Vol. 13 | No. 1 | April - June 2025

Kañch

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Quarterly Journal of **The All India Glass Manufacturers' Federation**

Bi-lingual

Special Feature

Events

AIGMF since 1944

The All India Glass Manufacturers' Federation

invites Project

on

Glass is Pure

Entries accepted via Essay / Poem / Drawing / Photography

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INTERNATIONAL YOUTH DAY

August 12, 2025

Best entries will be Published in:

GLASS News | Kañch

and at: www.aigmf.com

Send Entries at info@aigmf.com

by July 25, 2025

Age Group: 7-24 Years

1st Prize ₹ 25,000
2nd Prize ₹ 15,000
3rd Prize ₹ 10,000

Top 100 entries get a specially designed Glass Memento

SUPPORTED BY:

ICG | CCPS | FOSG | CSIR-Central Glass & Ceramic Research Institute

TERMS & CONDITIONS:

1. The entrant should be aged between 7-24 years
2. Only one project per applicant, either neatly hand-written or computer typed or animated work needs to be submitted with self-declaration about the ownership of the project
3. All entries need to be mailed at info@aigmf.com with any Photo ID issued by the Govt. *(as Address and Date of Birth proof)* or Passport or School/College ID, along with email ID and contact number
4. AIGMF has the rights to use the submitted entry for its social media channels, events, newsletters, publications i.e. KANCH, Glass News, reports, etc.
5. Any false information provided within the context of the contest by an entrant, concerning identity, address, telephone number, email address, ownership of write-up or non-compliance with these rules, will result in the immediate elimination of the entrant from this contest
6. The last date to submit the entries is July 25, 2025 *(Date is subject to change)*
7. There is no entry fee for this contest

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Tubular Glass Range

Material: Type I Borosilicate Glass
Ampoules & Vials in Clear & Amber Glass
Syringes and Cartridges in Clear Glass
ISO 9001, ISO 13485, ISO 15378, ISO 45001 & GMP Certified Facility
Vial Range: 1 ml – 30 ml for Parental & Diagnostics
HPLC Scientific Vials, Screw Neck / Crimp Neck Press Fit, Blowback
Ampoules: OPC, Break / Score Ring, Form: B, C, D Printed / Non printed, treated / non treated

Syringes & Cartridges Range

Material: Type 1 Glass
Syringes and Cartridges in Clear Glass
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Kañch

Quarterly Journal of **THE ALL INDIA GLASS MANUFACTURERS' FEDERATION**

Vol. 13 | No. 1 | April-June 2025

Contents

Transforming tiny places into larger-than-life spaces!

Create the illusion of space with the perfect reflections of Şişecam Mirror Flotal E. Its clear reflections visually expand any area, turning even capsule-sized rooms into open, airy spaces.

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From the President's Desk

On the World Environment Day on June 5th, AIGMF announced its annual Youth contest 2025 on the theme 'Glass is Pure'. The contest is open to Youth between 7-24 years who may send entries at info@aigmf.com by means of essays, poems, drawings, photography, etc. Winners will be announced on the International Youth Day on August 12, 2025. Apart from cash prizes for the top three contenders, top 100 entries will get a specially designed Glass memento.

We are equally pleased to announce the 2025 AIGMF Glass Awards. C K Somany Award for Excellence will be given to an individual who has made significant contributions to the glass industry in the fields of manufacturing, product development, environmental factors, business performance/growth, research and development, science/technology, etc. Balkrishna Gupta Award for Exports will be given to a glass manufacturing unit who has contributed towards identification or growth of new potential markets/ volume of exports/reaching no. of countries or any other area showcasing valuable contribution in Glass Exports. Applications are invited at info@aigmf.com from all those connected with the Indian Glass Industry who may submit a brief write up/CV in support of their candidature latest by August 5, 2025.

The All India Glass Manufacturers' Federation (AIGMF) addressed the recent misleading reports circulating in the media concerning the presence of microplastics in beverages packaged in glass bottles. These reports misinterpret findings from a scientific study conducted by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES).

The ANSES study, in its clear findings, points out that any plastic particles observed in drinks primarily originate from the paint on the caps used for decoration in glass bottles for packaging beverages. The study investigates the presence of microplastics across different types of beverage containers (i.e. plastic, cartons, cans, and glass) in drinks such as water, soda, iced tea, juices, etc. The study is clear that the level of microplastics found in the bottles tested is linked to the metal caps/closures of the bottles, and not from glass packaging. The official statement from ANSES can be accessed via https://www.anses.fr/en/content/caps-glass-bottles-contaminate-beverages-microplastics.

The Glass Industry Officials unfortunately were not consulted before making this study public. We request respected members of the media, stakeholders and public to verify the source of the information cited and understand the manufacturing process of glass bottles to avoid spreading any misleading information on Glass, which has been a trusted mode of packaging since ancient times. The European Container Glass Federation on their official response to ANSES Study, which clearly says that the level of microplastics found in glass bottles tested is linked to the metal caps/closures of the bottles, and not from glass packaging itself. https://feve.org/anses_study_industry-response_2025/ ■

Rajesh Khosla
President AIGMF and CEO/President AGI Greenpac

The All India Glass Manufacturers' Federation

in partnership with:

15th AIGMF International conference on

AI and Digitalisation – the future for sustainable glassmaking

(Sept 11, 2025)

at Bombay Exhibition Centre, Mumbai

***Program as on June 25**- Refer Future Events at www.aigmf.com for an updated program*

TIME (hrs.)	TOPIC/s	COMPANY	SPEAKER
1015	Registration / Tea / Coffee **Unveiling of Touring Exhibition - 'Glass or Class'** ***Featuring award-winning artwork, poetry, photography and essays by young participants (2018–2025) showcasing the role of glass in our daily life***		
1100	**Keynote Address on Artificial Intelligence** *By* **Mr. Rajesh Khosla** *(President AIGMF and CEO/President AGI Greenpac)* **Introduction of Speakers and need for Digitalisation** *By* **Mr. Dave Fordham** *(Global Engagement Lead, Glass Futures, UK; Member Editorial Board of AIGMF's quarterly journal 'KANCH' and Former Publisher of Glass Worldwide magazine)*		
1120	**Release of Book- Excellence in Container Glass Manufacturing** Written *By* **Mr. Ashoka Rao Manikala** *(Former President Operations PGP Glass and AGIGreenpac)*		
1140	**Driving Efficiency in the Smart Plant**	**HEYE INTERNATIONAL GmBH (GERMANY)**	**Mr. Michael Toelle** Director Sales
1200	**Cruise Control for Glass Furnaces:** automated furnace control and batch monitoring systems	**GLASS SERVICES (CZECH REPUBLIC)**	**Mr. Malte Sander** Consultant and Sales
1220	**AI for Mirror and Container Glass** *(with live display of Robots)*	**GRIDBOTS TECHNOLOGIES PVT. LTD. (INDIA)**	**Mr. Pulkit Gaur** Chief Technology Officer
1240	**Reducing Glassmaking Emissions:** a gateway to the digital future of process control technology	**GLASS FUTURES (UK)**	**Mr. Brian Matuszewski** Commercial Project Manager

1300	**Q&A** *MODERATORS:* **Mr. Dave Fordham**; **Mr. Ashoka Rao Manikala; Prof. A S Rao** *(Vice Chancellor Vikrama Simhapuri University, Nellore- Andhra Pradesh and Member Editorial Board of AIGMF's quarterly journal 'KANCH')* **Mr. Sharanjit Singh** *(Executive Member FOSG-Federation of Safety Glassand Director in GSC Glass Ltd.)*
1310	**Wrap-up** *By* **Mr. Purvish Shah,** Hon. General Secretary AIGMF and Director in Gopal Glass Works Ltd., and Gobind Glass and Industries Ltd.
1315	**Presentation on glasstec 2026** *By* Messe Dusseldorf GmbH
1330	**Vote of Thanks** *By* **Mr. Pawan Shukla,** Hon. Treasurer AIGMF; and President and Managing Director, Schott Glass India Pvt. Ltd. **Group Photo and Networking Lunch**

PARTICIPATION: Free of charge

However, *those requiring a Kit Bag, Glass Memento and Lunch may register under the following:*

Delegate Type	Fee *(INR)*
Main Delegate	5,000
Additional Delegate/s *(per member)*	2,500

Cheque payable to 'The All India Glass Manufacturers' Federation', at New Delhi may be sent to Secretary AIGMF, 812 New Delhi House, 27 Barakhamba Road, New Delhi - 110 001 INDIA
or Make an online payment at:

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Pre-REGISTRATION by Aug 20 at info@aigmf.com
(seats, on a first-come, first-served basis)

S. No.	Company / Organization	Participant/s (Name, Designation, Address, Tel, E-mail)
1		
2		

EVENT HIGHLIGHTS 2025

150+* Exhibitors

8500+* Expected Footfall

8,200+ Sqm.* Exhibition Space

Country Pavilions*
Germany Italy

Participating Countries

Belgium | Bulgaria | China | Czech Republic
Hong Kong | Japan | Turkey | UK | USA

*incl. glasspro INDIA 2025

VISITOR REGISTRATION IS NOW LIVE

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Supporting Associations: AIGMF THE ALL INDIA GLASS MANUFACTURERS' FEDERATION; VDMA Forum Glass Technology

Messe Düsseldorf India

GLASS News

FEVE ELECTS VERALLIA'S CHAIRMAN AS ITS PRESIDENT

Verallia's Mr. Michel Giannuzzi has been elected President of FEVE, the European Container Glass Association. Mr. Giannuzzi was unanimously elected FEVE's President during its Annual General Meeting on June 12.

Mr. Giannuzzi stated: *"It is a privilege to represent an industry that plays such a vital role in building beautiful and healthy packaging that enhances our customers' brand identities".*

"As we move forward, I am committed to reinforcing our collective efforts towards decarbonisation and innovation, ensuring that the glass packaging industry remains a competitive local manufacturer in Europe's green transition."

The European container glass industry, which supports 125,000 jobs, produces more than 20 million tonnes of endlessly recyclable glass each year across 23 countries.

With glass-packaged goods enabling over €140 billion in trade value, the sector is a vital pillar of Europe's industrial powerhouse.

"I look forward to continuing the important mission of promoting the unique benefits of glass – a permanent material that is endlessly recyclable, safe, and essential to a circular economy," added Mr. Giannuzzi.

The glass container industry is stepping up to implement the new EU packaging rules, which will have significant impacts on the whole packaging value chain.

Glass is reusable and infinitely recyclable, making it a reference for consumers and a true ally of brands that need to achieve the objectives of the Packaging and Packaging Waste Regulation.

In the coming months, FEVE will continue to advocate for a simple regulatory framework that supports innovation, competitiveness and the practical needs of the glass packaging value chain.

The election of the new President of FEVE comes at a critical time for the industry's transformation.

European glass packaging manufacturers have already invested in around 100 decarbonisation and innovation projects across Europe – from hybrid electric furnaces to eco-design - and to investments in collection and recycling.

Yet, huge bottlenecks remain, green energy prices remain high, and unstable energy infrastructures are not ready to support electrification and full industrial decarbonisation.

Outgoing President, Mr. Martin Petersson, CEO of Ardagh Glass Packaging-Europe, said: *"As an industry, we are committed to investment in decarbonising the European glass packaging industry, but we need a policy framework that reflects industry realities and a transition pathway to decarbonisation that is aligned with our capital-intensive investment cycles."*

"The Clean Industrial Deal is a step in the right direction and we are ready to play our role to ensure its successful implementation".

ARUN AND DARSHANA VARSHNEYA ENDOW UNIVERSITY CONFERENCE ON GLASS

A gift from Dr. Arun Varshneya, Alfred University Emeritus Professor of glass science, and his wife, Mrs. Darshana Varshneya will support the University Conference on Glass series as well as an annual lecture on glass at Alfred University.

The Varshneya Endowed Glass Fund, under the stewardship of Alfred University, will support the University Conference on Glass, a biennial conference which is hosted on a rotational basis by four institutions: Alfred University, Missouri University of Science and Technology, Rensselaer Polytechnic Institute, and Pennsylvania State University. Funding will support the conference at all four host institutions. The conference series, established at Alfred University in 1970, will now be titled the Varshneya-University Conference on Glass.

"My global reputation originated from two sources: professorship at the New York State College of Ceramics at Alfred University and ownership of Saxon Glass Technologies, Inc.," Dr. Varshneya said. *"The latter itself came about from my faculty position. At a breakfast meeting with retired faculty, I had remarked to President Zupan that I had the greatest time at Alfred. In Frank Sinatra's words, 'Regrets I had a few, but too few to remember.' It was, therefore, natural for me to think about giving back."*

Alfred University hosted the 21st annual University Conference on Glass in 2024. Undergraduate and graduate students, faculty, and industry professionals took part in the conference, learning about the latest developments in glass science, technology, and education. Sessions included introductory lectures by glass experts on important glass subjects and presentations by undergraduate and graduate students of their latest research.

In addition to supporting the Varshneya-University Conference on Glass, the Varshneyas' gift will also fund the Varshneya Lecture on Glass, an annual lecture series held at Alfred University. Dr. Varshneya said *he expects the lecture series to bring renowned members of the glass science community to campus, similarly to the Samuel L. Scholes Memorial Lectures series, held annually at Alfred University in April.* Established in 1982, the Scholes Lecture series honors the late Samuel R. Scholes, who in 1932 established the first glass science program in the United States at the New York State College of Ceramics at Alfred University.

"The subject matter (of the Varshneya Lecture on Glass) should include all glass science, technology, and education topics, building upon the fundamentals described in my textbook," Dr. Varshneya said, referring to his book, "Fundamentals of Inorganic Glasses," which he wrote at the request of his students. Currently used as a textbook to teach glass science and technology to students worldwide, "Fundamentals of Inorganic Glasses" earned Varshneya the nickname, "The Glass Guru," globally.

Dr. Arun Varshneya is Professor of glass science and engineering, emeritus, whose teaching and research career at the New York State College of Ceramics at Alfred University spanned from 1982 to 2010. During his tenure, Dr. Varshneya taught nearly every course in glass science and engineering at the undergraduate and graduate levels.

He taught business basics including a hypothetical business project for glass and ceramic engineers entitled, "Engineering Operations" which became the capstone course - a pioneering approach which received much admiration by accreditation boards. For this effort, he was appointed courtesy professor of entrepreneurial business administration by the College of Business at Alfred University.

Dr. Varshneya's notable former students include Alfred University alumnus John Mauro '01, '06 PhD, Dorothy Pate Enright Professor and head of the Materials Science and Engineering Department at Pennsylvania State University; A.N. Sreeram '91 M.S., Senior Vice President and Chief Technology Officer of Dow Chemical, and a member of the Alfred University Board of Trustees; Robert Callahan ''89 M.S., Partner, Global Infrastructure Partners; and Jeetendra Sehgal '88 M.S., President, Business R&D, Borosil Glass (India). Prof. Mauro was one of the lecturers at the 2024 University Conference on Glass, hosted by Alfred University.

Dr. Varshneya is a distinguished Life Member of the American Ceramic Society, an Honorary Fellow of the Society of Glass Technology and a President's Award recipient for lifetime achievement by the International Commission on Glass.

He is also the President of Saxon Glass Technologies, Inc., an entrepreneurship business co-founded in 1996 in the Alfred's Innovation Center to provide chemical strengthening service for glass. Its flagship product is the chemically strengthened Type-1 borosilicate glass cartridge that is incorporated in every EpiPen® autoinjector to combat anaphylaxis shock due to severe allergies to peanuts, beestings, shell foods and other allergens. The strengthening effectively reduces glass failure events from around 10 percent in the unstrengthened form to next to nothing during the administration of the EpiPen®. It helped the "EpiPen" to become a household name, helping save thousands of human lives each year, while increasing its market size from a million units in 1996 to roughly 30 million units in 2019. Mrs. Darshana, Dr. Varshneya's wife of 51 years, is the Chief Financial Officer of the company.

Dr. Arun and Mrs. Darshana Varshneya currently live in Vienna, VA, near their daughters Pooja, Kajal, and Rupal.

GLOBAL AND INDIAN GLASS INDUSTRY ADDRESSES MISINTERPRETATIONS ON MICROPLASTICS IN GLASS BOTTLE PACKAGING

The All India Glass Manufacturers' Federation (AIGMF) addressed on the recent misleading reports circulating in the media concerning the presence of microplastics in beverages packaged in glass bottles. These reports misinterpret findings from a scientific study conducted by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES). The ANSES study, in its clear findings, points out that any plastic particles observed in drinks primarily originate from the paint on the caps used for decoration in glass bottles for packaging beverages.

The study investigates the presence of microplastics across different types of beverage containers (i.e. plastic, cartons, cans, and glass) in drinks such as water, soda, iced tea, juices, etc. The study is clear that the level of microplastics found in the bottles tested is linked to the metal caps/ closures of the bottles, and not from glass packaging. The official statement from ANSES can be accessed via https://www.anses.fr/en/content/caps-glass-bottles-contaminate-beverages-microplastics

Mr. Rajesh Khosla, President- AIGMF said: *"The Glass Industry Officials unfortunately were not consulted before making this study public. We request respected members of the media, stakeholders and public to verify the source of the information cited and understand the manufacturing process of glass bottles to avoid spreading any misleading information on Glass, which has been a trusted mode of packaging since ancient times."*

He further cited the press statement issued by FEVE – *The European Container Glass Federation on their official response to ANSES Study, which clearly says that the level of microplastics found in glass bottles tested is linked to the metal caps/closures of the bottles, and not from glass packaging itself.* *https://feve.org/anses_study_industry-response_2025/*

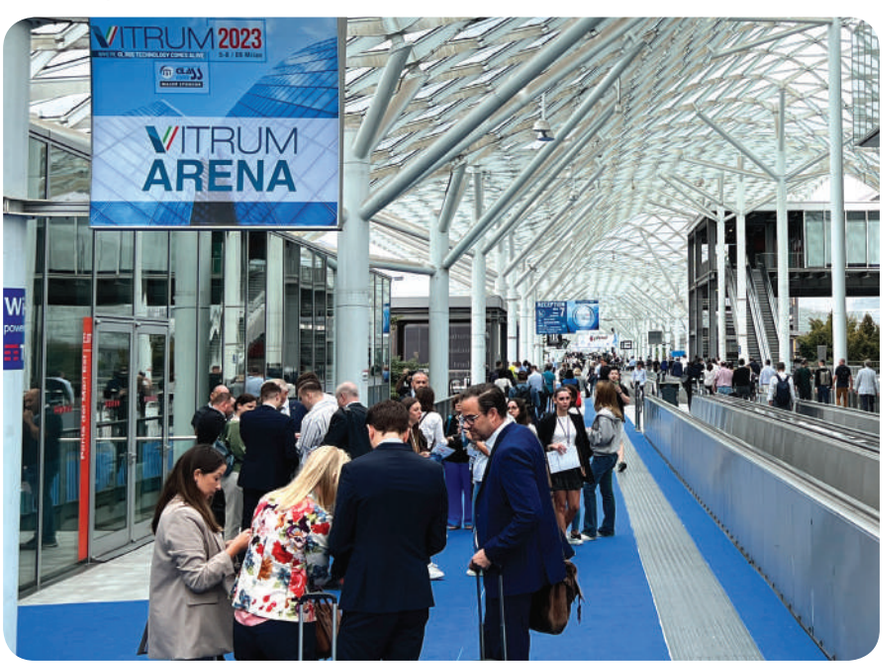
Mr. Vinit Kapur, Secretary- AIGMF, said, *"Glass and plastics are fundamentally distinct materials. Glass bottles are manufactured from abundant natural ingredients such as silica sand and cullet (recycled glass), through a high-temperature process that does not involve the use or formation of plastics. The glass manufacturing units are entirely free of plastic production. When plastic particles are observed in beverages packaged in glass bottles, these particles are attributed to external components like caps and closures, specifically those involving painted metal surfaces, plastic liners, or sealing compounds."*

It is important to note that Glass is chemically inert and non-toxic; Glass is 100% recyclable and contains no harmful additives; Glass is globally recognized as one of the safest and most sustainable packaging materials, especially for food, beverages, and pharmaceutical (Covid and other critical lifesaving vaccinations) applications; and Glass plays a critical role in public health, consumer safety, and environmental stewardship.

