the cavity.

This system unfortunately requires very high maintenance attention as the sensors require regular replacement after getting damaged. With the wires often untidily spread across the blank-side of the IS Machine, it does not help working conditions either. Such thermocouple wires get damaged quite easily because of this.

That is in stark contrast to the simple maintenance requirements of the Spyro, which is to clean each camera lens once per month. There are no exposed wires and

# SPECIAL FEATURES



no maintenance of moving parts owing simply to the complete absence of moving parts in the Spyro temperature measurement system.

## SPYRO AS TRENDSETTER

The thermocouple-based systems still work very well if the thermocouples and cables are maintained. Konatic can even offer such a thermocouple-based system if you have the discipline needed to maintain it. This will not, however, monitor and control the blow moulds like the new Konatic Spyro system can. Nor will it offer the many other additional benefits that come as part of the Spyro camera-based system.

Here's why the Konatic Spyro system is simply the next logical step forward from the old thermocouple approach. The step taken is in the use of the very latest infrared camera technologies with an extremely fast 'integration time'. These modern cameras are a prerequisite for the use of camera technology able to operate in real-time to give the most responsive control possible of the mould cooling air to each IS Machine section.

It would perhaps be unfair to identify it as the 'next logical step'. That's because others have already used camera technologies to con-

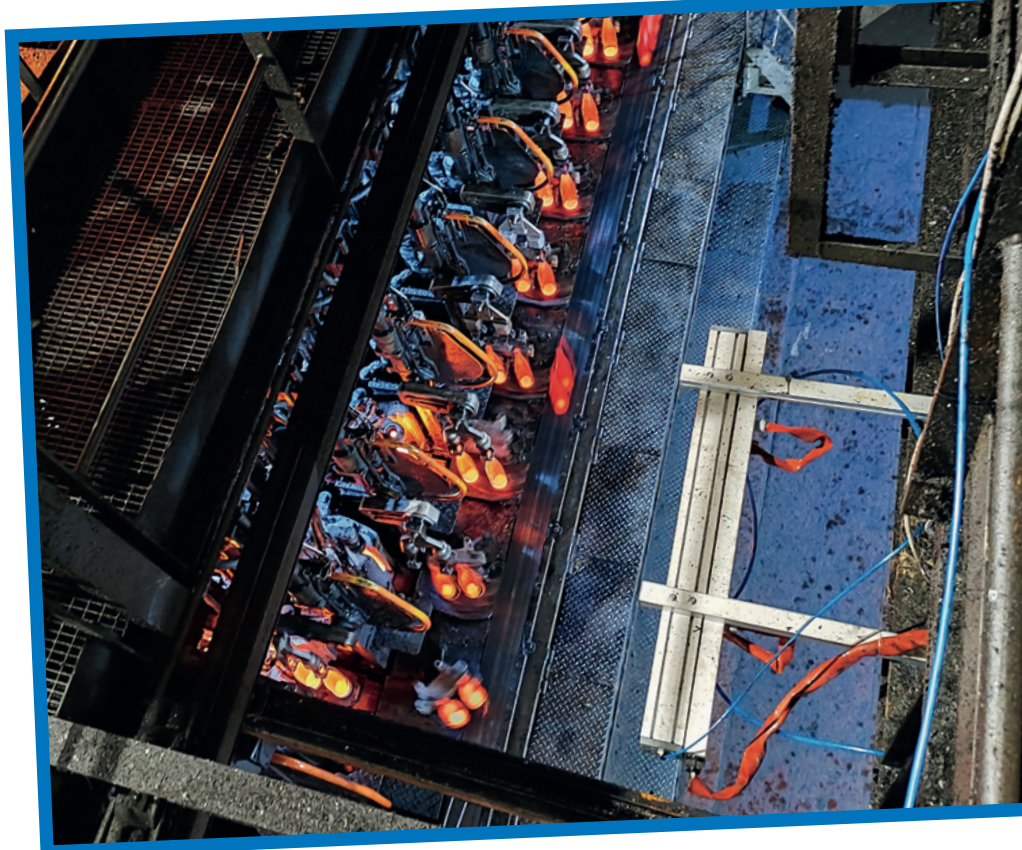
trol blank temperatures. Better to say that Konatic has taken a leap forward simply because it's the way the camera's being deployed here that's entirely new.

At least as far as I'm aware the blank temperature control camera systems currently in use have been deploying their infrared camera(s) at the blank side of the IS Machine. It took Konatic to

identify the opportunity to innovatively place the camera at the mould side.

## ADDING STILL MORE VALUE

But that's not all. Konatic has demonstrated that the best results are achieved by having one camera per section on the mould-side of the IS Machine. In this case, each single-camera per section 'looks



through' the section to the blank-side to see the blanks opening.

In the same camera picture, the opening of the blow moulds can also be seen and the temperatures measured. Therefore, all temperatures relating to the blanks and the blow moulds can be recorded using a single infrared camera looking at each section.

As mentioned before, providing multiple cameras for measuring across the full IS Machine means there are no moving parts to maintain. This naturally lowers the maintenance requirement while increasing the temperature reading repeatability of the system.

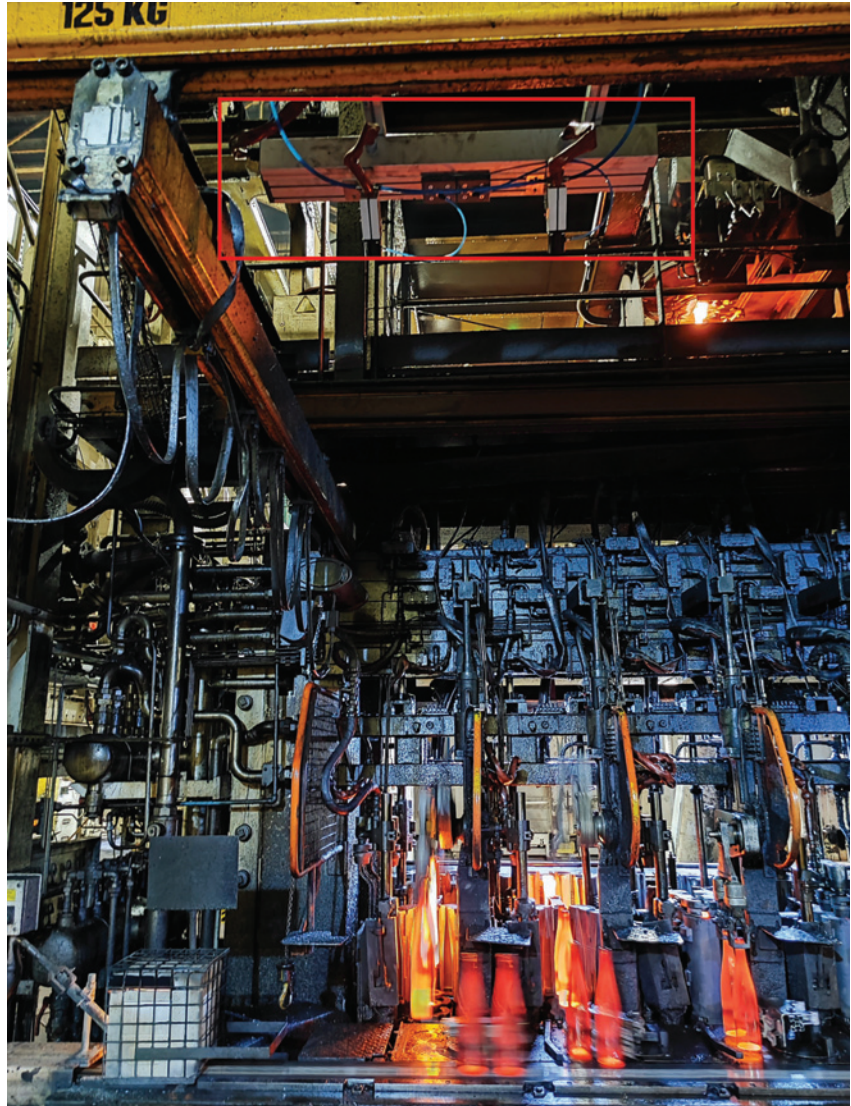
Although it might seem obvious now that it's been stated, this has every right to be called an innovation. Indeed neither Konatic nor I am aware that it has ever been done before by anyone else.

It was first deployed by Konatic around two years ago, so the principle has had plenty of time to prove itself. The simplicity of the current system relies upon arcuate opening of the blanks and mould arms (still the most predominant approach used).

It is not a problem to integrate this into any type of IS machine because the cameras can easily be mounted in a convenient position at the blow mould side. The only interfacing work that is required is for regulating the off-timing of the section mould cooling air (separate for the left and right sides).

This will not necessitate any technical interfacing to the machine timing system since it can be simply connected in series with the cooling air event electrical signal. Up to two separate left and right mould cooling lines being connected as the application of dual cooling modes is now quite common for providing maximum blank and mould cooling.

Synchronisation with the machine is the only direct connection required, which is normal for any system serving an



IS Machine. In this case, optoisolation with the feeder pulse is usually the approach taken for any such system.

