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YEAR 39 • ISSUE NO. 2/2026

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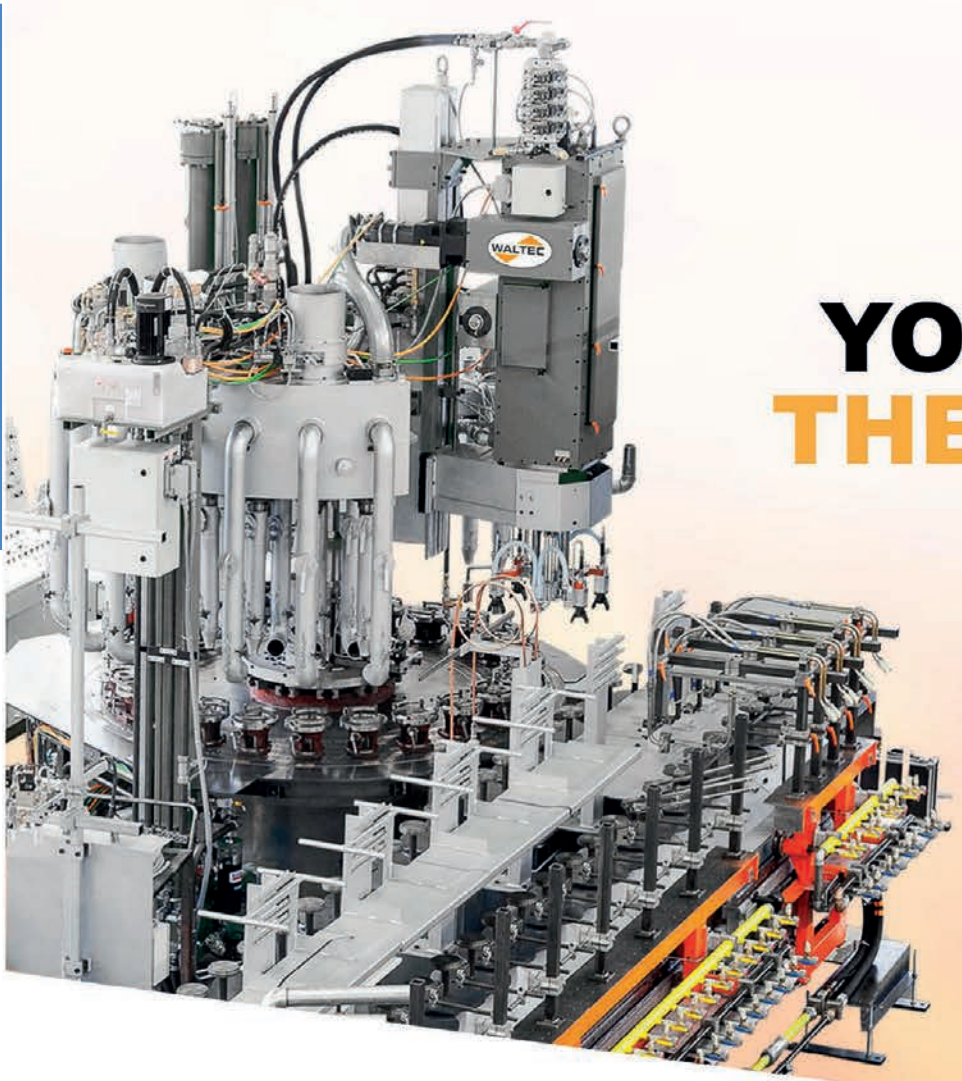

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2026 TRADE FAIRS CALENDAR

The magazine will be distributed at the following Events

2026 1

PHARMAPACK EUROPE | 21-22 JANUARY | PARIS - FRANCE

GLASSMAN ITALY | 4-5 FEBRUARY | BOLOGNA - ITALY

AMBIENTE | 6-10 FEBRUARY | FRANKFURT - GERMANY

Editorial files: 19-12-2025

Deadline Adv files: 07-01-2026

2026 2

COSMOPACK | 26-28 MARCH | BOLOGNA - ITALY

CHINA GLASS | 7-10 APRIL | SHANGHAI - CHINA

Editorial files: 20-02-2026

Deadline Adv files: 25-02-2026

2026 3

ICG - ANNUAL MEETING | 13-17 APRIL | LYON - FRANCE

INTERPACK | 7-13 MAY | DÜSSELDORF - GERMANY

FEATURED CONTENT: FORMING

Editorial files: 13-03-2026

Deadline Adv files: 20-03-2026

2026 4

GLASSMAN LATIN AMERICA | 20-21 MAY | MEXICO CITY - MEXICO

CPHI AMERICAS | 2-4 JUNE | PHILADELPHIA (PA) - USA

Editorial files: 16-04-2025

Deadline Adv files: 20-04-2026

2026

Glass Industry Directory 2026

Editorial files: 11-06-2026

Deadline Adv files: 18-06-2026

2026 5

GLASSTEC | 20-23 OCTOBER | DÜSSELDORF - GERMANY

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Editorial files: 28-09-2026

Deadline Adv files: 02-10-2026

2026 6

ATIV GLASS DAYS | 19-20 NOVEMBER | PARMA - ITALY

ALL4PACK- EMBALLAGE | 24-26 NOVEMBER | PARIS - FRANCE

UZ GLASS | 1-3 DECEMBER | TASHKENT - UZBEKISTAN

FEATURED CONTENT: ANNEALING & COATING

Editorial files: 16-10-2026

Deadline Adv files: 28-10-2026

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LUBEN GLASS

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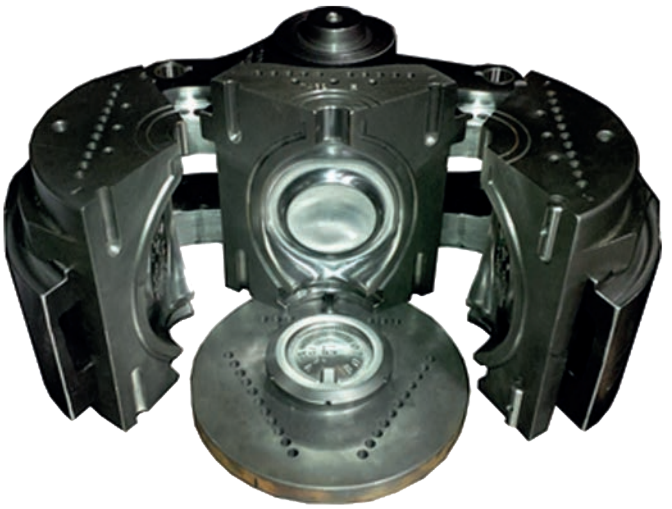
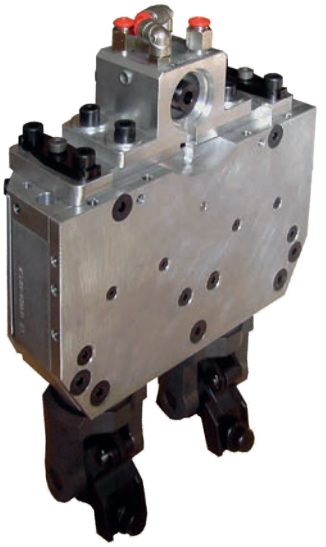




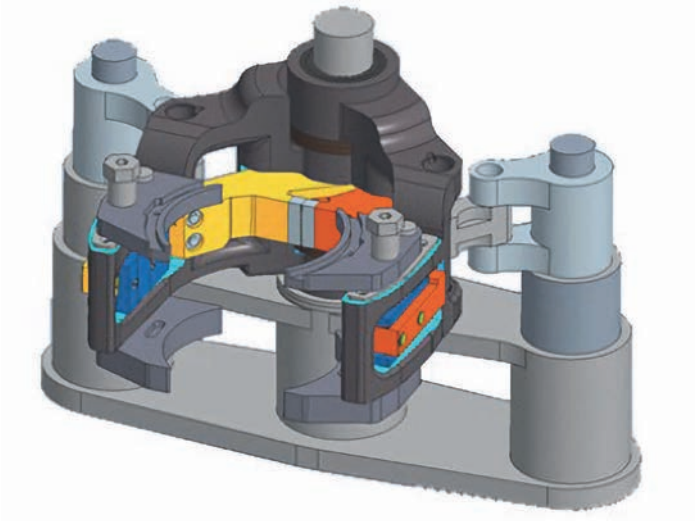
Coupled with the ongoing need to acquire new customers, the current market crisis is also leading some glassworks to vary their production programmes while seeking new market niches that often require special containers.

Indeed the production of bottles of this type is often not supported by the existence of suitable equipment that, when mounted on a machine, allows for high-quality, defect-free production.

In most cases, the production of a special item is made possible not only by the incalculable value of the individual glassmaker's experience, but also by the availability on the market of special equipment designed and built to meet the most specific requirements.

This is the context for **Luben Glass**' 'special' line. Alongside its standard product line, designed to meet the requirements of different machine manufacturers, the company offers a line of products specifically designed to help customers create items that would otherwise be difficult to produce with standard equipment.

One example above all others is the mould holder for opening moulds consisting of three parts, often necessary for producing triangular-shaped items but difficult to achieve with traditional systems that involve substantial modifications to the section.



Here Luben Glass also draws attention to the parallel opening gripper, which prevents chipping on the mouth of the article, or the rotating gripper for the correct positioning of the article on the machine conveyor - as well as many others, such as parallel opening systems for single gob, that can be adapted to angular opening machines to allow for better, defect-free demolding of the article.

WWW.LUBENGLASS.EU

FEVE

Industry update: a challenging context. A resilient outlook

2024 marked a difficult year for the European container glass industry, which was beset by sustained economic pressures and geopolitical uncertainty. Yet the sector continues to demonstrate resilience and a strong commitment to serving customer and consumer demand, ensuring a secure supply of safe, sustainable and circular glass packaging made in Europe.

Glass remains recognised as a strategic material: fully recyclable, trusted for product protection and aligned with long-term environmental expectations as well as brand value and identity imperatives. The industry is actively investing and adapting to maintain its contribution to Europe's manufacturing base and meet evolving market requirements.

A full overview of the industry's economic contribution, trade performance, sustainability leadership and market dynamics is available in the **FEVE**'s Executive Abstract of the Annual Report 2024.

WWW.FEVE.ORG

OMS SINGAPORE

Strategic Innovation in Asia: at the Forefront of Glass Packaging

As a global leader in end-of-line packaging solutions, **OMS Group** continues to expand its international footprint, placing **OMS Singapore** at the heart of its operations in the Far East. By blending the excellence of Italian craftsmanship with a strong regional presence, the Group stands out for its ability to deliver custom, cutting-edge technologies specifically designed for the glass industry.

To provide seamless support and expertise within the Chinese market, OMS Singapore works in close strategic partnership with **Ninesun Consulting Co. Ltd**, the official distributor dedicated to the glass sector in China. This collaboration ensures that customers benefit from a unique combination of global innovation and localized excellence, offering:

- Tailored Engineering: vertical integration allows for solutions adapted to specific industrial requirements.
- Sustainable Logistics: a focus on reducing CO_2 emissions and power consumption across all operations.
- After-Sales Excellence: a dedicated team of technicians and a wide availability of spare parts to support customers as true partners.

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OMS Group's technology range is engineered to meet the highest standards of reliability and efficiency:

- The **AT55 Thermoshrinking** Machine: a single-workstation system that applies and shrinks hoods on bottle pallets using a flameless gas ring system.
- **The FT55e Electric Thermoshrinking machine**: a green breakthrough that delivers the same high performance as our FT55 gas-powered rings using only electricity, drastically reducing consumption through R&D-driven demand-only heating.
- The **Press Master GLS**: a vertical strapping machine with a 2,400 kg top press capacity, capable of complex patterns like 2x0 up to 6x4.
- The **06CL Horizontal** Strapping Machine: featuring a linear rack-driven arch for perfect strap positioning and quick-action connectors for simplified maintenance.
- The **AVR1000 Wrapping** Machine: high-speed, stable loads are guaranteed by a carbon fiber ring and a patented pre-stretch carriage with a 300 percent ratio.

Through **OMS Singapore**, the Group not only provides machinery but also promotes new solutions that meet the highest green standards, anticipating the needs of an ever-evolving market.

WWW.OMSSIN.COM.SG

FRIGOGLASS

Completion of sale of Beta Glass to Helios Investment

Frigoglass Group has completed the sale of its Nigerian Glass business, including **Beta Glass**, to Helios Investment Partners for approximately EUR 100M.

The proceeds will be used to redeem various senior secured notes due 2028.

Chairman Gagik Apkarian highlighted the transaction as a milestone in the Group's three-year transformation process, enabling capital return to bondholders and further investment in the commercial cooler business.

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GLASS RECYCLING COALITION

Merger with Glass Recycling Foundation

The **Glass Recycling Coalition (GRC)** and the Glass Recycling Foundation (GRF) today announced they have merged into a single organisation operating as the Glass Recycling Foundation (GRF). This consolidation brings together two leading forces in the glass recycling movement, creating a stronger, more efficient platform to close supply chain gaps and accelerate progress across the United States. The merger aligns experts, programmes, and resources under a single, trusted GRF banner, making it easier for communities and industry representatives to access grants, technical tools, and best practices.

"Glass is infinitely recyclable and is a valuable commodity for many community recycling programmes," said Scott DeFife, president of the Glass Recycling Foundation. "By bringing our organisations together, we can unlock that value more effectively - scaling projects, improving material quality and ensuring communities have the tools they need to recycle more glass."

Under the unified structure, GRF will streamline communications, consolidate grant making, bolster fundraising efforts and expand technical assistance to improve recovery rates and glass quality. A joint leadership team, drawn from both organisations, will guide the expanded portfolio of projects, the MRF certification programme, data tools and industry resources.

All existing commitments remain in place: active projects will continue uninterrupted, current grants will be honoured, and the mission to strengthen U.S. glass recycling and keep recyclable glass out of landfills remains unchanged.

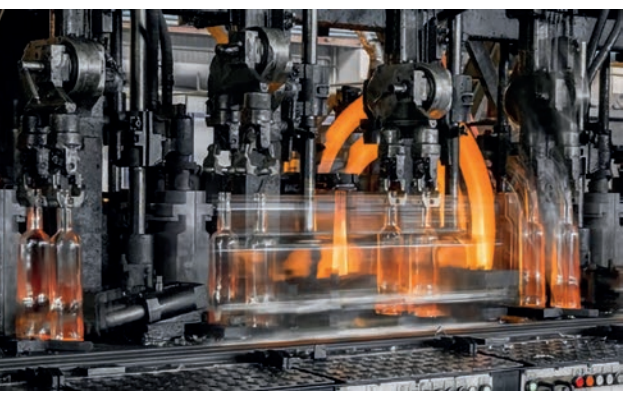
"The coalition and foundation have always been driven by the same vision," said DeFife. "Now, under one name, we can cut duplication, amplify what works and extend the reach of initiatives already making a difference."

Effective immediately, all future announcements, events and resources will be available through GRF. Stakeholders can expect updated branding across GRF's website, newsletters and programme materials.

WWW.GLASSRECYCLES.ORG

BRITISH GLASS

Uplift in network charging compensation scheme welcomed



British Glass recently welcomed the UK government's decision to increase compensation under the Network Charging Compensation scheme from 60 to 90 Percent. This measure will help reduce the disparity in electricity prices between the UK and its international competitors, supporting the competitiveness of the UK glass sector.

Nick Kirk, Federation Director, British Glass, said, "We welcome the additional support to reduce electricity costs for the UK glass sector. This is a positive step towards improving competitiveness and enabling further progress on decarbonisation.

"The sector continues to face significant challenges, including the flawed implementation of packaging Extended Producer Responsibility (pEPR) and rising imports of container glass."

British Glass urges continued engagement with government to ensure a strong, competitive UK glass industry capable of supporting a truly circular economy.

WWW.BRITGLASS.ORG.UK

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STEVANATO GROUP

Expansion of drug delivery systems capacity

Stevanato Group has announced a significant expansion of its drug delivery system manufacturing capacity, further strengthening its global footprint to meet the industry's evolving needs. As part of its footprint optimisation plan, the Company recently added a state-of-the-art production space for drug delivery devices to its facility in Bad Oeynhausen, Germany. This initiative provides more than 2,500 square metres of advanced manufacturing capacity designed to serve global pharma and biotech partners seeking robust and resilient European supply chain integration.

The multi-million investment includes installation of an ISO 8 clean-room environment, fully equipped for injection moulding and automated assembly operations. These upgrades enable the site to support both Stevanato Group's proprietary device production and contract manufacturing services enhancing operational flexibility, scalability and speed-to-market across the company's drug delivery systems portfolio.

The enhanced Bad Oeynhausen facility plays a pivotal role in advancing the production of key portfolio devices, including the Aidaptus® autoinjector and Alina® pen injector platforms. By integrating the Company's core capabilities in glass primary packaging, analytical services and equipment manufacturing, Stevanato Group continues to reinforce its position as a trusted partner in enabling safe, effective and patient-centric combination products tailored to individual customer requirements.

"This investment underscores our commitment to advancing self-injection technologies and supporting our customers in delivering better patient outcomes," said Michele Monico, President of DDS and IVD Business Unit at Stevanato Group. "As demand for drug delivery devices accelerates and patient adoption continues to rise -driven by the need for more convenient, personalised treatment options- expanding our manufacturing capacity is a strategic step to ensure readiness, agility, and innovation across our value chain."

WWW.STEVANATOGROUP.COM

SCHOTT

Successful circular economy pilot project

SCHOTT successfully completed a major pilot project regarding its circular economy recently. Together with partners from the waste management and home appliance industries, the company has reintroduced discarded glass-ceramic cook-tops into the production cycle for the first time.

In a multi-week large-scale trial, 50 tonnes of used glass-ceramic cullets were collected, processed and remelted - without any loss of quality. This marks a technological breakthrough for the industry, proving that a circular economy is feasible for glass-ceramic cook-tops. Each year, around 1.3 million cook-tops are replaced in Germany alone, and most end up in landfills. By reusing the valuable materials they contain, natural resources can be conserved and dependence on primary raw materials reduced.

To make large-scale recycling a reality, clear political frameworks are still needed. Here's why SCHOTT, along with their partners, are actively advocating for regulations that enable the separate and non-destructive collection of used cook-tops and support a functioning circular economy.

Through the pilot project, SCHOTT has reaffirmed its commitment to innovation, sustainability and responsibility - taking another step towards a more circular future.

WWW.SCHOTT.COM

VETROPACK

A holistic approach to optimising glass containers

As opposed to 'lightweighting', 'rightweighting' is about much more than just reducing the weight of packaging. **Vetropack** is taking a holistic approach to optimising glass containers - with dual goals: maximum resource efficiency and structural stability.

Rightweighting for glass packaging isn't just about reducing grams; it's about balancing performance, stability and sustainability through responsible design and engineering choices.

Because the real question for the container glass industry is not only how light packaging can be - but how to achieve maximum resource efficiency and structural stability.