VITRUM 2025: THE NEW CONCEPT ENHANCES THE FLAT GLASS SECTOR AND STRENGTHENS INDUSTRY-WIDE DIALOGUE

The renewal path undertaken by Vitrum, the international exhibition dedicated to glass technologies and manufacturing, marks an important step in consolidating the representation of the flat glass sector and in proposing a trade fair model that meets the evolving needs of the industry.

Vitrum's new concept aims to go beyond the traditional exhibition format, positioning itself as an integrated platform for dialogue, updates, and development. The event aspires to become a true showcase of glass manufacturing, effectively fostering connections among



technology producers, industrial enterprises, processing companies, and institutions. It will serve as a meeting point for the entire supply chain to build new opportunities, tackle the challenges of ecological transition, and promote innovation.

This vision is already being validated by the confirmed participation of major players in the flat glass industry: Saint-Gobain, Pilkington, Glass Group – the leading Italian glass processing group – and the Stazione Sperimentale del Vetro. Collaboration with Assovetro further strengthens the institutional representation of the event.

These presences go well beyond a simple exhibition role, representing a concrete commitment to supporting the sector's growth. Among the upcoming initiatives, the Stazione Sperimentale del Vetro will offer introductory courses on flat glass technologies, aimed at both professionals and emerging talents, to foster skill development and the spread of technical and industrial knowledge.

"Vitrum's new concept was born from listening to the industry and from the desire to offer a practical tool to support the supply chain," said Ms. Lucia Masutti, General Director of Vitrum. *"The participation of major players such as Saint-Gobain, Pilkington, Glass Group, the Stazione Sperimentale del Vetro, and the collaboration with Assovetro confirm that we are moving in the right direction: towards an event capable of showcasing glass manufacturing and promoting innovation, sustainability, and industrial growth."*

Vitrum is also continuing with determination to promote the participation and involvement of the hollow glass sector, with the goal of representing the entire industry and its various specializations in a more comprehensive and inclusive way.

Team GLINDCO at SNJ India Glasses site

GIMAV is the Association representing Italian manufacturers and suppliers of machinery, accessories, equipment, and special products for glass processing. Founded in 1980, it is now a fundamental point of reference for the entire sector in Italy and abroad. A member of Confindustria and Federmacchine, it represents a significant portion of the glass processing industry. Companies belonging to GIMAV account for about 75–80% of the sector's total turnover and 65–70% of total exports by Italian manufacturers of machinery, accessories, and special products for glass processing.

Vitrum 2025 will be held from Sept 16-19, 2025 at Fiera Milano Rho, ITALY.

GLINDCO SEAMLESSLY COMMISSIONED ANOTHER GREEN FIELD PROJECT

GLINDCO has commissioned another green field project under EPCM contract for SNJ India Glasses, a unit of M/s SNJ Distillers Pvt. Ltd., based in Chennai INDIA which is one of the largest spirits and beer manufacturers in southern India.

The plant has been setup near Gummidipoondi, Chennai and it is the first glass container project in the state of Tamil Nadu. The plant is designed to serve the requirements of spirits, beer, wine and food packaging

SNJ India Glasses

with a capability of producing flint, amber and green.

The company has a large requirement of glass, and this unit will serve as a strategic backward integration for an optimum supply chain and logistics management as well serving the other end users in the region.

The plant has been set up with state-of-the-art equipment from end to end. The plant is equipped with state-of-the-art technology and advanced IS Machines having the capability of producing glass containers in Blow and Blow, Press and Blow and NNPB processes.

GLINDCO has demonstrated its deep experience from initial planning to commissioning in a seamless manner and the plant has been commissioned with green colour beer bottle producing through B&B and NNPB processes with a packing efficiency of 90% from the very beginning.

GLINDCO also has supplied state of the art batch plant on a turnkey basis. The first glass was drained on May 7 and production started on May 8, 2025.

VETROPACK TO PRODUCE LIGHTWEIGHT BOTTLES

Vetropack Group aims to increase the production of lightweight, thermally hardened glass bottles in Pöchlarn, AUSTRIA late next year.

The thermally tempered bottles are a third lighter than traditional reusable bottles and are produced using a method developed by Vetropack.

The Board of Directors has already approved the plan to increase the production capacity of the lightweight glass bottles in AUSTRIA.

This means that the financial resources for setting up an industrial plant are now available, said the company's Chief Technical Officer Mr. Guido Stebner.

The company has spent several years to develop a process that makes glass bottles resistant through thermal hardening, while also reducing their weight.

Vetropack is preparing the infrastructure in Pöchlarn for the installation of a large-scale machine. The equipment is scheduled to go into operation in summer 2026.

For the development, design and manufacture of the first industrial production plant, Vetropack is working with Iprotec, a specialised machine construction group based in Zwiesel.

"In the medium to long term, it is conceivable that we will expand production to other sites using the same technology," added Mr. Stebner.

At the beginning of last year, the Vetropack Group, together with the Austrian Brewers Association, presented the 0.33 litre reusable bottle as a standard solution for the entire Austrian brewing industry.

FURNOTHERM INSTALLS REFRACTORY AND FURNACE EQUIPMENT FOR SNJ INDIA GLASSES

On April 23, Furnotherm successfully heated-up 230 TPD Container Glass Furnace for SNJ India Glasses, a unit of SNJ Distillers Pvt. Ltd., a milestone project that reinforces their commitment to excellence in industrial furnace construction.

Mr. S. N. Jayamurugan, Chairman, and Ms. Anitha Jayamurugan, Managing Director of M/s SNJ India Glasses congratulated Furnotherm's site Manager for the successful completion of the furnace. This state-of-the-art furnace, designed by HORN Glass Industries AG GERMANY, stands as a testament to international collaboration and engineering expertise.

This also marks a historic milestone for M/s SNJ India Glasses, as they proudly commissioned the first-ever container Glass furnace in the state of Tamil Nadu, INDIA. As trailblazers in the region's container glass manufacturing industry, SNJ adds yet another prestigious venture to their diversified business portfolio.

Furnotherm has played a pivotal role in this project, executing the complete structural steel works, including fabrication and installation; Fabrication and erection of cooling and combustion ducting; Installation of all furnace refractories—furnace, distributor, forehearths; Refractory lining of a 70-meter high chimney and Installation of all furnace, distributor, and forehearth equipment.

On May 7, 2025, the Glass draining for the commencement of production was successfully carried out.

TRANSFORMING GLASS MANUFACTURING: INTELLIGENT ROBOTIC INSPECTION FOR TINY INCLUSIONS IN GLASS

i3D Robotics is excited to announce the successful completion of its cutting-edge research project, Intelligent Robotic Inspection for Foundation Industry Optimisation (IRIFIO). This pioneering initiative is set to transform defect detection in the glass manufacturing industry, enhancing productivity, reducing waste, and supporting net zero targets.

In the glass manufacturing industry, even the smallest imperfections can lead to significant costs, and a tiny inclusion can cause a glass panel to shatter. Current defect detection methods, such as heat soaking, are energy intensive and time consuming.

This project, led by i3D Robotics, introduces a transformative solution for faster, consistent, and more accurate inspections using machine learning and robotics. IRIFIO leverages advanced smart vision and sensory technology to detect tiny defects during the flat glass production process.

IRIFIO received a collective £4m in funding by UK Research and Innovation's (UKRI) Transforming Foundation Industries (TFI) challenge and the TFI Fast Start competition and the project has achieved to date:

INDUSTRIAL SIMULATION: IRIFIO is the first cold trial to take place on Glass Futures' new state-of-the-art pilot line. By simulating a flat glass production line, vision sensors identified microscopic defects during production, which were smaller than the 150 microns existing scanners can detect and far beyond what manual inspection can spot.

COST SAVINGS: Implementing this defect detection technology could save toughened glass suppliers around £1.8m by eliminating the heat soaking process and preserving 11,000m^3 of glass that would otherwise be discarded as false positives.

INDUSTRY MILESTONE: This is a significant leap for the glass industry as we now have the technology to demonstrate with glass manufacturing partners, but we need their collaboration to elevate this innovation to the next level.

Detecting minute inclusions in glass could potentially eliminate the need for heat soaking thousands of panels before toughening. This technology has the potential to reduce the flat glass industry's CO_2 emissions by 20,000 tonnes per year and minimise waste from destructive testing.

Dr. Daniel Backhouse, Senior Glass Technologist at Glass Futures said: *"I'm proud to share that we successfully completed the first cold trial on Glass Futures' pilot line for the IRIFIO project. It was an exciting process, moving samples under the IRIFIO camera system to see how it performs in industrial conditions and we gathered valuable data that our project partners will now analyse. We look forward to continuing to collaborate with our partners to further develop and scale this technology for the glass industry."*

The project was managed by Science and Technology Facilities Council Hartree Centre, who also analysed the data. Other collaborators include glass manufacturing supply chain consultants Glass Technology Services, and international materials consultancy Lucideon to explore similar advancements in not only glass, but ceramic production processes as well.

Dr. Richard French, Innovation Lead at i3D Robotics added: *"The scale of IRIFIO's ambition has been just one of the many challenges on this journey, but it's extremely rewarding to have successfully demonstrated the technology's operational viability in a real-world scenario. The foundation industries (Glass, Metals, Ceramics, Paper, and Chemicals) contribute 10% of the UK's carbon emissions. Technologies such as these are vital to their achieving net-zero targets. It's been a privilege to work with expert partners to deliver solutions that will help to shape the future of these vital industries."*

SAD DEMISE OF MEENU RANI MITTAL

Mrs. Meenu Rani Mittal, Director in Mittal Group of companies and wife of Mr. Raj Kumar Mittal (Former President AIGMF and President UPGMS Firozabad) left for heavenly abode on April 23.

A prayer meeting was held on April 25 at Firozabad in remembrance of Mrs. Mittal.

SAD DEMISE OF CHANDER MARWAH

Mr. Chander Marwah, Chairman and Managing Director of Jai Mata Glass Ltd. (a former AIGMF Member company) passed away on May 28, 2025.

Antim Ardas (a prayer meeting) was held on May 31 at Delhi in remembrance of Mr. Marwah.

WORLD ENVIRONMENT DAY 2025 SEES AGI GLASPAC JOIN GLASS FUTURES

Amid global calls for the adoption of green materials on World Environment Day, Glass Futures and AGI Glaspac were delighted to use the auspicious occasion to announce a pivotal collaborative sustainability agreement.

World Environment Day encourages the adoption of sustainable practices to drive systemic change, and AGI Glaspac becomes the first Indian-owned member of Glass Futures' network of international stakeholders that is working together to identify and deliver routes to industrial decarbonisation. This membership underscores AGI Glaspac's deep commitment to environmental stewardship and sets a new benchmark for the Indian glass industry.

"Glass is fully recyclable and with the support of global research organisations like Glass Futures we have an unparalleled opportunity to discuss and implement green policies that each of us can adopt for a better environment.," commented Mr. Rajesh Khosla, CEO AGI Glaspac, a leading Indian container glass manufacturer that produces over 2000 TPD and is deeply committed to spearheading sustainable glassmaking.

"This collaboration isn't just about reducing our footprint; it's about pioneering a sustainable future for glass manufacturing, not just in India, but globally. We are excited to contribute our expertise and learn from Glass Futures' cutting-edge research, accelerating our own journey towards environmental sustainability," Mr. Khosla added.

Just weeks ahead of Glass Futures' experimental 30tpd R&D furnace going live in a transformational pilot plant in St Helens, UK, AGI and Glass Futures are already exploring opportunities to advance the common sustainability goals of Glass Futures' international community. Extensive research projects and external trials with industrial partners are already enabling Glass Futures to lead the way with ground-breaking developments in fields such as biofuels, hydrogen, carbon capture, alternative raw materials and technologies around supporting and enabling circularity.

"Since the announcement last year by strategic member Diageo to expand their partnership with Glass Futures into India to explore effective routes for decarbonising the glass industry, we have actively engaged with the AIGMF and key players from this fast-growing region. We are very pleased this has resulted in AGI joining Glass Futures and look forward to collaborating alongside our worldwide network of sustainability pioneers," enthused Mr. Dave Fordham, Glass Futures' Global Engagement Lead.

As highlighted by the UK Prime Minister Sir Keir Starmer during his recent visit to Glass Futures, the UK and India have signed a free trade deal that is expected to vastly boost bilateral trade between the nations. Citing a potentially significant boost to the glass sector, Highlands and Islands Labour MSP (Member of the Scottish Parliament) Ms. Rhoda Grant reported: *"The agreement has the potential to increase Scotch Whisky exports to India by £1bn over the next five years and to create 1,200 jobs across the UK".*

AIGMF Secretary Mr. Vinit Kapur said *"AIGMF is actively promoting glass as a sustainable material and participates in various initiatives to enhance glass' environmental credentials. Co-operation with R&D bodies such as Glass Futures is potentially very beneficial to the AIGMF and our members; AGI becoming a Glass Futures member to collaborate on sustainability projects is an important development for the Indian glass sector, as well as the wider UK and global markets".*

फ्रांस की संस्था के दुष्प्रचार पर कांच उद्योग का कड़ा विरोध

फ्रांस की एक संस्था, एएनएसईएस की ओर से कांच की बोतलों में पैक पेय पदार्थों में माइक्रो प्लास्टिक कणों की मौजूदगी के दावे पर फिरोज़ाबाद के कांच उद्योग ने कड़ा विरोध जताया है। स्थानीय कांच उद्यमियों और निर्यातकों ने इन दावों को कांच बोतल इंडस्ट्रीज के खिलाफ एक सोची-समझी साजिश करार दिया है।

कांच उद्यमियों का कहना है कि कांच की बोतलें पूरी तरह से सुरक्षित होती हैं और उनमें किसी भी तरह के प्लास्टिक मैटेरियल का मिश्रण नहीं किया जाता है। उन्होंने तर्क दिया कि पेय पदार्थों में माइक्रो प्लास्टिक कणों की मौजूदगी प्लास्टिक उत्पादों जैसे टेट्रा पैक और कैन के ऊपर लगे रंगीन ढक्कनों या धातु के ढक्कनों पर होने वाले पेंट के कारण हो सकती है।

कांच उद्योग जगत ने भारत सरकार से इस तरह का दुष्प्रचार करने वाली विदेशी संस्था के खिलाफ प्रभावी कदम उठाने की अपील की है।

34TH CHINA INTERNATIONAL GLASS INDUSTRIAL TECHNICAL EXHIBITION

The 34th China International Glass Industrial Technical Exhibition, known as China Glass 2025, was held from May 26-29, 2025 in Beijing, CHINA.

This exhibition was hosted by the Chinese Ceramic Society and organised by Beijing Zhonggui Exhibition.

With the theme of "Intelligent Manufacturing, Green Future," the exhibition focused on the high-end, intelligent and green development trends of the industry.

Leading manufacturing companies, buyers, industry organisations, scientific research institutions and traders from the global glass industry including some AIGMF Members gathered in Beijing to witness the most eye-catching glass event of the year.

(News Source: AIGMF Research Team / World Wide Web)

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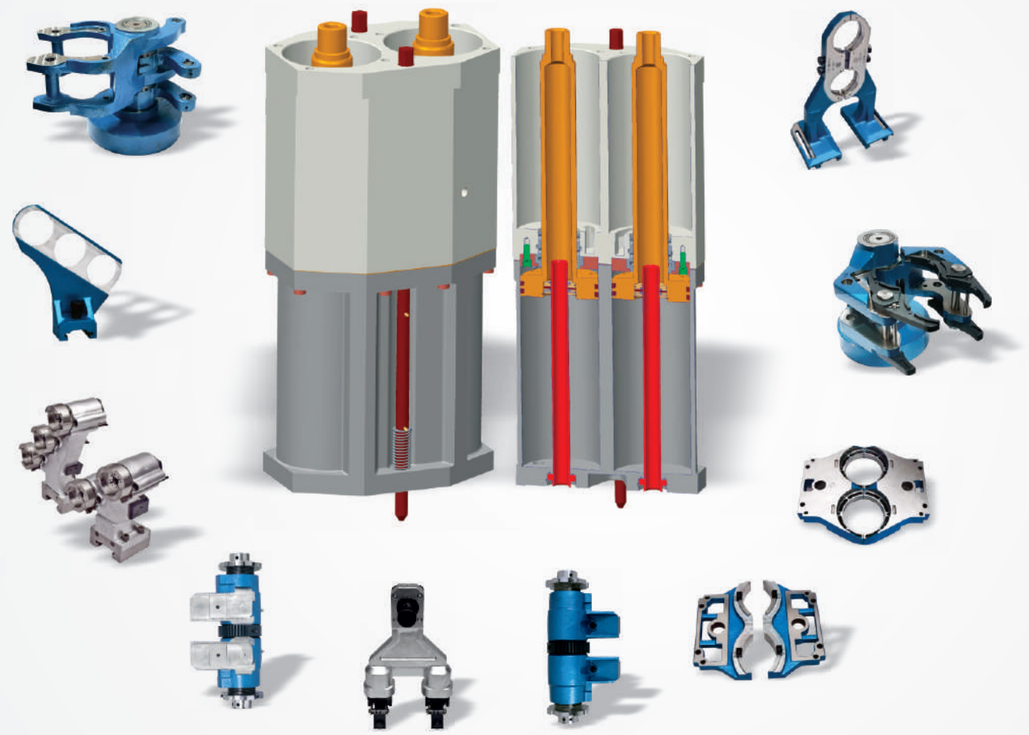

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Chalcogenide Glasses: A Vision beyond Visible (Part-1)

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Glass is an incredibly versatile material, utilized almost in every field from common to advanced applications. On day-to-day basis, we encounter with countless forms of glass. The windows of our home, bottles we use for drinking beverages, the containers used for storing food, automobile, display and protective screen of smartphones are made of glass only.

Nowadays, glass is been considered as safe and aesthetic building material, serving as not only as window panes but also as wall, floors, pillars, even stairs providing fire safety, sound proof to the building. Glass-based optical communication fiber and lens in medical diagnostic equipment or in any advanced optical devices are the essential but also indispensable materials. Literature evidenced that the word '*Kancha*' means '*Glass*' is mentioned in 'Vedas'. Thus, the history of Indian glass dates back to the Vedic Period (1000–1200 B.C). The most interesting property of glass is its transparency towards visible light. Further, glasses can be shaped in any form, preparation is simple, cost-effective, also it is recyclable. Glass, as a material, has secured a prominent position in various advanced fields of material science, particularly in optoelectronics, optics, and photonics.