Notwithstanding that, the system can also visually synchronise with the machine. This means the temperature readings are taken at the most stable point in the section cycle (after the blank and mould arms open). That will help improve the repeatability of temperature readings meaning increased reliability and better temperature control.

Whilst the infrared image captures the full-cavity temperature profile, the temperature control arises from selecting up to three spot points to take the measurements from, for each side of each

cavity. With smaller blank and blow mould cavities, this can be reduced to just two measurement spot points where appropriate.

The controlled temperature is then taken to be the average of the two or three spot temperatures measured at a specific point in the section cycle. That average becomes the input to a PID controller which is tuned to keep each half of each mould as close to the desired setpoint temperature as possible.

On multiple cavity sections, the temperatures of the inner and outer cavities are averaged to give a control system for the PID controller as the variable to be controlled. It does not matter how many cavities there are, the inner

# SPECIAL FEATURES

and outer cavities form the reference temperature. That means double, triple or quad gob is easily accommodated into the system.

Measured temperature deviations will come from such events as swab cycles and section or machine stoppages, but the Spyro system is there to ensure the temperature recovery to the setpoint temperature is achieved as quickly as possible.

## ADVANCING STABILITY

This is how the Spyro system creates enhanced stability of conditions that were mentioned in the opening paragraph. Stable conditions are a prerequisite for the highest possible production efficiency, according to any seasoned bottle-making expert.

As an example of how things can be without good control of blanks and blow moulds, I recall last year sitting in a production meeting and being passed a bottle which had two defects in it. This is not something I have often seen but one defect (a body tear) was created by heating at the blank side. Another defect in the same bottle was a crizzle created by cold conditions on the mould side. When using systems like the Konatic Spyro correctly, such defects would simply not normally arise. Certainly you would not be looking at getting a hot and a cold defect in the very same container.

However, that was quite an eye-opener for me to witness just how easy it is for blank and blow mould temperatures to get out of control without the aid of temperature control systems. This was at a well-respected container manufacturing facility, although I think (I hope) it was an exceptional situation.

## FACTORING IN TEMPERATURE

Further, on the topic of glass container defects and the implementation of the Spyro system, certain production types have been reported to reduce glass wall thickness rejects by 1.5 percent. This was on very high value production and so the financial benefits were very significant.

Now it is well known that the day and night temperature change can impact production performance. For this reason, some cooling air fans are regulated to reduce fan air pressure when ambient temperatures cool and increase cooling air pressure when ambient temperatures rise.

Separate control systems are available for such regulation of the overall fan cooling. However, this should not even be necessary when there is direct control over the temperature of the actual blank and blow mould cavities.

More generally, the benefit of having side-to-side temperature

control of each blank and (optionally) each blow mould half will be clear to experienced glass-forming people reading this article.

Additionally, having an automatic system take care of restoring blank and blow mould temperatures after a section or machine outage at or even at a machine start-up will be clear to all. A quicker way to get to the target (setpoint) temperatures saves time which in turn saves on production loss.

Even the recovery of temperatures more quickly after a swabbing cycle has been carried out (where manual swabbing is taking place) can show benefits in putting more ware into the lehr and rejecting less at the cold end.

Savings from temperature recovery after swabbing may be hard to quantify. This is simply because the level of disturbance created by each machine operator swabbing can vary significantly. But the principle is clear.

Having these systems work for the glass bottle maker is one thing, but, of course, there is set-up work required as well to get the best out of the system. Just like with the maintenance requirements of the system, careful attention has been given to reduce the time and effort taken to set up for each production.



## SETTINGS AND MEASUREMENT

The measurement points are simply achieved by the movement of a 'spot' that is placed where the measurement is required. Temperature measurement of up to three spots can be used for each blank half, and the same for each blow mould half, as mentioned before.

A graph of the real-time cyclical temperature profile for the average of each of measurement points is displayed, for each mould half (left and right for each cavity). This is then used to select the best time during the section cycle to highlight the most stable reading.

A setpoint temperature for the blank moulds is then assigned and the system will then adjust the cooling-off times to achieve the setpoint temperature - likewise for the blow moulds if this additional control option is also being used.

The set-up procedure is carried out on just one section. Then those settings are used to 'fill' the other cameras' processing software with the same settings. This approach drastically minimises the set-up work required.

In electronic and computerised machine timing systems this is by and large how optimal event-timing settings on the IS Machine are copied to each section. Likewise, each section can then be 'fine-tuned' if this is required at all. In the case of the Spyro, it would be a slight adjustment to the measured position 'dots' on the moulds, and a slight adjustment of the temperature reading timing.

After all these settings have been established, there is the feature to save them all to a 'job file'. This means on future job runs it is just a matter of loading the file to get an exact repeat set-up.

Saving the Spyro settings can also be done on a 'Best Day History' basis which many glass container plants now use. This is where all the data on a best-performing day for a particular job on a particular

production line is saved and used as a baseline for future job set-ups.

Of course, the usefulness of the 'best day history' approach is only as good as the amount of set-up data that can be recorded and repeated in future. That's where the Spyro scores heavily in terms of being able to record both blank and mould temperature settings.

## A WORK IN PROGRESS

Despite the Spyro system being very mature in terms of completeness of the features all glassmakers prefer (low maintenance and ease of set-up), Konatic still sees additional benefits it can quite easily deliver on.

Konatic still likes to see the Spyro as a 'work in progress'. This means even the existing purchasers of the system will benefit from future work as most of this will be software development work which means existing systems are easily upgraded. A few of the potential near-future features and benefits were discussed with them.

Connectivity to Big Data systems for the correlation of data with production output is already a reality, it just needs a connection to the Open Platform Communications (OPC) data output. This will give time-stamped temperature data that can be aggregated in any way the user chooses, or simply left as raw data representing each section cycle and the associated temperatures recorded.

Just a little further development work will see the detection of IS Machine sections that jam up with glass stopped automatically and then an alarm raised for the operator to attend. In this case, the 'normal stop' can be used to bring the section to a controlled stop and prevent an unnoticed jam-up presenting the threat of an IS Machine fire.

## TROUBLESHOOTING ANOMALIES

The detection of the jam up and any other anomaly where there is a high-temperature reading that

should not be present is a natural part of having the camera look through each IS Machine section from the mould-side to the blank-side. The cameras see everything in infrared so such anomalies in temperature are very easy to detect.

Measurement of the neck-ring temperatures can already be carried out with the blow mould side camera. However, this is not under automatic control just yet. For that, it is thought maybe a dedicated camera on the blank side may be required.

Neck-ring temperature control does not however fall into the same league as the requirement for blank temperature control. Monitoring the neck-ring temperatures and alarming upon detected deviations could simply be all that is required in practice.

## VIDEO CALLS WITH KONATIC

Having covered many matters concerning the Konatic Spyro system, I'm nonetheless mindful that the low number of words allowable in a technical article can never answer every question. This is why Konatic offers one-to-one video calls with anyone or any company wishing to know more, which has the technical team on hand to answer questions.

Notwithstanding that, I hope the above has conveyed some appreciation of how this new technology benefits the glass container industry. In relentlessly seeking better quality and higher output from glass container plants, using modern tools to make that possible renders the challenge much easier. For more information and to arrange a one-to-one call with Konatic, go to the link <https://bit.ly/spyro-info>. ■



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# SPECIAL FEATURES

Lehrs

## Glass manufacturing stress precision distinguishes **VIDROMECHANICA** annealing solutions

Any serious examination of the complexities of annealing in glass manufacturing must emphasise the importance of precise temperature control in the management of permanent and temporary stresses. Here VIDROMECHANICA provides adaptable solutions as it incorporates knowledge of optimal glass production from renowned scientists in the industry.



**VIDROMECHANICA**<sup>®</sup>  
GLASS MACHINERY TECHNOLOGY



## IMPROVED ANNEALING LEHR CYCLE

Glass is described as a mineral product obtained by a melting process that cools down without crystallisation and finally takes a solid state - a definition which provides an apt basis of the annealing process. Here every glass type (soda lime, borosilicate, etc.) is characterised by a different batch composition and consequently, a different temperature-dependent viscosity and expansion coefficient. During melting, the batch passes continuously from a solid to a liquid state. At forming it is brought back to a solid, passing the various 'plastic' stages while being characterised by different viscosities. These define the peculiar points of glass annealing, such as working, softening, annealing and strain points as well as annealing range (the temperatures between softening, annealing and strain points). Through knowledge of the annealing range, temperature limits for each stage have been established.

## PERMANENT STRESSES

There are two types of residual stress, namely permanent and temporary. Annealing is in fact a cooling process. Glass has poor temperature conductivity and although this property can be advantageous in some instances, it is an inconvenience in annealing.

To explain the origins of stress, consider that glass is made up of a series of distinct layers lying parallel to the surface. Heat loss from the glass depends upon the transfer of heat from layers in the body of the glass to those at the surface. These layers are interdependent and in different states of expansion. As the external surface cools faster, it reaches its final shape while the centre is still in expansion. All the molecules are intimately bound together and their reciprocal action will create compression stresses once the inner layers have cooled and contracted.