Rightweighting represents a holistic approach to glass packaging that matters to producers and brands:

- Containers that ensure reliable performance on the filling lines
- Optimised efficiency across transport and handling
- Packaging that protects brand impact and shelf differentiation
- Sustainability across the entire lifecycle

WWW.VETROPACK.COM

AFRIGLASS 2027

Save the date: March 03-05, 2027 in Nairobi, Kenya

AfriGlass 2027, a new international exhibition dedicated to the glass industry in Africa, has been officially announced. It will be held on March 3 to 5, 2027 in Nairobi, Kenya. The event will be organised by Y T International, an experienced organiser of professional B2B trade exhibitions.

AfriGlass 2027 is positioned as a specialised business platform for the architectural glass, container glass, glass processing, raw materials and production technology sectors. The exhibition aims to connect global manufacturers and suppliers with African buyers, distributors, project owners and decision-makers.

As Africa's construction, infrastructure, packaging and industrial manufacturing sectors continue to expand, demand for high-quality glass products and advanced production technologies is growing rapidly. AfriGlass 2027 responds to this demand by creating a focused marketplace for product sourcing, technology exchange and long-term partnership development.

The exhibition will feature a comprehensive range of solutions including architectural and processed glass, container glass, glass machinery and equipment, raw materials, accessories and innovative technologies supporting sustainable and energy-efficient production.

AfriGlass 2027 is set to become a key meeting point for stakeholders seeking to engage with Africa's evolving glass industry and explore new business opportunities across the continent.

WWW.EXPOAFRIGLASS.COM

VETROPACK

Digital recycling pilot concludes with valuable insights

In collaboration with **FEVE** (European Container Glass Federation), Podravka, a multinational company and one of the country's leading food producers, and the local municipal service provider Komunalac, **Vetropack** Straža recently completed the Digital Recycling Pilot Project in Koprivnica, Croatia. Launched in 2024, the project aimed to raise awareness and improve glass recycling through data-driven digital communication. It also supports the development of more effective communication approaches within the circular economy.

From October 2024 to March 2025, the Be a Hero digital recycling campaign was introduced to Koprivnica citizens to encourage more people to recycle their glass packaging. An initial consumer survey provided valuable insights into why some people regularly recycle their glass packaging while others do not, including common misconceptions about proper glass disposal, such as the belief that jars must be thoroughly washed, and concerns about convenience, such as the distance to bottle banks. These insights formed the basis for targeted messaging that addressed these concerns and emphasised the environmental benefits of recycling glass packaging.

Key insights and challenges from the digital pilot

Through digital channels, the pilot reached thousands of households and generated continuous engagement over the six-month period. Survey results confirmed an increase in awareness of correct recycling practices and a stronger sense of social responsibility, particularly among those who already recycled occasionally or regularly. The positive response to locally inspired messages showed the important roles proximity and relevance play in driving behavioural change.

The project also highlighted some important challenges. Digital communication alone had a limited impact on citizens who rarely or never recycled, suggesting that this group may require a different approach. It also became clear that messages must reflect real local conditions; when people perceive the recycling infrastructure as inconvenient, messages emphasising the "ease" of recycling can have the opposite effect.

The project showed how collaboration between industry partners, local brands and EPR schemes can make recycling communications more relevant and impactful.

WWW.VETROPACK.COM - WWW.FEVE.ORG

BEATSON CLARK

Amber glass as science and style

Beatson Clark's amber glass is Type III pharmaceutical glass manufactured to US and EU pharmacopeia standards, allowing no more than 10 percent light transmission between 290nm and 450nm.

The company has made its amber glass darker for improved light protection and premium appearance. Testing against an imported competitor bottle showed lower light transmission in critical ranges.

Amber glass also protects light-sensitive pharmaceutical products by filtering harmful wavelengths, ensuring stability and patient safety.

WWW.BEATSONCLARK.CO.UK

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BORMIOLI LUIGI & LIONGLASS

Deal renewed after successful trial run

Penn State's **LionGlass** project recently reached a major milestone in its partnership with Italian glassmaker **Bormioli Luigi** - marking one year of collaboration and the signing of a second-year agreement to continue commercialisation efforts in the cosmetics packaging industry.

The partnership, which began in 2024, aims to scale up LionGlass, a new family of glass developed at Penn State, as a sustainable alternative to traditional soda lime glass. LionGlass melts at temperatures up to 400 Celsius degrees lower than conventional glass and eliminates direct carbon dioxide (CO_2) emissions by removing carbonates from the glass batch. It also offers enhanced mechanical durability, in some cases up to 10 times higher crack resistance than conventional glass.

In March, researchers from Penn State joined Bormioli Luigi glassmakers for a pilot trial in Murano, Italy, home to some of the world's oldest glassmaking traditions. Over two days, the team melted two 100-kilogram batches of LionGlass in a rented artisanal gas-powered furnace and formed more than 150 clear glass cups, demonstrating that the glass can be manufactured at scale. Despite the furnace not being designed for the largest scale continuous production, the trial was deemed a success.

WWW.BORMIOLILUIGI.COM

UZ GLASS 2025

A great resounding story all in one trade show

Held last year from November 26 to 28 at the Uz Expo Centre in Tashkent, Uzbekistan, **UZ Glass** 2025 saw 144 brands from Germany, France, Italy, Czech Republic, Hungary, Russia, Finland, China, India, Turkey, Latvia, United States and Uzbekistan. Moreover, 2038 professionals from Uzbekistan, Kazakhstan, Italy, Switzerland, Iran, Egypt, Belarus, Czech Rep, United Kingdom, Poland, Ukraine, Saudi Arabia, Germany, India, Turkey, Turkmenistan, Kirghizia, Tajikistan, Azerbaijan, Russia and China all visited the fair.

All exhibitors present had the opportunity to receive visits from leading local glass container manufacturers and glass manufacturers and processors, as well as from other Central Asian countries and Russia.

This second edition also saw a greater number of visitors and exhibitors compared to the 2024 edition.

These figures consolidate the fair's leadership in the region and foreshadow a third edition in 2026 that will surely be very interesting for companies interested in this market. Uz Glass was quick to express its thanks to all the exhibitors for their support and trust, as well as to all its visitors - insisting that without them nothing would have been possible.

WWW.UZGLASS.COM

VETROPACK

Temporary shutdown of a furnace at Chișinău site

The **Vetropack Group** has started the controlled shutdown of one of the two furnaces at its plant in Chișinău, Republic of Moldova. The furnace will be out of operation for a period of at least six months. This decision is based on the continuing difficult market situation in Europe and the particularly challenging cost situation at the Moldovan site.

As Vetropack already informed at the end of October in an ad hoc announcement, the current market situation in Europe requires a strategic long-term management of production capacities. As of December 3, 2025, one of the two furnaces at the Chișinău plant was shut down in a controlled manner. This will reduce local production capacity by about one half.

High energy costs heavily impact location

The Chișinău site has been struggling with extremely high energy costs for a long time. Due to its geographical location and the tense political situation in the region, the Republic of Moldova is entirely dependent on energy imports for which it has to pay top prices. In contrast to the situation in many other European regions, recent months have seen a further deterioration of this energy crisis, and with it, the cost situation at the plant.

“Given these overall conditions, production is no longer competitive,” explained Johann Reiter, CEO of the Vetropack Group. “We have to take action now and temporarily reduce the site’s production capacity by half.”

The technical condition of the furnace will be maintained so that it can be recommissioned at any time, as soon as there is an improvement in the market. Vetropack will use this shutdown to carry out necessary repairs that will place the plant in a more competitive position going forward.

Unavoidable workforce reduction

Halving production capacity will have an impact on the local workforce. “We deeply regret that we cannot avoid redundancies,” said Johann Reiter. “This decision is not an easy one for us, especially in view of our highly committed workforce in Chișinău. We will do everything in our power to find socially acceptable solutions and are already in dialogue with colleagues who are affected by individual options.”

WWW.VETROPACK.COM

SEFPRO

Le Pontet: Sustainability starts with reliable data

Environmental Product Declarations (EPDs) for products manufactured at **SEFPRO** Le Pontet, France, are now available on the ENVIRONDEC platform, part of the International EPD System.

This milestone reflects SEFPRO’s commitment to verified environmental data and continuous improvement in operational environmental performance.

Making environmental performance measurable supports a more sustainable glass industry and helps customers reduce Scope 3 emissions.

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GLASS FUTURES & VEC

Partnership in UKRI-Funded AI glass initiative

Glass Futures and the University of Liverpool's VEC (Virtual Engineering Centre) are launching AI-GLASS, a digital twin project designed to accelerate decarbonisation and drive innovation in the glass manufacturing industry. This collaboration represents a major step in sustainable manufacturing and industry digitalisation.

As part of a wider GBP 1.5M project funded by UKRI, the AI-GLASS project will help industry partners accelerate decarbonisation efforts, improve efficiency and confidently adopt new low-carbon fuels and materials.

Located at Glass Futures' 165,000 square foot Global Centre of Excellence in St Helens, the project builds on the centre's pilot furnace and research labs. AI-GLASS will deliver a virtual replica of the glass manufacturing process, integrating advanced physics modelling and artificial intelligence for sustainable technology development.

The digital environment will empower manufacturers to experiment with specific variables in the process, such as transitioning to hydrogen or biofuels, and adjusting batch compositions without disrupting production or risking equipment. The system can instantly predict the impact on energy use, emissions, melt quality and operating costs, enabling fast, evidence-based decision-making.

AI-GLASS also features an immersive 3D digital twin of the entire Glass Futures site, crafted through a combination of BIM data, LiDAR scanning, and UAV photogrammetry. This photorealistic model will be instrumental in training, safety planning, remote walkthroughs and visualising live process insights.

AI-GLASS offers the tools necessary for exploring cleaner technologies like hydrogen firing and electrification safely and swiftly.

Dr Konstantin Vikhorev, Chief Technology Officer at the VEC, emphasised, "AI Glass will revolutionise how the industry approaches decarbonisation. By merging advanced modelling and AI, we can help manufacturers explore new fuels and materials in seconds, reducing risk and accelerating progress toward sustainable, efficient and cleaner glass production."

Justin Kelly, CEO of Glass Futures added, "Working with the VEC on AI Glass shows the power of collaboration in tackling global challenges. By combining digital twin technology with AI, we're creating a virtual environment that accelerates decarbonisation and gives manufacturers the confidence to innovate without risk - optimising processes, improving efficiency and cutting costs while maintaining quality and sustainability. This is innovation with impact."

AI-GLASS marks a significant leap forward for sustainable manufacturing, enhancing the UK's leadership in industrial digitalisation and clean technology innovation. By offering real-time, data-driven decision platforms, the project supports Glass Futures' mission to lead the global transition to environmentally responsible materials production.

The project builds on the Centre's previous research demonstrating that sustainable biofuels can reduce carbon emissions by up to 80 percent compared with high carbon natural gas, further promoting sustainability through advanced testing and technology development.

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GTS

New large-scale research furnace commissioning completed

Glass Technology Services (GTS) has successfully completed the construction and commissioning of its new large-scale research furnace at its Sheffield laboratory facility. The completion marks a major expansion of its capabilities in glass melting and materials innovation.

GTS has been carrying out world-leading research in both mainstream and specialist glass fields for over a hundred years, but until now, glass melting trials have been limited to batches of a maximum of 2 kilograms per melt.

The newly commissioned furnace increases this capacity, enabling melts of up to 50 kilograms, providing a greater representative scale for research trials and pre-commercial development.

The development of its High Temperature Melting Observation System (HTMOS) is a unique melting facility designed to GTS's own specification by A.F.T (UK), with a range of bespoke components to enable better glass observation, measurement and control.

"This investment represents a significant evolution in our research capability," said GTS Chief Executive Gareth Jones. "By bridging the gap between small-scale laboratory melts and industrial production, we can offer our partners and clients deeper insight, greater confidence and a faster route to innovation."

GTS's larger melting capacity will sit alongside existing melting capabilities, enabling staged glass trials to validate findings from small-scale melts. The furnace is equipped with an expanded suite of analytical tools that transform GTS's ability to observe and quantify melting behaviour, including:

- Gravimetric monitoring to track mass changes and material evolution throughout the melt
- In-furnace camera systems to visually record melting progression and batch reactions at temperature
- Offgas analysis enabling real-time monitoring of gases released during melting and refining
- Sampling during melting for intermediate assessment of seed, refining and batch free times
- Stirring and viscometry with indicative viscosity measurement as the melt progresses

The new furnace also enables melting up to 1,600 degrees Celsius, opening pathways for the development of new glass compositions, including advanced and high-temperature formulations.

WWW.GLASS-TS.COM

The 35th China International Glass Industrial Technical Exhibition

Shanghai New International Expo Centre

April 7th-10th, 2026

Host: The Chinese Ceramic Society

Organizer: Beijing Zhonggui Exhibition Co., Ltd.

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ISPLASTICNECESSARY

New technology for shipping bulk glass bottles and jars

Retired California native and inventor Mark Costello, **isplasticnecessary.com**, has reverse engineered the standard shipping method for bottles and jars.

The standard method of shipping bulk bottles and jars post production is to stretch and wrap the pallet before it is shipped to the customer. While working at a major winery in central California, Costello noticed how much plastic was being thrown away after each production run. He also noticed that when a trailer full of glass came into the winery to be unloaded, the glass stacks required up to eleven air bags to hold them in place.

After several designs, he started the process of designing and patenting his version of how glass bottles and jars should be stabilised before shipment. Costello said, "My shipping method will truly make producing single use glass containers environmentally sustainable and will eliminate the need for stretch wrap and airbags currently being used by these facilities."

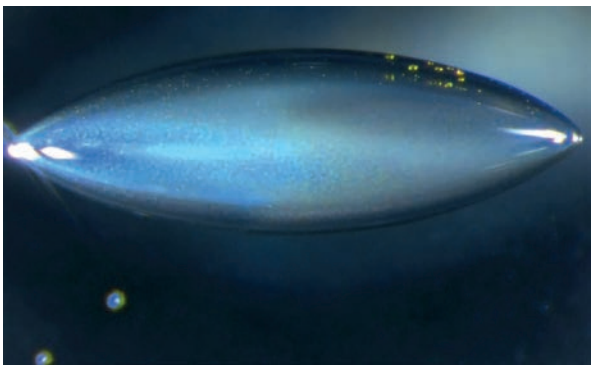
Costello also emphasised the importance of being first to change over. "The first glass plant that changes over will experience benefits that their competitors will never see. One of the biggest is having a new tool for the procurement of new customers. A plant can sell the same product without plastic and paper airbags and work out a long term contract where both parties see no loss on their ROI."

WWW.IISPLASTICNECESSARY.COM

IGR

Seeds and blister content analyses

The IGR Institut für Glas- und Rohstofftechnologie (Institute for Glass and Raw Materials Technology) is a globally recognised, DIN EN ISO/IEC 17025:2018 accredited service provider for the glass industry, raw material producers and food technology. As a reliable testing laboratory, IGR routinely offers seed and blister content analyses. Typical blister content analysis is performed using gas chromatography, mass spectroscopy and/or Raman spectroscopy and covers gases including H2, Ar, O2, N2, CO2, SO2, CO, COS, H2S, CH4 and H2O.



It is particularly important that all gases -explicitly including sulphur modifications- as well as pressure, are analysed during blister content analysis to obtain a meaningful interpretation of the origin.

In addition to gas content analysis, IGR uses microscopy to examine the inner surface (e.g. crystals or droplets) as well as the shape, size and location of seeds or blisters, enabling guidance on how to avoid these gas inclusions in future. If abnormalities such as streaks or particles are found in the surrounding area, a SEM-EDX examination is carried out to obtain additional information about the cause of blister formation. IGR interprets results based on macroscopic and microscopic examinations, blister content determination and client information such as melting tank and raw material parameters and cullet qualities. This enables clear recommendations to prevent future blister formation. IGR also analyses special "vacuum blisters" (vacuoles), which contain no crystalline or gaseous content and occur when glass cools too quickly during production. These disappear when reheated to approximately 650-680°C.

WWW.IGRGMBH.DE

GLASS FUTURES - F.I.C. (UK) -ENCIRC

Completed first trials mark new chapter in Glass Futures' mission

Glass Futures has reached a significant milestone in its mission to accelerate the decarbonisation of energy intensive industries, with the successful completion of alternative fuel trial programmes testing biofuels and electric melting, and commissioning hydrogen capabilities on its 30 tonnes-per-day pilot line.

The achievement comes almost exactly seven years after the organisation secured funding for its first Industrial Fuel Switching projects from the Department for Energy Security & Net Zero, marking a new phase of innovation and momentum for the global glass sector.

These complex, multi-pathway trials that started in October 2025 have delivered groundbreaking results that demonstrate the technical potential of low-carbon fuel technologies at industrially relevant scales.

Key successes include the installation and commissioning of a bespoke bio-fuel delivery system, fully integrated into the site's digital control environment which has been used to successfully fire four novel, low-cost, waste-derived biofuels for sustained periods over several days.

The Glass Futures team, supported by **F.I.C. (UK)**, installed, commissioned, and trialled a custom electric boost (e boost) system. The work tested a wide range of power settings, including rapid switching, to demonstrate how a glass furnace could provide demand side response capabilities to local electricity networks.

Glass Futures also commissioned a new hydrogen fuel delivery system on the pilot line, enabling successful firing of hydrogen supplied by **Ryze Power** and natural gas blends, up to 100 percent hydrogen.

Justin Kelly, CEO of Glass Futures, said, "The successful completion of these trial programmes marks a crucial milestone not just for Glass Futures, but for the industry's journey to net zero. We have demonstrated, at industrial scale, the technical viability of a number of alternative low-carbon fuel pathways that have never before been trialled in this way. It is a testament to the resilience, ingenuity and collaboration of the entire Glass Futures team."

Barry King, Engineering Manager at **Encirc** said, "Encirc is delighted to be part of Glass Futures' groundbreaking trials in biofuels, electric and hydrogen technologies. Collaboration and innovation are at the heart of our decarbonisation journey, and working together on these pioneering projects brings us closer to finding viable alternatives to fossil fuels.

"By exploring new energy pathways side by side with industry partners, we're helping to shape a more sustainable future for glass manufacturing and the communities we serve."

With completion of these first trial campaign around alternative fuels, Glass Futures has already progressed into detailed discussions with its members around the next campaign, exploring the next generation of raw materials and process innovations, and looking to the third campaign, to explore product innovations in both flat and packaging glass.

The technical teams are collating the results from this first campaign to ascertain the technical readiness of each alternative fuel pathway, and how this will influence the broader policy landscape for decarbonisation.

Glass Futures has now commenced the next phase of pilot activity through its AI-GLASS project, funded by the Made Smarter Innovation Programme at Innovate UK, which will gather operating data to validate the advanced furnace model, allowing advanced sensing, digitalisation and intelligent control to further optimise industrial furnace performance and reduce emissions

WWW.GLASS-FUTURES.ORG - WWW.FIC-UK.COM - WWW.ENCIRC360.COM

VETROPACK

Melting furnace to be shut down earlier than planned

The **Vetropack Group** has informed its employees in Kremsmünster, Austria, that it will shut down one of the three melting furnaces at the site earlier than originally planned. The move supports long-term site development and is part of a planned merger of two furnaces into a modern, larger and more climate-friendly production facility.

Due to the tense European market situation, the company decided to bring forward the planned shutdown. This allows sustainable reductions in energy consumption and costs.