Since the late 1970s, glass has gained popularity as a reinforcement material over plastic. Initially glasses were commonly used in window pane, later, after 1980s glasses began to be utilised as replacement of concrete in building material. In the cold countries, glasses are being used as an insulating building material, allowing ample daylight to pass while helping indoors to retain warmth. Advances in production technology and functional innovation have made glass a highly versatile, safe building material in architecture, as well as a valuable resource in transportation and packaging. With ongoing technological advancements, glass has found extensive applications in photonics and optoelectronics, serving as optical glass, communication fiber, display glass, laser glass as gain medium in high power lasers, and cover glass of solar panels. Apart from these innovative applications, glasses are also used in thermal imaging and night vision, utilizing a special category of non-oxide, non-conventional, infrared (IR) transmitting glasses known as "chalcogenide glass". These glasses are made of one or more chalcogenide elements (group 16 elements: S, Se, Te), in combination with electropositive atoms from group 13 (Ga, In), 14 (Ge) and 15 (Sb, As, Bi). Except few sulfur-based compositions chalcogenide glasses are non-transparent to visible light, therefore, appear black in colour. Depending on composition their IR transparency window can be extended beyond 25 μm (Far-IR). The physics behind the IR transparency of any material is related to its atomic vibrational transitions, rather than

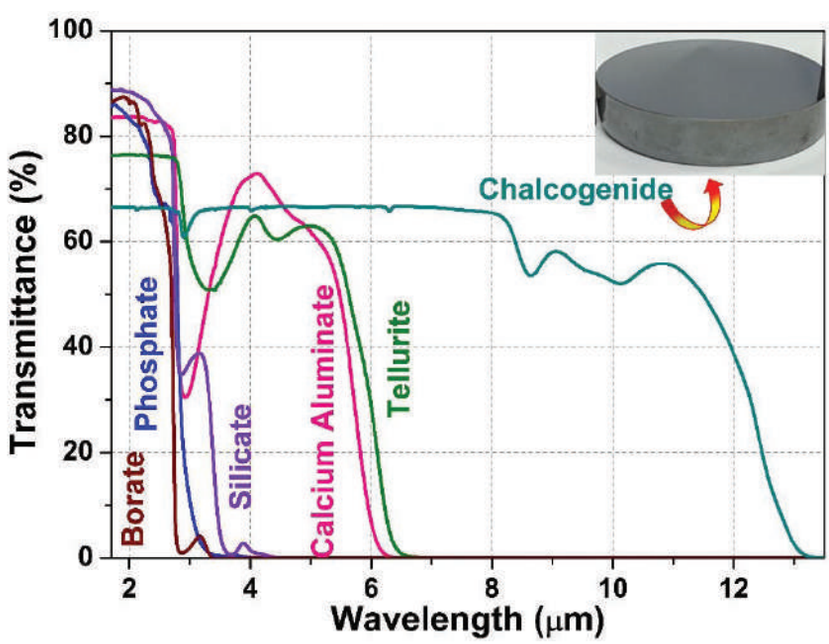


Fig 1. Comparative Transmission window of different oxide glasses with chalcogenide glass

electronic transitions derived from Hooke's Law is given below:

$$\nu = \frac{1}{2\pi}\sqrt{\frac{k}{\mu}}$$

The expression shows proportional relation between vibrational frequency (ν) and bond strength (k), and inverse relation between vibrational frequency (ν) and reduced mass (m).

Therefore, materials with weaker bond or heavier atom absorb lower frequency, and their absorption window is prolonged towards extended IR spectrum. A comparative transmission window of different oxide glasses like silicate (up to 4 μm), borate (up to 3 μm), phosphate (up to 3 μm), calcium Aluminate (up to 5.5 μm), Tellurite (up to 6 μm) with chalcogenide glass is shown in Figure 1. Extended transparency window of chalcogenide glasses covers the second and third atmospheric window such as 3-5 μm (thermal window) and 8-12 μm (hot window) wavelength regions, which made them suitable for thermal imaging lens production.

Thermal Imaging is one of the most advanced applications of IR technology and known for its diverse application fields such as security, medical diagnosis, environmental control, agriculture, driving assistance, building constructions etc. Thermal cameras are also known as infrared (IR) cameras due to their sensitivity in 1-14 μm wavelength region. They can capture image of any substance irrespective of the ambient lighting condition through sensing the IR radiation emitted from that substance and also can provide a complete thermogram of different temperature zones. Thermal cameras were first invented in 1940s by US army and its use was restricted only in defence related domain up to 1958 for surveillance. First commercialization of thermographic camera was taken place in 1965 for the inspection of high voltage power supply line. Since 2005, advancements in low-cost thermal lenses, uncooled detector arrays for high-resolution imaging, and sophisticated computer analysis tools have made this technology accessible for civilian applications. Recently thermal imaging acquired enormous interest in medical field for temperature detection, finding cancer cells, inflammatory or vascular problematic area in human body, cryotherapy etc. After Corona Virus Pandemic situation of 2020, thermal cameras are being used in many places specially airports, hospitals and educational organizations, with the purpose of preliminary thermometric detection of people having fever or might have been infected with virus. The best part about thermal cameras is that it allows non-contact mode operation and also provides temperature mapping of different areas of a substance.

Temperature control is a crucial element in manufacturing processes, and infrared imaging has revolutionized how temperatures are measured. For example, glass industry itself involves lot of high temperature processes; hence, thermal imaging can be used in controlling melt homogeneity, measuring temperature uniformity in heating zone of melt pool, assessing any faults in power circuits, controlling gradient heating zone based melting process etc. Additionally, it can also help in executing digital automation. Another important application of thermal imaging is low-light navigation in the automotive industry. Approximately half of all serious traffic accidents happen during nighttime as well as in different weather conditions like snowfall/ fog, due to low visibility. Hence, it is a key challenge for

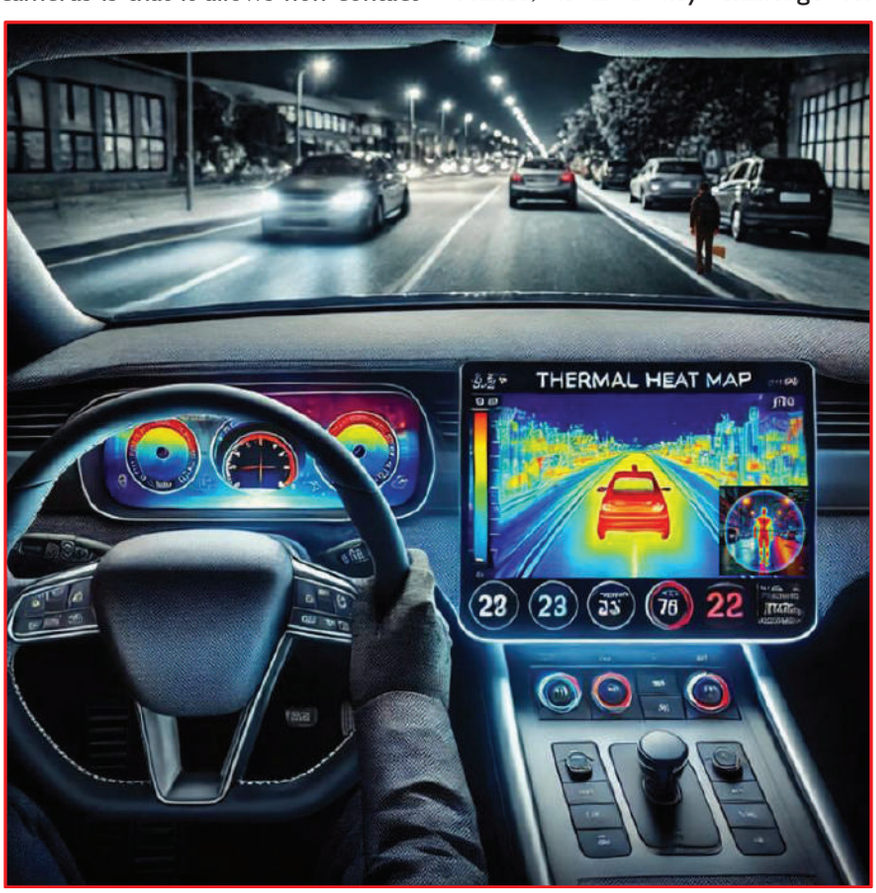


Fig 2. Pictorial illustration of a high-end car dashboard fitted with thermal imaging device

automobile industries to enhance safety features during night time/ foggy weather. Although, thermal imaging can provide those safety measures, but, till date only few high-end automobile companies are able to provide this feature (Figure 2), which is limited by its price point. Generally, IR optics of thermal imaging cameras are made up of Ge single crystals, which make the price high. Hence, development of low-cost thermal camera parts (like IR lens) can advance both the above-mentioned technologies. The chalcogenide glasses are the low-cost alternate for Ge single crystal in thermal imaging cameras.

There is a significant difference in the operating principles of daylight cameras and thermal imaging devices. For a normal daylight camera, suitable lightning is required to capture image. The light bounced from an object is detected by the camera detector and turned into an image. So, their application is limited to sun light or any sort of an artificial light. However, thermal imagers altogether work in a different principle. Thermal imaging device can detect infrared (IR) radiation (Mid-IR in the wavelength range of 3-14 μm) emitted from a substance at a temperature higher than absolute zero (0 K). Principle of IR cameras are based on three theories, the total radiation law, Stefan-Boltzmann's law and Planck's radiation law. Total radiation law states that the amount of incident energy is equal to the sum of absorbed, reflected and transmitted energy. Stefan-Boltzmann's law states that the total radiant energy (W) of a body is proportional to the fourth power of temperature (T) following the equation:

$$W = \varepsilon\sigma T^4$$

where W= total radiated energy from a system, ε= emissivity. Therefore, as the temperature increases, IR-radiation intensity from the same substance also increases. According to Planck's radiation law for a perfect radiator at temperature T, the radiative power (P) and its wavelength (λ) distribution follows the equation:

$$P(\lambda,T)=\frac{2\pi c}{\lambda^4}\left[exp^{\left(\frac{hc}{\lambda KT}\right)}-1\right]^{-1}$$

P is proportional to the number of photons emitted, h= Planck's constant, c= velocity of light, K= Boltzmann's constant.

Every living or non-living material in surrounding environment emit or absorb thermal energy. Any living/ non-living body emits in the second atmospheric window (3-5 μm) and a hot body emits comparatively at longer wavelength in third window (8-12 μm). The emitted or absorbed thermal energy from a particular material is called its 'Heat-Signature'. Any livingbody (including human) emits thermal energy both day and night. Engine or machinery items fall in hot material category. However, the rocks, lands, vegetation absorb heat from sun in the day and radiates (emits) it at night. As a matter of fact, rate of heat emission is different for different material.

(Figure 3), presents a schematic illustration of the various components and operational procedure of a thermal imaging camera, highlighting the IR lens crafted from chalcogenide glass.

This IR-transparent lens is the most primary element of the thermal imager, that can collect and focus the infrared light emitted by an object in view. Then the focused IR radiation is transferred onto an IR-detector, where collected IR beam is scanned by phased-array of the IR-detector element. The detector generates a detailed temperature pattern or 'thermogram' in an ultrashort time interval (~1/13 second). In the next step, created thermogram is translated into electrical pulse, which is then sent to a signal processing unit. In the signal processing unit electrical signal is translated into optical data for the display through an advanced image sensor. The part 2 of this article will be continued with the description of the important class of chalcogenide glasses.

……..To be continued

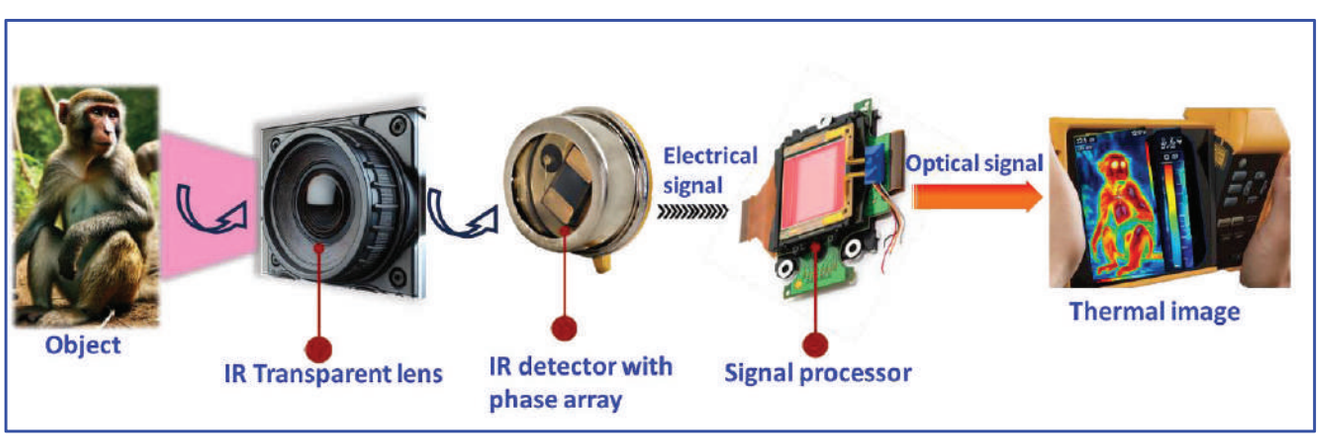
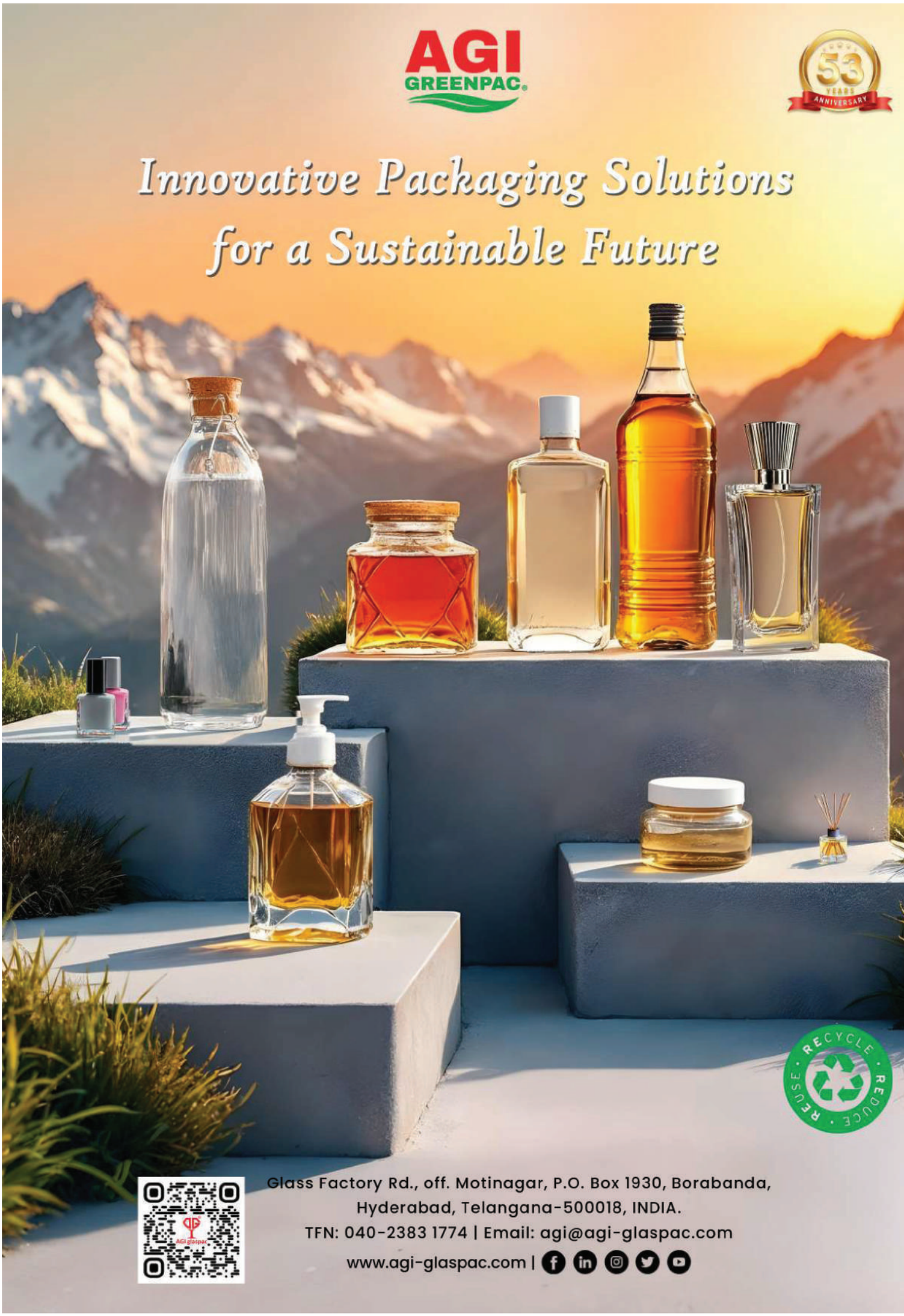


Fig 3. Schematic of a thermal imaging camera parts and operation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AGR International, Inc. remains Prominent in the Glass Container Industry

AGR International and its subsidiary, American Glass Research, have a long history in the advancement of glass container quality. Their roots date back to 1927, with the opening of Preston Laboratories, a company that provided technical support and research services to the burgeoning glass industry of the time. Over the years, scientists and technicians at Preston Laboratories developed many techniques and devices for analyzing the strength and performance of glass containers. Their work set the standards that are still used today for the production and quality management of glass containers around the world.

In 1961, Preston Laboratories officially became American Glass Research and moved its facilities to the present location. In addition to glass container research and development, the company added manufacturing capabilities to meet the demand for testing equipment. The product catalog included laboratory devices for measuring thickness, pressure and coatings as well as a host of other devices essential to managing the quality of glass bottles.

In the late 1960's and early 1970's the company experienced a period of considerable growth, during which its portfolio of products was expanded to include a wide assortment of laboratory, on-line and sampling test systems for glass containers. This established American Glass Research as the leading supplier of quality control equipment to the world-wide glass industry.

ON THE LEADING EDGE OF THE LIGHTWEIGHT MOVEMENT

The introduction of the Agr OLT in the early 1970's was a watershed event in the history of Agr and for the glass container manufacturing industry. The OLT was the first product of its kind that could accurately measure wall thickness on every bottle produced at production speeds. Until the arrival of the OLT, bottle makers had been sampling and measuring wall thickness by hand during routine quality checks. However, these quality checks were time consuming, labour intensive and not statistically significant to ensure that every bottle met minimum thickness requirements. Consequently, bottles were over-designed with extra material to ensure that bottle performance and safety requirements were met.

With the OLT installed on a production line, every bottle was measured for sidewall thickness. Bottles that did not meet minimums were automatically rejected. Production

Agr Omni Labtesting system performs critical bottle measurements and pressure testing, in one automated system

Agr facilities now

managers no longer had to worry about bottles with thin walls getting into the hands of their customers. The OLT gave the bottle maker a new level of confidence in container light weighting since it was no longer necessary to over-design the bottles and include extra material. Over the years, thousands of Agr OLT's were installed on production lines to monitor wall thickness. The OLT, in combination with improved forming technology, played a key role in the weight savings realized in glass bottles over several decades. Versions of the OLT remain in operation on hundreds of production lines, helping manufacturers produce bottles that are light, strong and safe.