There is a necessary balance to maintain between compressive and tensile stresses. Imbalances create varying degrees of destruction in the glass thickness but

if cooling is achieved sufficiently slowly, the layers will not be submitted to disturbance and stress generation will be avoided. All stresses created at this point remain permanent. Indeed annealing is important because mechanical and thermal resistance are conditioned by it.

## TEMPORARY STRESSES

When being cooled below strain point, glass can still be submitted to thermal influences - creating temporary stresses and distortions that disappear slowly. However, unless cooling is controlled, unbalanced stress levels could lead to breakages. Of course, controlled and strong cooling to generate high stresses makes toughening desirable in some instances. Increasing the compression stress on the surface gives the glass high mechanical and thermal resistance.

## ANNEALING CURVE

Passing through the tunnel of a continuous annealing lehr, glass follows a fixed temperature gradient that is necessary to produce the desired level of stress. Glass must be reheated or cooled to assure homogeneity above the annealing point. The amount of time glass is maintained at this temperature is determined by time-thickness calculations.

Precisely-controlled cooling is required during the annealing phase until the strain point is reached. The cooling gradient is given by calculations depending on glass thickness and type. Finally controlled, fast cooling is necessary to bring the glass to ambient temperature. This process must also be maintained within calculated tolerances to avoid breakages resulting from temporary stresses.



## CONCLUSIONS

Annealing is an important element of the glass-making process and can be more complex than it may first appear. Consequently, thorough knowledge of the process is becoming increasingly necessary. A number of scientists have developed theories and established rules that are relatively easy to use, including Adams and Williams (widely-applied), Shand (Corning Glass); Owens (the most widely-applied and easy-to-use curves); and Redstone and Stanworth (mainly used for optical glass).

Neutral annealing, which avoids the creation of stresses, is not necessarily the ultimate goal to attain. In certain instances, the introduction of controlled stresses to the glass can be advantageous. Design flexibility has certainly been an important requirement for lehr builders such as Vidromecanica over the last three decades - providing customers with readily adjustable heating and cooling equipment.

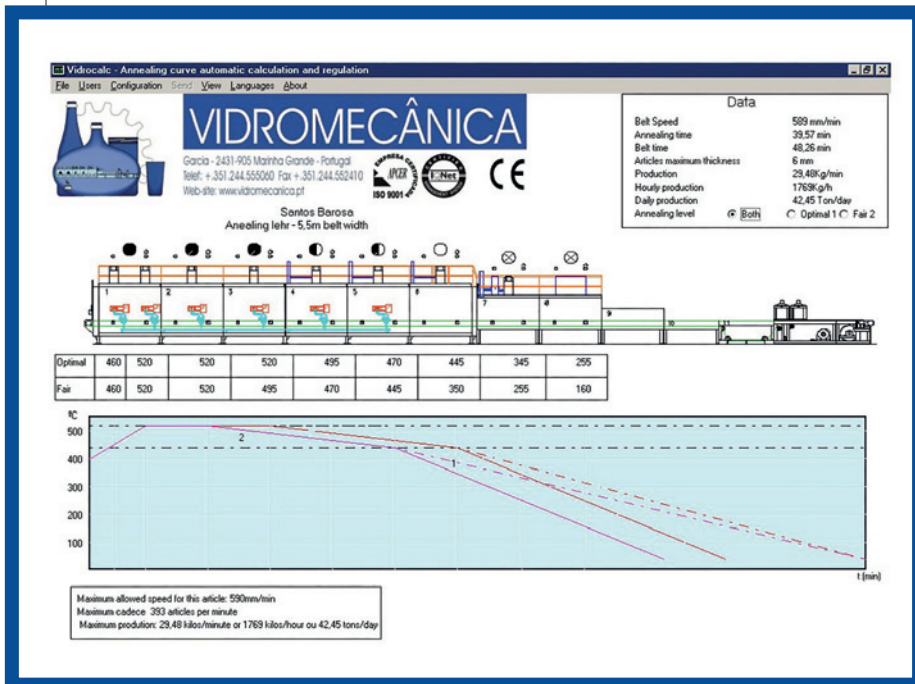


Vidromecanica manufactures thermal equipment (for annealing, decorating and toughening); equipment for coating treatment (hot and cold end coating) and cullet

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Development, design and manufacture of machinery, development of control systems, control panel construction and software provision for the production lines are all handled by the company's in-house specialists.

With glass machinery solutions for many applications of the glass industry, equipment and systems from Vidromecanica are used worldwide in the glass container, tableware and technical glass sectors. ■



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# Glass recycling plant opened by **REDWAVE** is largest in Australia

**T**he recent opening ceremony at Laverton site in Melbourne marked the culmination of a ground-breaking collaboration between Redwave and Visy - a leader in glass recycling and manufacturing in both Australia and New Zealand. This saw the two embarking together on a revolutionary project that's set to redefine glass recycling in Australia. Cutting-edge in every sense, the facility is equipped with the latest sorting technology - thereby replacing its forebear while introducing a new era in

sustainable glass management.

Wayne Russell, Executive General Manager of Recycling at Visy, emphasized the commitment to closing the loop for glass in Victoria. Said Russell: "By building our brand-new glass recycling facility with Redwave's world-class optical sorters we've doubled the amount of glass we can recycle. Our partnership with Redwave means we have state-of-the-art equipment supported by a trusted and reliable technology partner."

Here, as general contractor, Redwave was responsible for the entire process of design, engineering, delivery, installation and commissioning - all while ensuring a maximum cullet yield.

## **REVOLUTIONIZING GLASS PROCESSING**

With a processing capacity of 200,000 tonnes annually, the new plant will receive two-thirds of the input from kerbside mixed recycling collections



A global leader in glass recycling solutions, REDWAVE recently supplied Australia's most advanced glass recycling facility, which has been valued at around EUR 20M. Designed to process 200,000 tonnes of recycled glass per year, this cutting-edge facility represents a significant leap forward in glass recycling technology.

(MRF Glass) and one-third from the newly established Victorian container deposit scheme (CDS Glass). On arrival, the glass is meticulously sorted into three different colours, down to three millimetres in size. This systematic sorting ensures a reliable supply of flint (clear), amber, and green glass for future glass production. The plant also maximises the use of by-products, minimising the impact on landfill and recovering valuable secondary materials. Remarkably, the sorting operates autonomously, eliminating the need for manual sorting - a pioneering achievement in glass processing.

#### **INNOVATIVE SENSOR TECHNOLOGY**

REDWAVE has devised an ingenious solution to the unique challenges posed by



REDWAVE CEO Silvia Schweiger-Fuchs at the ceremony at Visy in Melbourne

## TRENDSETTERS



**Opening ceremony: f.l.t.r: Visy Chairman Anthony Pratt, Visy Co-owner Fiona Geminder, Victorian Minister for Environment Steve Dimopoulos, Visy CEO Mark De Wit**

glass-ceramics, which behave differently to ordinary glass when melted. Using its proprietary CX camera and lighting unit, the system skillfully separates glass-ceramics, ceramics, stones, porcelain, and off-colours through a multi-stage sorting process.

### **INCREASED EFFICIENCY WITH REDWAVE MATE SMART PLANT**

The implementation of REDWAVE mate smart plant software optimises plant efficiency by collecting and processing real-time production data. This data empowers operators and enables autonomous plant operation, all tailored to meet customer requirements. At the heart of this data collection are REDWAVE's sorters, which act as data hubs to relay critical information to the software.



## DIGITAL SALES LANDSCAPE

Navigating this major plant sale during the global pandemic required innovation. REDWAVE rose to the challenge by making the entire sales process digital. With a remarkable commitment to the customer experience, all interactions, including reference visits and sorting tests, were conducted virtually,

bridging distances of 16,000 kilometres and an eight-hour time difference.

## FOLLOW-UP ORDER

As a testament to the success of the project, a follow-up contract to build another glass recycling facility at the Yatala site near Brisbane has been awarded. This project is already underway and is scheduled for completion in

early 2025. Meanwhile, speaking on the impact of the new facility in Australia, Redwave CEO Silvia Schweiger-Fuchs said: “We take pride in Redwave’s significant contribution to reducing glass landfilling in Australia. With our exceptional sorting quality, we can now reintroduce this glass into the recycling loop, facilitating the creation of new bottles.” ■



## ABOUT REDWAVE

Redwave offers pioneering and economically-viable solutions in the recycling sector. The company provides sorting systems for recyclables and sensor-based sorting machines for the recovery of secondary raw materials. In addition to sensor technology, Redwave supplies complete sorting machine systems - taking full responsibility for the sorting results. With in-house expertise in software and hardware, the company remains agile in meeting customer needs and market demands.

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# Spotlight on CHINA: container glass for the beer industry

**Rajeev Jetley**

**N**ecessitating a sizable volume of container glass for its packaging, China is the largest global producer and consumer of beer. Diminished demand and curtailed production of beer and container glass during the Covid-hit years was followed by a steady recovery during 2023. Expansions and modernisation exercises by leading brewers in 2023 led to significant

demand for container glass by year-end. Here, in examining the current container glass demand in China, the country's massive beer segment can offer a useful lens of interpretation.