The shutdown process will start at the end of April and will impact the local workforce. Most job reductions will occur through temporary contracts and natural attrition, with further solutions including voluntary severance payments.

The furnace merger planned for 2028 will enable production with a larger, more energy-efficient facility, contributing to CO2 reduction goals.

WWW.VETROPACK.COM

ZIPPE

Project update - site visit at Visy in Australia

As part of ongoing project execution, Joachim Ullrich, Head of Electrical & Process Automation at **Zippe**, visited Australia to collaborate with **Visy** and the local project team.

The visit focused on construction progress review, alignment of technical requirements and preparation for commissioning phases.

On-site collaboration strengthens partnerships and ensures smooth project transition into 2026.

WWW.ZIPPE.DE - VISY.COM

NOVAXION

Strengthening of Sales & Services organisation

Novaxion, part of **Rondot Group**, has evolved its organisation to reinforce Sales & Services capabilities.

Dumesny Mathieu becomes Acquisition Process Director. Melanie Basset joins as Sales Director. An independent Service & Support Division has been created to manage maintenance, technical support and training.

The new structure enhances responsiveness in productivity, quality, digitalisation, safety and environmental performance.

WWW.NOVAXION.FR - WWW.RONDOT-GLASS.COM

INTERNATIONAL GLASS MANUFACTURING SHOW

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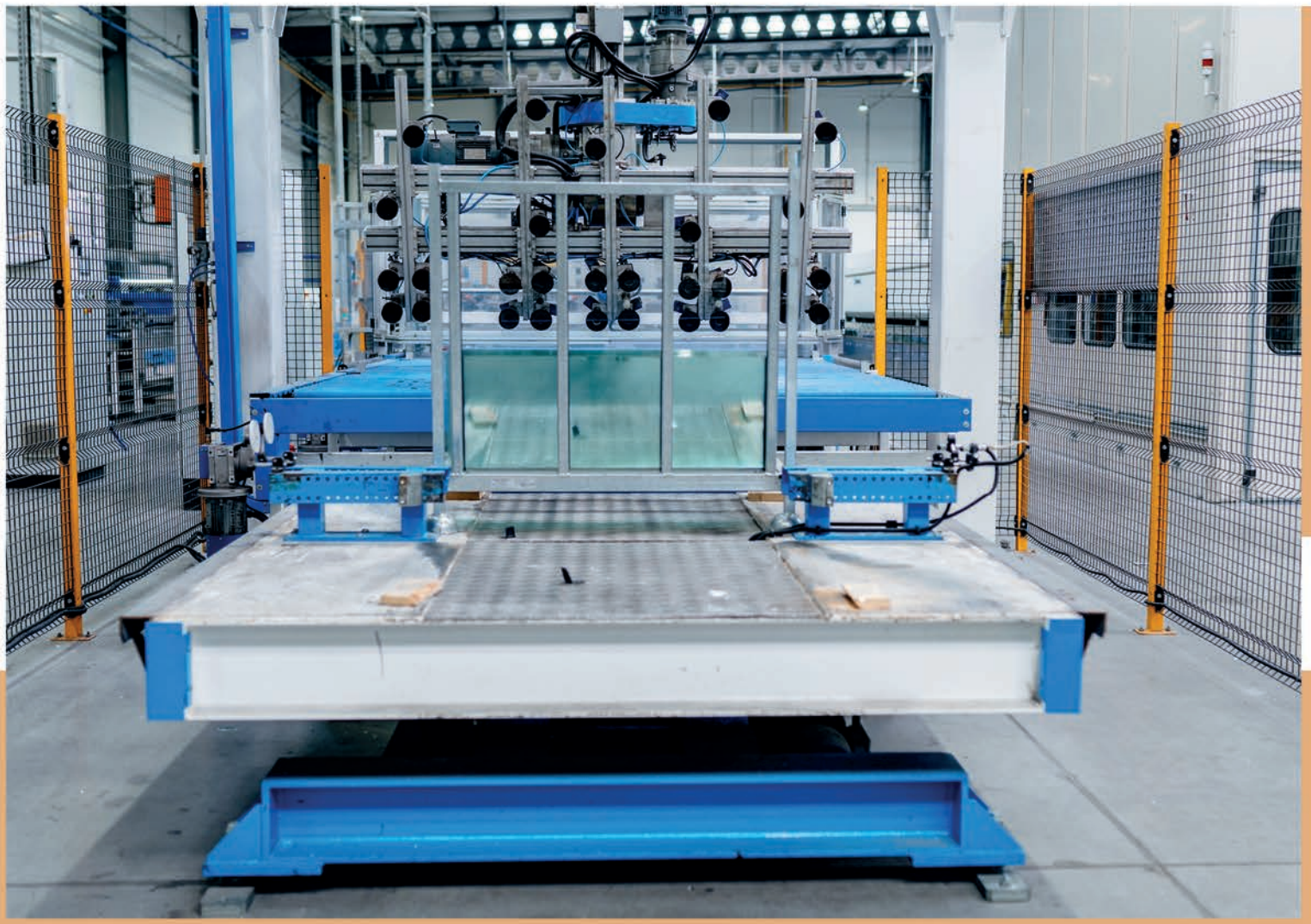
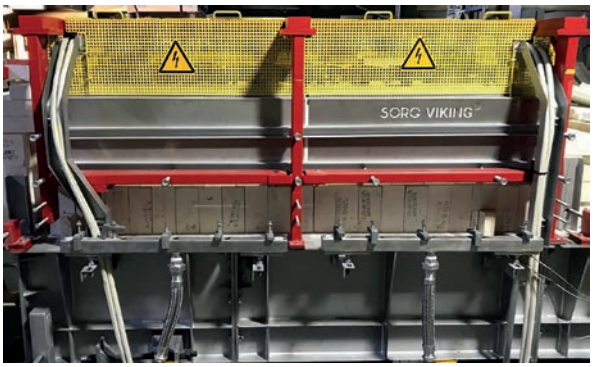


GLASS-SHOW.COM

SORG

Electric VIKING® forehearth proves itself in long-term use



SORG has advanced sustainable glass production with its Viking® forehearth, enabling 100 percent electric glass conditioning for all tonnages.

The first installation has successfully passed long-term industrial testing. Heating elements integrated into the superstructure prevent local overheating and eliminate contamination risks.

Installed with an emergency gas backup system that has not been needed, the Viking® performed conditioning flawlessly. Together with VSM®, VSM+® and the CLEAN Melter® hybrid tank, SORG technologies enable up to 100 percent CO2-free glass production from melting to conditioning.

WWW.SORG.DE

BUCHER INDUSTRIES

Release of financial results for fiscal year 2025

In 2025, some of **Bucher Industries**' markets stabilised, particularly in Europe. Order intake was higher than the prior year despite tariff uncertainties. However, sales declined due to a low order book at the start of the reporting period.

For 2026, stable sales are expected on a comparable basis, with an operating profit margin of around 8 percent excluding property sale effects.

Business performance of Bucher Emhart Glass

Overcapacities at glass manufacturers influenced demand, particularly in Europe and North America. Order intake fell significantly, especially for glass forming machines and sections, while service and spare parts remained more stable. Sales and operating margins were significantly lower than the prior year.

WWW.BUCHERINDUSTRIES.COM

RONDOT FRANCE & FERMAC

Local presence, global strength

Fermac and **Rondot France** have deepened their strategic partnership to strengthen customer proximity and service capabilities.

The collaboration covers Europe (France and Belgium), North Africa (Tunisia, Algeria, Morocco) and Sub-Saharan Africa (Angola, Cameroon, Congo).

Dedicated teams from both companies will support customers with engineering expertise and local service presence.

WWW.FERMAC.IT - WWW.RONDOT-GLASS.COM

VERALLIA

Potential Europe industrial footprint weighed

Following market contraction in Europe, **Verallia** conducted a strategic review to adjust production capacity.

In Germany, production may be refocused on three sites, potentially leading to the closure of Essen and affecting around 300 positions.

In France, shutdown of a furnace at Châteaubernard is being considered, potentially affecting 60 positions through voluntary departures.

In the UK, closure of an end-of-life furnace in Knottingley and restart of a more efficient furnace in Leeds are under consideration, with redeployment options explored.

WWW.VERALLIA.COM

KANDIL GLASS

Financing agreement signed with Banque du Caire

Kandil Glass has signed a USD 26.7M financing agreement with Banque du Caire.

The funding will support construction of a new glass manufacturing plant in the Ataqa Free Zone, Suez Governorate, Egypt, with a capacity of 100 tonnes per day, as well as CAPEX investments in existing facilities.

The partnership supports sustainable growth, export expansion and development of local manufacturing.

WWW.KANDILGLASS.COM

VERALLIA ITALIA

Expansion of largest distributed generation deal with Verallia Italy

EDP Energia Italia has extended its partnership with **Verallia Italia** by adding 1 MWp of solar capacity to existing installations across five plants. Total annual generation will reach 17 GWh, avoiding nearly 8,500 tonnes of CO2 annually. The new installation in Pescia, Tuscany, will be operational in 2026. The partnership supports Verallia's CSR roadmap and emission reduction targets.

WWW.IT.VERALLIA.COM

GLASS FUTURES team-up with STARA GLASS for clean manufacturing

Built by the glass industry for the glass industry. The unique, independent, GLASS FUTURES' industrial scale pilot facility now in operation in St Helens, in the UK features a highly innovative oxy-fired multi-fuel multi-purpose furnace designed by STARA GLASS. The Centre of Excellence aims to accelerate sustainable glass manufacturing globally through alternative fuels, carbon capture, digitalisation and circular economy innovation - all to de-risk disruptive technologies from laboratory concept to commercial deployment.

For the glass sector, the transition to low carbon production is as much about de-risking innovation as it is about rethinking energy and raw materials. Glass Futures has been created precisely to address this challenge. Built by the glass industry, for the glass industry, its Global Centre of Excellence in St Helens, UK exists to make materials industries clean, circular and driven by digital innovation. Operating as a research and technology membership organisation, Glass Futures is dedicated to leading the global shift to sustainable manufacturing while supporting companies along their sustainability journeys. Glassmaking members include AGC, AGI Glaspac, Ardagh, Encirc, Guardian, Knauf, O-I, Pilkington, SINA Medical Glass, Sisecam, Stoelzle, Verallia and Wiegand Glas. Brands such as Diageo, Edrington, Molson Coors, Nestlé and Velux are also members, alongside leading suppliers and academic bodies that form a collaborative network spanning the global glass supply chain. At the heart of Glass Futures' vision lies a clear mission: turning breakthrough ideas into industrial-scale impact. To

achieve this, Glass Futures positions itself not simply as a research body but as a collaborative platform. It works to support organisations as they define and implement their sustainability strategies, to demonstrate disruptive technologies under realistic operating conditions and to generate new, impactful ideas whose benefits can be felt from raw material suppliers through to brand owners and consumers.

WHY GLASS FUTURES?

What makes Glass Futures distinctive is the scale and configuration of its Global Centre of Excellence in St Helens. The site comprises a 165,000 square foot industrial facility and a 100,000 square foot industrial yard, conceived from the outset as an independent innovation ecosystem. Within this environment, a 30-tonne-per-day glass R&D capability offers industrial scale melting and forming capacity, supported by laboratory space, warehousing and logistics functions and a digital supply chain proving ground. This combination allows members and partners to explore solutions under conditions that closely mirror commercial operations, but without putting their own production furnaces at risk. The facility has been deliberately configured for flexibility and agility. It can support container and flat manufacturing processes, enabling a broad cross section of the glass industry to test technologies, process parameters and raw material strategies. Circular economy principles are embedded through the ability to trial new materials, alternative batch compositions and increased recycled content, while logistics and digital supply chain capabilities allow the wider implications of process changes to be explored in context. Around 60 highly skilled jobs and apprenticeships are associated with the site, reinforcing its role not just as a research hub but also as a training ground for the next generation of glassmakers and technical specialists.

BRIDGING THE TRL GAP

A central purpose of Glass Futures is to bridge the technology readiness level (TRL) gap that often separates academic research from commercial adoption. On one side of this gap lies fundamental research: solution focused work with limited commercial validation and no direct link to full scale industrial operation. On the other side stand commercial furnaces that typically run 24/7 for more than 20 years and are understandably risk averse, with operators reluctant to test unproven technologies on assets that underpin their business. Between these two worlds sits a significant technology block: ideas that look promising in the laboratory but cannot be trialled at production scale without unacceptable risk. Glass Futures addresses this block by providing a test and development environment that operates at industrial scale yet is dedicated to innovation and experimentation. The pilot line, with its 30-tonne-per-day nominal pull, sits between small scale, one-tonne-per-day trials and commercial scale, hundred-tonne-per-day furnaces. It responds to market demand for full-scale solutions while allowing both industry and academia to explore process changes, new fuels and alternative raw materials in a controlled setting. Here, technologies can be evaluated, refined and proven before being deployed on risk averse commercial furnaces. The membership model is open to any organisation and is central to this innovation ecosystem. By inviting cross-sector participation -drawing in manufacturers, suppliers, technology providers and academic partners- this model facilitates collaborations that might not otherwise occur. Members can engage with projects on the pilot furnace, share knowledge and help

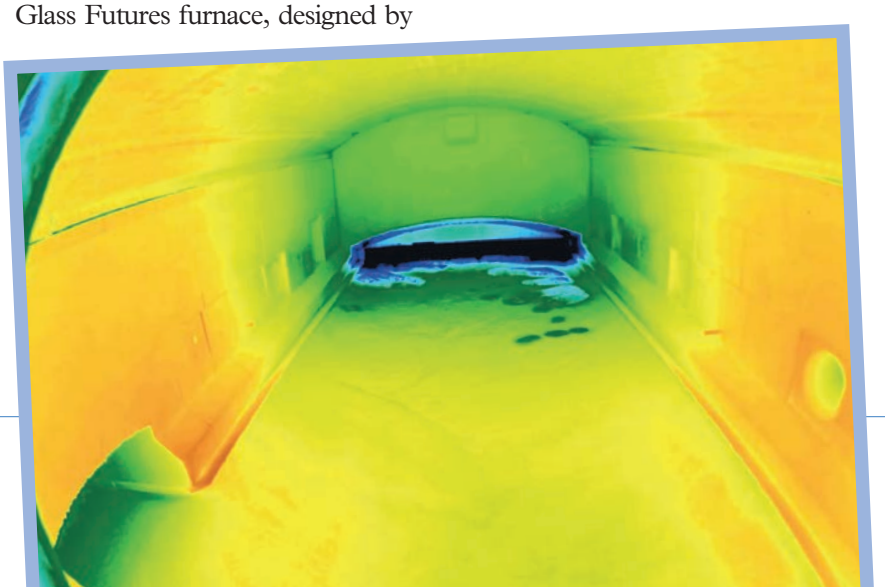
steer development programmes that are aligned with real world needs, all while spreading the risk and cost of experimentation across a broader community.

THE GLASS FUTURES PILOT LINE

The pilot line trial programme recognises the multiple pathways towards sustainable glass manufacturing. Phase one of the trials focuses on alternative fuels, addressing one of the most pressing challenges facing foundation industries: how to reduce carbon intensity while maintaining high temperature process performance. Subsequent phases of work are dedicated to raw materials and cullet trials, opening the way for new batch compositions, higher recycled content and industrial symbiosis concepts that integrate glass production with other sectors' waste streams. Within this framework, Glass Futures identifies several key opportunities to advance sustainable glass manufacturing. Alternative fuels -including options that are also relevant for other foundation industries- form one important pillar. Carbon capture technologies and strategies to increase recycled content and industrial symbiosis represent additional levers. Waste heat recovery, Industry 4.0 digital technologies, advanced sensors and automation all contribute to improved energy efficiency and process control. Finally, the exploration of new raw materials and batch compositions expands the range of technical solutions available to manufacturers seeking to reduce environmental impact while safeguarding product performance.

INSIDE THE GLASS FUTURES FURNACE

At the core of the pilot line is the Glass Futures furnace, designed by Stara Glass as a unique platform for the global glass industry. Conceived by industry experts for industry use, the furnace combines versatility with advanced engineering. It has a nominal pull of 30 tonnes-per-day and a melting area of 20 square metres, with a glass depth of 1.3 metres. The system is oxy-fired and capable of operating with different fuel types, including natural gas, hydrogen and other sustainable liquid fuels, as well as blends. Bottom electric boosting and bubblers provide additional flexibility in controlling temperature profiles and melt quality. The refractory configuration has been specified for both performance and experimentation.



Glass contact refractories are based on fused-cast AZS, while the crown uses low-lime silica. A full width doghouse and two batch chargers manage the introduction of batch materials, ensuring realistic simulation of industrial conditions. The furnace design includes a dedicated test pocket in the tank for glass contact refractory testing, allowing new refractory materials to be evaluated under genuine molten glass exposure. This is complemented by space in the waste gas duct for checkers testing and a very large waste gas duct that can be used for multiple purposes. The flue system is deliberately configured for trial work. It offers flexibility for testing waste heat recovery concepts, carbon capture approaches, sensor development and new refractory materials. In practice, this means that Glass Futures can host projects covering everything from flue gas composition and heat exchanger performance to the durability of novel materials and the behaviour of monitoring systems in real operating environments.

DESIGNING WITH SIMULATION AND DATA

Stara Glass has applied its proprietary FurnaceMaster® design and simulation software to the Glass Futures furnace, drawing on experience from hundreds of operational furnaces worldwide. All walls of the furnace and its overall performance have been analysed in detail. Design work has included comprehensive heat balance calculations, simulations of different pull and boosting conditions and the study of parameter variations such as cullet ratio and batch mix humidity. Heat loss analysis and three dimensional modelling have been used to understand and optimise thermal behaviour, feeding into both engineering refinement and didactic objectives. The result is not only a robust industrial scale furnace but also a teaching instrument for future generations of glassmakers. The extended design report produced for the furnace serves dual purposes: it provides the technical basis for reliable operation and constitutes a didactic resource that can be used to train engineers in furnace design, operation and optimisation. For Stara Glass, the project represents a turning point, marking the company's recognition alongside the highest levels of glass furnace expertise and significantly increasing its visibility and credibility in the market.

A PROVING GROUND FOR DECARBONISATION

Beyond its technical configuration, the Glass Futures furnace has already become a catalyst for broader collaboration and project development. Through its involvement with the facility, Stara Glass has embraced the organisation's purposes and has become part of cooperative efforts aimed at enabling truly sustainable worldwide glass production. Among these is the COREu project, focused on the introduction of carbon capture and storage technologies into the glass industry. Other significant cooperative initiatives are also emerging around the platform, reflecting its role as a focal point for decarbonisation-oriented innovation. In essence, Glass Futures provides the glass community with something that has long been missing: an industrial scale, independent proving ground where alternative fuels, new materials, digital tools and circular economy strategies can be tested under realistic conditions without placing commercial assets at risk. By combining a versatile oxy-fuel furnace, flexible flue gas infrastructure, laboratory support and a membership driven innovation ecosystem, it creates a space where disruptive technologies can be demonstrated, refined and translated into commercially viable solutions. As the Global Centre of Excellence in St Helens moves fully into operation, the furnace will quite literally begin to 'spit fire and glass' in the service of the industry that built it. Its 30-tonne-per-day pilot line, advanced design and membership structure position Glass Futures as a central actor in the journey towards sustainable glass manufacturing bridging the TRL gap, enabling cross sector collaboration and helping to make glass the low carbon material of choice for a sustainable future. ■

Glass Futures

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Precision through partnership: a joint HEYE-LINUO achievement

Otherwise known as Linuo Pharmaceutical, Shandong Linuo Pharmaceutical Packaging Co., Ltd. is a publicly-listed company founded in 1995. Now, with decades of expertise and a strong reputation in the glass industry, it has become a global leader in pharmaceutical and specialty glass packaging and is trusted by healthcare brands worldwide.