BOTTLE SAFETY AND PREVENTION OF PRESSURE BREAKS

One of the earliest testing devices introduced by Preston Laboratories in the late 1930's was the first available commercial pressure tester. The introduction of this science-based device, along with Agr's development of the ASTM C147 standard for pressure testing, gave bottle makers a means to address and prevent liability issues due to bursting bottles, especially those filled with pressurized content. With a pressure tester in plant, bottle producers could now sample and test production ware and identify any potential pressure deficiencies.

Over the last 50 years, Agr innovated and evolved the art of glass bottle pressure testing. As part of this evolution, Agr introduced the Sampling Pressure Tester (SPT) in 1979. The SPT pioneered the concept of automatically sampling containers from the production line and testing them for pressure strength on a regularly scheduled basis. This development made it possible to continuously monitor the pressure strength of bottles being produced and provide a statistically significant level of sampling that was not possible with laboratory-based testing. Agr pressure testers have been relied upon by manufacturers to ensure that pressure ware is safe, and bottles perform as expected. In the wake of increased light-weighting, pressure testing plays an even more vital role.

EXPANDED CAPABILITIES

In the late 1980's American Glass Research expanded its catalog of products to include equipment for testing other container packaging types in addition to glass. Considering this, the company was re-organized, and the name was changed to Agr International, Inc. The research and testing portion of the company retained the name American Glass Research and continues to be an integral part of the Agr International family.

AUTOMATION AND DIGITIZATION FOR TODAY'S GLASS INDUSTRY

Agr continues to innovate, develop and provide products and services that are in line with the needs of the global packaging industry. Some of the more recent developments include products that incorporate robotics, advanced sensors, vision and computer technology in the testing and measurement process to further support the quality management of very light, high-performance containers. With today's high-efficiency container making operations, precision, throughput and efficiencies are equally important for testing and quality management as they are for the production lines themselves. Agr is completely committed to providing the best, most robust, accurate and efficient products to support these needs.

PRESSURE TESTING DEVELOPMENTS

Developing standards and equipment for pressure testing has been a mainstay for the engineering staff of Agr. Descending from this extensive line of pressure testing systems, the Ramp Pressure Tester 3 (RPT3), incorporates years of technical experience in pressure testing glass containers in combination with the

latest advanced electronics, and Industry 4.0 connectivity. In developing this system, particular attention was paid to maximizing operator usability, operational uptime, testing throughput and purchase value.

The RPT3 can be placed in the laboratory or near the line is designed to maximize laboratory testing throughput. Essentially two testers in one, it offers a unique 2-bay system that incorporates two independent pressure generators. With this design, it is possible for an operator to test two containers simultaneously, doubling laboratory testing capabilities with a single device. This feature offers a number of advantages including reduced investment over the purchase of two test systems, increased testing throughput and more efficient use of limited laboratory staff.

At the heart of the RPT3 is a dual, high-precision, hydraulic pressure generation system that uses an FPGA-based controlled velocity pressure management method. This design allows the RPT3 to achieve the defined ramp-rate from the start of the test at low pressures and maintain the ramp rate with an accuracy of + 2 psi throughout the test. This meets and exceeds the industry requirements defined in ASTM C-147, and ISO 7458 and provides unmatched precision in the control and application of pressure up to 68.9 bar (1000 psi) (one-minute equivalent). In addition to testing capabilities for high-strength containers, the RPT3 also tests low-pressure ware with a remarkably high level of confidence with the detection of pressure breaks as low as 1.4 bar (20 psi).

Agr's current model of its sampling line pressure tester, the SPT2™, offers two critical measurements in one system: automated pressure measurement and high-precision volume measurement. SPT2 incorporates advanced pressure management technology for precise pressure applications, and positive-displacement technology for accurate and repeatable volume measurement. SPT2 also features a high throughput rate, dynamic bottle handling for bottles of different finishes, shapes and sizes, and multiple line compatibility.

Integrated into the production line, the SPT2 can automatically test and collect pressure and volume data on bottles selected for sampling, without operator intervention, on a 24/7 basis at a rate of up to 270 bottles per hour. The high throughput rate and continuous, hands-free operation offer a real advantage when it comes to testing efficiency and frequency of sampling. More frequent sampling translates into faster detection of pressure related issues. With early detection, corrections can be made faster and, as a result, the amount of held or discarded ware can be reduced. Automated or hands-free operation (in sampling configuration) allows testing of sample sets on a regularly scheduled basis with testing data fully documented, regardless of the time of day or availability of workforce.

The combination of volume measurement along with pressure testing also offers advantages. Of significance is the savings resulting from the automation of the labor intensive and time-consuming task of volume measurement. No less important, however, is the ability of the SPT2 to perform routine volume measurement outside of the laboratory, on the plant floor in a regular plant environment. Proximity to production improves testing efficiency and makes it practical to perform volume and fill-level measurements, more often, on a regular and timely basis. As a result, plant operators can closely measure volume and fill level with high precision, on a regularly scheduled basis throughout the production run, making it possible to better manage and meet customer quality requirements.

AUTOMATED DIMENSIONAL GAUGING AND THICKNESS MEASUREMENT

Along the lines of supplying glass container manufacturers with the necessary tools to produce quality bottles that fall within specification, Agr also has continually developed and enhanced dimensional gauging

Initial Agr facilities

systems to ensure that the finish and body dimensions fell in line with the manufacturer's specifications.

The Dimensional Sampling Gauge, Series 500 (DSG500™) is the latest generation in the line of high-precision dimensional gauging systems designed and manufactured by Agr. While the DSG500 retains some of the look and feel of earlier versions of Agr's Dimensional Sampling Gauge, this version incorporates a multiplicity of new cameras, hardware, features and capabilities that further expand the handling, throughput, precision, communication and measurement functions of the DSG product line.

Some of the most prominent industry leading capabilities incorporated in the DSG500 include the highest accuracy and repeatability available; unmatched measurement and throughput up to 100+ BPH; positive handling and placement of containers; laboratory or at-the-line configurations; and AutoJob® automated job creation. Operators can use AutoJob® to automatically identify finish measurements, build a job from individually selectable measurement routines or choose from a library of industry standard or customized templates that include a collection of measurements and their associated limits.

A major emphasis for the DSG500 is measurement precision, which is 10x greater than typical design specifications. Enhanced telecentric lighting provides for improved edge shadow for the highest dimensional precision and repeatability. This improvement is of major significance as it provides for more distinct categories and lowers the percentage of process variation for individual measurements.

When measuring thickness, it is important to be able to measure material distribution over the complete bottle profile including sidewall, shoulder and angled areas. The DSG500 comes standard with Agr's Thickness 360® measurement system and provides high accuracy measurements simultaneously with the dimensional measurements. With its patented vision-guided, three-axis positioning and optical measurement, Thickness 360® can measure round and non-round panels, tilted sidewalls or even corners at an accuracy, with optimized bottle positioning and additional software features that extend the measurement range making it possible to measure thickness over the complete body sidewall.

The simultaneous operation in all stations of the DSG500 allows for throughput up to two bottles per minute with the exact same measurements performed on every bottle, offering a means to significantly improve quality management productivity. The high precision DSG500 system performs a range of critical measurements in a single operation and is compatible with a wide variety of shapes and sizes.

COMPLETE, AUTOMATED SOLUTION

Pairing the DSG500 and SPT2 together forms another innovative product developed to support the evolving needs of glass container manufacturers, the OmniLab® system. The OmniLab incorporates a robotic handling system for precise bottle placement throughout each of the measurement stations. The OmniLab provides detailed, mold correlated reports that include weight, comprehensive finish and body dimensioning, push-up, bore, thickness, pressure and volume. Like the DSG500 and SPT2, the OmniLab can be configured for the laboratory or installed on the sampling line to automatically receive and test bottles, hands-free, 24/7.

GAWIS4GLASS

The Gawis4Glass® system is Agr's latest edition to their line of high precision laboratory measurement systems for the glass container industry. This all-in-one dimensional measurement system is designed specifically to improve the efficiency and testing throughput of the glass container quality control laboratory. The Gawis4Glass automates several critical bottle measurements into a single operation and performs a complete dimensional analysis in a matter of seconds. This new laboratory test system provides an unmatched level of measurement capabilities to support the design, process and quality management of glass containers.

The Gawis4Glass utilizes the latest optical gauging technology, in combination with automation and intuitive operational software, to

simplify container measurement operations while maximizing testing throughput. As a result, this system offers broad measurement capabilities on a wide range of glass containers with unmatched accuracy, repeatability and operational through put.

This system provides measurements with a level of precision and repeatability that not only can document dimensions of production containers but can also be used to qualify and manage moulds. The vision measurement technology incorporated in the Gawis4Glass utilizes high pixel density camera components in combination with enhanced telecentric optics and lighting. Cameras are fixed with zero movement, eliminating any potential errors from vibrations or camera movement. Telecentric optics ensure that every measurement is accurate and repeatable regardless of container size, shape or distance from the camera. This combination provides a very crisp edge shadow, making it possible to achieve the highest dimensional precision and repeatability, as well as an incredibly low percent of process variation for individual measurements. Further, images are captured at one-degree intervals and the entire bottle is scanned, achieving 100% full-bottle capture in order to facilitate the most efficient dimensional processing.

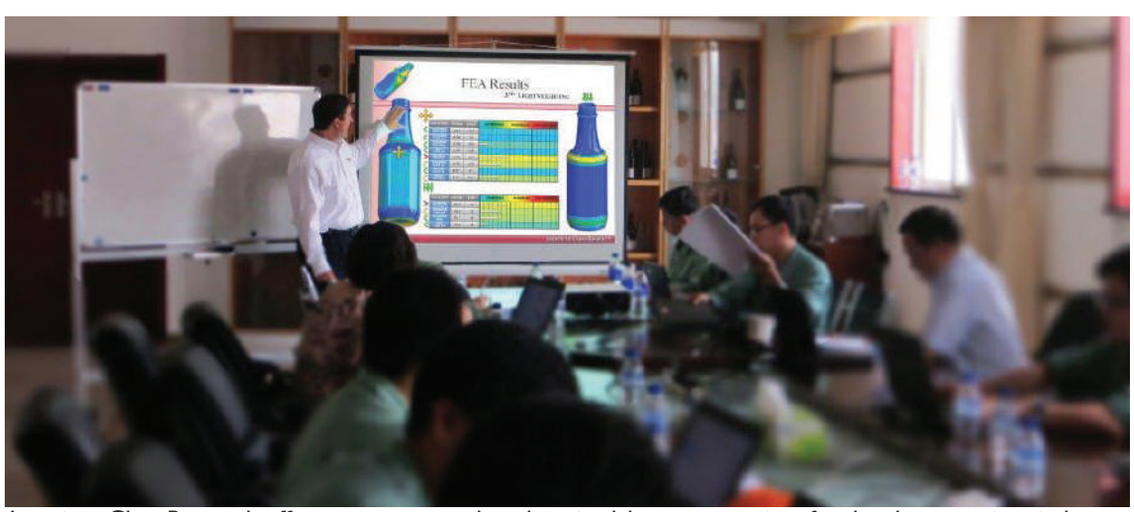
One of the biggest challenges with measurement systems of this type is the preparation and programming of the device to perform the desired measurements. Gawis4Glass offers a range of tools that are available to simplify this process and minimize the time needed to edit jobs. Like the DSG500, operators can use AutoJob® automated job creation to easily create a job from scratch. Gawis4Glass also enables an operator to select a single measurement or combination of measurements for a particular job. All job setup methods are straight forward and intuitive yet provide the versatility to enable an operator to customize tests for the application.

Industry 4.0 standard communication protocols have also been incorporated into the Gawis4Glass to improve communications and support Industry 4.0 objectives. This capability facilitates advanced communication with other devices, to share data, support remote job change and interface with factory robotic handling systems without operator intervention.

COATING MEASUREMENT

Another necessity in the production of quality ware is the use of the correct amount of hot end coating on a bottle. Over the years, Agr continued to develop models of coating measurement systems for use in the laboratories of worldwide bottle manufacturers. The current version, the Combined Coating Measurement System (CCMS), provides operators with a one-stop, single operation testing station for measuring tin oxide coatings applied to the container body and finish during the production process.

This system utilizes Agr's proven reflective coating measurement technology as a foundation and features a fully automated measurement approach. By incorporating a number of technological advances, including dedicated measurement heads for each of the finish and body regions, the CCMS precisely identifies the presence of very small amounts of coating in the finish region while measuring heavier coating levels applied to the body of the container, all in one operation. With this technology in combination with automation, Agr has been able to achieve a 33% improvement in testing throughput and a 70% improvement in precision with this device over previous coating measurement systems. The CCMS provides the industry with a leading-edge system with measurement precision needed for process management requirements, while reducing the labor intensity of coating measurement.



American Glass Research offers expert research and testing laboratory services for the glass container industry

PORTABLE THICKNESS MEASUREMENT

The ThicknessPen® is the most recent in Agr's line of thickness measurement products for the container and packaging industry. This all-new device offers an innovative approach to portable thickness measurement with its dual mode design. Developed to address the multiple and diverse thickness measure applications of the production environment, the ThicknessPen's small size, with its light weight and robust design, can be used anywhere, from the laboratory, the plant floor or even in a wet environment at a job site in the field. The ThicknessPen provides easy, non-destructive and highly accurate thickness measurement for glass containers, sheet materials as well as all types of non-ferrous products, regardless of their size, shape or material.

The ThicknessPen differs from other measurement devices with its dual-mode operation that offers users the option to measure using either a magnetic or capacitance mode, whichever is most appropriate for the application. This provides a unique advantage and offers versatility not found in any product in this marketplace while still providing the precision necessary for the laboratory and the portability, ruggedness and safety for use on the production floor.

AMERICAN GLASS RESEARCH GROWTH

Like Agr International, American Glass Research continues to grow and innovate as a full service, independent research and testing laboratory. The company is globally recognized for their expertise in glass testing, design, analysis, consulting, training, inspections, product liability and auditing services. American Glass Research maintains a staff of scientists, engineers and technicians dedicated to providing testing and research services to the glass industry.

Training seminars offered by American Glass Research have been a staple to glass companies for decades and include topics such as fracture analysis, design evaluation, coating technology and batch and furnace. The seminars are not only offered at its main location in Butler, PA, USA or the Delft, The Netherlands laboratory, but they are held on a consistent basis in Poland, Germany and Thailand as well as in-plant at glass container facilities around the world. The seminars are continually updated and developed to cover current needs and trends of the glass container industry.

American Glass Research's laboratory testing offerings were additionally enhanced with the acquisition of West Analytical Laboratories. This acquisition further extended the testing and analysis capabilities of American Glass Research to include heavy metal analysis, glass composition, raw material composition analysis, USP/EP testing and more. The acquisition brought with it a modern, fully equipped ISO 17025 accredited analytical laboratory and a staff with experience in a number of disciplines that highly complement the traditional capabilities of American Glass Research.

AGR TODAY

Over the last several years, Agr has provided support in the product and process sustainability and recycling efforts of the glass industry as it moved toward high-volume, high-speed operations. Agr continues to help with these efforts by providing expertise in glass container light weighting and the use of recycled material. Targeted reduction in the thickness of a glass container is necessary to not compromise its strength and functionality. An example benefit of reducing the weight of a glass container by 200 grams provides a cost benefit over 30%, not to mention the use of fewer raw materials, lowered CO_2 emissions and reduced wear on plant equipment. In addition to testing equipment, Agr offer solutions to lightweighting through bottle design with FEA analysis, line audits, Proof of Design testing, production verification and training through American Glass Research. Properly recycling glass into new production also saves raw materials, energy and money. To ensure an effective program is in place for recycling, Agr provides solutions such as composition analysis, coating process reviews as well as testing and measurement. By using Agr's automated, digitalized monitoring, management and control equipment, users gain many benefits in both recycling and sustainability efforts including reduction in human error, increased efficiency, required precision, consistency, traceability and better overall product quality.

Today's Agr operations span the globe, employing over 200 people. Its headquarters and main manufacturing facility sit on a large campus in Butler, PA, USA, with sales and services offices in Germany, Italy, Spain, Mexico, Thailand and China. American Glass Research runs laboratory facilities at the Butler campus as well as in Maumee, OH, USA and The Netherlands. After nearly 100 years, Agr continues to change global packaging technology – one solution at a time■

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A Furnace-Profiling Partnership

Mr. Philippe Kerbois, Global Industry Manager – Glass at Ametek Land (right), with Mr. Aston Fuller, General Manager at Glass Futures.

Mr. Philippe Kerbois* highlights the benefits of a partnership between Ametek Land and training, research and development body Glass Futures.

Temperature measurement company Ametek Land has partnered with Glass Futures to support activities at its training, research and development (R&D) facility in the UK.

Based in St Helens, UK, the Global Centre of Excellence is the first of its kind in the world, allowing Glass Futures to trial and demonstrate disruptive technologies and ideas.

Ametek Land and Glass Futures are collaborating to advance training and R&D at the facility using Land's technology and decades of experience.

Previously, Glass Futures purchased a system from Land for the first trial on combustion for flame optimisation on different fuels, which has led to this long-standing partnership.

Land has now supplied its Automatic Retraction System (LPAR) along with the IPV2 and NIR-Borescope-2K-Glass (NIR-B-2K-Glass), a short-wavelength radiometric infrared borescope imaging camera.

The NIR-B-2K is a calibrated instrument providing repeatable and reliable temperature measurement into the furnace, which is based on oxy-gas technology with potential conversion to other fuels, including hydrogen.

This will identify cold and hot spots immediately, and profiling the furnace in this way will make it easy to conduct the furnace through the ultra-clear, high-definition (1968 x 1476 pixels) thermal images while offering unparalleled precision in temperature measurement from any of the three million temperature points in the image.

The camera measures temperatures in the range of 1000 to 1800°C (1832 to 3272°F) and is designed for use in float glass, container glass, borosilicate glass, and fibreglass melt furnaces.

A compact solution, the NIR-B-2K-Glass only requires a small diameter hole through the furnace casing and refractory to accommodate the wide-angle lens tip. This means it is possible to accurately and continuously profile the temperature of the entire furnace, with only a small opening in the wall.

With the NIR-B-2K-Glass it is possible to continuously monitor the glass, refractory walls, port arches, and the crown/roof with pinpoint accuracy, while avoiding wasted energy from heat loss.

The NIR-B-2K-Glass is supported by Land's powerful IMAGEPro thermal imaging software. This allows the imager's region of interest (ROI) to be user-defined and trended, showing maximum, minimum, and average temperatures.

The software's Playback view allows users to replay events and stop at any frame to measure multiple temperatures at the same point in time, which is particularly useful for measuring port arch temperatures at the moment of reversal.

IMAGEPro also allows ROIs to be used to set alarms for the furnace DCS, to facilitate better control of the batch coverage by adjusting the batch charging direction and length, which directly affects furnace temperatures.

By monitoring the batch coverage near the throat, this critical ROI can help avoid large amounts (below 15%) of batch entering this area even for large pull rates and prevent production of glass defects.