## OVERVIEW OF CHINESE BEER INDUSTRY

The Chinese beer market has developed at an unprecedented pace over the past three decades. The country has been the world's largest beer market since 2002. With total revenue in the range of

USD 138-140 billion by the end of last year, the beer market is one of the most important sub-segment for the country's container glass producers. However, the market is facing some challenges, such as overcapacity in beer mass production and decreasing domestic beer consumption. That said, the value of beer sales in the country continues to grow thanks to rising demand for premium and flavoured beers. China's beer market is consolidated. Here the top five brewers account for a large





A significant driver of container glass demand, the beer industry in China faced challenges during Covid only to rebound in 2023. Today, leading brewery expansions are boosting glass demand. In this issue of Glass Machinery Plants & Accessories, we explore the resilience and growth of the container glass industry in the PRC amidst economic fluctuations.

CR Snow held the largest market share (23.2 percent), followed by Tsingtao Brewery (16.4 percent), Budweiser Asia Pacific (16.2 percent), Yanjing Beer (8.5 percent), and Carlsberg (6.1 percent). According to He Yong, secretary-general of the China Alcoholic Drinks Association, “The Chinese beer industry is confident of upgrading, particularly high-end products - an unwavering trend that’s fueled by higher expectations among consumers. There have been profound changes in products and consumer groups in the beer sector, leading to more variations to push the sector to further expand its categories. This overrides boundaries between bever-



proportion of total sales volume and continue to hold a reasonably consistent share of the market. The Chinese beer industry is dominated by domestic brewers - making it challenging for international brewers to take market share away from the domestic companies. Back in 2021, China Resource Beer, Tsingtao

Brewery, Anheuser-Busch InBev, Yanjing Beer and Carlsberg all dominated China’s beer market. The combined market share of these five brands has reached more than 70 percent, with a relatively high industry concentration. Small and medium-sized brands make up the remaining market share. In the same year,

ages and liquors to meet demand for diversification and personalization, as the consumption population has become increasingly more fragmented.” Digital and smart transformation is key to transforming the supply chains for beer producers, according to Geng Chao, chairman of Beijing-based Yanjing Brewery, the nation’s top brewer. Chao went

on to add that every aspect of operations, including production, logistics, marketing and consumer management, must still face challenges in digitalization to unleash further growth potential.

**BEER, THE LARGEST DEMAND DRIVER OF GLASS CONTAINERS IN CHINA**

The beer industry is by far the largest consumer of glass containers in China. More than 70 percent of the total beer consumed in the country is through glass containers. Metal packaging has been increasing the share in the beer industry, leading to market share loss for container glass producers. The Covid years were one of the most challenging times for beer and container glass producers for the segment in China. At one time during these years, the country’s largest beer producer China Resource Beer had to close a total of 28 plants in locations including Heilongjiang, Liaoning, Anhui, Sichuan and Guangdong provinces. It also closed two plants in Hunan and Jilin provinces, respectively, in the six months through June 2020, which left it with 72 plants in China. Then the country’s second largest brewer, Tsingtao’s revenue dropped 5.3 percent to JPY 15.6 billion for the first six months of the year back in 2020. Beijing Yanjing Brewery, another major player, saw net income decrease 47.5 percent to CNY 269M, while revenue dropped 13.9 percent to CNY 5.5 billion in the six months to June of that same year.

**CONTAINER GLASS FOR THE BEER INDUSTRY**

Much like its beer industry, the Chinese container glass industry is the largest global container glass industry. Indeed the country’s container glass industry accounts for nearly 40 percent of the global container glass produc-

tion on volume terms. Catered to by more than 100 container glass producers, the Chinese container glass industry registered one of the lowest growth in recent memory. This was mostly on account of the long lockdown due to Covid-19 pandemic and the eco-

nomical slowdown that ensued. Consolidation in the Chinese container glass industry, which has been going for the last few years, has been one of the most important developments of the Chinese container glass industry. Here tougher environmental reg-

S. No.	Company	Location	Production Capacity
1	Yantai NBC Glass Packaging	Shandong	140,000 tonnes per annum
2	Yantai Changyu Glass Company	Yantai, Shandong Province	500,000 tonnes per annum
3	Rockwood & Hines Glass Factory	Jiaxing	120,000 tonnes per annum
4	Kohler Glass Company	Jiangsu	80,000 tonnes per annum
5	Shandong Yuncheng Ruisheng Glass Co., Ltd	Yuncheng, Shandong	160,000 tonnes per annum
6	Xuzhou Dahua Glass Company	Jiangsu	180,000 tonnes per annum
7	Yamamura Glass Qinhuangdao Company Limited	Jiangsu	200,000 tonnes per annum
8	Shandong Heishan Glass Group	Shandong	100,000 tonnes per annum
9	Zibo Baoxiang Glass Company	Shandong	120,000 tonnes per annum
10	Shandong Shenhua Glass Joint Company	Shandong	160,000 tonnes per annum
11	Dalian Shengdao Glass	Dalian	120,000 tonnes per annum

Leading container glass producers for beer industry in China



ulations and issues of profitability have been the two main factors behind the consolidation, with the consolidation drive making it difficult for both small container glass producers and standalone glass producers to survive.

Last year China's economy experienced ups and downs. Growth was driven by the resilience of the high-tech and services sectors, while challenges came from declining property investment, debt risk and weak consumption growth. The most appropriate word to describe China's economy over 2023 is bumpy. After an expectations-exceeding growth of 4.5 per cent in the first quarter following three years of strict COVID-19 prevention policies, China's GDP grew short of the market

expectations by 6.3 per cent in the second quarter. Despite pessimism, GDP growth for the third quarter reached 4.9 per cent, beating expectations once again. The fourth quarter saw 5.2 per cent GDP growth, which also marked the annual growth rate for China. Growth within the container glass sector for the beer industry hinges on overall economic growth to some extent. Indeed robust economic growth over 2024 will be a harbinger of steady growth in beer consumption and resultant in container glass for the beer industry in coming years.

#### **SHENZHEN TONGCHAN GROUP**

Shenzhen Tongchan Group is one of the leading producers of glass containers for the

beer industry. The group operates a number of companies - Shenzhen Beauty Star Co., Ltd., Zhaoqing Tongchan Glass Co., Ltd., Sichuan Tongchan Huajing Glass Co., Ltd., and Shenzhen 863 New Material Technology Co., Ltd. Some of the leading consumers of Tongchan Group are Carlsberg, Heineken, Pearl River, Kingwei, Qingdao and Haitian.

#### **SHANDONG HUAPENG GLASS**

Shandong Huapeng Glass Co., Ltd. is among the leading container glass producers for the beer industry in the country. Comprising the subsidiaries Huapeng Glass Company, Liaoning Huapeng Guangyuan Glass Co., Ltd., Anqing Huapeng Changjiang

## COUNTRY STUDY

Glass Co., Ltd., and Shanxi Huanpeng Shuita Glass Co. Ltd., Shandong Huapeng Glass has an installed capacity of about 300,000 tonnes per annum of container glass.

### YAMAMURA GLASS QINHUANGDAO CO., LTD

Japanese container glass producer Yamamura Glass entered the Chinese container glass industry by establishing a JV with an existing Chinese glass producer, Qinhuangdao Fangyuan Glass Co., Ltd. back in June 2013. Operating since 1958, Qinhuangdao Fangyuan Glass is located in the coastal city of Qinhuangdao of Hebei province. The company operates a total of four furnaces and eleven production lines with an installed capacity of 200,000 tons of glass containers. Yamamura acquired the full ownership of the company by acquiring the remaining 15.25 percent stake in the venture.

### GUANGDONG WHUAXING GLASS

With 14 production sites spread across China, Guangdong Huaxing Glass is one of the largest container glass producers globally. Headquartered in Foshan City of Guangdong province, Guangdong Huaxing Glass operates container glass production in Guangdong, Hubei, Henan, Guizhou, Fujian, Jiangsu, Zhejiang Hebei and Xinjiang provinces. The company operates a total of 35 furnaces and 169 glass production lines to cater to almost all the segments of food, beverage and pharma industries - in addition to the beer industry.

### GUILIN JINGSHENG GLASS

Guilin Jingsheng Glass Co., Ltd., formerly known as Guilin Glass Factory, was founded



in 1956. Back in 2002, it was restructured from a state-owned enterprise to Guilin Jingsheng Glass Co., Ltd. The company has invested more than USD 60M in technological transformation during the last five years. Currently it has three furnaces, nine glass bottle production lines and two glass bottle printing production lines. The company's leading products are beer bottles, with an annual output of more than 400 million beer bottles - main-

ly supplying to leading brewers such as Yanjing, Qingdao, China Resources and other beer brands.