SUCCESS DOESN'T HAPPEN BY CHANCE - IT'S DRIVEN BY PEOPLE

This same conviction underpins its collaboration between Heye International GmbH. Here, Heye equipped Linuo with cutting-edge production machines and equipment and invested in its team through the HiSKILLS Campus, a programme built for practical, hands-on learning. Operating advanced equipment can be challenging - but with the right training, hesitation turns into confidence. Heye's approach ensures that every participant not only understands the technology but masters it: running complex systems smoothly, safely and free of downtime. This is how knowledge transforms into performance - and performance into success.

EMPOWERED TEAMS. SMART TECHNOLOGY. PROVEN RESULTS

Five Linuo specialists spent two intensive weeks at Heye's HiSKILLS Campus in Obernkirchen, engaging in an informative and collaborative experience with expert trainers. The outcome was tangible: strengthened confidence, sharpened competence and measurable improvements in production performance. As Mr Cui Chengzhong, Vice President and General Manager of the Moulded Glass Division, emphasises: "The training gave our team the confidence to operate and maintain the equipment efficiently. Everything was explained clearly and we now feel fully prepared for daily production tasks. Since completing the training, we've seen a noticeable improvement in machine uptime and overall efficiency. The practical approach and hands-on exercises made a real difference." Indeed the measurable increase in machine uptime and overall efficiency underscores the direct link between structured technical training and operational excellence.

THE STRENGTH OF A SMART PARTNERSHIP

Beyond immediate gains, the cooperation between Linuo and Heye highlights the long-term value of investing in people and technology simultaneously. When skilled operators meet high-performance equipment, production lines do not simply run - they operate at peak efficiency. The training strengthened the team's ability to make informed deci-

A strategic collaboration between HEYE and LINUO demonstrates how combining advanced equipment with structured, hands-on training drives measurable performance gains. Through the HiSKILLS Campus initiative, Linuo specialists have strengthened operational expertise - improving machine uptime, efficiency and long-term production reliability in pharmaceutical glass manufacturing.

sions on the shop floor, handle real-world scenarios with greater ease and leverage the equipment's full potential. This combination of expertise and innovation establishes a durable foundation for continued growth, reliability and quality in pharmaceutical glass manufacturing. It is a partnership defined by continuous improvement, shared ambitions and a commitment to excellence - one that demonstrates how strategic collaboration can elevate not only individual companies, but the broader glass industry. ■

ABOUT HEYE INTERNATIONAL

Based at Obernkirchen, Germany, Heye International GmbH is one of the container glass industry's foremost suppliers of production and inspection technology, high performance equipment and production expertise. The company's mechanical engineering has set industry standards for more than six decades, significantly contributing to its customers' success. Heye's vision is to ensure highly cost-effective, sustainable and safe operation of glassworks worldwide and thus further strengthen the position of glass as the packaging material of the future. The company considers glass as the purest and most natural packaging on our planet. As such, Heye's actions are driven by experience, courage and passion as it seeks to make a positive impact upon the environment and health, fostering a sustainable future - in the company's own words: Today. Tomorrow. Together.

heye international

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AB InBev expands PNEUMOFORE UV100 deployment

Expanded installations at AB InBev glass plants underscore how PNEUMOFORE UV100 air-cooled vacuum systems are delivering verified energy savings, stable high-speed forming performance and long-term reliability, as manufacturers pursue efficiency upgrades, lower defect rates and resilient 24/7 operations across modern hollow glass container production worldwide.

Engineer Daniel Hilfiker,
President of Pneumofore

Following the successful installation of Pneumofore UV100 vacuum pumps at the Tierra Blanca hollow glass plant in Mexico in 2020, two additional units have now been commissioned at the San Luis Potosí facility. Part of the Anheuser-Busch InBev group since 2013, Grupo Modelo has now installed the world's largest air-cooled vacuum systems for container glass manufacturing, Pneumofore UV100 rotary vane pumps. These units represent the most powerful air-cooled solution available globally for hollow glass production.

PROVEN PERFORMANCE

The first two UV100 pumps, each delivering the capacity of 6.610 m³/h, entered operation at Tierra Blanca in 2020. Their installation resulted in substantial reductions in electrical energy consumption. Based on verified performance data, a third unit was added to the same site in 2021. The demand for consistent high-speed, high-quality glass container production continues to accelerate. Efficient vacuum plays a decisive role, enabling optimal productivity and significantly lowering rejection rates. Today's inspection technologies classify more than one hundred potential defect types, spanning finish, neck, shoulder, sidewall, base, and other categories, as evidenced in leading technical studies in the

sector. While vacuum alone does not eliminate all defect modes, its contribution to forming precision, thermal stability, and process speed is widely acknowledged across the industry.

OPERATIONAL RELIABILITY

Continuous operations, typically running over three uninterrupted shifts, place strict requirements on equipment reliability and lifecycle efficiency. Maintaining stable performance with minimal main-

tenance and without major overhauls is increasingly regarded as an operational necessity rather than an advantage. Governmental pressure to reduce industrial energy consumption continues to intensify, often coupled with incentive programs supporting efficiency upgrades. Replacing legacy technology, particularly liquid ring vacuum pumps, with Pneumofore's rotary vane systems usually results in a reduction of absorbed power of 50%. The UV Series has also proven capable of replacing rotary screw vacuum pumps, which suffer efficiency decline and require scheduled overhauls after relatively short cycles of continuous 24/7 operation. Before every installation, Pneumofore conducts detailed energy audits and provides guaranteed performance commitments, including projected financial return.

SYSTEM ENGINEERING

Long-term operational experience remains the most credible reference for capital investment, especially when measured over multiple years of reliable performance. This has been demonstrated in AB InBev's case. In 2024, Pneumofore commissioned two additional UV100 units at the Vidriera Industrial del Potosí plant. In vacuum systems, the machine itself is only part of the equation; pipeline design, pressure loss control and system engineering are decisive in determining final performance. Pneumofore provides dedicated pipeline and system design support as part of its commitment to ensure installations operate efficiently over decades. ■

ABOUT THE AUTHOR

Pneumofore President Daniel Hilfiker represents the third generation of Swiss engineers managing Pneumofore, the world's oldest rotary vacuum pumps and air compressor manufacturer, celebrating more than 100 years of expertise. Daniel graduated as Mechanical Engineer at the Federal Technical Institute of Zürich, Switzerland, in 1993. He is personally engaged in R&D with strong commitment for lowest environmental impact which corresponds to minimal operational costs. He participates at worldwide conferences on a regular basis, given that his pneumatic theory and products are applied in many sectors including container glass production, can making, aerospace, medicine, food, petrochemical and more.

ABOUT PNEUMOFORE

Founded in 1923, Pneumofore manufactures vacuum pumps and compressors for industrial applications worldwide. Pneumofore compressors and vacuum pumps are found worldwide, whenever customers require extraordinary reliability and constant performance over time. Leader in the Rotary Vane technology, Pneumofore solutions focus on efficiency, durability, minimal Life Cycle Cost and high environmental respect.

Pneumofore

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Automation meets artistry: The HSTEC CPM approach

A persistent bottleneck in mould finishing finds resolution in HSTEC's CPM 200 and 400 series. Designed exclusively for cavity polishing, the system combines servo-driven control, programmable emboss omitting and wet/dry flexibility to deliver automated consistency without full robotic complexity.

In the lifecycle of glass container moulds, the finishing stage has notoriously been the most difficult to standardise. While rough machining is easily automated, polishing remains a stubborn outlier-often reliant on manual labour which is increasingly scarce, or expensive robotic cells that can be overkill for smaller batches. The industry has long needed a middle ground: a solution that offers the consistency of automation without the complexity of full-scale robotics. Enter HSTec Glass Systems with their

latest answer to this specific shop-floor challenge: the CPM (Cavity Polishing Machine) Series.

A DEDICATED SOLUTION FOR A DELICATE PROCESS

The CPM 200 and CPM 400 aren't just repurposed milling machines; they are purpose-built units designed solely for the geometry of mould cavities. The distinction matters. By focusing on this single task, HSTec has engineered a system that respects the nuances of the mould profile in a way that general-purpose machines often miss.

The series comes in two primary configurations to match production throughput:

- CPM 200: Equipped with two independent polishing heads.
- CPM 400: A four-head powerhouse designed for higher volume workshops.

Both iterations share a robust backbone: a servo-driven architecture managed by Siemens control systems. This isn't just about brand names; for the operator, it means the feedback loop is immediate. The pressure, spindle speed and rotation velocity aren't just 'set and forget' - they are fully adjustable parameters that can be tuned to specific mould alloys or surface finish requirements.

THE 'SMART' APPROACH TO RELIEFS: EMBOSS OMITTING

Perhaps the most significant engineering stride in the CPM series is the 'Four Section Emboss Omitting' feature. Any mould shop manager knows the frustration of automated polishing and washing out critical details. Bottom plate engravings, recycling codes, and complex logos are often the first casualties of aggressive mechanical polishing. HSTec addresses this by allowing operators to programme specific 'no-go' zones.

The machine's controller divides the mould rotation into sections. When the polishing head approaches a programmed relief area-say, a customer logo - it automatically retracts or reduces pressure, skipping that specific segment before re-engaging. This mimics the intuition of a skilled human polisher who knows exactly where not to press too hard, ensuring that the mould comes out with a mirror finish while the engravings remain sharp and legible.

VERSATILITY ON THE FLOOR

Recognising that no two mould shops run exactly the same protocols, the CPM series is agnostic regarding the medium. It supports both wet and dry polishing processes right out of the box. Furthermore, efficiency is driven by the self-centring workpiece fixture. In a high-mix environment where operators might be switching between different mould types multiple times a shift, the ability to clamp a piece and have it automatically centred cuts down setup time drastically. Coupled with an integrated dust extraction outlet, the machine also addresses the health and safety concerns associated with metallic dust in dry polishing environments.

THE BIGGER PICTURE: FROM STANDALONE TO SYSTEM

While the CPM 200/400 units function perfectly as standalone workhorses, they represent a piece of a larger puzzle. HSTec Glass Systems, with its roots deep in robotics and automation since 2016, views these machines as entry points into Industry 4.0. For facilities ready to go further, these units complement HSTec's broader portfolio of multi-machine automated robot cells. However, by offering the CPM as an independent unit, HSTec provides a scalable path for glass plants. You don't need to overhaul your entire workshop to get automated quality; you just need the right tool for the finishing touch.

IN SUM

With the CPM series, HSTec Glass Systems confirms its status not just as a machinery builder, but as a company that understands the granular realities of glass manufacturing. By solving the specific problem of 'emboss protection' in an accessible, automated package, the CPM 200 and 400 are poised to become essential assets for mould workshops aiming for perfection. ■

Premium spirits continuity reinforced by STOELZLE network strategy

Continuity under disruption has defined performance with STOELZLE securing uninterrupted premium spirits supply following a July 2025 UK fire - shifting volumes across its European network. The response, transparent coordination and accelerated rebuild earned the Diageo Global Supplier Award 2025 - reinforcing proven multi-site resilience.

Premium spirits brands require more than glass bottles. They rely on continuity: stable specifications, predictable deliveries and a partner capable of protecting brand plans when unexpected events disrupt production. Stoelzle's core strength lies in its own multi-plant manufacturing network, structured to absorb shocks and maintain customer supply without the need to qualify additional manufacturing footprints.

RAPID RESPONSE TO DISRUPTION

That capability was tested in July 2025, when a significant fire at Stoelzle Flaconnage's UK production site in Knottingley, West Yorkshire, caused substantial damage to the furnace and critical equipment. All employees were safely evacuated and no serious injuries were reported. However, the UK site faced months of full production downtime - precisely the type of disruption that typically threatens availability, launches and on-shelf presence. In immediate response, Stoelzle activated its Business Continuity Plan. Production volumes were transferred to backup facilities in Poland, Austria and France, ensuring uninterrupted customer supply during the UK outage. UK specialists supported start-up and on-the-job training at the backup sites, safeguarding consistent specifications, decoration interfaces and quality standards. Weekly updates on lead times and allocations provided customers with the transparency required for effective brand planning.

RECOGNITION FOR MEASURABLE PERFORMANCE

These coordinated measures -and the proven ability to protect supply throughout the UK site's downtime- earned Stoelzle the Diageo Global Supplier Award 2025. The recognition links the honour to performance under disruption, highlighting service continuity, close coordination and accelerated tooling and mould

management to protect supply for key brands. For premium spirits manufacturers, the award signals that security of supply is not merely a promise, but a demonstrated capability. Dr August Grupp, CEO of Stoelzle, underscores the operational imperative: "Premium spirits brands cannot afford supply disruption in today's volatile market. When our UK site went offline, our network absorbed the shock and kept our customers on schedule. That is what supply chain resilience means."

ACCELERATED REBUILD AND NETWORK STRENGTH

In parallel, Stoelzle Flaconnage completed an accelerated rebuild and resumed operations on 22 December 2025, installing cutting-edge furnace technology and new high-performance forming lines. Since restart, ramp-up in the UK has been seamless, maintaining continuous supply and reliable delivery performance. The investment strengthens process stability and efficiency, supporting higher throughput and reinforcing resilience for premium spirits customers. For procurement leaders, the conclusion is direct: Stoelzle operates multiple production sites with built-in backup. Whether brands opt for dual sourcing or a single-source partnership with robust risk mitigation, the network ensures continuity while simplifying procurement coordination and keeping brand plans on track. ■

ABOUT STOELZLE

Stoelzle is a global leader in the manufacture and decoration of glass packaging for premium brands across the spirits, beauty, healthcare and consumer (food and beverage) sectors. Founded more than 200 years ago in Austria, the company became part of the family-owned CAG Group in 1987. Since then, it has expanded beyond its Austrian roots to become an international organisation. Today, Stoelzle operates six production sites and four decoration facilities across Europe and North America, supported by sales offices in Austria, the United Kingdom, France, the United States, Poland, Italy and beyond. This global network enables the group to serve brands of all sizes with the same dedication and forward-thinking spirit: delivering innovative glass solutions that reflect quality, creativity and responsibility - all anchored in a strong commitment to excellence.

STOELZLE

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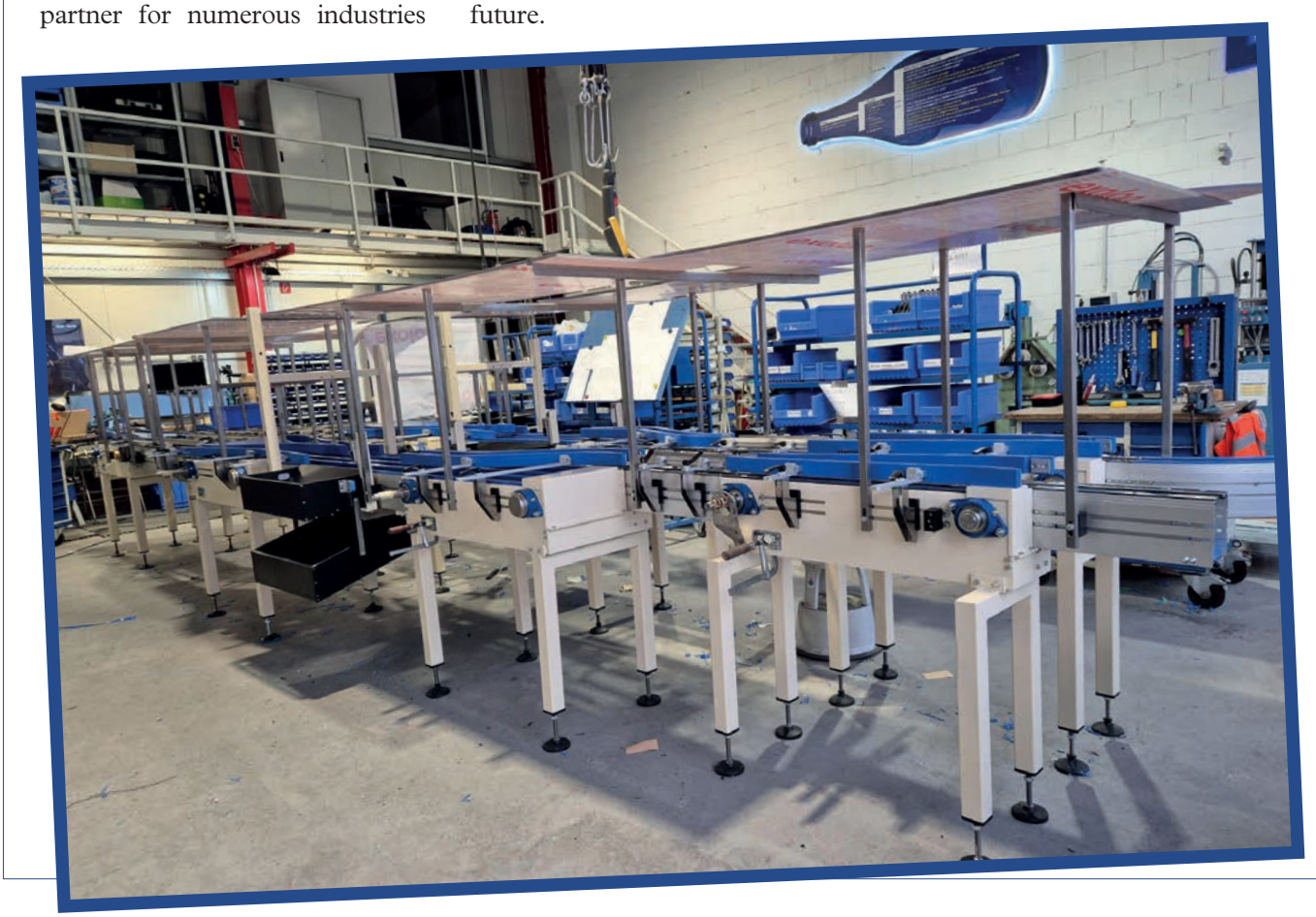
Driving process optimisation: how DMA elevates conveyor performance

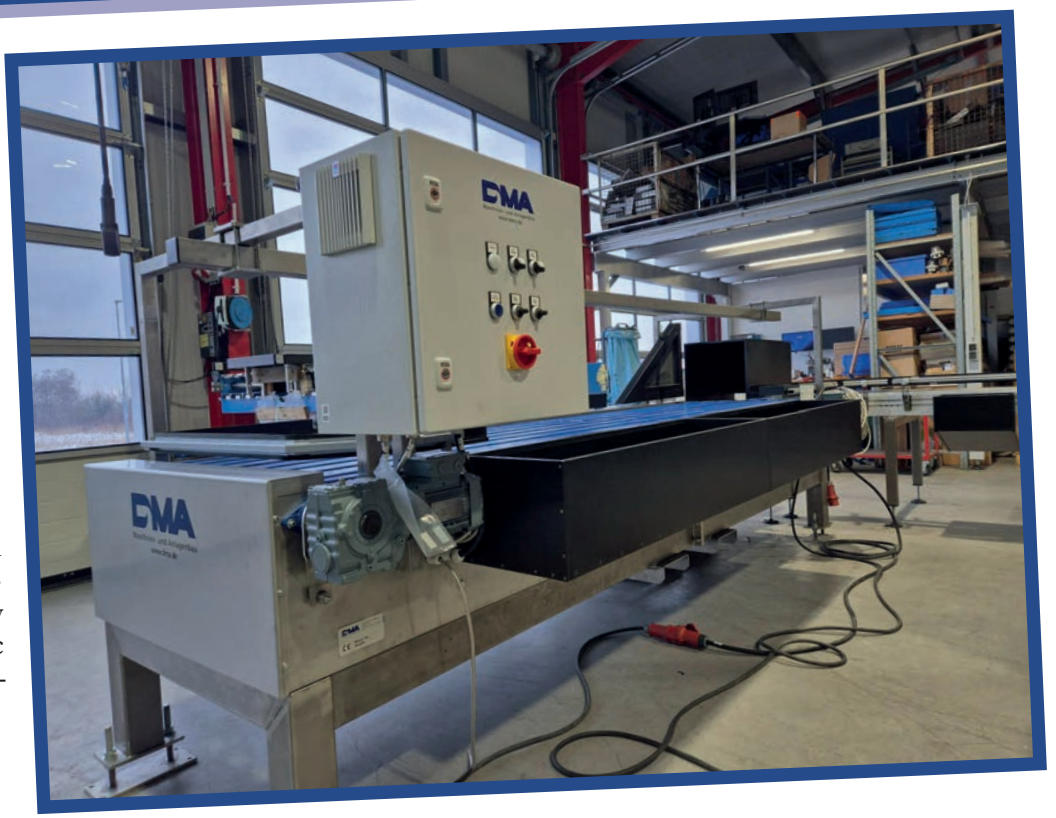
For many years, DMA Maschinen und Anlagenbau GmbH & Co. KG has been among the technological leaders in the field of conveyor and process technology. As a strong partner for numerous industries -including container glass, food processing, bakeries, beverage filling and dairy products- DMA supports its customers in implementing production processes that are efficient, safe and ready for the future.