These tools will provide a full overview of the fixed NIR-B-2K as a complete solution for the optimisation of the

Continued>>

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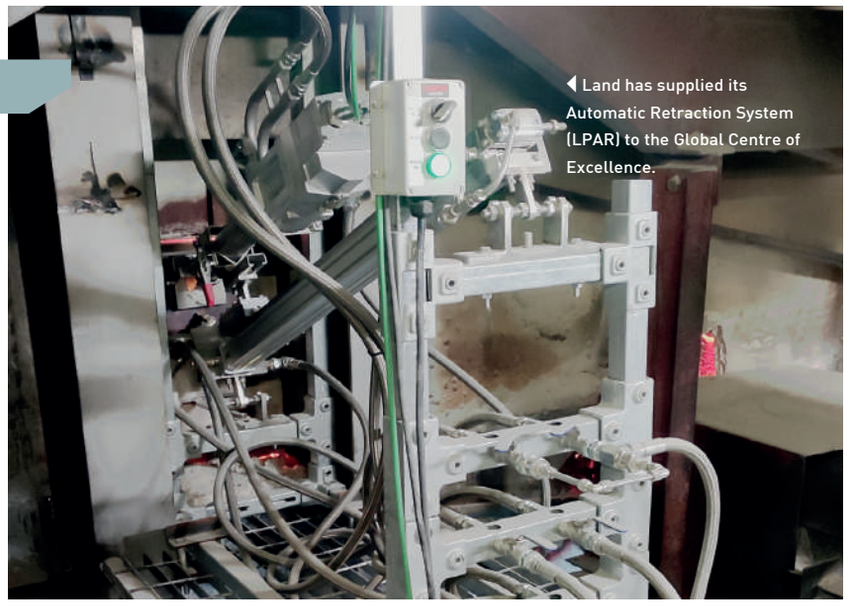

Land has supplied its Automatic Retraction System (LPAR) to the Global Centre of Excellence.

furnace.

This will enable Glass Futures to demonstrate how to use the system and see what happens thermally in the furnace, how to interpret the data and deploy the technology to save energy and reduce emissions.

Glass Futures – Centre of Excellence

The Glass Futures Centre of Excellence aims to support the glass industry to decarbonise and become more sustainable more quickly. It opened in 2023 and is now operating an industrial-scale, 30-tonnes per-day pilot furnace with abatement and heat recovery.

It will have full plant utilities and services, and glass output can be processed by an IS machine and cold end container process coating, inspections and packing line.

Glass Futures members – which include global glass manufacturers, industry societies, and academics – have access to the pilot furnace along with world-class training and development activities for both them and their supply chain.

Conclusion

Land has supplied the glass industry with essential equipment for more than 70 years. The company creates specifically designed instruments that provide accurate results at key locations throughout the process.

These solutions meet high standards of quality and reliability, delivering the precision temperature measurements critical to the glassmaking process.

It also means Land is well-placed to assist the industry through training partnerships such as with Glass Futures, collaborating to improve standards and ensure the correct use of highly advanced systems such as the NIR-B-2K, which are critical to the life of a furnace, and bridges the gap between technology and readiness level (TRL), and commercial viability and readiness. ■

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Strategic Plan of Financial Institutions to Strengthen the MSME Sector

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This article outlines strategic initiatives by Indian financial institutions to bolster the MSME sector, a vital economic driver. Facing challenges like limited finance, skill shortages, and technological gaps, MSMEs require targeted support. Financial institutions are addressing this through increased access to finance via government-backed schemes like PMMY and CGTMSE, and tailored bank loans. Technological advancements, including digital lending, mobile banking, and supply chain finance, are streamlining processes and expanding reach. Sector-specific loans, such as agri-business and women entrepreneur loans, cater to unique needs. Further support comes from branchless banking, P2P lending, and fintech partnerships. Risk management and export credit support, through agencies like CRISIL and ECGC, enhance MSME creditworthiness and international competitiveness. These multifaceted strategies aim to foster robust MSME growth, crucial for India's economic development and the realization of VIKSIT BHARAT 2047.

INTRODUCTION

The MSME sector is a key pillar of the Indian economy, offering significant potential for job creation and contributing substantially to the country's GDP. However, this sector faces numerous challenges, including limited access to finance, a shortage of skilled labor, inadequate infrastructure, and intense competition from larger companies, weak marketing strategies, regulatory compliance hurdles, low productivity, and limited technological adoption. Achieving the Indian Government's vision of VIKSIT BHARAT depends on the robust and accelerated growth of the MSME sector. Recognizing the sector's importance in driving economic development, financial

A) Schemes with Government Support

Scheme	Beneficiaries	Limit
Pradhan Mantri Mudra Yojana (PMMY)	Microenterprises and small businesses	Loan categories: Shishu (upto ₹50,000) Kishor (₹50,000 – ₹5 lakh) Tarun (₹5 lakh –₹10 lakh)
Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE)	Microenterprises and small businesses	Loans upto ₹500 lakh (collateral free) Banks & NBFCs provide loans under this scheme with a government backed guarantee
Stand-Up India Scheme	For SC/ST entrepreneurs and women led enterprises	Loans between ₹10 lakh to ₹1 crore
SIDBI Make in India Loan for Enterprises (SMILE)	For Manufacturing & Service Micro, Small & Medium Enterprises	Loans between ₹10 lakh to ₹25 Lakh
PSB Loans in 59 Minutes	For Micro, Small & Medium Enterprises	Loans upto ₹5 crore
Credit Linked Capital Subsidy Scheme (CLCSS)	For SC/ST Micro, Small & Medium Enterprises	Upto 25% (ceiling ₹ 25 lakh) subsidy for procurement of Plant & Machinery & Equipment
Credit Guarantee Scheme for Subordinate Debt (CGSSD)	For stressed Micro, Small & Medium Enterprises	Credit upto 15% (ceiling ₹75 lakh) of promoter's stake (Equity plus Debt)

institutions have developed various schemes and initiatives aimed at overcoming these challenges and strengthening the sector. Here are some common elements found in the strategic plans of financial institutions to strengthen the MSME sector:

1. Increasing Access to Finance

The financial health of a business, whether large or small, directly influences its success. Indian MSMEs encounter significant challenges in obtaining affordable financing. To overcome these obstacles, financial institutions have created targeted loan programs featuring flexible terms, reduced collateral, and expedited processing. These initiatives are designed to support the growth and stability of MSMEs. Key MSME loan schemes are detailed below:

B) Bank & NBFC MSME Loan Products

MSMEs access term loans for expansion and working capital loans for daily needs from banks and lenders. Loan terms and interest rates vary based on factors like creditworthiness. Many collateral free options exist, offered by major banks like SBI, HDFC, ICICI, and Axis, alongside NBFCs, SFBs, RRBs, and microfinance institutions.

C) Sector-Specific MSME Loans

Financial Institutions of India have tailored General Loan products to the unique need of a particular industry / segment to provide more access of finance for MSMEs. Below are the key examples of these loans:

Agri-Business Loans supported by NABARD, empower rural MSMEs through financing via regional banks. These loans fund farm mechanization, food processing, and related ventures, fostering rural development with favorable terms.

Women Entrepreneur Loans offer concessional interest rates and relaxed collateral, encouraging women's business participation. Banks and government schemes provide these, along with training, to address gender-specific financial barriers.

Export Credit Facilities aid MSMEs in international trade. Pre- and post-shipment loans, offered by authorized banks and Exim Bank, manage cash flow and reduce risks associated with exports. These loans, sometimes in foreign currency, boost competitiveness and facilitate global market access. Each loan type addresses specific challenges, promoting inclusive economic growth.

2. Leveraging Technology

Through technological innovation, financial institutions in India are expanding their reach and improving the efficiency of services offered to MSMEs. Following are some Key solutions:

A) Digital Lending Platforms:

Online applications and faster processing:

Fintech platforms allow MSMEs to apply for loans online, reducing paperwork and processing time significantly.

Alternative credit scoring: These platforms use alternative data sources like transaction history, social media activity, and customer reviews to assess creditworthiness, making it easier for MSMEs with limited credit history to access loans.

Customized loan products: Fintech companies offer a wide range of loan products tailored to the specific needs of MSMEs, including smaller loan sizes and flexible repayment options. Some key examples are:

Invoice Financing: Fintech offer invoice discounting, allowing MSMEs to get paid upfront for outstanding invoices, and improving cash flow.

Working Capital Loans: Flexible working capital loans tailored to the specific cash flow needs of different MSME sectors.

Point-of-Sale (POS) Financing: Fintech partner with POS providers offer instant financing to merchants based on their sales data.

B) Mobile Banking and Digital Payments:

Increased accessibility: Mobile banking allows MSMEs to manage their finances anytime, anywhere, even in remote areas.

Improved transaction efficiency: Digital payment solutions like mobile wallets and payment gateways make transactions faster, easier, and more secure, reducing reliance on cash.

Better cash flow management: Digital payment solutions help MSMEs track payments and improve cash flow management.

C) Supply Chain Finance:

Fintech platforms offer supply chain finance solutions that allow MSMEs to access working capital by leveraging their invoices and purchase orders. These solutions help MSMEs get paid faster, improving their cash flow and allowing them to invest in growth.

3. Other Initiatives

A) Branchless Banking:

Business Correspondents: Banks are using business correspondents (BCs) to provide banking services in remote areas where they do not have a physical branch. BCs act as agents of the bank and can help MSMEs open accounts, deposit and withdraw money, and access other financial services.

Agent Banking: Agent banking allows MSMEs to access financial services through a network of authorized agents, who may be local shopkeepers or other community members. This expands the reach of

financial services and makes it easier for MSMEs in underserved areas to access them.

B) Focus on Women Entrepreneurs:

Dedicated Products and Services: Many financial institutions are offering dedicated financial products and services for women entrepreneurs, who often face additional challenges in accessing finance. These products may include loans with preferential interest rates or flexible repayment terms.

Women-focused Training and Mentorship Programs: Financial institutions are also providing training and mentorship programs specifically for women entrepreneurs to help them develop their businesses and improve their financial literacy.

C) Peer-to-Peer (P2P) Lending

P2P lending platforms facilitate direct loans between individual lenders and MSMEs. This digital process eliminates paperwork, speeds up funding, and offers competitive interest rates. Examples of RBI-regulated **Fintech Partnerships:** Fintech companies play a crucial role in enabling embedded financing by partnering with e-commerce platforms, software providers, and other businesses that serve MSMEs. These partnerships allow for the integration of lending, payment, and other financial services directly into the MSME's workflow.

D) Risk Management & Credit Rating Support

Agencies like CRISIL, ICRA, and CARE specialize in assessing the creditworthiness of businesses. They use standardized methodologies to evaluate various factors, including financial performance, management quality, and industry risks. Their ratings provide an independent and reliable assessment of an MSME's ability to meet its financial obligations.

E) Trade Finance & Export Credit Support

The Export Credit Guarantee Corporation of India (ECGC) provides essential trade credit insurance, specifically designed to help MSMEs navigate the complexities of international trade. By insuring against payment defaults and other risks, ECGC fosters confidence among MSMEs to explore new markets. This risk mitigation not only encourages export expansion but also makes MSMEs more attractive to lenders, who are more willing to provide export finance when ECGC coverage is in place. Consequently, MSMEs are better equipped to compete on a global scale, contributing significantly to India's overall export growth.

CONCLUSION

In conclusion, the Indian MSME sector, despite its critical role in economic growth and job creation, faces significant hurdles that necessitate strategic intervention. Financial institutions are stepping up to this challenge by implementing comprehensive plans aimed at strengthening this vital sector. The core of these strategies revolves around enhancing access to finance through a variety of avenues. Government backed schemes like PMMY and CGTMSE, coupled with tailored loan products from banks and NBFCs, are designed to alleviate the financial constraints that often stifle MSME growth.

Beyond financial support, initiatives like branchless banking, P2P lending, and risk management support through credit rating agencies are crucial in building a robust and resilient MSME sector

Furthermore, the integration of technology is transforming the landscape of MSME lending. Digital platforms, mobile banking, and fintech partnerships are streamlining processes, reducing paperwork, and expanding the reach of financial services to previously underserved areas. Sector-specific loan products, such as those catering to agri-businesses, women entrepreneurs, and exporters, acknowledge the diverse needs of the MSME ecosystem.

Beyond financial support, initiatives like branchless banking, P2P lending, and risk management support through credit rating agencies are crucial in building a robust and resilient MSME sector. The support provided by ECGC for export credit insurance is particularly vital for MSMEs looking to expand their global footprint.

Ultimately, the success of these strategic plans hinges on a collaborative approach involving financial institutions, government agencies, and the MSMEs themselves. By addressing the multifaceted challenges faced by MSMEs, India can unlock the full potential of this sector, driving economic growth, fostering innovation, and realizing the vision of a developed nation. The ongoing efforts to strengthen the MSME sector are not just about providing financial assistance; they are about building a sustainable and inclusive economic future for India.

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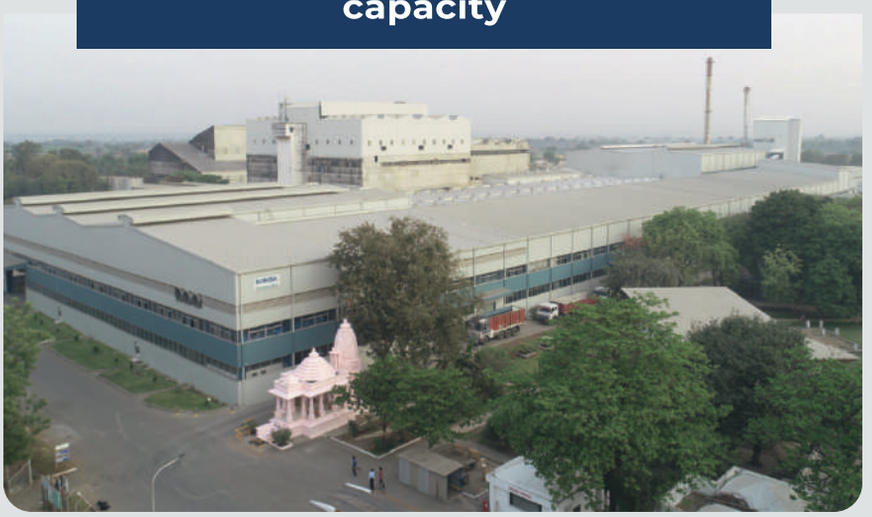


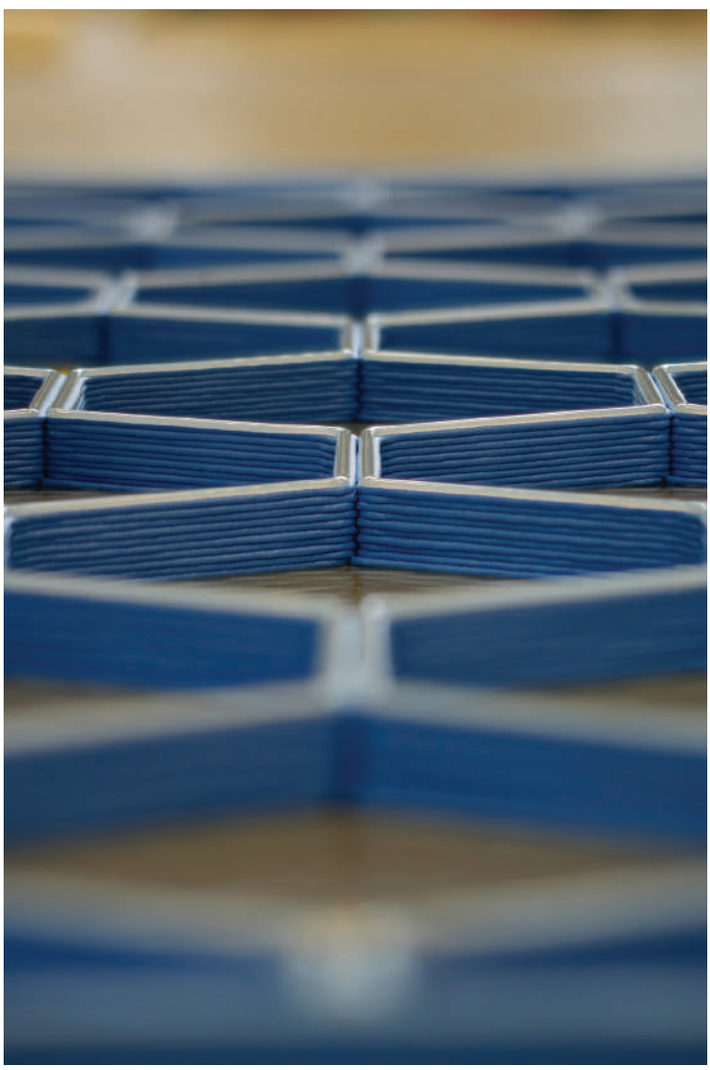
INDIA

GERMANY

Thin Glass in Architecture: First Applications to Start

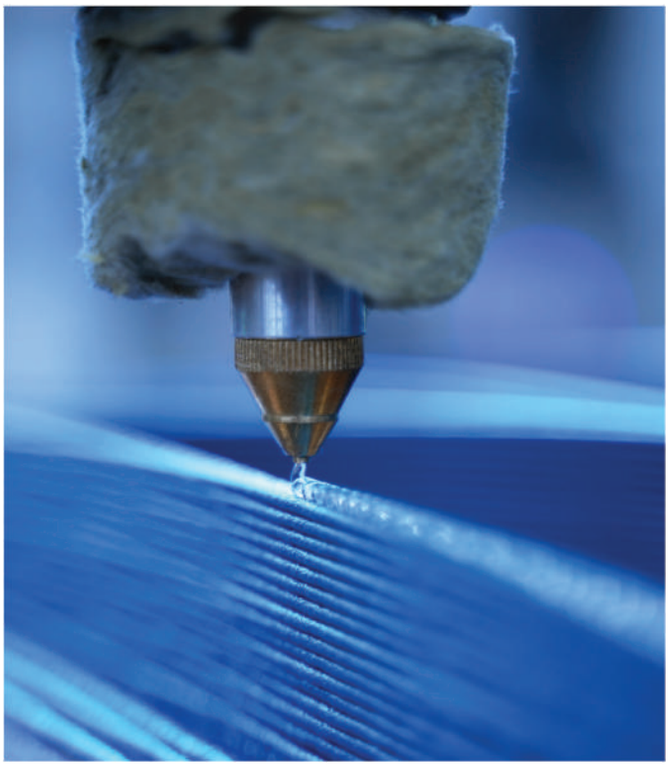
The topic of thin glass especially for new applications in architecture attracted a great deal of interest among trade visitors at the past glasstec and its special show "glass technology live". On behalf of glasstec the author asked research and industry about the current state of the art, what its limits are and which applications can already be expected by the end of the year: Mr. Daniel Pfarr (TU Dresden), Mr. Peter Nischwitz (Glaston) and Mr. Bernhard Hötger (Hegla) answered.

Thin glass is gaining increasing relevance for reducing the weight of glass construction components: slimmer insulation glazing units make for lighter, resource-saving structures with a smaller carbon footprint in fenestration and façade construction. In the process of energetic renovation slim triple glazing units will be able to replace technically obsolete double-glazing units while conserving frames and sections. Thin glass also brings benefits for curved elements as it is far easier to cold bend – an advantage for both its optical characteristics (less distortions) and in terms of costs. Flat glass is referred to as thin glass when it is less than 3 millimeters thick. TSG up to 2 mm thin and thermally toughened glass up to 1 mm in thickness is produced in special high-convection furnaces by evenly heating and cooling off the material especially fast. Until now tempering has only been possible up to this standard thickness – but with the great benefit of being able to process glass ribbon sizes and some manufacturers even being able to process extra-large glazing. Even thinner glass sheets, until now only used in such technical applications as display production, are chemically tempered but have only been available in smaller dimensions so far. They are laser-cut from extremely thin base glass, finished and finally chemically toughened for smartphones, for example. Chemically speaking, thin glass is a borosilicate glass, which – compared to classic soda lime sheets – stands out with greater strength and thermal resistance at the same thickness. These material characteristics are what make the processing of very thin glass possible in the first place. However, the reduced material thickness results in higher requirements for handling, transport and edge quality when sizing.