### CHANGYU GLASS

Changyu Glass (Yantai Changyu Glass Co, Ltd) is a leading producer of container glass for beer industry. With 500,000 tons in production capacity, Changyu Glass also supplies container glass to the Chinese wine industry. The company ranks among the top ten container glass producers in China. ■

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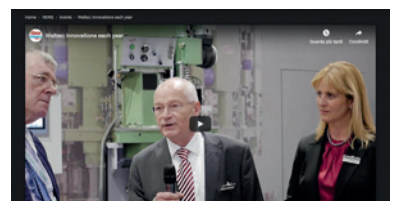
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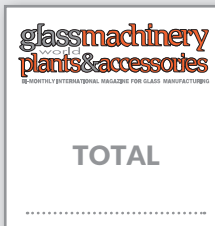


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## A.I. NIR FURNACE CAMERAS

GS - Glass Service

## AIR COOLING SYSTEMS

Forglass  
KYP Accesories  
Luben Glass  
Stara Glass

## AIR COOLING SYSTEMS for I.S. MACHINES

Revimac-Bottero

## AIR COMPRESSORS

Pneumofore

## ALLOYS FOR MOULDS

Fima-Olimpia Fonderie  
Fonderie Bartalesi  
Fonderie Valdelsane

## AMPOULE AFTER FORMING MACHINES/ LINES

KYP Accesories  
Moderne Mecanique  
OCMI OTG  
Pennekamp  
Spami-Optrel-Stevanato  
Group

## AMPOULE FORMING MACHINES/LINES

Euromatic  
KYP Accesories  
Moderne Mecanique  
OCMI OTG  
Spami-Optrel-Stevanato  
Group

## AMPOULE PACKAGING MACHINES

Euromatic  
KYP Accesories  
Moderne Mecanique  
OCMI OTG  
R.Cestaro  
Spami-Optrel-Stevanato  
Group

## ARCHITECTURE OF A FURNACE HEAT RECOVERY SYSTEM

Stara Glass

## ARTICLE PRODUCTION

Olimerk

## ARTIFICIAL INTELLIGENCE

Video Systems

## AUTOMATIC TUBE LOADERS

Euromatic  
KYP Accesories

## Moderne Mecanique OCMI OTG

R.Cestaro  
Spami-Optrel-Stevanato  
Group

## AUTOMATIC WAREHOUSES

EMS Group

## AUTOMATION

EME  
Forglass  
GS - Glass Service  
Luben Glass  
Mimsan Conveyor Systems  
R.Cestaro  
Stara Glass  
Vetromeccanica  
Video Systems  
ZIPPE

## BAG FILTERING PLANTS

BDF Industries  
Stara Glass

## BATCH CHARGERS

BDF Industries  
EME  
Falorni Tech  
Forglass  
GCG - Glass Consulting  
Group  
Glass Service  
Horn  
MT Forni Industriali  
Sorg Nikolaus  
Stara Glass  
TECO Group  
ZIPPE

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## BATCH AND CULLET HANDLING SYSTEMS

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Falorni Tech  
Forglass  
ZIPPE

## BATCH/CULLET PREHEATERS

EME  
GCG - Glass Consulting  
Group  
Sorg Nikolaus  
ZIPPE

## BATCH PLANTS

EME  
Falorni Tech  
Forglass  
GCG - Glass Consulting  
Group  
Glass Service  
HFT  
Stara Glass  
TECO Group  
Vidromecanica  
ZIPPE

## BENDING FURNACES

Forglass

## BLOWING MACHINES

Bucher Emhart Glass  
Famor Engineering  
Olivotto Glass Technologies  
Waltec Maschinen

## BURN-OFF MACHINES

Famor Engineering  
Olivotto Glass Technologies  
Waltec Maschinen

## BURNERS & ACCESSORIES

BDF Industries  
Car-Met  
Falorni Tech  
Famor Engineering  
Forglass  
GCG - Glass Consulting  
Group  
KYP Accesories  
Glass Service  
Horn  
Luben Glass  
Moderne Mecanique  
MT Forni Industriali  
OCMI OTG  
Olivotto Glass Technologies  
Pennekamp  
Sorg Nikolaus  
Stara Glass  
Waltec Maschinen

## BURNERS/ LOW NOx

BDF Industries  
Falorni Tech  
Famor Engineering  
GCG - Glass Consulting  
Group  
Glass Service  
Horn  
KYP Accesories  
Pennekamp  
Sorg Nikolaus  
Stara Glass

## BURNERS/ OXY-FUEL

BDF Industries  
Falorni Tech  
Glass Service  
KYP Accesories  
MT Forni Industriali  
Olivotto Glass Technologies  
Sorg Nikolaus  
Stara Glass

## CARPOULE AFTER FORMING MACHINES LINES

Moderne Mecanique

## OCMI OTG

## CARPOULE FORMING MACHINES LINES

Moderne Mecanique  
OCMI OTG

## CAST IRON FOR MOULDS

Fima-Olimpia Fonderie  
Fonderie Bertalesi  
Fonderie Valdelsane

## COATING OF GLASS - SYSTEMS & MATERIALS (HOT- / COLD-END)

Bohemi Chemicals  
Fluorital  
Forglass  
Graphoidal  
Developments  
Luben Glass  
Pennekamp  
R.Cestaro  
Tecnosens  
Vidromecanica

## COGENERATION AND TRIGENERATION THROUGH HEAT RECOVERY SYSTEMS

BDF Industries

## COLD-END LINES

ACH - Advanced  
Container Handling  
All Glass  
Bucher Emhart Glass  
EMS Group  
Forglass

Heye International  
Iris Inspection Machines  
KYP Accesories  
Mimsan Conveyor Systems  
MSK Coverttech  
Pennekamp  
R.Cestaro  
Regina Catene Calibrate  
Tecnosens  
Vetromeccanica

## COLOURS & ENAMELS

Bohemi Chemicals  
GCG - Glass Consulting  
Group  
Fluorital  
Forglass

## CONSULTING SERVICES

AGR International Inc  
BDF Industries  
Bucher Emhart Glass  
Falorni Tech  
Forglass  
Bucher Automation  
GCG - Glass Consulting  
Group  
GS - Glass Service  
HFT  
Horn  
Luben Glass  
Olivotto Glass Technologies  
Stara Glass  
TECO Group  
Video System

## CONTROL & AUTOMATION SYSTEMS

BDF Industries  
Bottero  
Bucher Emhart Glass  
Falorni Tech  
Forglass  
Bucher Automation  
GCG - Glass Consulting  
Group  
Glass Service  
GS - Glass Service  
Luben Glass  
Horn  
Iris Inspection Machines

Marposs  
MSK Coverttech  
**Nirox**  
Olivotto Glass Technologies  
**Stara Glass**  
TECO Group  
Tecnoferrari  
Tecnosens  
VMA  
Video Systems  
**Waltec Maschinen**  
**ZIPPE**

## CONVEYING & STOCKING SYSTEMS

All Glass  
Forglass  
MSK Coverttech  
Olimerk  
OMS  
**Ramsey Products**  
Regina Catene Calibrate  
Tecnoferrari  
Vetromeccanica  
EMS Group

## CONVEYOR BELTS

Bonaiti Pietro  
Car-Met  
**Famor Engineering**  
Forglass  
Luben Glass  
Olivotto Glass Technologies  
Pennekamp  
Pennine  
**Ramsey Products**  
Regina Catene Calibrate  
Revimac-Bottero  
Vetromeccanica  
**Vidromecanica**  
WBT  
**ZIPPE**

## CONVEYOR CHAINS & SPROCKETS (HOT-END)

Bonaiti Pietro  
Luben Glass  
Pennine  
Renold  
Revimac-Bottero  
**Ramsey Products**  
WBT  
**ZIPPE**

## CRACK-OFF MACHINES

Olivotto Glass Technologies  
**Waltec Maschinen**

## CROSS CONVEYORS

**BDF Industries**  
Bonaiti Pietro  
**Bucher Emhart Glass**  
Car-Met  
Ergon Meccanica  
**Famor Engineering**  
**Heye International**  
Luben Glass  
MT Forni Industriali  
Olimerk  
Pennekamp  
**Ramsey Products**  
Revimac-Bottero  
**Vidromecanica**  
**Waltec Maschinen**  
WBT

## CULLET SEPARATION & TREATMENT SYSTEMS

**EME**  
**Falorni Tech**  
Forglass  
GCG - Glass Consulting Group  
**Vidromecanica**  
**ZIPPE**

## DATAMATRIX READING DEVICES

**TIAMA**

## DECORATING MACHINES

Fermac  
**Koenig & Bauer Kammann**  
Pennekamp

## DECORATION CUTTING MACHINES

**Waltec Maschinen**

## DECORATIVE ENAMELS

Fluorital  
GCG - Glass Consulting Group

## DEDUSTING & FILTERING SYSTEMS

**BDF Industries**  
Forglass

## DOSING SYSTEMS: COLD-END EMULSIONS

GCG - Glass Consulting Group  
Graphoidal Developments  
Luben Glass  
Pennekamp  
R.Cestaro  
Revimac-Bottero  
**Vidromecanica**