MADE IN GERMANY QUALITY – COMBINED WITH MODULAR FLEXIBILITY

DMA relies upon high-quality, durable systems that impress



Innovative conveyor and process solutions are redefining production standards, with DMA delivering modular flexibility, comprehensive service, digital customer integration and targeted technological advancements. From metal detection cleaning systems to precise product orientation, the company enhances efficiency, reduces downtime and strengthens long-term operational reliability across industries.



with their robust construction and precise engineering. The modular system architecture allows conveyor technology to be integrated into existing production lines with great flexibility - step by step and precisely tailored to individual requirements. This reduces conversion times, increases production efficiency and enables strategic planning of investments.

COMPREHENSIVE SERVICE: FROM CONSULTATION TO LONG-TERM SUPPORT

A central element of DMA's philosophy is its all-in-one service approach, which includes:

- tailored consultation and precise planning,
- manufacturing and delivery of equipment,
- professional installation and commissioning,
- long-term support, maintenance, and fast spare parts supply.

The goal is to minimise downtime, maximise system availability, and sustainably optimise production processes.

DIGITAL TRANSFORMATION IN SERVICE: NEW CUSTOMER PORTAL UNDER DEVELOPMENT

To further strengthen its service offering, DMA is currently developing a digital customer portal that will provide even faster and more intuitive access to essential information. In the future, the portal will allow customers to:

- view all DMA machines and systems installed at their facility,
- access comprehensive spare parts lists,
- request or directly order spare parts.

In parallel, the company is planning an expansion of its spare parts warehouse to reduce delivery times and, if desired, take over inventory management directly on behalf of customers. With this, DMA further expands its role as a reliable and proactive service partner.

NEW CLEANING STATION REDUCES REJECTION RATES IN METAL DETECTION

Alongside digital enhancements, DMA is investing heavily in technological innovation. One of the latest developments is a cleaning station specifically designed to reduce rejection rates in metal detection processes.

By continuously cleaning the conveyor chain, the system removes metallic residues and contamination that previously caused false measurements. This enables more precise adjustment of metal detectors and significantly reduces the number of incorrectly rejected products.

Key advantages include:

- significantly reduced material losses,
- increased process stability,
- improved system availability,
- easy integration without major structural modifications.

This makes the new cleaning station particularly suitable for ongoing production environments where interruptions must be kept to a minimum.

PRECISE PRODUCT ORIENTATION: DMA'S NEW 'ORIENTER'

Another innovation focuses upon the precise orientation of shaped products during production. With the newly developed 'Orienter', DMA addresses a challenge common in many industries: products are transported in undefined positions but must enter downstream processes -such as labeling- in a perfectly controlled orientation.

The Orienter ensures that products are automatically and reliably aligned on their narrow side. The system offers several advantages:

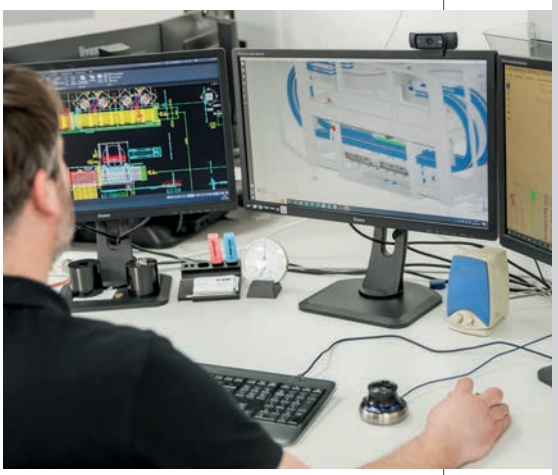
- higher process reliability
- fewer manual interventions
- consistently high quality
- easy integration into nearly any conveyor system

Control can be executed via the central system control or autonomously by the Orienter, allowing for maximum flexibility.

TRADITION MEETS INNOVATION

With deep roots in Marienmünster, DMA Maschinen- und Anlagenbau GmbH & Co. KG looks back on a long industrial tradition. Today, the company combines this experience with state-of-the-art technology, strong customer focus and a high level of innovative strength.

DMA demonstrates that German engineering continues to be in demand worldwide when quality, service and innovation come together consistently.



DMA Maschinen- und Anlagenbau

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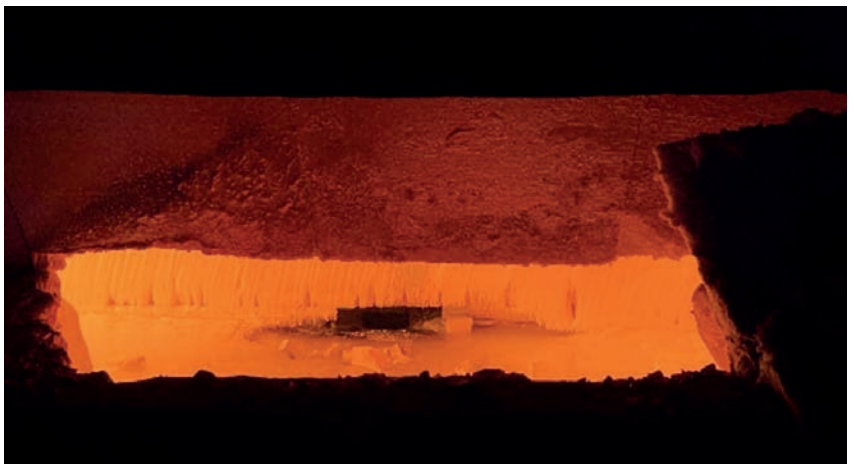
Oxy-fuel furnace reliability reinforced by SEFPRO

SEFPRO CARE® REPAIR HOT BOTTOM: ENSURING CONTINUOUS PRODUCTION FOR OXY-FUEL CONTAINER GLASS FURNACES

For glass manufacturers, a full production line shutdown for furnace maintenance results in significant losses. SEFPRO CARE® faced a remarkable challenge: performing China's first-ever hot-state furnace bottom repair without shutdown for a container glass manufacturer in Henan Province, China. A follow-up inspection four months later confirmed that the repaired section remains stable, successfully helping the client avoid massive losses from production stoppage.



SEFPRO CARE® REPAIR HOT BOTTOM AZS, THE SOLUTION FOR OXY-FUEL FURNACE BOTTOMS

During routine monitoring, the client identified a serious risk of material leakage at the bottom of their 60 m² all-oxygen furnace, a key component of their production line.

This situation created a difficult dilemma: shutting down for a cold repair would have meant a complete production stop, resulting in significant financial losses and delays in fulfilling essential orders. Continuing operations, on the other hand, posed the danger of a severe molten glass leak, which could lead to irreversible equipment damage and major safety hazards.

Faced with this urgent challenge, the client turned to SEFPRO CARE®'s advanced hot repair technology - a solution designed to restore furnace integrity without interrupting production.

REPAIR HOT BOTTOM AZS, THE KEY TO RELIABLE OXY-FUEL FURNACE PERFORMANCE

Backed by a dedicated emergency response team with extensive hands-on experience, SEFPRO CARE® is committed to solving unexpected production challenges and ensuring uninterrupted operations for glass manufacturers. When a critical hot bottom repair was required by a customer, the team mobilised immediately and arrived on-site without delay. Working in extreme conditions, close to temperatures approaching a thousand degrees Celsius, SEFPRO experts collaborated

By completing China's first hot-state furnace bottom repair without shutdown, SEFPRO has helped one Henan manufacturer avoid major losses whilst ensuring long-term furnace stability and operational safety. Here the company demonstrates how SEFPRO CARE® Repair Hot Bottom AZS enables continuous oxy-fuel container glass production.

with the construction crew to execute this complex 'surgical' intervention.

The process began with a precise diagnosis using endoscopic inspection to identify the erosion and define a detailed technical plan. Preparations included draining molten glass, drilling the breast wall, and filling eroded areas with AZS crushed blocks. A customised injection lance was designed to match on-site conditions, and a screw pump trial run ensured flawless execution. This combination of technical rigour and rapid response exemplifies SEFPRO CARE®'s role as a trusted partner in maintaining furnace integrity without compromising production.

FROM EMERGENCY TO PERFORMANCE: SEFPRO CARE® REPAIR HOT BOTTOM AZS IN ACTION

SEFPRO CARE® is dedicated to ensuring uninterrupted glass production through rapid, technically advanced repairs. When an urgent hot bottom repair was needed, the team mobilised immediately and worked under extreme conditions near temperatures of a thousand degrees Celsius. Using Repair Hot Bottom AZS material engineered for corrosion resistance and thermal stability, the repair was executed with precision through a custom injection system. In just five hours of injection and twenty-three hours of sintering, the furnace was ready to restart within 120 hours, minimising disruption and safeguarding the client's operations.

The repair was completed within an exceptionally short timeframe:

- Only five hours of injection
- Followed by twenty-three hours of sintering
- Allowing the furnace to restart in only 120 hours

This rapid intervention minimised production disruption and safeguarded the client's operations. Three months after the repair, SEFPRO CARE® conducted a dedicated follow-up inspection. The results confirmed that the hot-repaired area remained stable and free of abnormalities, proving the long-term performance of the Repair Hot Bottom AZS solution and reinforcing the commitment to keeping glass furnaces running without costly downtime. ■

"SEFPRO's rapid response and cutting-edge hot repair materials helped us avoid immeasurable production losses. The smooth operation over the past few months is the strongest proof of success!" On-site manager

Selflow and easily pumpable Repair Hot Bottom AZS installation.

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Trendsetting furnace visibility – all thanks to LAND

Glass furnaces remain among the most energy-intensive assets in industrial manufacturing, with performance governed by complex interactions between combustion, batch behaviour, heat transfer and refractory condition. Traditional point measurements and visual inspections offer limited visibility - leaving operators to balance energy consumption, emissions and glass quality largely through experience and manual adjustment. Here the Near Infrared Borescope (NIR-b) portfolio from LAND addresses this gap by delivering continuous, in-furnace thermal imaging that's specifically designed for harsh glass-making environments

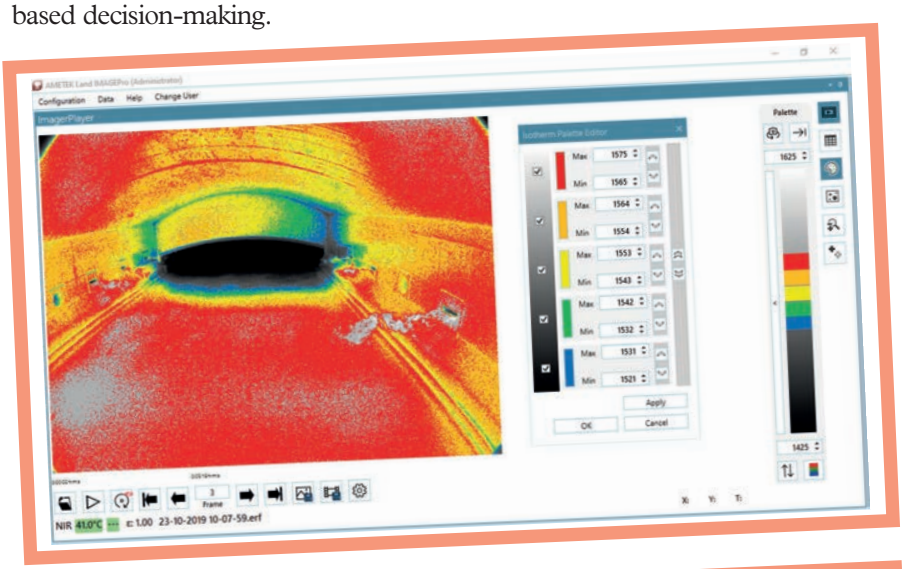
VISIBILITY

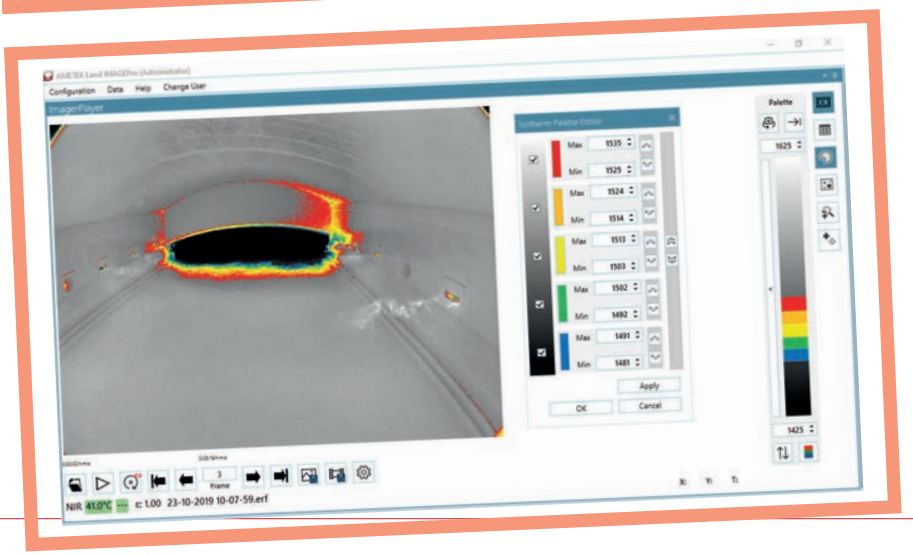
At the core of the system is the NIR-b-2K HD camera, which increases image resolution by an order of magnitude compared with earlier generations. With pixel-level thermal detail, operators can observe temperature gradients across the crown, sidewalls, regenerators, and batch blanket in real time. This higher definition is not cosmetic; it allows precise identification of hot spots, cold zones, flame impingement, and asymmetric heat transfer that directly affect melting efficiency and refractory life.

Thermal imaging supports the primary goals of melting: maintaining a stable temperature profile for consistent glass quality, minimising wall and stack losses, optimising combustion, and reducing overall fuel consumption. Unlike PID-controlled processes, most glass furnaces rely on manual control. NIR-b data provides the quantitative feedback needed to make informed adjustments, transforming subjective judgement into evidence-based decision-making.

CONTROL

Multiple visualisation modes enhance operational insight. Black-and-white palettes reveal air ingress and batch patterns, while rainbow isotherms segment hot and cold regions into defined temperature bands. Flame shape and intensity monitoring highlights





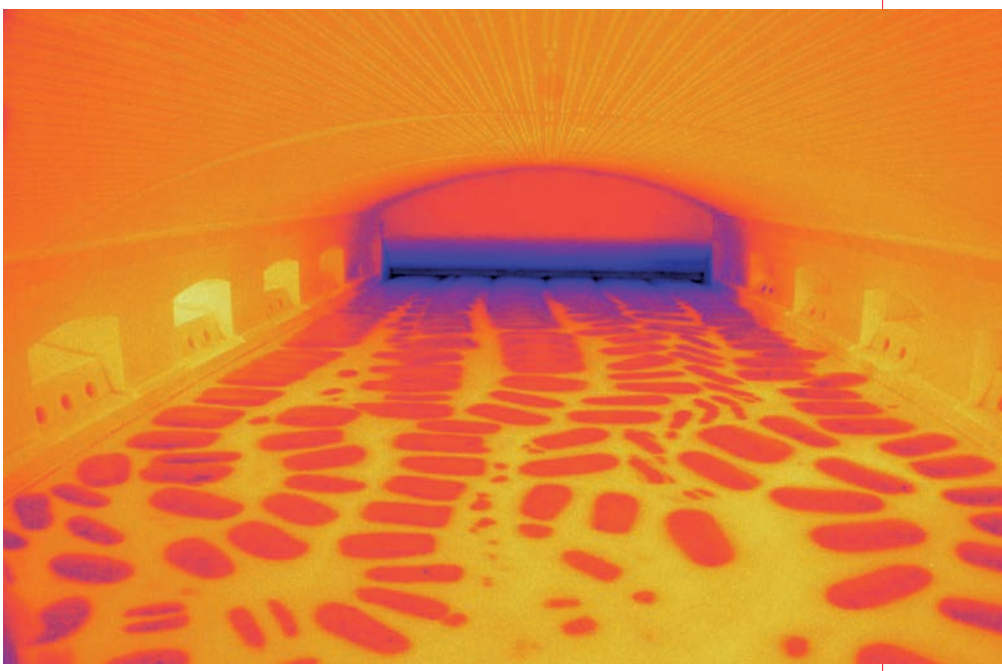
LAND introduces advanced near-infrared thermal imaging that enables glass manufacturers to visualise furnace behaviour with unprecedented clarity - all to link real-time temperature data, combustion dynamics and batch tracking to measurable gains in energy efficiency, emissions reduction, asset protection and day-to-day operational control across furnace types.

zones of incomplete combustion or excessive radiant loading, supporting emissions reduction strategies in both air-fuel and oxy-fuel furnaces. Continuous temperature trending across defined regions of interest enables monitoring of highest, average, or lowest temperatures depending on operational priorities.