Additive Manufacturing
Photo: Daniel Pfarr, Institute for Building Construction

The first producers are now offering chemically tempered thin glass (0.5 – 0.7 mm) that is specifically designed for building physics requirements and particularly resistant, like Corning which is now launching its "Advanced Technical Glass" (ATG). This is designed to make for slimmer, lighter window elements with triple and quadruple glazing units, laminated sheet glass and laminated sheet stacks, for instance for smart glazing, combining a high optical quality with a scratch-resistant surface. The available sheet size of 2,200 x 3,200

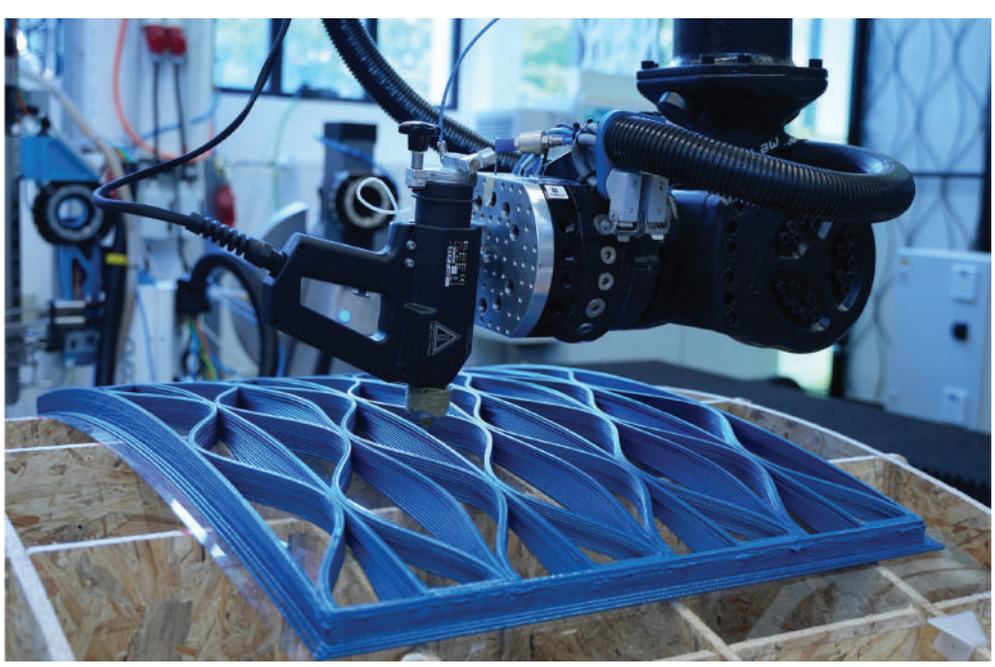


Adhesive Application
Photo: Daniel Pfarr, Institute for Building Construction

mm now makes it relevant for IGU production.

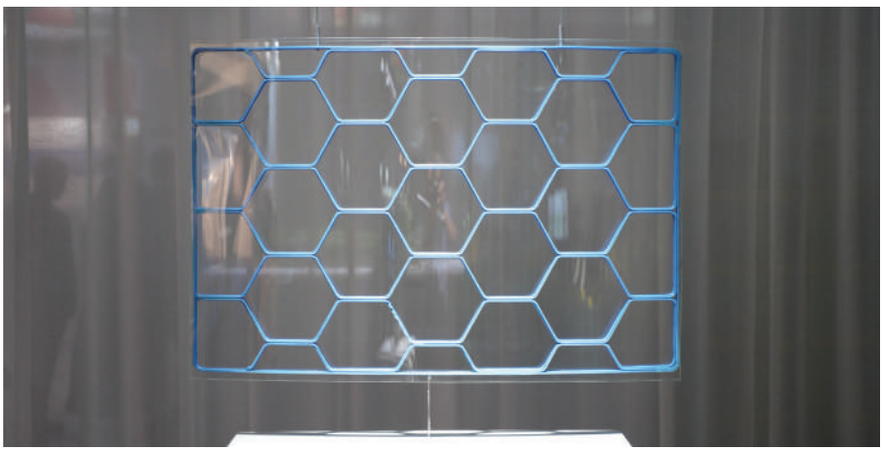
WHICH THIN GLASS APPLICATIONS ARE BEING RESEARCHED?

Thin glass applications are the topic of research amongst others by the Institute for Building Construction of the Construction Engineering Faculty at the Technical University Dresden. According to Dipl.-Ing. Mr. Daniel Pfarr, scientific assistant at the faculty, thin glass holds great potential for making inroads in architectural applications – with thin glass used as the internal pane in triple glazing being just one example. *"Those assuming thus far that thin glass would undergo strong deformation when used as an internal pane were wrong. Due to the mostly uniform isochoric pressure of the two adjacent spaces between the panes, deformations as a result of climatic loads become negligible compared to external impacts such as wind. Through chemical tempering very high surface strengths can be achieved – regardless of the glass thickness. The limitations here are only the limited formats available as well as the price. The thermal tempering customary for IGU production, which has the great benefit of allowing complete ribbon dimensions or even extra-large glazing, has so far not achieved the required gradient with such thin sheets – i.e. it has not reached the necessary temperature between the sheet core and the sheet surface."* With thin glass the core and the surface are located closer to each other than with standard float glass at a 4 mm or 6 mm thickness. This is why the compressive stress forming at the glass surface when cooling is not so high and the glass is not so heavily tempered. In a research project with Solling Glas the university is now conducting tests to ascertain up to which glass thickness thermal tempering is still technically feasible: *"We have achieved very high strengths as well as standard-compliant fracture patterns for TSG of up to 2.6 mm; 3 mm are customary in the market. To attain this, we change the plant parameters during tempering and cool off the gas faster to reach higher tempering values. With these measures in place it will be possible to reliably temper glass sheets of up to 1.1 mm in future."*

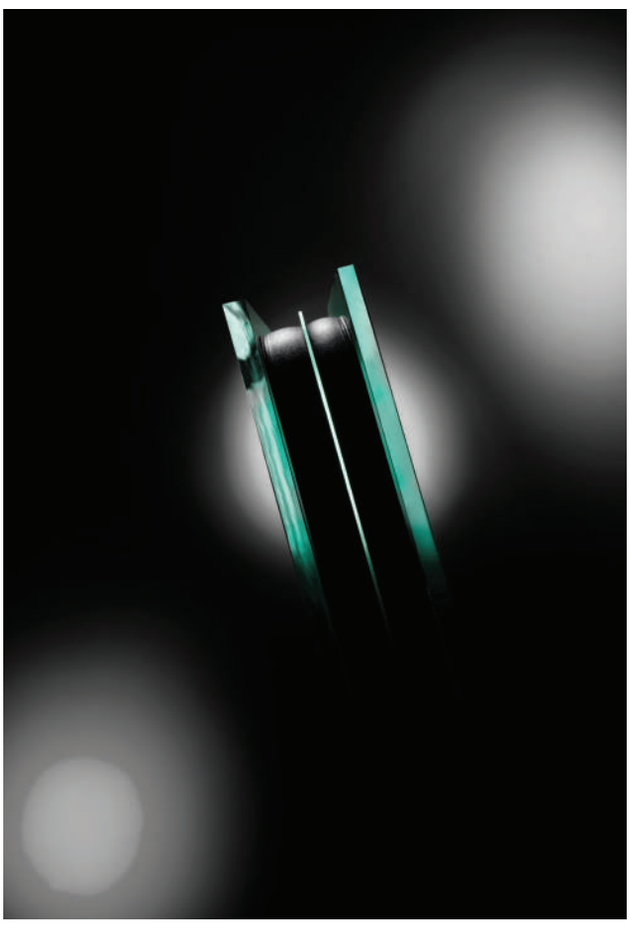


Lamination Process
Photo: Daniel Pfarr, Institute for Building Construction

A second interesting application studied by the Institute is laminated thin-glass components with transparent plastic cores. These could in future be deployed as lightweight components in curtain walling. *"The transparent core is extremely lightweight offering*



L3!chtglas-thin glass composite panels with additively manufactured core structures.
Photo: Daniel Pfarr, Institut für Baukonstruktion

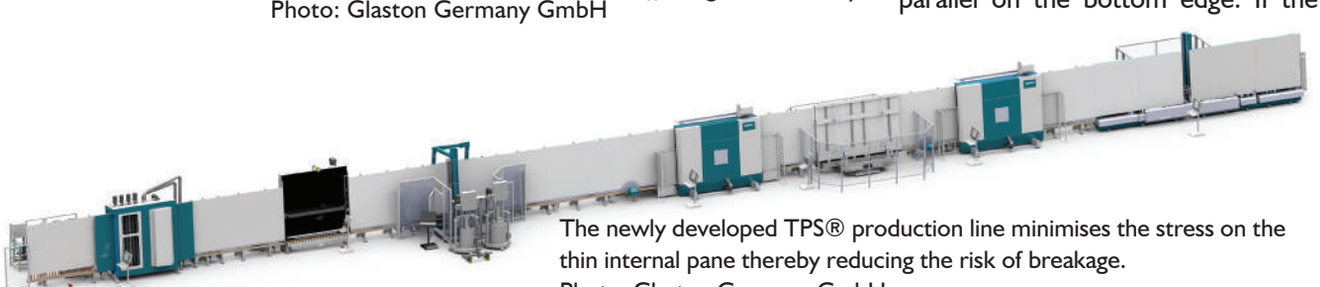


Triple thermal insulation glazing with up to 0.5 mm thin internal pane is especially lightweight and can replace technically obsolete double glazing. The ultra-thin internal pane is slightly set back.
Photo: Glaston Germany GmbH

great potential for resource savings. Optically there are hardly any constraints – but we have to take a closer look at daylight transmission, U-values, g-values and similar properties. We could even imagine cold bent thin-glass elements with high stiffening." The third application researched by Mr. Pfarr and his colleagues are laminated thin-glass assemblies with additively manufactured cores: *"We connect cold bent thin glass with 3D-printed structures. This opens up completely new design avenues with the stiffening achieved by the sandwich effect. The voids between the 3D-printed structure create spaces between the sheets with thermal effects comparable to insulating glass. This concept, however, is still under development, especially in terms of the robustness and durability when exposed to temperature fluctuations and UV radiation,"* explains Mr. Pfarr.

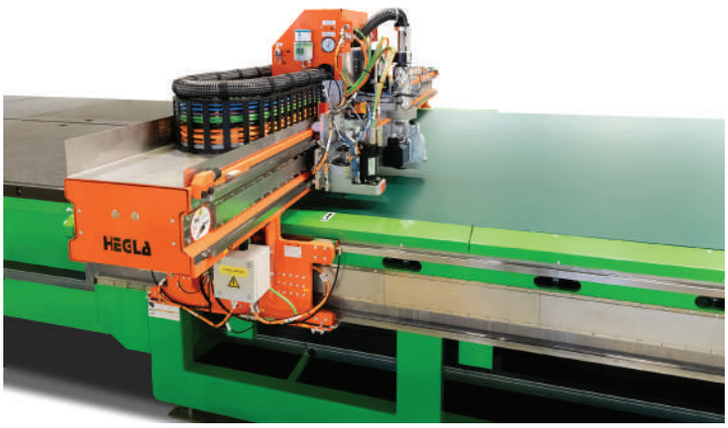
HANDLING: THIN GLASS HANDLED BY IG LINES?

The first IGUs with 0.5 mm internal glass pane are expected to be available in late 2025, confirms Mr. Peter Nischwitz, Marketing Manager at Glaston Germany: *"We see great potential for slim triple glazing with thin-glass internal panes, which can replace technically obsolete double glazing in well-preserved window frames – by simply exchanging the glass."* At glasstec 2024 the company introduced a new manufacturing process for IGUs that were equipped with Corning's new ATG glass. Mr. Nischwitz explains: *"Conventional IGU production methods proved unsuitable for the ultra-thin internal pane. This is why we developed a new technology and patented it in autumn 2024. Our new and fully automatic TPS line (Thermo Plastic Spacer) minimises the stress on the internal glass pane and reduces the risk of breakage also in mixed operating modes. The first lines are already in operation in the USA and preparations for installation at one of the big IGU manufacturers in the DACH region is underway."* In conventional triple-glazed IGU layouts all sheets end in parallel on the bottom edge. If the



The newly developed TPS® production line minimises the stress on the thin internal pane thereby reducing the risk of breakage.
Photo: Glaston Germany GmbH

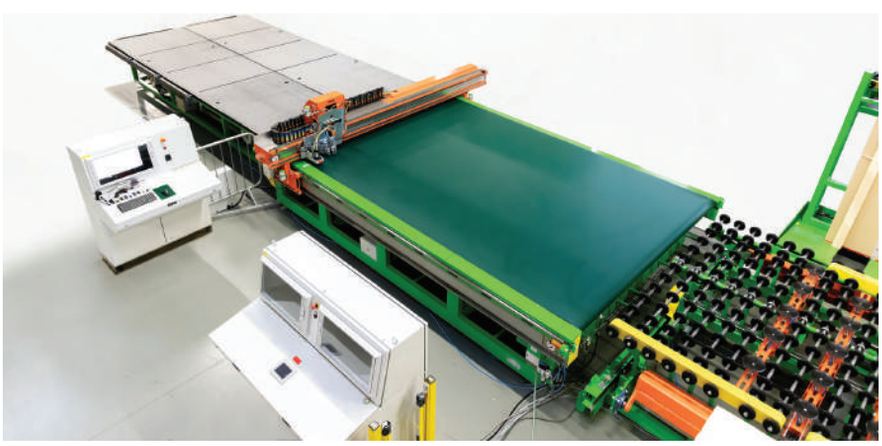
Glaston TPS® technology for automated manufacturing of thin-glass IGUs.
Photo: Glaston Germany GmbH



The thin-glass cutting tables are fitted with electromagnetic linear drives for maximum precision, smooth running and precision alignment.
Photo: Hegla GmbH & Co KG

internal pane is only 0.5 mm thin, however, the load on its bottom edge would be too high; to minimise the risk of breakage an excellent edge finish would be required. Therefore, the thin-glass sheet in the new TPS system is a little shorter than the two external panes, slightly set back and completely embedded in the thermoplastic spacer complete with secondary sealing. Feeding and sizing of the thin glass is done on Hegla lines entirely in an automated process to avoid damage by manual handling. Managing Director Mr. Bernhard Hötger shares the details: *"Feeding can be done by a specifically adapted floor loading system plus corresponding suction cup offset. A flat conveyor belt replaces the typical felt covering on the cutting line and prevents slippage. Sensors capture the glass sheet position, rendering manual alignment superfluous. A special cutting head then scores the sheets to obtain an especially homogeneous edge, which is indispensable to downstream finishing. Transportation of the cut sheets is system-controlled; they are placed by the cutting system in compartments via a tilting air cushion table. Glass removal and handover to the IGU line is also automatic, so that edge damage is largely excluded."*

By Glaston accounts, the resulting triple glazing with ultra-thin internal pane can be as slim as double glazing and improve the Ug-value compared to double glazing by up to 20% – depending on the Low-E coating and gas filling. The use of weight and resource-saving IGUs is especially beneficial for residential housing and energetic renovation or when heavy sliding windows and doors pose weight-related closing problems.



For three decades now HEGLA has built lines for sizing thin glass. The glass is fed in using a flat conveyor belt.
Photo: Hegla GmbH & Co KG

From October 20-23, glasstec 2026 in Düsseldorf will once again be the central and inspiring leading trade fair for the exchange of ideas on future topics in the glass industry. With its special show "glass technology live" and the associated "glasstec conference", the trade fair brings together researchers, manufacturers and users who want to help shape the future■

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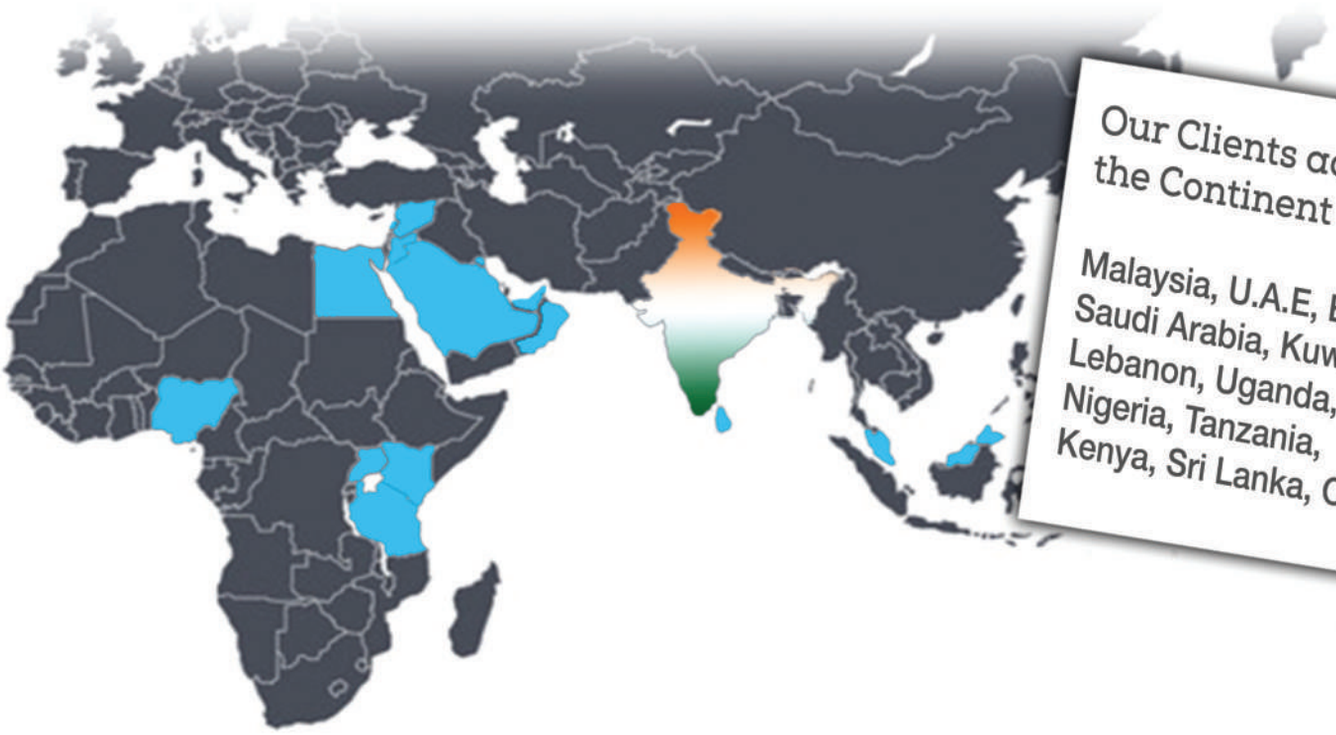

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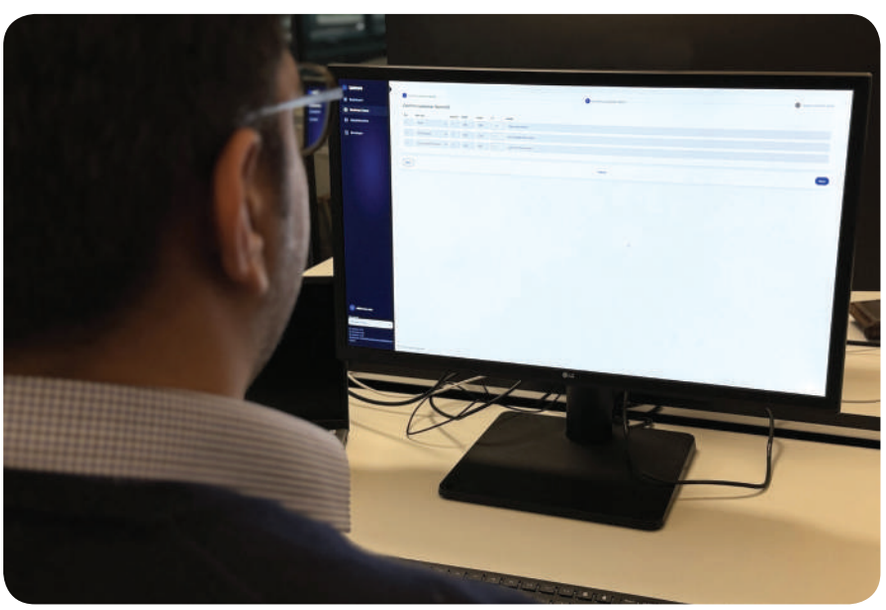
Glass Industry meets AI: And the Glazier Trade?