## DOSING SYSTEMS: GOB CUTTING LUBRICATION

Graphoidal Developments  
Luben Glass  
R.Cestaro  
Revimac-Bottero

## DOUBLE SHELL RECUPERATOR

**Stara Glass**

## DRIVE SYSTEMS / VARIABLE SPEED

**BDF Industries**  
Bottero  
Forglass  
Bucher Automation  
**Heye International**

Olivotto Glass Technologies  
Pennekamp  
Revimac-Bottero  
Tecnoferrari

## DROPPER AFTER-FORMING MACHINES/LINES

**Moderne Mecanique**  
**OCMI OTG**

## DROPPER FORMING MACHINES/ LINES

**Moderne Mecanique**  
**OCMI OTG**

## ELECTRIC BOOSTING SYSTEMS

**BDF Industries**  
Bock Energietechnik  
**Falorni Tech**  
Forglass  
GCG - Glass Consulting Group  
**Glass Service**  
Horn  
**Sorg Nikolaus**  
**Stara Glass**  
TECO Group

## ELECTRONIC CONTROL SYSTEMS AND IT

**BDF Industries**  
Bock Energietechnik  
Forglass  
Bucher Automation  
**Glass Service**  
Horn  
Olivotto Glass Technologies  
**Sorg Nikolaus**  
**Stara Glass**  
TECO Group  
**Waltec Maschinen**  
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## ELECTRODE HOLDERS

Bock Energietechnik  
GCG - Glass Consulting Group

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## Glass Service

Horn

Sorg Nikolaus

Stara Glass

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## ELECTRODE HOLDERSHOT AND COLD FURNACE INSTALLATION

Horn

TECO Group

## EMISSION MONITORING SYSTEMS

BDF Industries

GS - Glass Service

## EMULSION DOSING SYSTEMS

Graphoidal

Developments

Luben Glass

Pennekamp

R.Cestaro

Revimac-Bottero

## ENERGY RECOVERING SYSTEMS

BDF Industries

Falorni Tech

Luben Glass

Novaxion

Stara Glass

ZIPPE

## ENGINEERING SERVICES

Falorni Tech

TECO Group

## ENGINEERING AND MODELLING FOR BOOSTING SYSTEMS

Bock Energietechnik

Horn

## ENGRAVING MACHINES

TIAMA

## FEEDERS & MECHANISMS

BDF Industries

Bottero

Bucher Emhart Glass

Ergon Meccanica

Famor Engineering

Forglass

Glass Service

Heye International

Olivotto Glass Technologies

Revimac-Bottero

Waltec Maschinen

## FIBERGLASS / GLASSWOOL PRODUCTION LINES, EQUIPMENT & PRODUCTS

Falorni Tech

Glass Service

HFT

Olivotto Glass Technologies

Stara Glass

TECO Group

## FINISHING MACHINES

KYP Accesories

## FIRE POLISHERS & EQUIPMENT

Famor Engineering

Bucher Automation

Luben Glass

Olivotto Glass Technologies

Vidromecanica

Waltec Maschinen

## FOREHEARTHS & SYSTEMS

BDF Industries

Bock Energietechnik

Bottero

Falorni Tech

Forglass

GCG - Glass Consulting

Group

Glass Service

HFT

Horn

MT Forni Industriali

Revimac-Bottero

Sorg Nikolaus

Stara Glass

TECO Group

## FORMING MACHINES

Amig

BDF Industries

Bottero

Bucher Emhart Glass

Ergon Meccanica

Famor Engineering

Heye International

KYP Accesories

Novaxion

OCMI OTG

Olivotto Glass Technologies

Revimac-Bottero

Spami-Optrel-Stevanato

Group

Waltec Maschinen

## FURNACES: BUBBLING SYSTEMS

BDF Industries

Bock Energietechnik

Falorni Tech

Forglass

GCG - Glass Consulting

Group

Glass Service

Horn

Sorg Nikolaus

Stara Glass

TECO Group

## FURNACES: CLEANING SYSTEMS

Glass Service

Stara Glass

## FURNACES: DRAINING SYSTEMS

Bock Energietechnik

Falorni Tech

Forglass

GCG - Glass Consulting

Group

Glass Service

Horn

Sorg Nikolaus

Stara Glass

## FURNACES: ELECTRIC

Bock Energietechnik

Falorni Tech

Forglass

Glass Service

GS - Glass Service

Horn

KYP Accesories

Sorg Nikolaus

Stara Glass

TECO Group

## FURNACES: HEAT-UP

BDF Industries

Falorni Tech

Forglass

Glass Service

Horn

Sorg Nikolaus

Stara Glass

## FURNACES: HOT CULLET FILLING

Falorni Tech

Forglass

Stara Glass

## FURNACES: MELTING

BDF Industries

Bock Energietechnik

Falorni Tech

Forglass

Glass Service

Horn

MT Forni Industriali

Sorg Nikolaus

Stara Glass

TECO Group

## FURNACES: METAL STRUCTURES

BDF Industries

Car-Met  
**Falorni Tech**  
 Forglass  
**Glass Service**  
 HFT  
 Horn  
**Stara Glass**

## FURNACES: OXY-FUEL OR RECUPERATIVE

**BDF Industries**  
**Falorni Tech**  
**Glass Service**  
 HFT  
 Horn  
 MT Forni Industriali  
**Sorg Nikolaus**  
**Stara Glass**  
 TECO Group

## FURNACES: PREHEATING SYSTEMS

Commersald Impianti  
**Falorni Tech**  
 Forglass  
**Glass Service**  
 Horn  
 Olivotto Glass Technologies  
**Sorg Nikolaus**  
**Stara Glass**

## FURNACES: REPAIR, MAINTENANCE & REVAMPING

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**Falorni Tech**  
 Forglass  
**Glass Service**  
 HFT  
 Horn  
**Sorg Nikolaus**  
**Stara Glass**  
 TECO Group

## GASES

**Glass Service**

## GLASS ANALYSIS AND TESTING SERVICES

**AGR International Inc**

## GLASS BRICK PRODUCTION LINES

Amig  
 Olivotto Glass Technologies  
**Stara Glass**  
**Waltec Maschinen**

## GLASS LEVEL CONTROL DEVICES

**BDF Industries**  
 Bock Energietechnik  
**Falorni Tech**  
 GCG - Glass Consulting  
 Group  
**Glass Service**  
 Horn  
 MT Forni Industriali  
 Olivotto Glass Technologies  
**Sorg Nikolaus**  
**Stara Glass**  
**ZIPPE**

## GLASS METALISATION PROCESS MATERIALS

Fluorital

## GLASS RECYCLING PLANTS

**EME**  
**Falorni Tech**  
 GCG - Glass Consulting  
 Group  
**Vidromecanica**  
**ZIPPE**

## GOB WEIGHT CONTROL SYSTEMS

**BDF Industries**  
**Bucher Emhart Glass**

**Heye International**  
 Olivotto Glass Technologies  
**Waltec Maschinen**

## HANDLING EQUIPMENT

All Glass  
**BDF Industries**  
 Bottero  
**Bucher Emhart Glass**  
**Famor Engineering**  
 Luben Glass  
 MSK Coverttech  
 Olivotto Glass Technologies  
 OMS  
 Pennekamp  
 R.Cestaro  
 Revimac-Bottero  
 Simtech  
 Vetromeccanica

## HEAT RECUPERATORS

**BDF Industries**  
**Falorni Tech**  
**Glass Service**  
 Horn  
 Luben Glass  
 MT Forni Industriali  
**Sorg Nikolaus**  
**Stara Glass**

## HEAT REGENERATION PLANTS

**Falorni Tech**  
**Glass Service**  
 Horn  
**Stara Glass**

## HEATING SYSTEMS

Bock Energietechnik  
**Falorni Tech**  
 Forglass  
**Glass Service**  
 Horn  
 Pennekamp  
**Stara Glass**

## HYBRID FURNACE & FOREHEARTH SYSTEM

**Stara Glass**

## HYDROGEN BURNERS

**Stara Glass**

## HOT-END PROCESS MONITORING SOLUTIONS

**Falorni Tech**  
**TIAMA**

## HOT GLASS CONTACT MATERIALS

**Bucher Emhart Glass**  
 Olivotto Glass Technologies

## HOT GLASS SCRAPES

Car-Met  
**Falorni Tech**  
 Forglass  
 GCG - Glass Consulting  
 Group  
**Stara Glass**  
**Vidromecanica**  
**ZIPPE**

## INFRARED THERMOMETERS

GCG - Glass Consulting  
 Group  
 GS - Glass Service  
**KYP Accesories**

## INFRARED THERMOMETERS

**Famor Engineering**  
**Heye International**  
 Olivotto Glass Technologies

## INSPECTION MACHINES: COLD-END

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Simtech  
**TIAMA**  
Tecnosens  
Video Systems  
Vimec  
VMA

## INSPECTION MACHINES: HOT-END

**BDF Industries**  
**Bucher Emhart Glass**  
**Euromatic**  
**Heye International**  
**KYP Accesories**  
Marposs  
**Moderne Mecanique**  
**OCMI OTG**  
Olivotto Glass Technologies  
**TIAMA**  
Tecnosens  
Video Systems  
Vimec