For oxy-gas and hybrid furnaces, the benefits extend further. Thermal profiling combined with isotherms allows accurate batch line positioning, identification of burner block fouling or overheating, assessment of flame impact on refractories, and early detection of abnormal conditions requiring maintenance intervention. Survey mode configurations, supported by water-cooled probes and transportable kits, enable temporary inspections during heat-up, cool-down or troubleshooting phases without permanent installation.

INTELLIGENCE

Digitalisation is reinforced through ImagePro V2 Glass software, which introduces advanced analytics and user interfaces tailored to glass operations. Neural-network-based batch tracking, derived from modified U-Net semantic segmentation architectures, delivers pixel-level classification of batch coverage regardless of furnace design. Compared with traditional threshold-based methods, this approach improves accuracy and robustness, providing reliable batch line determination and enabling data exchange with SCADA systems via Modbus or OPC UA.



The result is a comprehensive thermal intelligence platform rather than a standalone camera. By combining continuous monitoring, AI-assisted analysis and optional AMECare advanced services such as thermal surveys, LAND supports combustion optimisation, predictive maintenance, quality traceability and extended asset life. The technology provides operators with a practical, data-driven way to balance energy efficiency, emissions compliance and stable glass production across small, medium and large furnaces. ■

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Evaluating low-carbon raw materials in glass production with GlassTrend

In quantifying how batch materials shape the carbon footprint of glass melting and exploring alternative raw materials for soda-lime-silicate compositions, GlassTrend's step-by-step approach linked lab assessment, energy demand, and integrated costs to show how decarbonised sodium and calcium carriers can cut emissions significantly.

FOUNDATIONS

GlassTrend begins from a fundamental question: which decarbonised raw materials can truly drive sustainability in glass manufacturing? The answer demands a fully quantified examination of batch chemistry, furnace energy demand, CO_2 pricing, and the integrated cost of production, centred on soda-lime-silicate glass. Supported by eleven industrial sponsors, the partners show that raw materials are not secondary variables in decarbonisation but a central lever in meeting climate pledges toward 2030. Their work isolates the behaviour and impact of alternative sodium and calcium carriers, assessing their influence on both direct and indirect emissions as well as on overall energy intensity. The study begins with a reference case: a furnace operating with 60 percent cullet, converting a 1080 kg batch at 25°C into 1000 kg of melt at 1300°C. In this scenario, direct emissions from the batch reach 80 kg CO_2 per tonne of glass, while combustion of methane adds 240 kg CO_2 per tonne, bringing total direct emissions to 320 kg CO_2/t. This means that batch materials account for about one quarter of direct CO_2 emissions. With methane's lower heating value at 50 MJ/kg, the reference furnace requires 87.3 kg of methane per tonne of glass, or 4365 MJ/t. Raw materials, therefore, contribute to emissions not only through calcination but also by influencing the furnace's energy demand. Float glass data show that raw materials represent around 30 percent of the total CO_2 footprint, with contributions split between Scope 1 and Scope 3. As furnaces become more efficient,

the proportion of emissions coming from raw materials naturally increases, strengthening the case for targeted batch optimisation.

ECONOMICS

The economic side of the analysis is equally important. Over the course of the study, the CO_2 price rose from 37.5 EUR/t at kickoff to 86.7 EUR/t at project closure -an increase by a factor of 2.3- with projections pointing toward 50 EUR/t by 2030. Because raw materials affect both emissions and furnace energy demand, their selection directly shapes integrated cost. GlassTrend combines raw material prices, energy consumption and CO_2 cost into a single evaluative framework, quantifying how various substitution strategies shift the economic and environmental balance simultaneously.

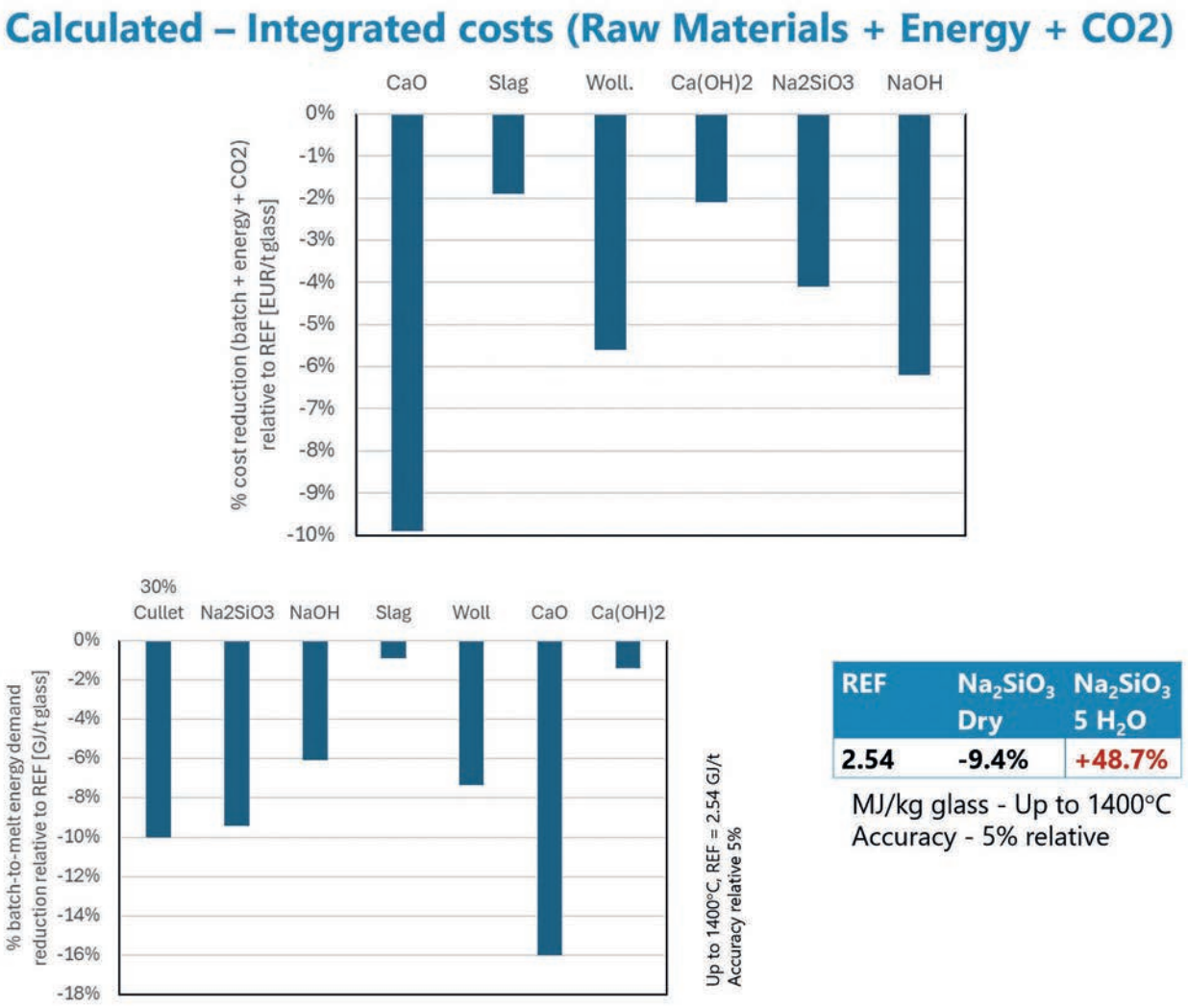
SUBSTITUTION

To identify viable decarbonised raw materials, GlassTrend undertook a structured programme in partnership with its industrial project sponsors. They began by identifying alternative raw materials for soda-lime-silicate glass and assessing them at a laboratory scale. They then evaluated melting behaviour, examining foam, scum, emissions, and glass formation. Next, they quantified batch-to-melt energy demand up to 1400°C and translated these experimental outcomes into furnace-scale models describing energy use, emissions, and costs. This systematic approach ensures that any proposed raw material is judged according to industrial feasibility, not theoretical attractiveness.

PERFORMANCE

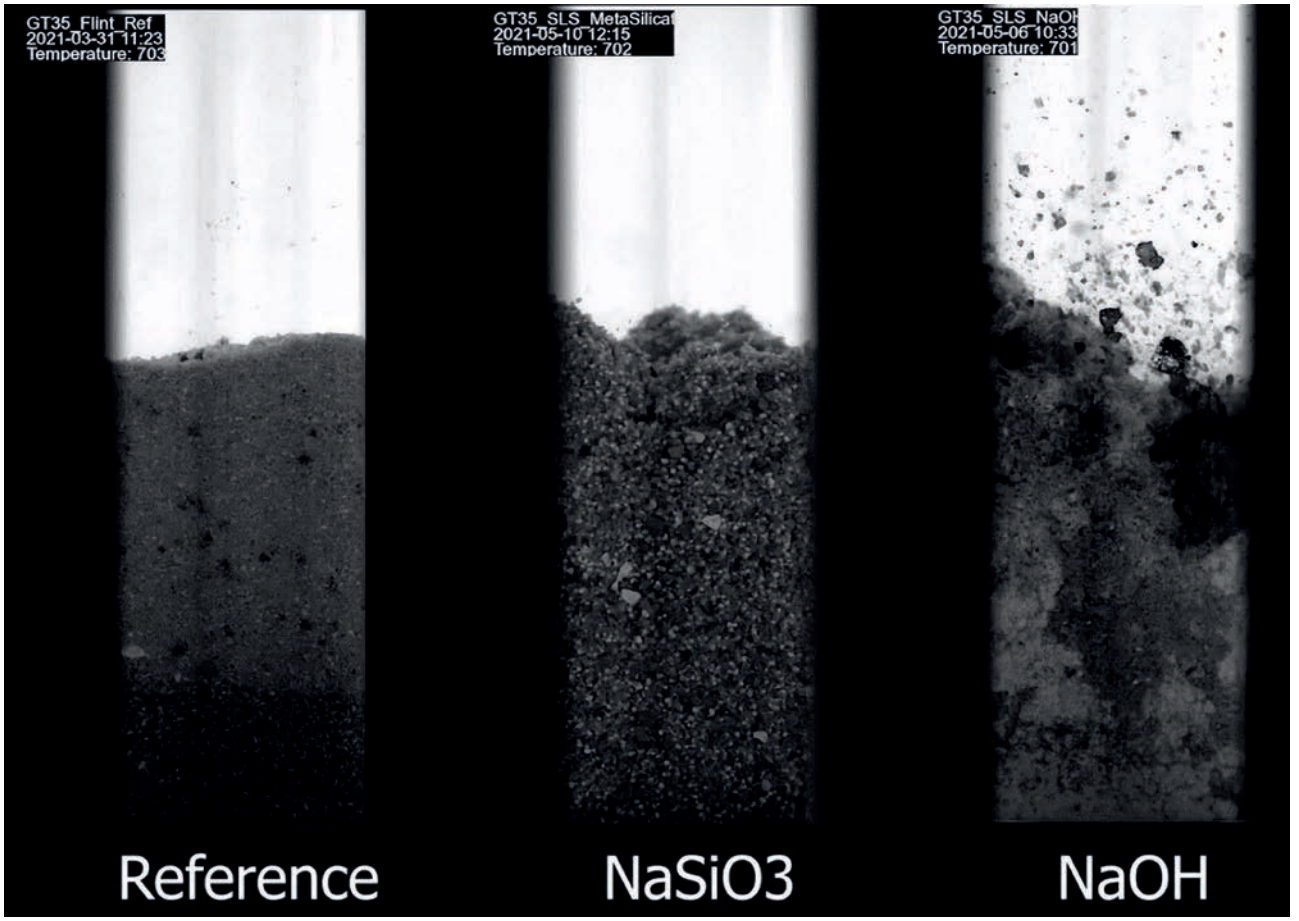
One of the study's central metrics is the batch-to-melt energy demand. For the reference soda-lime-silicate batch, GlassTrend measures an energy requirement of 2.54 GJ/t with a relative accuracy of 5 percent. When recalculated for alternative raw materials, the data reveal how different sodium and calcium carriers modify the thermal load of the melt. Reductions in batch-to-melt energy immediately translate into lower fuel consumption and thus reduced combustion-related CO_2. The picture grows clearer when direct and Scope 3 emissions are considered together. For a formulation with 50 percent cullet, direct emissions from batch plus combustion reach 239 kg CO_2/t and when Scope 3 contributions from raw materials are included, the combined total reaches 385 kg CO_2/t. These values confirm that raw materials exert influence far beyond their share of direct process emissions and that reducing their footprint can yield substantial overall savings. On the sodium side, the benchmark remains soda ash (Na_2CO_3), but GlassTrend evaluates alternatives including dry sodium silicate and electrically produced NaOH, as well as potential reductions in total soda content, now the focus of a new GlassTrend project. A key development comes from a Solvay pilot in Dombasle, where soda ash demonstrates a 50 percent lower CO_2 footprint than the standard material, excluding transportation. This reduced-footprint soda ash competes directly with natural soda, offering glass producers a practical means of lowering Scope 3 emissions without redesigning

their formulation. Spray-dried sodium silicate, meanwhile, presents a different profile whose benefits and drawbacks must be assessed in relation to the energy and emissions required for drying. Through its integrated-cost approach, GlassTrend reveals how varied sodium carriers can shift both the environmental and economic calculus of glassmaking. Calcium carriers show similarly diverse impacts. The traditional limestone ($CaCO_3$) is compared with burnt lime, wollastonite, and calcium-rich slags. Burnt lime stands out for delivering a strong positive effect on energy savings-marked as having '+++ impact on energy savings'-while showing no change in the total CO_2 footprint under today's conditions. This makes it an attractive lever for improving furnace efficiency even when its net emissions performance remains comparable. Wollastonite and calcium-rich slags, especially in coloured glasses, pose more complex challenges. Their sulfur and iron content, tendency toward persistent amber colouration, and dependence on strict redox control limit their use. In addition, these materials are not easy to source, reducing their immediate applicability despite their theoretical advantages. Further considerations arise when examining sulfates and chlorides. These components, while sometimes proposed as substitutes, have the potential to create foam, generate emissions, cause scum formation and even prevent proper glass formation. GlassTrend underscores that decarbonisation measures cannot compromise basic production stability; therefore alternatives must be evaluated not only for their CO_2 reduction potential but also for operational robustness. A distinctive strength of GlassTrend's work is its integrated cost calculation, which incorporates raw material prices, furnace energy consumption and CO_2 costs. Glass producers may adapt the inputs-such as local raw material prices, gas costs, furnace efficiencies and CO_2 pricing - to align the model with their own operational context. This makes the methodology transferable across regions and market conditions while preserving consistent comparisons among raw material options. As carbon pricing intensifies and energy markets shift, some alternatives that once appeared marginal may become economically favourable. By integrating these variables into one



REF	Na_2SiO_3 Dry	Na_2SiO_3 5 H_2O
2.54	-9.4%	+48.7%

MJ/kg glass - Up to 1400°C
Accuracy - 5% relative



model, GlassTrend equips producers to anticipate such turning points. The analytical work is positioned within the broader context of global climate objectives. Direct CO_2-equivalent emissions in float glass production represent about 30 percent of the total footprint, while container glass data from 2005 show direct emissions of roughly 61 percent. Raw materials contribute 20-30 percent of these direct values and their optimisation can yield meaningful energy improvements. One striking combined scenario involving CaO and NaOH shows a reduction of around 35 percent in direct emissions, illustrating the potential scale of savings when sodium and calcium carriers are re-engineered together. With 2030 described as being 'right around the corner,' GlassTrend emphasizes the urgency of addressing raw materials now, rather than treating them as minor adjustments at the end of process development.

OUTLOOK

Taken as a whole, the programme conducted by GlassTrend demonstrates that decarbonised raw materials form a practical and quantifiable pathway toward sustainability in glass manufacturing. Batch materials represent roughly one quarter of direct CO_2 emissions in key reference cases and their selection affects both melting energy and Scope 3 contributions. Sodium and calcium carriers with significantly reduced footprints or improved thermal performance can shift furnace behaviour, emissions and cost simultaneously. By merging raw material science with energy modelling, emissions accounting and integrated cost evaluation, the consortium provides manufacturers with a realistic roadmap for redesigning their batch in line with carbon, energy and economic constraints. In the end, decarbonised raw materials are not a single solution but a portfolio of carefully assessed options, grounded in measurable data and directly aligned with 2030 climate pledges. For GlassTrend and their sponsors, this work establishes how glass producers can meaningfully cut raw material-related emissions by 20-30 percent, improve energy performance and position themselves securely within a carbon-constrained industrial future - one tonne of glass at a time. ■

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Innovation and efficiency accelerated through RONDOT acquisition

Rondot Group's recent acquisition of LWN Lufttechnik represents a significant opportunity for glassmakers, creating new technological synergies across the Group's entities and reinforcing its long-term development strategy.

EXPANDING TECHNICAL CAPABILITIES

Based in Champagne-au-Mont-d'Or near Lyon, France, Rondot Group delivers a comprehensive range of technologies and expertise to the global container glass industry. Its specialisms span advanced mould equipment, robotics, conveyors and ware handling systems. These solutions are designed to enhance efficiency, reliability and sustainability, enabling glass manufacturers to improve performance across the entire production cycle. Founded in Germany, LWN develops advanced mould cooling systems focused on optimising quality, stability and productivity in glass manufacturing processes. Its solutions precisely manage airflow at mould level, where temperature control directly influences forming conditions, cycle times and finished product quality. Through the acquisition, Rondot Group expands its portfolio while integrating complementary technical expertise at the core of its opera-

The acquisition of LWN Lufttechnik by RONDOT strengthens the Group's technological capabilities by integrating advanced mould cooling expertise with existing process solutions. Through data-driven airflow regulation and enhanced energy performance, the collaboration delivers measurable gains in efficiency, stability and sustainability for container glass manufacturers worldwide.

tions. The move strengthens the Group's capacity to deliver integrated, high-value solutions that combine process knowledge with practical, field-proven technologies. This strategic step reflects the Group's commitment to consolidating technological know-how and improving the energy performance of its systems. "The integration of LWN into the Group marks a major milestone in our growth strategy," said Raphael Constantin, CEO of Rondot Group. "By combining our expertise, we can provide customers with comprehensive solutions that enhance productivity, improve energy efficiency and ensure consistent production quality."

DATA-DRIVEN PROCESS OPTIMISATION

The collaboration between LWN and Novaxion represents a particularly promising development. Through its swabbing technology, Novaxion captures process data directly at mould level, where operating conditions have the greatest impact on forming performance. This real-time data can be shared with LWN's cooling systems to accurately regulate the volume of air required. Shifting from fixed or standardised settings to a data-driven cooling strategy enables glassmakers to optimise airflow with precision. The result is improved cooling efficiency, greater process stability and the avoidance of unnecessary air consumption.

ADDRESSING A MAJOR CHALLENGE: ENERGY CONSUMPTION

Energy consumption remains a critical issue for the glass industry, and this synergy offers clear, measurable benefits. Optimised airflow reduces compressed air demand, lowers overall energy usage and decreases operating costs, directly supporting more competitive and sustainable production. The project illustrates Rondot Group's vision: combining process expertise, digital integration and energy efficiency to help glass manufacturers meet evolving industrial, environmental and economic challenges. ■

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Technical insight to drive upcoming FURNACE SOLUTIONS

The Society of Glass Technology has announced that the milestone 20th Furnace Solutions Conference will be returning to St Helens, UK, on 3-4 June 2026 - reaffirming the event's long-standing role as a focal point for furnace and process innovation within the global glass industry.