Artificial Intelligence (AI) is increasingly being used in manufacturing by major flat glass producers with a view to optimising processes, reducing energy consumption and CO_2 emissions and securing competitiveness long term. But are AI applications also already of relevance to glass processors and the glazier trade? This question was explored by the author on behalf of glasstec, the world-leading trade fair for glass producers and the associated machinery manufacturers but also for glass processors and the glazier trade. In machine technology and manufacturing processes AI developments have been driven intensively over the past few years. The improvement of administrative processes, however, was followed less closely even though AI developments also hold plenty of potential here.

In industrial flat glass production AI is already being used in machine producer technologies such as in automation platforms to dynamically adapt production flows by adaptive process control or material flow optimisation, for example. AI-assisted image processing is used for high-precision defect detection and dimension control in flat glass production. AI can be used in so-called digital twins for predictive maintenance or the smart control of sizing and warehousing processes.

In the glazier trade and glass processing, by contrast, AI still seems to be less systematically deployed. Nevertheless, initial applications are also finding practical use, as Mr. Karsten Sommer of the Hamburg Glaziers' Guild revealed: *"Many outfits are starting to look at this topic. This is especially easy to achieve when AI becomes part of the systems already used such as AI-based office and communication tools like Microsoft Copilot, Google Workspace AI or ChatGPT. These can easily help with text-based proposal, calculations or appointment organisation."* Other imaging AI tools such as Canva AI, Midjourney or DALL·E 3 help users get a first impression or provide inspiration for visualising workpieces, products or construction planning thereby making days of rendering



After the data has been extracted by AI it is controlled and released by a human-in-the-loop. Photo: Lumeso FlexCo

Mr. Karsten Sommer (Hamburg Glaziers' Guild) also sees an increasing use of AI applications in the glazier trade, especially if they are integrated into existing systems or can be coupled with them. Photo: Glaser-Innung Hamburg

Mr. Georg Katzlinger-Söllradl is the co-founder and CEO of Lumeso. The AI application saves valuable time for glass production and processing in order data capture.

Photo: Lumeso FlexCo

done by high-performance computers increasingly superfluous – at least for initial designs or concepts.

INITIAL CONCRETE APPLICATIONS: ORDER ENTRY

All this means AI allows both companies big and small to free up time with the help of assistance systems. A case in point is order entry, which– except with classic electronic data interchange systems – is often performed manually due to its complexity. Here, plenty of time is tied up in data transfer, queries and error corrections – because only very few enquiries are complete and precisely formulated from the outset. Add to this the wide variety of enquiries – there are glass producers capable of supplying IGUs in ten thousand possible configurations. How the order data entry process can be noticeably simplified by AI was explained by Mr. Georg Katzlinger-Söllradl, CEO and co-founder of the start-up "Lumeso", who exhibited his AI solutions for the first time at glasstec 2024: *"Our software analyses incoming e-mails, automatically identifies all relevant order data and compiles them in a structured manner. Missing data is completed automatically by smart queries. After release by the case handler the data is transferred directly to the order data capturing system via an interface. This solution was only made possible for us by the availability of performance AI systems. AI in administration markedly increases the speed of order data capture, significantly reduces errors and considerably minimises the throughput time from order entry to confirmation."* The efficiency gain is attractive, but customers were particularly interested because they lacked relevant staff or did not even find the staff to manage existing processes to start with. Mr. Katzlinger-Söllradl: *"We soon realised we can also help combat skilled labour shortages with our AI. Experienced employees can reduce their workload and focus on control and decision-making tasks while younger staff can be drawn into the exciting flat glass working environment by modern, attractive AI solutions."*

Image: AI-generated with ChatGPT

A view at the state of the art gives hope: the increasing availability of modular AI tools and the development of hands-on sector-specific solutions can increase efficiency, prompt positive developments for everyday work while making employers more attractive at the same time. We can look forward to glasstec 2026 where AI & Digital Technologies will be Hot Topics alongside circularity and decarbonisation■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The World of Soda Ash: Building Momentum, Adapting to Change

Hasan Copur
Associate Director, Global Soda Ash
Chemical Market Analytics by OPIS
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Soda ash remains a fundamental ingredient in many everyday products, from the glass we drink from each morning to the windows in our homes, from batteries in appliances to the detergents we use for laundry. In 2025, glass production is projected to account for 57% of global soda ash consumption. Flat glass continues to lead demand, followed by container glass. Until now, solar glass has been the fastest-growing segment, fuelled by rising investment in solar energy, but this trend may shift in 2025.

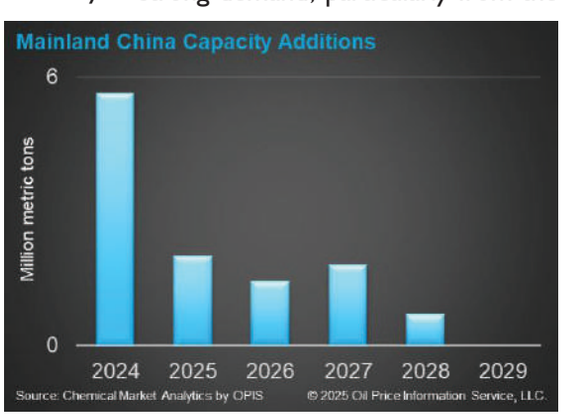
The global soda ash market faced a paradox last year; while demand rose—driven largely by the clean energy sectors—soda ash capacity, particularly in mainland China, also expanded significantly. This dual growth has led to an oversupply in 2025.

THE CHINA EFFECT

Mainland China continues to dominate the global soda ash narrative. In 2024, the country recorded a record-breaking 17% demand growth, primarily driven by solar glass production, translating to an additional 5.6 million metric tons (mt). However, this momentum hasn't persisted into 2025. In the first quarter, demand decreased by 1%, year-on-year, and solar glass production decreased by 10%, year-to-date April. Mainland China's solar glass capacity is expected to increase from 52 million mt in 2024, to approximately 56 million mt in 2025.

This rapid expansion in solar glass since 2022 has raised questions about whether there's excess capacity. The situation has been further complicated by new US tariffs and anti-dumping duties targeting mainland China and Southeast Asian solar PV module producers—many of which are Chinese-owned—casting uncertainty over the solar glass outlook in both mainland China and the broader region.

Since 2023, China has added more than 7 million mt of soda ash capacity, including 5 million mt of low-cost natural soda ash in Inner Mongolia. While robust domestic demand initially absorbed this new supply, keeping the global market relatively balanced through most of 2024, the pressure from excess capacity has begun to weigh on the market since the start of this year.



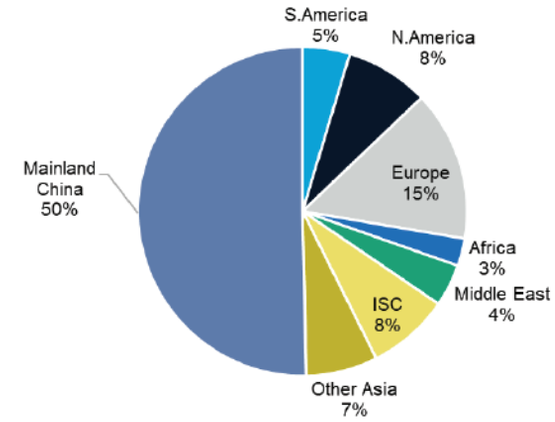
GLOBAL DEMAND

In 2025, global demand for soda ash is expected to increase by 1.2%, adding over 800,000 mt. This suggests that the world demand growth will slow in 2025 to levels not seen since after the pandemic. This follows an 8% increase in 2024, which was driven primarily by strong demand from mainland China. In contrast, demand in the rest of the world, excluding mainland China, remained flat last year.

Across the rest of the world, soda ash demand trends are mixed:

Other Asia (excluding mainland China and **Indian Subcontinent**): Other Asia is the largest seaborne market, relying almost entirely on imports. The region recorded nearly a 10% increase in imports in 2024, reflecting strong demand, particularly from the

World Demand, 2025



Total Demand 72.9 million mt

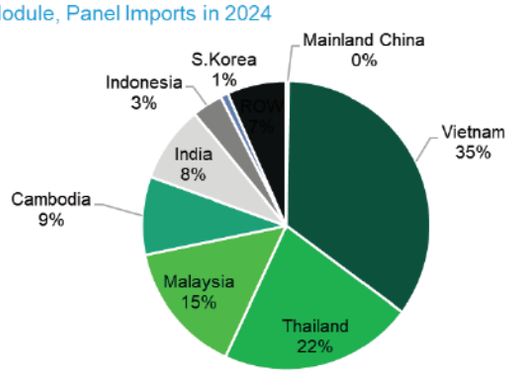
Source: Chemical Market Analytics by OPIS © 2025 Oil Price Information Service, LLC.

solar and flat glass sectors. However, US tariffs targeting certain Southeast Asian solar PV module exporters have created uncertainty for 2025. In terms of the importance of the US market as a destination, Southeast Asia is a significant supplier of both solar glass and panels to the US while mainland China is more important as a solar glass supplier.

Irrespective of the uncertainty in the outlook for glass in this region, there are several Chinese and South Korean flat and solar glass investments being developed in Indonesia and Malaysia, some of which already started production during the first quarter of this year. This new glass production supported a 30%, year-on-year, increase in soda ash imports to Other Asia in the first quarter of this year.

The Americas (excluding the US): Outside the US, the Americas region is heavily reliant on soda ash imports.

US PV Module, Panel Imports in 2024



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In 2024, imports to North America declined by 11%, led by Mexico, where soda ash imports—mainly for container glass—decreased by 10%, or 138,000 mt. In contrast, in South America, imports, and thus apparent demand, in 2024 was fairly flat.

In South America, growth is expected to come mainly from lithium, particularly in Argentina and Chile. While lithium carbonate currently accounts for 3% of global soda ash demand, it represents 20% of demand in South America and is projected to become the region's largest end use in 2025. In the first 3-4 months of this year, soda ash imports to South America have increased by 26%, year-on-year.

India: India's soda ash demand continues to grow steadily. In 2024, consumption increased by around 4%. While powder detergents remain the largest end-use segment, a faster-than-expected consumer shift towards liquid detergents—which do not use soda ash—is beginning to reshape raw material demand in this sector. Despite having domestic soda ash capacity, India remains a net importer and has ranked as the world's third-largest soda ash importer for the past two years. Imports currently account for around 20% of India's total soda ash supply. In 2025, demand is projected to increase by 5.8%, or approximately 300,000 mt, driven mainly by solar glass as well as sodium bicarbonate which is primarily supported by flue gas treatment and food applications in India. Over the next five years, India is expected to be the third fastest-growing soda ash market globally, after Southeast Asia and South America.

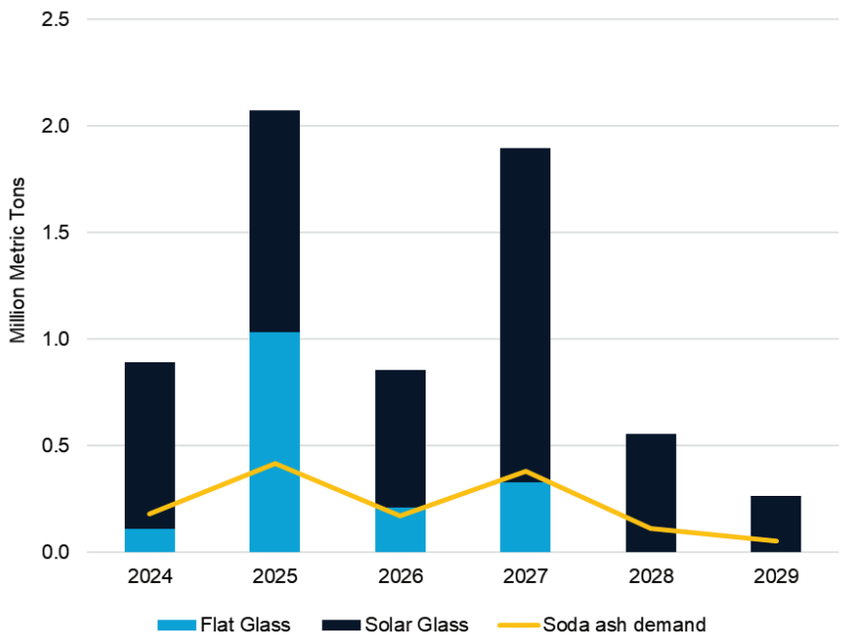
CAPACITY, ACQUISITIONS AND TECHNOLOGY

After a fairly stable capacity base until 2022, the supply-side started to change quite dramatically since 2023. By 2024, mainland China saw the largest annual capacity increase in its history. The Inner Mongolia Berun natural soda ash project had finalised its ramp up and reached 5 million mt of capacity. In the same year, China also expanded its Hou-based synthetic capacity and added a total of more than 5.5 million mt. The US has also seen expansions. In 2023 -2024, Genesis Alkali (now WE Soda) added 1.2 million mt of natural soda ash production. Solvay is expected to add a total of 600,000 mt by the end of this year. US producers are export oriented with more than 40% of the world's soda ash exports shipped from this source. Meanwhile, Europe has historically seen cost pressures, and a total 1.0 million mt of synthetic capacity is scheduled to close by the end of this year.

The soda ash industry has also seen consolidation. In March 2025, WE Soda acquired the largest US soda ash producer, Genesis Alkali, becoming the largest soda ash producer in the world, with a total capacity of more than 9 million mt.

The soda ash industry is also seeing a change in its technology profile as natural soda ash, with its cost advantage, is increasing its share in supply.

New Glass in Other Asia



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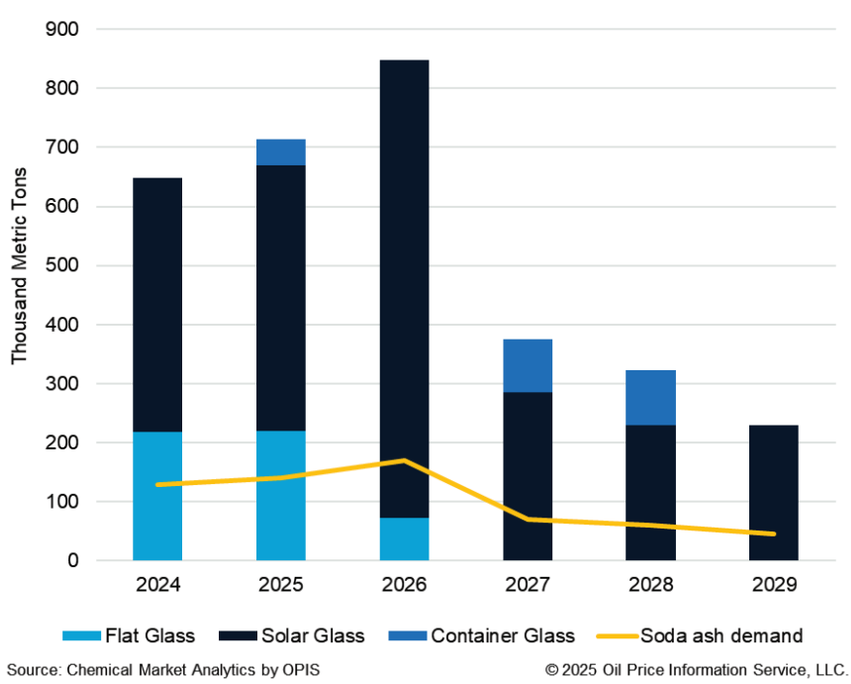
TRADE AND PRICING TRENDS

Trade remains essential, as around 25% of soda ash is shipped globally. The USA is the world's largest exporter, followed by Türkiye. Mainland China is also important in terms of trade, but its position is highly volatile. This volatility has a significant influence on the global trade balance. Mainland China typically has a fairly big trade surplus. However, in 2024 it ended the year almost balanced on trade, although for much of the year it was running a deficit. Due to the current over-capacity in mainland China the traditional surplus position has returned this year. And during the first four months of 2025, exports from mainland China has more than doubled while imports have fallen by 98%.

New Glass in India



Source: Chemical Market Analytics by OPIS

In 2024, US soda ash exports rose 11% year-on-year, led by an 72% increase in shipments to mainland China. However, the trend reversed in early 2025: through March, USA exports declined by 7%, with no shipments recorded to mainland China.

Both contract and spot prices have been declining since 2024 as demand growth globally is lagging supply. Chinese export prices are the most volatile since the country exports more on a spot basis than the other key suppliers. As such, an assessment of export prices from China provides some insight into the underlying global trends. This assessment shows that China's export price which started last year at $301 per mt FOB has fallen sharply to $189 per mt FOB by April 2025.

OUTLOOK AND CONCLUSION

One of the key factors shaping the soda ash market outlook today is slower GDP growth than anticipated at the start of the year. This weaker macroeconomic environment is impacting overall demand across several sectors. Additionally, US trade policies are creating significant uncertainty in global markets. Also, demand in new energy sectors, which have been a major growth driver, is now being undermined by more conservative environmental agendas, which may slow the anticipated growth in sectors like solar and lithium. As a result, the potential for overcapacity in the soda ash industry is likely to persist in the short to medium term. Nonetheless, some supply-side adjustments are underway, and how quickly the market rebalances will be critical for the health of the industry going forward.