## INSPECTION MACHINES: VIALS & AMPOULES

**Euromatic**  
Iris Inspection Machines  
**KYP Accesories**  
Marposs  
**Moderne Mecanique**  
**Nirox**  
**OCMI OTG**  
Spami-Optrel-Stevanato  
Group  
Tecnosens  
Video Systems  
Vimec

## INSPECTION SYSTEMS: AMPOULE, VIAL, SYRINGES, CARTRIDGES

Vimec

## I.S. MACHINES

**BDF Industries**  
Bottero  
**Bucher Emhart Glass**  
Ergon Meccanica  
**Heye International**  
**Novaxion**

## I.S. MACHINES LUBRICATION SYSTEMS

**BDF Industries**  
**Bucher Emhart Glass**  
Graphoidal Developments  
**Heye International**  
Luben Glass  
**Novaxion**  
Revimac-Bottero

## I.S. MACHINE RECONDITIONING

**BDF Industries**  
**Bucher Emhart Glass**  
Ergon Meccanica  
**Heye International**  
Luben Glass  
**Novaxion**  
Revimac-Bottero

## LABORATORY FURNACES POLARISCOPES

MT Forni Industriali

## LABORATORY TESTING AND MEASUREMENT EQUIPMENT

**AGR International Inc**  
Marposs

## LASER CUTTING MACHINES

Olivotto Glass Technologies  
**Waltec Maschinen**

## LEHR DRIVES

**Heye International**  
Pennekamp

## LEHRs: ANNEALING

**Antonini**  
Bonaiti Pietro  
Car-Met  
**Euromatic**  
**Heye International**  
**KYP Accesories**  
**Moderne Mecanique**  
MT Forni Industriali  
**OCMI OTG**  
Pennekamp  
Tecnosens  
**Vidromecanica**

## LEHRs: DECORATING

**Antonini**  
Bonaiti Pietro  
Car-Met  
MT Forni Industriali  
Pennekamp  
**Vidromecanica**

## LOW NOx BURNERS

Pennekamp  
**Stara Glass**

## MAINTENANCE AND REPAIR SERVICES

Bock Energietechnik  
Ergon Meccanica  
Forglass  
Luben Glass  
Olimerk  
Pennekamp  
Revimac-Bottero  
**SKS - Sorg Keramik Service**  
**Stara Glass**

## MARKING MACHINES

Luben Glass

**Sorg Nikolaus**

## MEASUREMENT & CONTROL SYSTEMS

**AGR International Inc**  
**BDF Industries**  
Bock Energietechnik  
**Bucher Emhart Glass**  
Bucher Automation  
GS - Glass Service  
Horn  
**KYP Accesories**  
Luben Glass  
Marposs  
**Nirox**  
**Novaxion**  
Olivotto Glass Technologies  
**Stara Glass**  
Tecnosens  
Video Systems  
VMA  
**Waltec Maschinen**

## MICRONIZATION

STM MICROTEC

## MILLING AND GRINDING

STM MICROTEC

## MIXERS

**EME**  
Forglass  
GCG - Glass Consulting  
Group  
**KYP Accesories**  
MT Forni Industriali  
R.Cestaro  
**Stara Glass**  
Teka  
**ZIPPE**

## MOLYBDENUM ELECTRODES

**Stara Glass**

## MOULDS

Changshu Jianhua  
Mould Technology  
Officine  
Perego Giancarlo

## MOULDS: CLEANING POLISHING MACHINES

**BDF Industries**  
Luben Glass  
Ecotecne

## MOULDS: COMPONENTS & ACCESSORIES

Changshu Jianhua  
Mould Technology  
Officine  
Olimerk  
Perego Giancarlo

## MOULDS: INSPECTOR SYSTEM

Luben Glass

## MOULDS: LUBRICANTS & SPRAY EQUIPMENT

Graphoidal  
Developments  
Luben Glass  
**Novaxion**  
R.Cestaro

## MOULDS: MAINTENANCE EQUIPMENT

Ecotecne  
Luben Glass

## MOULDS: POLISHING MACHINE

Luben Glass

## MOULDS: PREHEATING OVENS

**Antonini**  
Car-Met  
MT Forni Industriali  
Luben Glass  
Olivotto Glass Technologies  
Pennekamp  
Revimac-Bottero  
**Vidromecanica**

## MOULDS: WELDING LINES

Commersald Impianti

## MOULDS & PLUNGERS COATING SYSTEMS & MATERIALS

Changshu Jianhua  
Mould Technology  
Commersald Impianti

## NECK RINGS

Changshu Jianhua  
Mould Technology  
Olimerk  
Perego Giancarlo

## PALLETIZER COMPONENT: GRIPPER TUBES

Simtech

## PALLETIZING/ DEPALLETIZING LINES

ACH - Advanced  
Container Handling  
All Glass  
EMS Group  
Messerssi Packaging  
Mimsan Conveyor Systems  
MSK Covertch  
Olivotto Glass Technologies  
OMS  
R.Cestaro

Regina Catene Calibrate  
Vetromeccanica

## PASTE MOULD MACHINES

Olivotto Glass Technologies

## PHARMACEUTICAL LEHRS & HANDLING

Pennekamp

## PLANT UTILITIES

GCG - Glass Consulting  
Group  
Pneumofore

## PLATINUM FEEDER SYSTEMS

**BDF Industries**  
**Glass Service**  
Olivotto Glass Technologies  
**Stara Glass**

## PLUNGER HONING MACHINES

Bottero

## PLUNGERS & MECHANISMS

**BDF Industries**  
**Bucher Emhart Glass**  
Olimerk  
Olivotto Glass Technologies  
Perego Giancarlo  
Revimac-Bottero  
**Waltec Maschinen**

## POLISHING/ GRINDING MACHINES

Luben Glass  
Olivotto Glass Technologies

## POWER REGULATION/ TRANSFORMERS

Bock Energietechnik

## PREDICTIVE SOLUTIONS

Video Systems

## PRESS MACHINES

Amig  
**Bucher Emhart Glass**  
**Famor Engineering**  
Olivotto Glass Technologies  
**Waltec Maschinen**

## PRESS & BLOW MACHINES

Amig  
**Bucher Emhart Glass**  
**Famor Engineering**  
**Heye International**  
Messerssi Packaging  
**Novaxion**  
Olivotto Glass Technologies  
OMS  
**Waltec Maschinen**

## PRESS RECONDITIONING

**Famor Engineering**  
Luben Glass  
Olivotto Glass Technologies

## PRODUCTION ASSISTANCE FOR HOLLOW GLASS

Olimerk

## PUSHERS

**BDF Industries**  
Bottero

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## RAW MATERIALS

Bohemi Chemicals  
GCG - Glass Consulting Group  
Minerali Industriali

## RECYCLING PROCESSES

**EME**

## RECYCLING SYSTEMS

**EME**  
**Falorni Tech**  
GCG - Glass Consulting Group  
**ZIPPE**

## RECYCLING SYSTEMS

**Bucher Emhart Glass**  
**Falorni Tech**  
Forglass  
**Linco Baxo**  
Olivotto Glass Technologies  
S.I.G.MA.  
**Waltec Maschinen**

## REFRACTORIES INSTALLATION SERVICES

**Bucher Emhart Glass**  
**Falorni Tech**  
HFT  
Horn  
**SKS - Sorg Keramik Service**  
**Stara Glass**

## REPLACEMENT PARTS

Olimerk  
Olivotto Glass Technologies  
**Stara Glass**  
TECO Group  
**Waltec Maschinen**

## ROBOTS: BALL GATHERERS

**Falorni Tech**  
**Glass Service**  
**Novaxion**  
Olivotto Glass Technologies  
**Waltec Maschinen**

## ROBOTS: HANDLING & PACKAGING

ACH - Advanced Container Handling  
All Glass  
EMS Group  
**Euromatic**  
**Falorni Tech**  
**Famor Engineering**  
**KYP Accesories**  
Messersi Packaging  
MSK Coverttech  
**Novaxion**  
Olivotto Glass Technologies  
R.Cestaro  
Simtech  
Spami-Optrel-Stevanato Group  
Vetromeccanica  
**Waltec Maschinen**

## ROTATING TABLES

Messersi Packaging  
Olivotto Glass Technologies  
OMS  
Vetromeccanica  
**Waltec Maschinen**

## SANDBLASTING MACHINE

Luben Glass

## SAW MACHINES

Olivotto Glass Technologies

## SECOND-HAND EQUIPMENT

**BDF Industries**  
Ergon Meccanica  
**Falorni Tech**  
**Heye International**  
**KYP Accesories**  
**Novaxion**  
Olivotto Glass Technologies  
Pennekamp  
**Vidromeccanica**

## SERVICES

**AGR International Inc**  
Bock Energietechnik  
**EME**  
Ergon Meccanica  
**Falorni Tech**  
Forglass  
**Novaxion**  
Olimerk  
**Stara Glass**  
TECO Group