A NOD TO SUSTAINABILITY

Held under the theme 'Decarbonisation: What's the Reality?', the two-day programme will feature a dense schedule of technical presentations from industry specialists spanning raw materials, furnace design, combustion, electrification, digitalisation and downstream integration. Speakers from across the supply chain will address practical pathways toward reduced carbon intensity while maintaining product quality, operational resilience and commercial viability.

The conference is expected to attract an international audience of glass manufacturers, end users and technology providers - creating a forum for frank discussion of the technical, regulatory and economic pressures shaping the sector's transition to a more sustainable future.

THE CONFERENCE OF INDUSTRY TITANS

Recent Furnace Solutions Conferences have drawn senior decision-makers and technical leaders from major global glass producers including AGC, Ardagh, Beatson Clark, Encirc, Euroglas, Guardian, Knauf, Nippon Electric Glass, NSG

Returning to St Helens in June, the FURNACE SOLUTIONS CONFERENCE reaches its 20th edition this year with a sharp focus on decarbonisation realities, technical innovation and industrial delivery - bringing together global glassmakers, suppliers and end users for two days of expert-led insight and discussion.

Pilkington, O-I, Saint-Gobain, Saverglass, Sisecam, Stoelzle, Verallia, Vidrala and Vitro - all of whom underscore the event's relevance at both strategic and operational levels.

Alongside the core technical programme and extensive networking opportunities, a series of accompanying events is planned, including a civic reception and a tour of the Glass Futures R&D Innovation Centre. Together, these activities are intended to provide additional context on innovation initiatives and reinforce the conference's value as a knowledge-sharing and relationship-building platform.

EVENT RUN-UP

Companies wishing to submit abstracts, explore sponsorship opportunities or reserve a stand in the tabletop exhibition have been invited to reach out to Christine Brown at Society of Glass Technology (details below). ■

SOCIETY OF GLASS TECHNOLOGY

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GLASSTREND puts sustainability first, courtesy of STARA GLASS

SETTING THE FRAMEWORK FOR DECARBONISATION

The 2025 GlassTrend Autumn Meeting on Smart & Sustainable Glass Manufacturing was held in Genoa, Italy, on 12-13 November and hosted by Stara Glass within the framework of GlassTrend, the global consortium bringing together glass manufacturers, suppliers and research institutes to advance glass science, technology transfer and industrial sustainability.

Opening the technical programme, Ernesto Cattaneo of Stara Glass presented the company's decarbonisation roadmap, outlining current technology developments and innovation projects. He emphasised that meeting EU climate objectives will require coordinated progress across four strategic pillars: energy efficiency, hydrogen combustion, carbon capture and renewable electrification.

Yujin Ziegler of Siemens followed with a presentation on smart data integration and AI-driven use cases in glass manufacturing. She illustrated how the convergence of digital and physical systems can accelerate both sustainability and digital transformation by translating industrial data into actionable insights through advanced analytics and artificial intelligence.

CONTROLLING EMISSIONS THROUGH PROCESS INNOVATION

Long-term emissions mitigation was the focus of Galen Kutlubay from Topsoe, who shared performance data from catalytic ceramic filters after 11 years of operation. His contribution demonstrated the durability of de-NOx catalytic activity while introducing the development of next-generation filter technologies.

Terutaka Maehara of AGC then explored the influence of water vapour in the melting atmosphere on glass production, comparing methane, hydrogen and ammonia combustion. His analysis showed how fuel selection alters flue-gas composition, with direct effects on melting behaviour and final glass quality.

HYDROGEN, CARBON CAPTURE AND SYSTEM INTEGRATION

Industrial-scale hydrogen implementation was addressed by Simone Tiozzo from SSV, who introduced the H2GLASS Horizon Europe project. He reported on the first large-scale hydrogen combustion trials conducted in oxy-fuel furnaces at

Gathering industry leaders in Genoa, last year's GLASS TREND Autumn Meeting hosted by STARA GLASS examined smart, sustainable glass manufacturing through advanced furnace design, hydrogen combustion, carbon capture, AI-driven operations and emerging zero-emission pathways - highlighting collaborative innovation across research institutes, suppliers and manufacturers.

Steklarna Hrastnik and Owens Corning, representing a key milestone toward broader hydrogen adoption in glass melting.

Taking a systems-level perspective, Chiara Caccamo of SINTEF presented the Glass Industry Emission Reduction Alliances developed within the COREu project. These alliances link industry, researchers, policymakers and CCS stakeholders, with Stara Glass coordinating the alliance dedicated specifically to the glass sector.

Alessandro Monteforte from K2CO2 reviewed CO_2 capture solutions based on hot potassium carbonate for glass furnaces, comparing this approach with alternative decarbonisation pathways. His assessment covered technological readiness, integration with air pollution control systems, applicability across furnace types and associated CAPEX and OPEX considerations.

MATERIALS, MARKETS AND THE PATH FORWARD

Technological transition in specialty glass production was discussed by Moritz Hauf of Schott, who outlined strategies and advances in sustainable melting technologies designed for high-performance glass applications.

Returning to applied innovation, Giorgio Minestrini of Stara Glass shared progress on the LIFE SUGAR project, including an upcoming pilot installation at Vetrerie Meridionali Furnace 3, which already hosts the Second Centauro furnace. The non-full-scale pilot aims to demonstrate an optimised melting system capable of reducing energy consumption by approximately 15 percent.

Raw-material-related emissions were addressed by Hans-Ullrich Werner from Metaliq, who introduced the Decarbonisation to Zero concept. By enabling on-site soda ash production and converting CO_2 into a usable raw material through carbon capture and utilisation, the approach offers a potential route to zero

GLASSTREND

GlassTrend is a global consortium of glass manufacturers, suppliers and research institutes - all focused on advancing glass science and technology. It coordinates R&D projects, knowledge transfer and innovation to improve production efficiency, quality and sustainability. The organisation also offers seminars, workshops and networking opportunities to share expertise and address industry challenges.

CO_2 emissions when combined with electric melting, while also improving cost efficiency.

Market-based flexibility was explored by Laura Darvey of Energy Pool, who showed how glass container manufacturers can generate additional revenue through participation in electricity balancing markets, contributing simultaneously to profitability and grid stability.

The programme concluded with a focus on materials innovation. Sophie Franchitto of Heraeus Precious Metals presented advances in platinum alloys designed to enhance durability, reduce precious-metal consumption and improve environmental performance. Sindy Fuhrmann of TU Bergakademie Freiberg followed with research into zero-emission melting concepts, including hydroxide batch melting and hybrid microwave technologies.

Bringing together around 90 engineers, researchers, academics, industry representatives and technology providers, the meeting enabled in-depth technical exchange and collaboration. Dedicated networking opportunities, including a convivial dinner sponsored by the COREu project, reinforced a shared commitment to shaping the future of smart and sustainable glass manufacturing.

STARA GLASS

Stara Glass is an Italian company specialising in advanced glass furnace design and focusing on energy efficiency and performance. It combines decades of operational experience with precision software tools to optimise furnace operation and reduce environmental impact. Committed to innovation and sustainability, Stara Glass delivers tailored design, diagnostics and support across the entire furnace lifecycle.

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Digitising the glass industry through SCHNEIDER ELECTRIC innovation

SCHNEIDER ELECTRIC is accelerating decarbonisation in the global glass sector by merging electrification, digital transformation and open, software-centric automation. Through integrated power and process systems, real-time data and digital twins, the company delivers efficient, flexible and sustainable solutions that redefine total cost of ownership and long-term furnace performance.

For the company, the glass industry stands at a decisive moment - one where energy transition and digital transformation converge to reshape how plants operate, consume energy and plan for the future. This shift is driven by a simple but powerful philosophy that guides the company worldwide: to empower all to make the most of energy and resources through intelligent, connected and efficient technologies. With more than 150,000 colleagues across over 100 countries, Schneider Electric channels its global expertise into decarbonising sectors that are both energy-intensive and essential to modern life. Glass manufacturing is one of them.

ELECTRIFICATION AS THE NEW FOUNDATION

The company highlights how the transition from fossil fuels to electricity is already reshaping glass melting. High-electric (80 percent) oxyfuel configurations for container production and large full-electric furnaces represent a dramatic shift in the industry's technological landscape. These next-generation systems significantly reduce reliance on combustion, enabling cleaner operation and offering a long-term path to decarbonisation. At the same time, Schneider Electric underlines the need to carefully reassess total cost of ownership, as the operating logic of electric furnaces introduces new patterns of investment, maintenance and energy management. To support this transition, the company provides a complete electrical backbone designed specifically for large-scale industrial performance. From XLPE cables under 1000 V and fully-equipped transformer rooms to Okken, SM AirSeT and Trihal MV/LV

Schneider Electric smart factories
Based on our own philosophy

Le Vaudreuil facility in France

- Recognized as "sustainability lighthouse" by the World Economic Forum
- 32% lower energy use
- 11% less maintenance costs
- 7% increase in productivity
- It is fun to work here => 43% more unsolicited applications!

solutions, every element of the power chain is engineered to deliver stability, protection and efficiency. Combined with Masterpact MTZ circuit breakers and a power controller integrating smart power control software, these solutions form the essential infrastructure needed for high-electric furnace operation.

LEARNING FROM THE SMART FACTORY MODEL

Schneider Electric's own smart factories demonstrate the measurable impact of digital transformation. The company's facility in Le Vaudreuil, France -recognised as a sustainability lighthouse by the World Economic Forum- has achieved a 32 percent reduction in energy use, an 11 percent drop in maintenance costs and a 7 percent increase in productivity. The transformation even improved staff engagement, generating 43 percent more unsolicited job applications. These results reinforce a compelling message: digitalisation does not simply optimise performance; it improves the human experience within the factory.

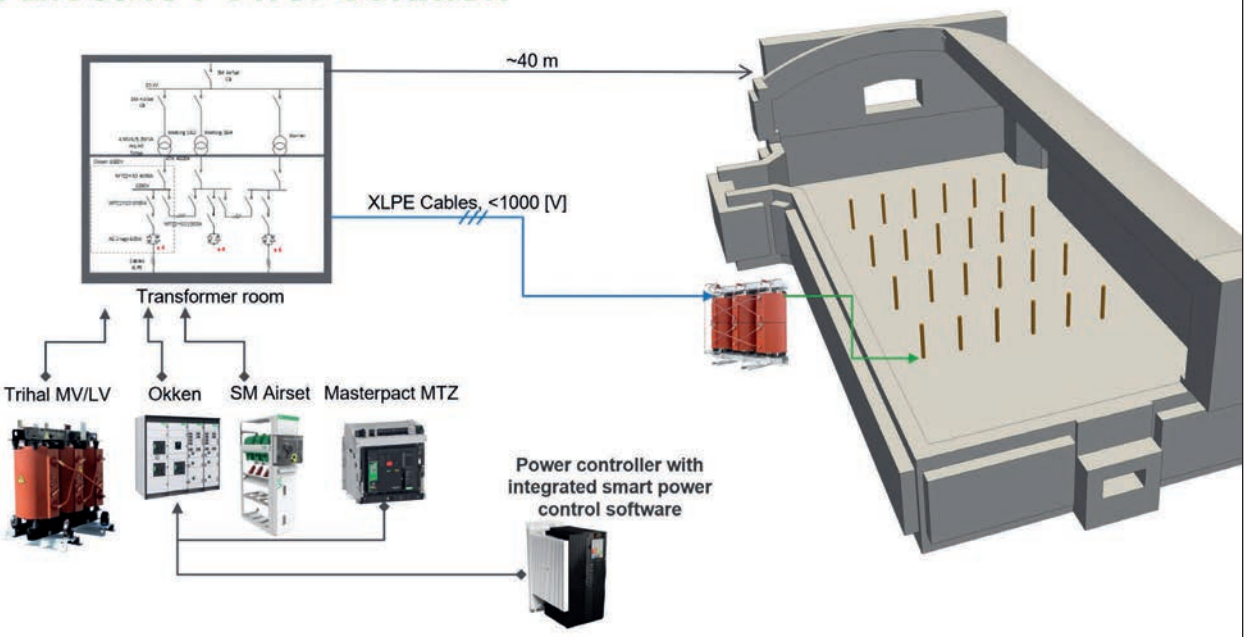
A UNIFIED, OPEN SOFTWARE-CENTRIC AUTOMATION APPROACH

Central to the company's vision is open, software-centric automation built on the IEC 61499 standard. Unlike rigid systems tied to proprietary hardware, this architecture allows software to operate independently of the physical device on which it runs. The result is a flexible, distributed environment where orchestration becomes more powerful, integration becomes simpler and systems communicate through a common language. For glass manufacturers, whose operations depend on long furnace lifecycles and continuous process integrity, this approach provides a future-proof path. Plants gain the ability to evolve over time, integrate advanced control schemes, embed new digital services and scale without the limitations of conventional automation frameworks.

DIGITAL TRANSFORMATION: CONNECTING POWER, PROCESS AND INTELLIGENCE

Electrification is only the first step. Schneider Electric emphasises that true decar-

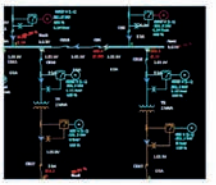
1. Electric Power solution



2. Digital transformation

Connect all systems, Power and Process
- Open Software Centric Automation

Use digital twins
- For Power and Process



Collect, analyze and use data (PI)
- Present information clear and easy for decision makers

bonisation requires the fusion of power and process systems into a single digital ecosystem. That means connecting every asset -from electrical equipment to production machinery- and using digital twins to simulate, predict and optimise performance. Data becomes the driving force behind operational excellence. By collecting, analysing and contextualising information through platforms such as PI, decision-makers gain a clear, accessible view of the plant's behaviour. Whether monitoring energy consumption, anticipating maintenance needs, or assessing furnace stability, digital intelligence ensures that complex information becomes actionable insight. The aim is not just transparency but clarity - empowering teams to make decisions faster and with greater confidence.

A HOLISTIC PATHWAY TO DECARBONISED GLASS MANUFACTURING

The presentation lays out a vision in which the glass factory of the future is both electrically powered and digitally orchestrated. Augmented reality, predictive maintenance, robots and AGVs, non-intrusive sensors, cybersecurity and MES performance tools all contribute to a highly connected operational model. Each innovation reinforces the others, creating a dynamic environment where energy is conserved, downtime is minimised and productivity is optimised. Schneider Electric's integrated approach ensures that sustainability does not compromise performance. Rather, electrified melting, digital twins and open automation collectively strengthen operational resilience, supporting stable production even as plants transition to greener energy sources. In doing so, the company helps manufacturers move confidently toward ambitious decarbonisation goals while laying the groundwork for long-term efficiency gains.

THE CONNECTED FURNACE ERA

At a time when the glass industry faces increasing pressure to reduce emissions, enhance efficiency and prepare for regulatory shifts, the company offers a cohesive strategy that links today's industrial realities with tomorrow's sustainability expectations. Its technologies reimagine the furnace not as an isolated asset but as the core of a fully integrated energy and data ecosystem. By combining electrification, digitalisation and open automation, Schneider Electric positions itself as a catalyst for industry transformation - one capable of guiding glass manufacturers into a more efficient, intelligent and decarbonised future. ■

Schneider Electric

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Airflow balance insights from ZIBO MINGCHEN ENVIRONMENTAL TECHNOLOGY

Stable furnace pressure is often treated as an auxiliary control target. In extensive field service on glass production lines, we have found that long-term pressure instability -or an overly biased positive or negative pressure strategy- can act as a chronic load upon the furnace structure. The effects are rarely dramatic at the beginning, but they accumulate over time and may accelerate refractory deterioration and trigger unplanned interventions.

The following three representative field cases illustrate typical 'hidden' damage pathways caused by draft imbalance.

Centrifugal fan installation on site (dust-handling service condition)

Presenting practical observations and operator-focused guidance for safer, longer furnace service thanks to field observations from his frontline engineering practice, Haochen Hu, Senior Engineer and Technical Director of ZIBO MINGCHEN ENVIRONMENTAL TECHNOLOGY, explains how dynamic airflow imbalance undermines furnace pressure stability whilst accelerating refractory degradation and eroding control margins.

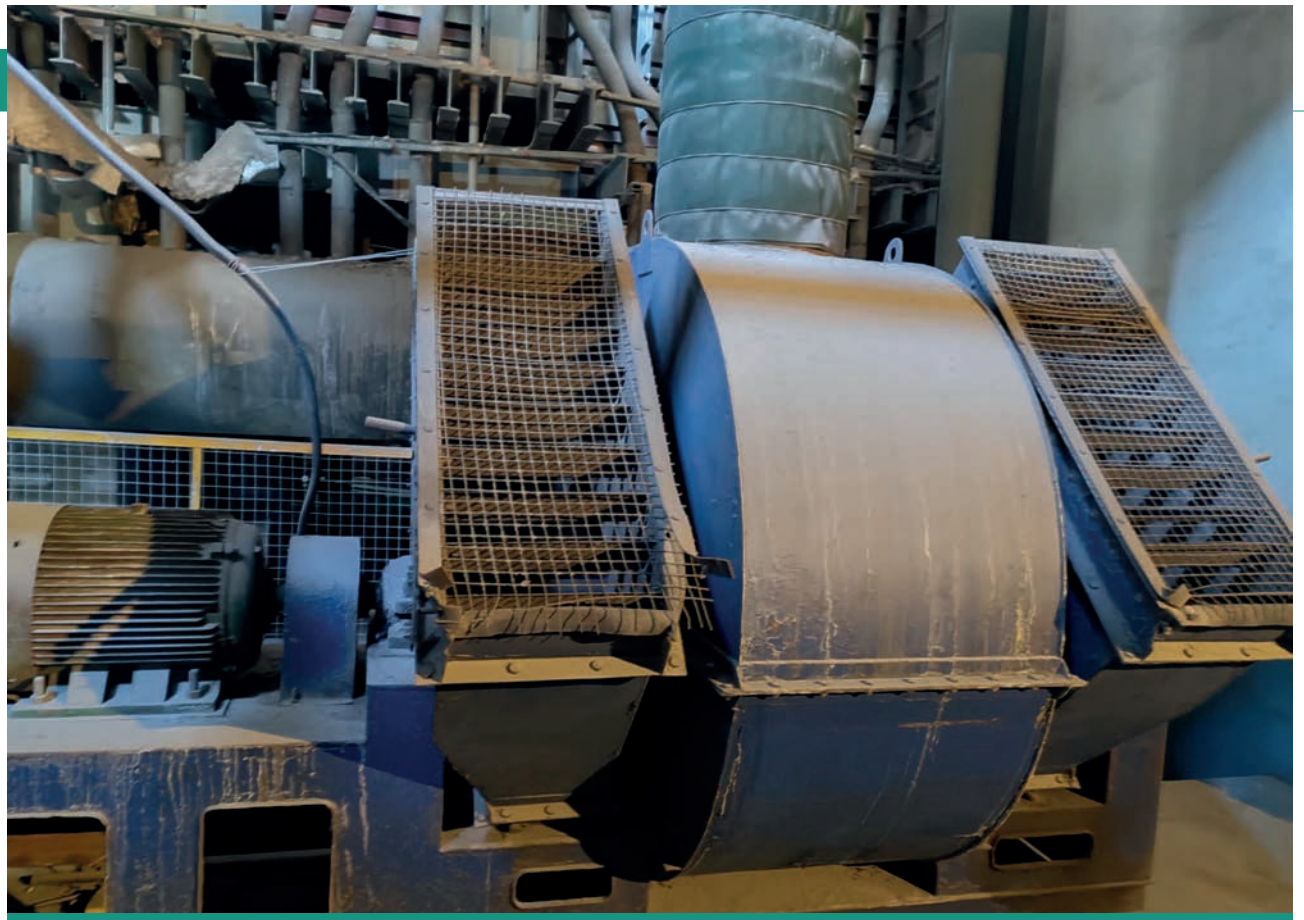
Fan unit and duct connection (field installation view)

CASE 1 – POSITIVE PRESSURE IS NOT ONLY A FLAME-ESCAPE RISK: HOT GAS MAY FIND 'INVISIBLE ROUTES'

During operational transitions such as load changes, pulling changes, or resistance fluctuations, delayed induced-draft response can lead to repeated positive-pressure episodes. Over time, plants may observe localised shell hot spots, early thermal-fatigue indications on steelwork, or traces around joints. Cold-repair reviews often show that hot flue gas has penetrated through gaps and weak interfaces, followed by internal deposition and condensation of corrosive species. This mechanism drives degradation from the inside outward and is difficult to detect at an early stage.

CASE 2 – NEGATIVE PRESSURE IS NOT 'THE MORE, THE SAFER': COLD-AIR INGRESS AMPLIFIES THERMAL CYCLING

Some production lines maintain a deeply negative draft to reduce flame-out risk. Field experience shows that sustained negative pressure increases the driving force for cold-air ingress at doors, ports, and imperfect seals, creating cold spots and steep tempera-



Typical centrifugal fan casing and drive-end arrangement (site condition)

ture gradients. Repeated hot-cold cycling promotes micro-cracks and spalling. Once cracks form, gas and dust ingress can further accelerate deterioration, increasing the likelihood of non-planned repairs.

CASE 3 – CONTROL MARGIN CAN BE SLOWLY CONSUMED: FAN OPERATING-POINT DRIFT MAKES PRESSURE HARDER TO HOLD

With accumulated runtime, fouling in regenerators and ductwork, together with damper wear, gradually changes system resistance and shifts the fan operating point. Because this drift is slow, the line adapts until pressure becomes increasingly difficult to stabilise. Symptoms include larger swings during transitions, slower response, and aggressive corrections that can trigger secondary oscillations. In many cases, the root cause is not tuning quality, but reduced operating margin.

PRACTICAL NOTES FOR OPERATORS (NO OVER-ENGINEERING)

- Manage pressure as a trend, not a single number. During shift handover, note whether draft is stable or prone to drift, and under which operating modes.
- During transitions, stabilise airflow first-then combustion. Avoid chase-control that amplifies oscillations.
- Treat sealing and resistance changes as daily checks, including doors, ports, joints, duct deposits and damper wear. If hot spots or leakage traces appear, begin troubleshooting from airflow and sealing.

CONCLUSION

Airflow stability is not only an energy topic; it is a foundational condition for safe, controllable, long-term furnace operation. Many seemingly 'random' structural issues become explainable when viewed through the lens of sustained variability, biased draft, and gradual loss of control margin. ■

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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
GCG - Glass Consulting
KYP Accesories
Glass Service
Horn
Luben Glass
Moderne Mecanique
MT Forni Industriali
OCMI OTG
Olivotto Glass Technologies
Pennekamp
Sorg Nikolaus
Stara Glass
Tecsiglass
Waltec Maschinen

BURNERS/ LOW NOX

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Falorni Tech
Famor Engineering
GCG - Glass Consulting
Glass Service
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KYP Accesories
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Stara Glass

BURNERS/ OXY-FUEL

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Glass Service

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MT Forni Industriali
Olivotto Glass Technologies
Sorg Nikolaus
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CARPOULE AFTER FORMING MACHINES LINES

Moderne Mecanique
OCMI OTG

CARPOULE FORMING MACHINES LINES

Moderne Mecanique
OCMI OTG

CAST IRON FOR MOULDS

Changshu Jianhua Mould Technology
Fonderie Bartalesi
Fonderie Valdelsane

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

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

COGENERATION AND TRIGENERATION THROUGH HEAT RECOVERY SYSTEMS

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COLD-END LINES

ACH - Advanced
Container Handling
All Glass
Bucher Emhart Glass
Heye International
Iris Inspection Machines
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Mimsan Conveyor Systems
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Tecnosens
Vetromeccanica

COLOURS & ENAMELS

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CONSULTING SERVICES

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Fives
GCG - Glass Consulting
GS - Glass Service
HFT
Horn
Luben Glass
Olivotto Glass Technologies
Stara Glass
TECO Group
Tecsiglass
Video Systems

CONTROL & AUTOMATION SYSTEMS

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Bottero
Bucher Automation
Bucher Emhart Glass
Falorni Tech
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Lahti Glass Technology
Luben Glass
Horn
Iris Inspection Machines
Marposs
MSK Covertech
Nirox
Olivotto Glass Technologies
Stara Glass
TECO Group
Tecnoferrari
Tecnosens
Tecsiglass
VMA
Video Systems
Waltec Maschinen
ZIPPE

CONVEYING & STOCKING SYSTEMS

All Glass
MSK Covertech
Olimerk
OMS
Ramsey Products
Regina Catene Calibrate
Tecnoferrari
Vetromeccanica

CONVEYOR BELTS

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Car-Met
Famor Engineering
Luben Glass
Olivotto Glass Technologies
Pennekamp
Pennine
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Vetromeccanica
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CONVEYOR CHAINS & SPROCKETS (HOT-END)

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Bottero
Luben Glass
Pennine
Ramsey Products
WBT
ZIPPE

CRACK-OFF MACHINES

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CROSS CONVEYORS

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

CULLET SEPARATION & TREATMENT SYSTEMS

EME
Falorni Tech
GCG - Glass Consulting
Lahti Glass Technology
Vidromecanica
ZIPPE

DATAMATRIX READING DEVICES

TIAMA

DECORATING MACHINES

Fermac
Koenig & Bauer Kammann
Pennekamp
Omso

DECORATION CUTTING MACHINES

Waltec Maschinen

DECORATIVE ENAMELS

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DEDUSTING & FILTERING SYSTEMS

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DOSING SYSTEMS: COLD-END EMULSIONS

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Graphoidal Developments
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Pennekamp
R.Cestaro
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DOSING SYSTEMS: GOB CUTTING LUBRICATION

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Graphoidal Developments
Luben Glass
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DOUBLE SHELL RECUPERATOR

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DRIVE SYSTEMS / VARIABLE SPEED

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Fives
Heye International
Olivotto Glass Technologies
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Tecnoferrari

DROPPER AFTER-FORMING MACHINES/LINES

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DROPPER FORMING MACHINES/ LINES

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OCMI OTG

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ELECTRONIC CONTROL SYSTEMS AND IT

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Glass Service
Horn
Olivotto Glass Technologies
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Stara Glass
TECO Group
Tecsiglass
Waltec Maschinen
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ELECTRODE HOLDERS

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Electroglass
Fives
GCG - Glass Consulting
Glass Service
Horn
Sorg Nikolaus
Stara Glass
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ELECTRODE HOLDERSHOT AND COLD FURNACE INSTALLATION

Horn
TECO Group

EMISSION MONITORING SYSTEMS

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GS - Glass Service

EMULSION DOSING SYSTEMS

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Graphoidal Developments
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Pennekamp
R.Cestaro

ENERGY RECOVERING SYSTEMS

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Falorni Tech
Luben Glass
Novaxion
Stara Glass
Tecsiglass
ZIPPE

ENGINEERING SERVICES

Falorni Tech
TECO Group

ENGINEERING AND MODELLING FOR BOOSTING SYSTEMS

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ENGRAVING MACHINES

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FEEDERS & MECHANISMS

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Ergon Meccanica
Famor Engineering
Fives
Glass Service
Heye International
Olivotto Glass Technologies
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Glass Service
HFT
Olivotto Glass Technologies
Stara Glass
TECO Group
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FINISHING MACHINES

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Electroglass
Falorni Tech
Fives
GCG - Glass Consulting
Glass Service
HFT
Horn
MT Forni Industriali
Sorg Nikolaus
Stara Glass
TECO Group
Tecsiglass

FORMING MACHINES

Amig - Ocmi - MT Forni
BDF Industries
Bottero
Bucher Emhart Glass
Ergon Meccanica
Famor Engineering
Heye International
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Novaxion
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FURNACES: BUBBLING SYSTEMS

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Bock Energietechnik
Electroglass
Falorni Tech
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Glass Service
Horn
Sorg Nikolaus
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FURNACES: CLEANING SYSTEMS

Glass Service
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Falorni Tech
GCG - Glass Consulting
Glass Service
Horn
Sorg Nikolaus
Stara Glass
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Electroglass
Falorni Tech
Fives
Glass Service
GS - Glass Service
Horn
KYP Accesories
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Stara Glass
TECO Group
Tecsiglass

FURNACES: HEAT-UP

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Falorni Tech
Glass Service
Horn
Sorg Nikolaus
Stara Glass
Tecsiglass

FURNACES: HOT CULLET FILLING

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FURNACES: MELTING

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Bock Energietechnik
Falorni Tech
Fives
Glass Service
Horn
MT Forni Industriali
Sorg Nikolaus
Stara Glass
TECO Group
Tecsiglass

FURNACES: METAL STRUCTURES

BDF Industries
Car-Met
Falorni Tech
Glass Service
HFT
Horn
Stara Glass
Tecsiglass

FURNACES: OXY-FUEL OR RECUPERATIVE

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

FURNACES: PREHEATING SYSTEMS

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

FURNACES: REPAIR, MAINTENANCE & REVAMPING

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Electroglass
Falorni Tech
Glass Service
HFT
Horn
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Glass Service
Horn
MT Forni Industriali
Olivotto Glass Technologies
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ZIPPE

GLASS METALISATION PROCESS MATERIALS

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GLASS RECYCLING PLANTS

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Vidromecanica
ZIPPE

GOB WEIGHT CONTROL SYSTEMS

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All Glass
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Bucher Emhart Glass
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HEAT REGENERATION PLANTS

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Glass Service
Horn
Stara Glass

HEATING SYSTEMS

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Falorni Tech
Glass Service
Horn
Pennekamp
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HYBRID FURNACE & FOREHEARTH SYSTEM

Stara Glass

HYDROGEN BURNERS

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HOT-END PROCESS MONITORING SOLUTIONS

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HOT GLASS CONTACT MATERIALS

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Olivotto Glass Technologies

HOT GLASS SCRAPES

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Falorni Tech
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Vidromecanica
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Regina Catene Calibrate
TIAMA
Tecnosens
Video Systems
VMA

INSPECTION MACHINES: HOT-END

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KYP Accesories
Marposs
Moderne Mecanique
OCMI OTG
Olivotto Glass Technologies
TIAMA
Tecnosens
Video Systems

INSPECTION MACHINES: VIALS & AMPOULES

Euromatic
Iris Inspection Machines
KYP Accesories
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Moderne Mecanique
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Stevanato Group
Tecnosens
Video Systems

I.S. MACHINES

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Bucher Emhart Glass
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I.S. MACHINES LUBRICATION SYSTEMS

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Bucher Emhart Glass
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Luben Glass
Novaxion

I.S. MACHINE RECONDITIONING

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Bottero
Bucher Emhart Glass
Ergon Meccanica
Heye International
Luben Glass
Novaxion

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suppliers guide

YELLOW PAGES

LABORATORY TESTING AND MEASUREMENT EQUIPMENT

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Marposs

LASER CUTTING MACHINES

Olivotto Glass Technologies
Waltec Maschinen

LEHR DRIVES

Fives
Heye International
Pennekamp

LEHRS: ANNEALING

Antonini
Bonaiti Pietro
Car-Met
Euromatic
Fives
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
Bottero
Ergon Meccanica
Fives
Luben Glass
Olimerk
Pennekamp
SKS - Sorg Keramik Service
Stara Glass
Tecsiglass

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
GCG - Glass Consulting
KYP Accesories
Lahti Glass Technology
MT Forni Industriali
R.Cestaro
Stara Glass
Teka
ZIPPE

MOLYBDENUM ELECTRODES

Electroglass
Stara Glass

MOULDS

Changshu Jianhua Mould Technology
Officine
Perego Giancarlo

MOULDS: CLEANING POLISHING MACHINES

BDF Industries
Ecotecne
Luben Glass

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

MOULDS: WELDING LINES

Commersald Impianti

MOULDS & PLUNGERS COATING SYSTEMS & MATERIALS

Commersald Impianti

NECK RINGS

Changshu Jianhua Mould Technology
Olimerk
Perego Giancarlo

PALLETIZING/ DEPALLETIZING LINES

ACH - Advanced Container Handling
All Glass

Messersì Packaging
Mimsan Conveyor Systems
MSK Covertech
Olivotto Glass Technologies
OMS
R.Cestaro
Regina Catene Calibrate
Vetromeccanica

PASTE MOULD MACHINES

Olivotto Glass Technologies

PHARMACEUTICAL LEHRS & HANDLING

Pennekamp

PLANT UTILITIES

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Pneumofore
Tecsiglass

PLATINUM FEEDER SYSTEMS

BDF Industries
Glass Service
Olivotto Glass Technologies
Stara Glass

PLUNGER HONING MACHINES

Bottero

PLUNGERS & MECHANISMS

BDF Industries
Bottero
Bucher Emhart Glass
Changshu Jianhua Mould Technology
Olimerk
Olivotto Glass Technologies
Perego Giancarlo
Waltec Maschinen

POLISHING/ GRINDING MACHINES

Luben Glass
Olivotto Glass Technologies

POWER REGULATION/ TRANSFORMERS

Bock Energietechnik

PREDICTIVE SOLUTIONS

Video Systems

PRESS MACHINES

Bucher Emhart Glass
Famor Engineering
MT Forni Industriali
Olivotto Glass Technologies
OCMI OTG
Waltec Maschinen

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Famor Engineering
Heye International
Messersì Packaging
MT Forni Industriali
Novaxion
OCMI OTG
Olivotto Glass Technologies
Waltec Maschinen

PRESS RECONDITIONING

Famor Engineering
Luben Glass
Olivotto Glass Technologies

PRODUCTION ASSISTANCE FOR HOLLOW GLASS

Olimerk

PUSHERS

BDF Industries
Bottero
Car-Met
EME
Famor Engineering
Fives
Heye International
Luben Glass
Olivotto Glass Technologies
Waltec Maschinen

RAW MATERIALS

Bohemi Chemicals
GCG - Glass Consulting
Minerali Industriali

RECYCLING PROCESSES

EME
Lahti Glass Technology

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EME
Falorni Tech
GCG - Glass Consulting
Lahti Glass Technology
Linco Baxo
Olivotto Glass Technologies
SIGMA
Waltec Maschinen
ZIPPE

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Tecsiglass

REFRACTORIES INSTALLATION SERVICES

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

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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
Euromatic
Falorni Tech
Famor Engineering
KYP Accesories
Messersì Packaging
MSK Covertech
Novaxion
Olivotto Glass Technologies
R.Cestaro
Stevanato Group
Vetromeccanica
Waltec Maschinen

ROLLING MACHINE

Fives

ROTATING TABLES

Messersì 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
Vidromecanica

SERVICES

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Bock Energietechnik
EME
Ergon Meccanica
Falorni Tech
Fives
Novaxion
Olimerk
Stara Glass
TECO Group
Tecsiglass

SERVICES IN HOT-DRILLING AND CHANGE OF ELECTRODE HOLDERS

Bock Energietechnik

SHEAR BLADES

BDF Industries
Famor Engineering
Heye International
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
Waltec Maschinen

SHUTTLE CARS

Tecnoferrari

STRETCH & SHRINK FILM WRAP MACHINES

All Glass
Messersì Packaging
MSK Covertech
OMS
Tecnosens
Vetromeccanica

SHRINK OVENS

Messersì 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
Tecsiglass
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
Famor Engineering
Luben Glass
MT Forni Industriali
Olivotto Glass Technologies
Pennekamp
Regina Catene Calibrate
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
Fives
GCG - Glass Consulting
Glass Service
Horn
MT Forni Industriali
Olimerk
Olivotto Glass Technologies
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

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BDF Industries
Bock Energietechnik
Bucher Emhart Glass
Falorni Tech
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
Tecsiglass

THERMAL SHOCK TEST MACHINES

Vidromecanica

THERMOCOUPLES & ASSEMBLIES

Bock Energietechnik
Falorni Tech
Fives
GCG - Glass Consulting
Stara Glass

THERMO SHOCK TEST MACHINES

BDF Industries

TIN OXIDE ELECTRODES & CONNECTORS

Horn
Stara Glass
TECO Group

TRAINING SERVICES

AGR International Inc

TOOLS & EQUIPMENT

Bottero
Fives
Luben Glass
Stara Glass

TUBING LINES

Falorni Tech
Olivotto Glass Technologies
Stara Glass

TURNKEY PLANTS ENGINEERING & CONSTRUCTION

Amig - Ocmi - MT Forni
BDF Industries
Falorni Tech
EME
Glass Service
HFT
Horn
Olivotto Glass Technologies
Stevanato Group
Stara Glass
TECO Group
Waltec Maschinen

UV LAMPS

Graphoidal Developments

VACUUM PLANTS & ACCESSORIES

Pneumofore

VACUUM PUMPS

Pneumofore

VIAL AFTER FORMING MACHINES/LINES

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OCMI OTG
Pennekamp
Stevanato Group

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Moderne Mecanique
OCMI OTG
Pennekamp
Stevanato Group

VIAL PACKAGING MACHINES

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

VIBRATING EQUIPMENT

EME
Lahti Glass Technology
Vetromeccanica
ZIPPE

WASTE GAS CLEANING SYSTEMS

BDF Industries

WASTE GASES DUCT WORKS AND VALVES CLEANING SYSTEMS

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Tecsiglass
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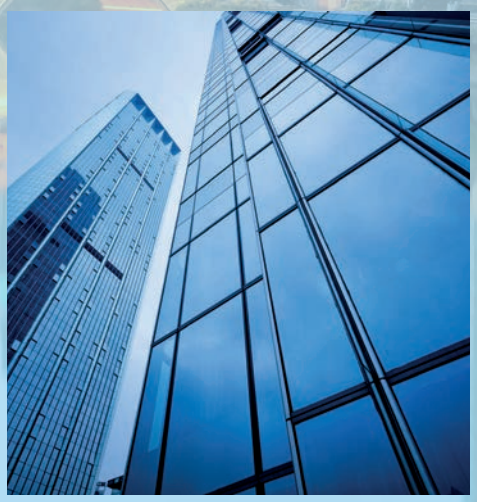

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