## SERVICES IN HOT-DRILLING AND CHANGE OF ELECTRODE HOLDERS

Bock Energietechnik

## SHEAR BLADES

**BDF Industries**  
**Heye International**  
**Famor Engineering**  
Luben Glass  
WBT

## SHEAR BLADES LUBRICANTS

Graphoidal Developments  
Luben Glass

## SHEAR SYSTEMS

**BDF Industries**  
Bottero  
**Famor Engineering**  
Graphoidal Developments  
**Heye International**  
Luben Glass  
Olivotto Glass Technologies  
Revimac-Bottero  
**Waltec Maschinen**

## SHUTTLE CARS

EMS Group  
Tecnoferrari

## STRETCH & SHRINK FILM WRAP MACHINES

All Glass  
EMS Group  
Messersi Packaging  
MSK Coverttech  
OMS  
Tecnosens  
Vetromeccanica

## SHRINK OVENS

Messersi Packaging  
OMS

## SILKSCREEN INKS

Fluorital

## SILKSCREEN PRINTING LINES: HOLLOWARE & TABLEWARE

**Euromatic**  
Fermac

## SILKSCREEN PRINTING LINES: VIALS & AMPOULES

**Moderne Mecanique**



**OCMI OTG**

**SOFTWARE**

**BDF Industries**

Bottero  
**Bucher Emhart Glass**  
 Bucher Automation  
 GS - Glass Service

**Heye International**  
 Olivotto Glass Technologies

**Stara Glass**  
 Tecnoferrari

**TIAMA**  
 Vertech'  
 Vetromeccanica  
 Video Systems  
**Waltec Maschinen**

**SPINNING MACHINES**

**Famor Engineering**  
 Olivotto Glass Technologies  
 Waltec Maschinen

**SPOUT ELECTRICAL HEATING ELEMENTS**

Bock Energietechnik

**STACKERS**

All Glass  
**BDF Industries**  
 Bottero  
**Bucher Emhart Glass**  
 Car-Met  
 EMS Group  
**Famor Engineering**  
 Luben Glass  
 MT Forni Industriali  
 Olivotto Glass Technologies  
 Pennekamp  
 Regina Catene Calibrate  
 Revimac-Bottero  
**Vidromecanica**  
**Waltec Maschinen**

**STEMWARE PRODUCTION LINES**

**Falorni Tech**

Olivotto Glass Technologies

**Vidromecanica**  
**Waltec Maschinen**

**STEMWARE SEALING MACHINES**

**Falorni Tech**  
**OCMI OTG**  
 Olivotto Glass Technologies  
**Waltec Maschinen**

**STIRRERS**

**BDF Industries**  
 Bottero  
**Falorni Tech**  
 Forglass  
 GCG - Glass Consulting  
 Group  
**Glass Service**  
 Horn  
 MT Forni Industriali  
 Olimerk  
 Olivotto Glass Technologies  
 Revimac-Bottero  
**Stara Glass**  
**Vidromecanica**

**SUCTION GATHERERS**

**Falorni Tech**  
 Olivotto Glass Technologies

**SYRINGE AFTER FORMING MACHINES/LINES**

**Euromatic**

**SYRINGE FORMING MACHINES/LINES**

**Euromatic**

**SYRINGE FILLING INTO TRAY MACHINES/MODULES**

**Euromatic**

**SUPERVISORS MODEL BASED PREDICTIVE CONTROL**

GS - Glass Service

**TAKE-OUT DEVICES & EQUIPMENT**

**BDF Industries**  
 Bottero  
**Bucher Emhart Glass**  
**Falorni Tech**  
**Famor Engineering**  
 Luben Glass  
 Olimerk  
 Olivotto Glass Technologies  
**Ramsey Products**  
**Vidromecanica**  
**Waltec Maschinen**

**TEMPERATURE MEASUREMENT & CONTROL**

**BDF Industries**  
 Bock Energietechnik  
**Bucher Emhart Glass**  
**Falorni Tech**  
 Forglass  
 Graphoidal  
 Developments  
 GS - Glass Service  
 Horn  
**KYP Accesories**  
**Novaxion**  
 Pennekamp  
**Stara Glass**

**TEMPERING LINES**

Pennekamp  
**Vidromecanica**  
**Waltec Maschinen**

**THERMAL CLEANING SYSTEM FOR FURNACE**

**Stara Glass**

**THERMAL SHOCK TEST MACHINES**

**Vidromecanica**

**TECHNICAL ARTICLES IN RUBBER & PLASTIC**

Simtech

**THERMOCOUPLES & ASSEMBLIES**

Bock Energietechnik  
**Falorni Tech**  
 GCG - Glass Consulting  
 Group  
**Stara Glass**

**THERMO SHOCK TEST MACHINES**

**BDF Industries**

**TIN OXIDE ELECTRODES & CONNECTORS**

Horn  
**Stara Glass**  
 TECO Group

**TRAINING SERVICES**

**AGR International Inc**

**TRAY FORMERS**

EMS Group

**TOOLS & EQUIPMENT**

Bottero

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## TUBING LINES

Falorni Tech  
Olivotto Glass Technologies  
Stara Glass

## TURNKEY PLANTS ENGINEERING & CONSTRUCTION

Amig  
BDF Industries  
Falorni Tech  
Forglass  
EME  
Glass Service  
HFT  
Horn  
Olivotto Glass Technologies  
Spami-Optrel-Stevanato Group  
Stara Glass  
TECO Group  
Waltec Maschinen

## UV LAMPS

Graphoidal Developments

## VACUUM PLANTS & ACCESSORIES

Pneumofore  
Simtech

## VACUUM PUMPS

Pneumofore

## VIAL AFTER-ORMING MACHINES/LINES

Euromatic  
Moderne Mecanique  
OCMI OTG  
Pennekamp  
Spami-Optrel-Stevanato Group

## VIAL FORMING MACHINES/LINES

Euromatic  
Moderne Mecanique  
OCMI OTG  
Pennekamp  
Spami-Optrel-Stevanato Group

## VIAL PACKAGING MACHINES

Euromatic  
KYP Accesories  
Moderne Mecanique  
OCMI OTG  
R.Cestaro  
Spami-Optrel-Stevanato Group

## VIBRATING EQUIPMENT

EME  
Forglass  
Vetromeccanica  
ZIPPE

## WASTE GAS CLEANING SYSTEMS

BDF Industries

## WASTE GASES DUCT WORKS AND VALVES CLEANING SYSTEMS

BDF Industries

## WATER CLEANING SYSTEMS

BDF Industries  
Forglass  
Graphoidal Developments  
Luben Glass  
ZIPPE

## WATER COOLING SYSTEMS

Bock Energietechnik

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A significant driver of container glass demand, the beer industry in China faced challenges during COVID only to rebound in 2023. Today, leading brewery expansions are boosting glass demand. In this issue of Glass Machinery Plants & Accessories, we explore the resilience and growth of the container glass industry in the PRC amidst economic fluctuations.

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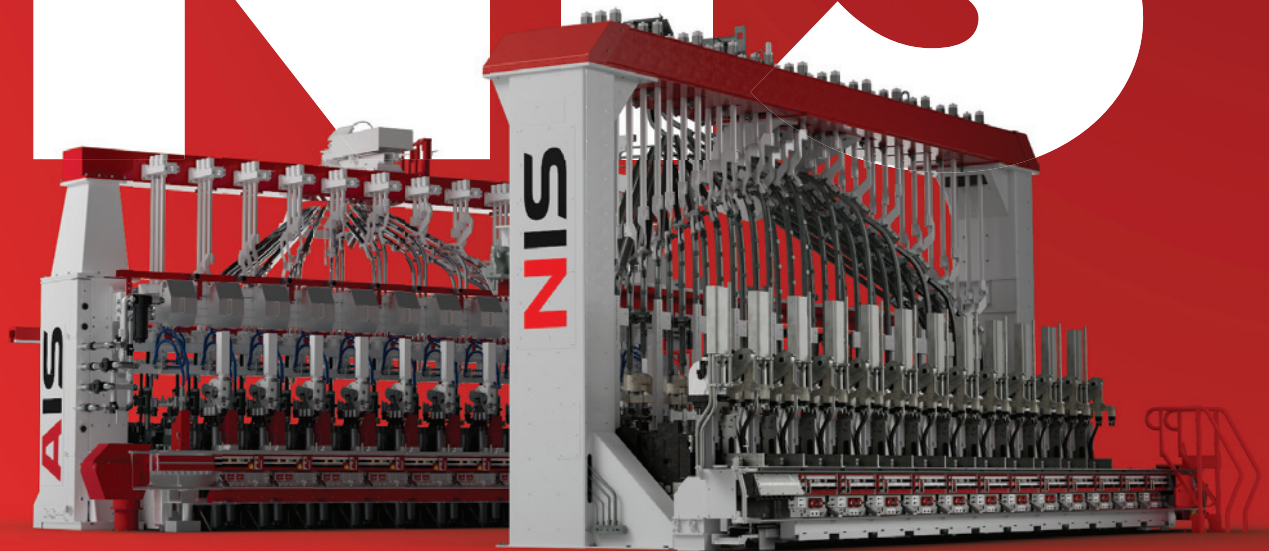
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