The upcoming World Soda Ash Conference in Palma de Mallorca, SPAIN will be an important time to share views from key stakeholders regarding the industry's strategic direction moving forward■

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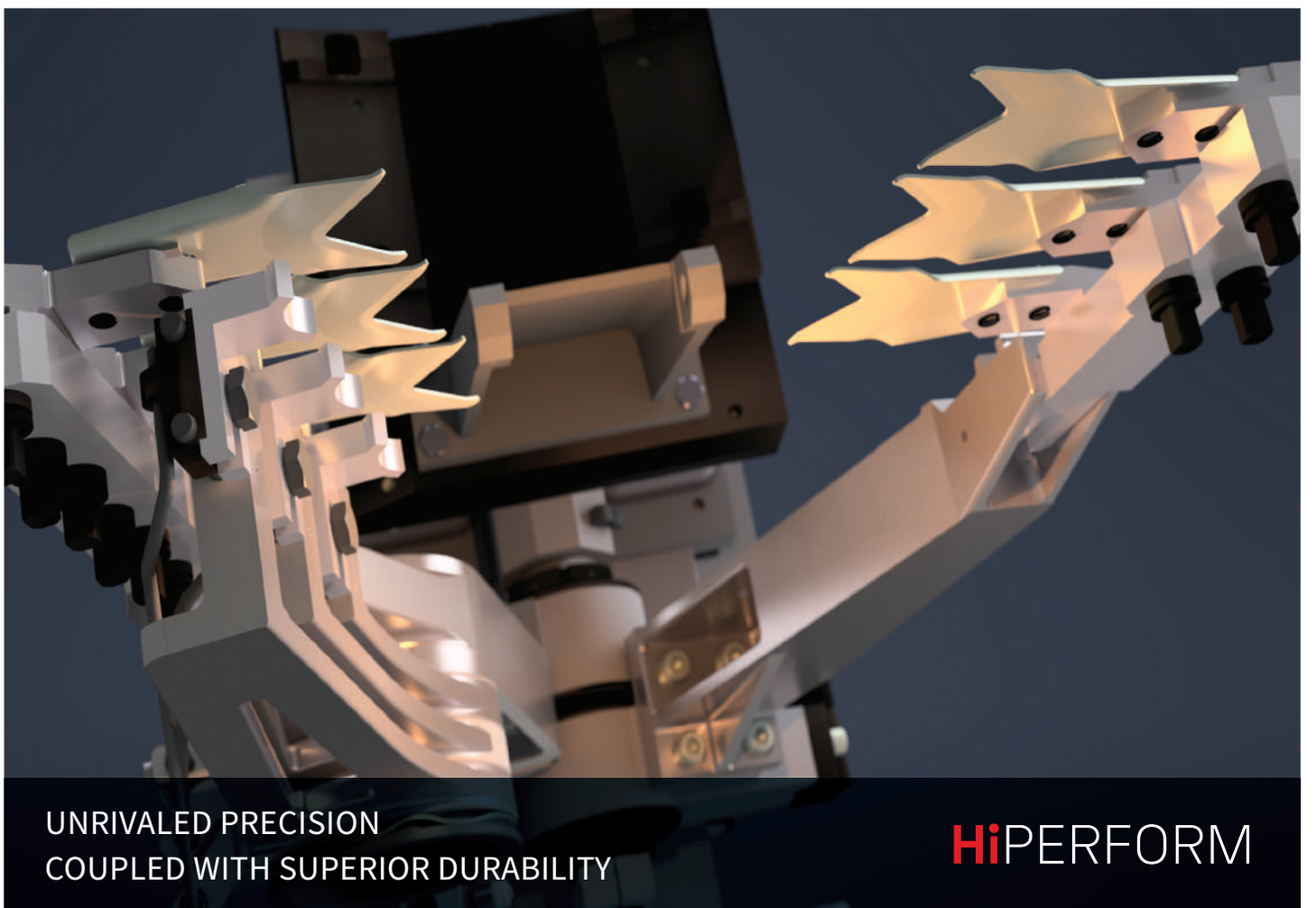

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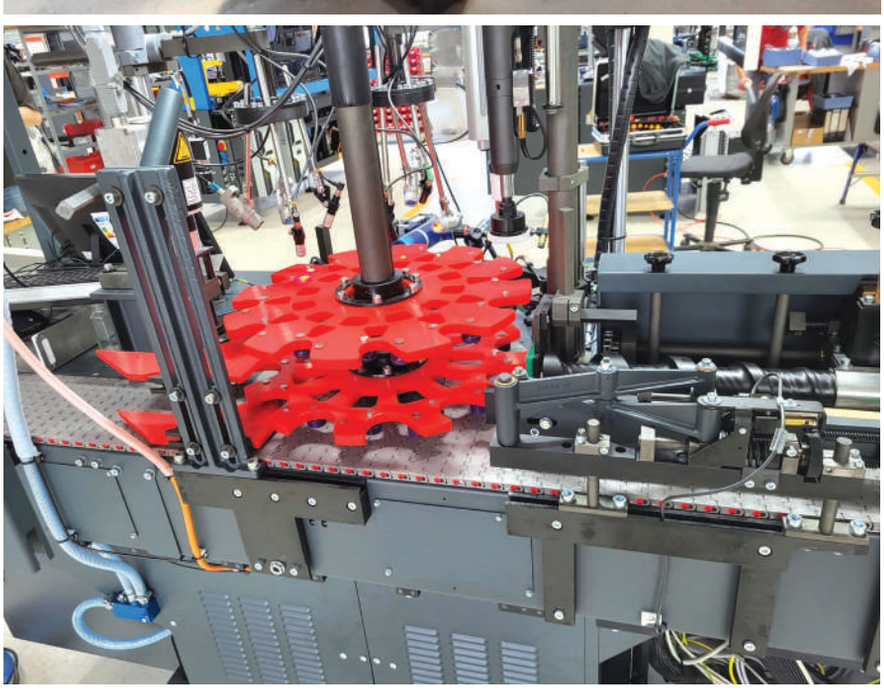
HiSHIELD is Heye's premium subbrand, dedicated to delivering cutting-edge cold end technology and expertise. Through the HiSHIELD RTR retrofit solution, Heye enables you to revitalize your inspection equipment, bringing it up to the highest performance standards.



PERFORMANCE BOOST

Heye specializes in refurbishing outdated CO starwheel machines, guaranteeing they meet today's most demanding performance requirements. Heye ensures higher inspection speed and flexibility with its redeveloped servo drive technology. Thanks to this your CO machine will get a servo driven starwheel as well as plug and planity unit. Outdated parts will be replaced against Heye's latest mechanical and electronic components, enabling your machines to operate at peak efficiency and reduced downtime. These are complemented by our modern user interface, equipped with the latest features, making operation easier, faster, and more intuitive.

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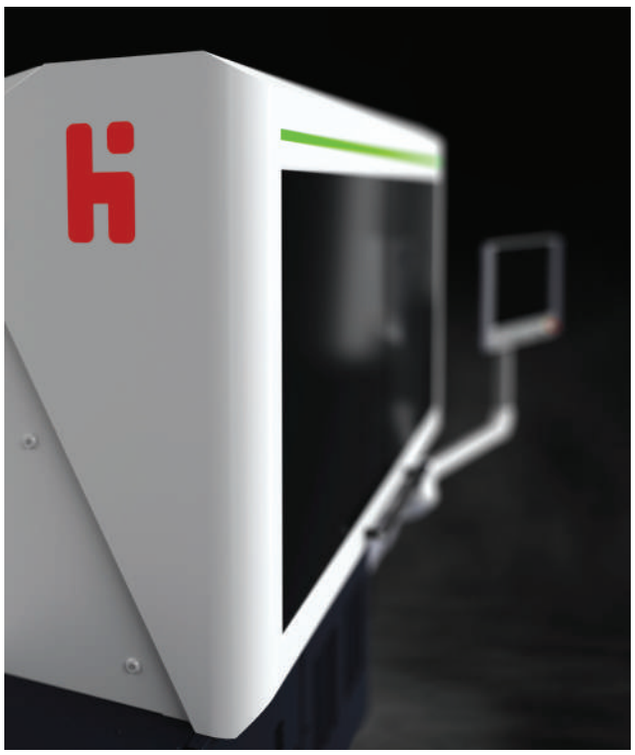
To ensure your machines are in optimal condition, we will thoroughly disassemble the entire machine for refurbishment. This process allows us to carefully clean and inspect each component to meet the highest standards. After cleaning, each unit will be powder-coated, not only to extend the lifespan of the parts but also to provide an appealing appearance. This comprehensive care ensures that your machines are not only functional but also visually pleasing. Once the cleaning and powder coating are complete, we will reassemble the machine and



conduct extensive testing to ensure everything operates smoothly. Our goal is to deliver a machine that not only looks like new but also provides the performance and efficiency you need.

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Furthermore, we replace the old monitor with a new 24-inch touchscreen featuring a modern interface designed to enhance the user experience, making operation more intuitive and efficient. With its large display, operators can easily navigate through various functions and settings, allowing for quicker adjustments and improved workflow.

Don't let your inspection equipment age - send your CO machines to us for refurbishment and watch them transform into high-performance assets that drive productivity and quality in your operations, maximizing the potential of your existing machinery.

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. Our mechanical engineering has set industry standards for more than six decades, significantly contributing to our 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. We consider glass as the purest and most natural packaging on our planet. Our actions are driven by experience, courage and passion.

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Forehearths enhance Operational Flexibility at Glass Futures' Plant

▲ Image from PSR's time-lapse camera installation at Glass Futures.

Parkinson-Spencer Refractories has designed adaptable forehearths and a distributor for Glass Futures' Global Centre of Excellence in St Helens, UK. The equipment is outlined by Mr. Simon Parkinson.*

Parkinson-Spencer Refractories (PSR) has served the glass industry for over 200 years and during this time we have seen dramatic transformations within the sector as processes, materials and products have evolved.

To remain a leader in the market and offer the latest solutions in refractories and glass conditioning equipment, it is imperative to stay at the forefront of technological advancements as we look to the future of glassmaking. Our collaboration with Glass Futures underpins this.

Glass Futures' Global Centre of Excellence is a not-for-profit research and development facility that hosts a 30 tonne per day glass melting furnace, as well as raw materials and cold-end processing.

The intention is that this will support research and development projects for the container, flat glass and tableware industries, where clients will be able to use the plant to bridge the difficult gap between the lab and full-scale manufacturing.

The Glass Futures project has been an opportunity to demonstrate our expertise and unique capabilities, as a manufacturer of both glass conditioning machinery and forehearth refractories.

Designing such a flexible system has not been without its challenges, but we have been presented with an opportunity to envision something which has never been done before and to contribute to the future development of our industry.

Forehearths designs

Following a tender process, PSR was selected to design and supply the distributor, container alcove, container forehearth and rolled plate forehearth last year.

Following installation at the Global Centre of Excellence, both forehearths will be capable of producing the full 30 tonnes per day of the glass melting furnace.

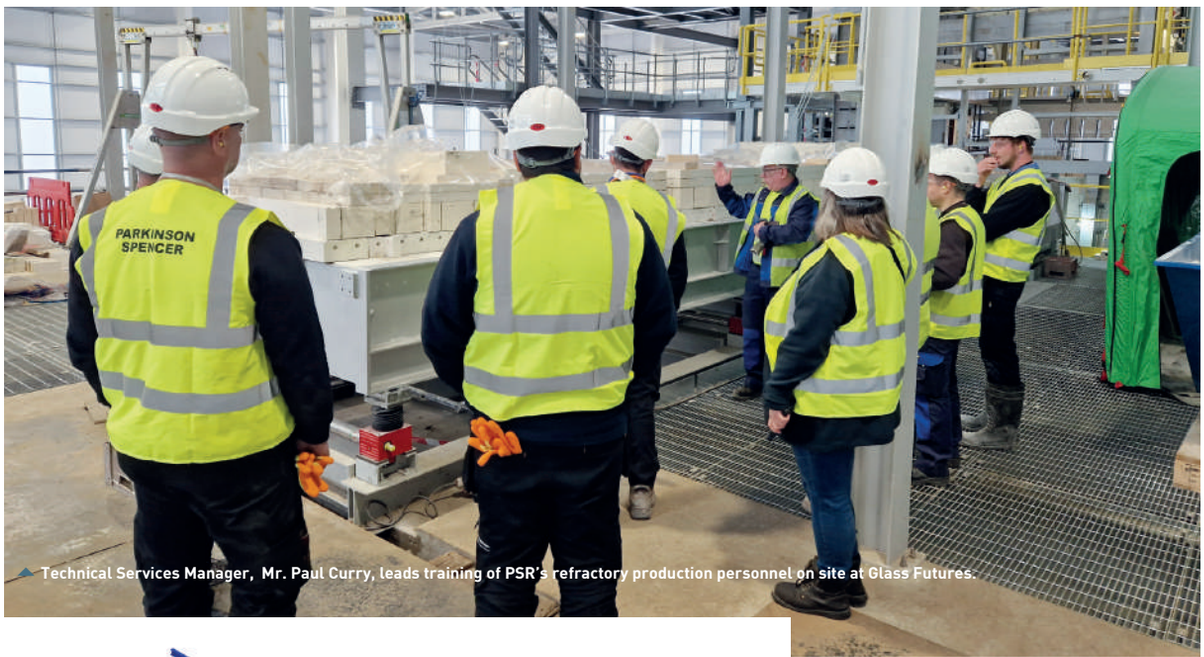
Each will be designed suitable for the installation of water jackets, to allow one line to be drained and shut down.

There is also a third forehearth entrance position off the Throat Riser section of the Distributor, to allow for the future installation of a Drain Forehearth to balance furnace tonnage and assist in flushing the furnace Melting End.

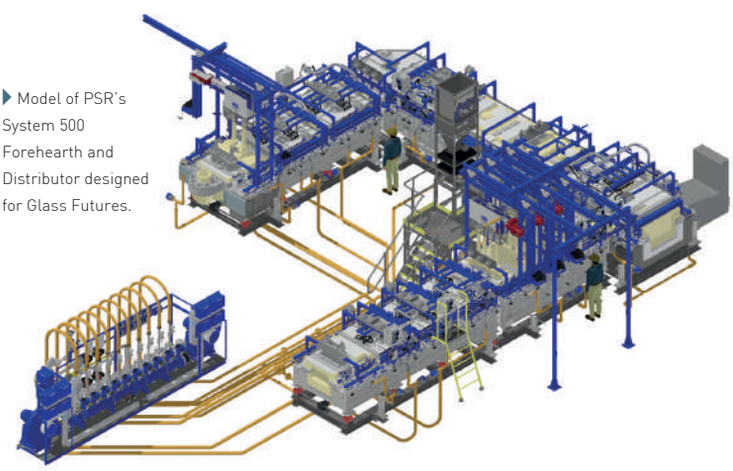
The container alcove and flat glass forehearth are designed and supplied suitable for the future installation of

Continued>>

Originally Published in GLASS INTERNATIONAL



Technical Services Manager, Mr. Paul Curry, leads training of PSR's refractory production personnel on site at Glass Futures.



Model of PSR's System 500 Forehearth and Distributor designed for Glass Futures.

Colourant Systems.

The Colourant Sections are configured to allow the seamless transfer of one Forehearth Colourant Stirrer System between the two lines, should this be required.

It would enable a common Frit Weighing and Delivery System to be positioned between the two lines, allowing either line to be supplied by re-location of the vibratory tube conveyer.

Each forehearth equalising section is configured suitable for the future installation of PSR Cord Dispersal Systems to combat the common cat-scratch cord defect, should this be required.

The PSR Cord Dispersal System is supplied with a money-back guarantee that it will successfully eliminate the cat-scratch cord defect, with over three hundred systems having been successfully installed across the globe.

Automated jacking system

At the heart of this project is the flexibility to switch seamlessly between production, and research and development initiatives. This has led to the implementation of several interesting features.

For example, the forehearths must be able to switch between maximum and minimum tonnage operations on each line. To enable this, we revisited and developed past designs for a jacking system to address the problem of glass head loss at low pull.

Both forehearths will be equipped with an Automated Forehearth Jacking System consisting of eight screw jacks.

Each of these has +/-30mm movement capability, installed underneath the forehearth casing and controlled by four helical bevel gear motors and inverters.

The position of the casings is measured by eight lasers, one at each screw jack position.

Measurements are relayed back to the forehearth control system, providing continuous monitoring of the forehearth levels. This allows the operator to control the forehearth height and slope, and therefore the glass level, to accommodate a wide range of production conditions as necessitated by the vast array of possible projects demanded by clients.

Alternative combustion

As we transition to a low carbon future, more research is needed to provide alternative combustion methods.

Although the forehearths will be started up on air / natural gas combustion, supported by our MR-5000 combustion equipment, it is expected that future research projects and development work may involve the use of hydrogen or oxy-hydrogen combustion in the forehearths.

Refractories

As well as designing and engineering the forehearths and distributor, all associated refractories that are installed at the Global Centre of Excellence have also been manufactured on our site in Halifax, UK.

PSR is a manufacturer of forehearth, distributor and feeder expendable refractories.

We are constantly developing and improving our refractory solutions for the glass industry and investigating solutions to embrace transitioning to a low carbon future in the ceramics industry.

As PSR is also an affiliate member Glass Futures, we too are likely to access the facilities on offer at the site.

It opens the possibility for field trials of refractory developments to be carried out on an operating glass container furnace.

Future collaborations

One such opportunity may follow from PSR's industrial research project to develop sustainable low CO_2 refractories.

Continued>>

Funded by Innovate UK's Industrial Strategy Challenge Fund and delivered in collaboration with Sheffield Hallam University and Ceramics UK, this project studied dopant additive technologies to promote densification and sintering of alumina-zirconia-silica refractories at lower temperatures.

The objective of the project was to lower the sintering temperatures of PSR's refractory compositions whilst maintaining, or even enhancing, the thermo-mechanical and corrosion resistant properties.

The project was successful in identifying dopants capable of maintaining and/or improving the refractory properties whilst sintering at 1400°C, rather than the usual 1500°C.

This reduced energy usage by 15%, with further reductions possible through optimisation of dopant addition rates and firing cycles.

PSR is currently identifying opportunities for further collaborative projects to progress this technology to the next stage.

This would involve further research into the science underpinning the sintering behaviour, optimisation of compositions, material characterisation, high temperature testing and evaluation, scale up to factory production, and eventually application based real life testing.

Glass Futures has indicated it would support future PSR projects in this field with an eventual aim of conducting field trials at it site.

Other recent refractory development projects by PSR have resulted in new materials being brought to market. These provide considerable performance improvements for feeder expendable refractories.

For example, PSR-925, has proven capable of increasing the typical operating life of feeder spout bowls from around 18 months to more than four years in typical soda-lime silica container glass applications.

The next generation

The majority of PSR's equipment for the forehearths and distributor has now been installed on site in St Helens.

Our Technical Services Manager, Mr. Paul Curry, was on site to oversee the installation of the refractories, alongside two of PSR's more recent engineering recruits.

With over 30 years of experience in the design and installation of forehearth refractories, Mr. Curry's knowledge is invaluable to the next generation of PSR engineers.

This project has provided an excellent training and mentoring experience.

Our refractory manufacturing personnel were also given a tour of the facility by Mr. Curry so that they could see a glass melting furnace under construction. This allowed them to gain a better understanding of how the refractories they produce in Halifax come together in a glass factory.

As an Affiliate Member of Glass Futures, and a key supplier and partner, we look forward to working closely with the Glass Futures team as the project is realised.

PSR will take a keen interest in the next generation glassmaking trials which will be taking place at the Centre for Excellence in future. ■

***Managing Director, Parkinson-Spencer Refractories, Halifax, UK**
https://www.parkinson-spencer.co.uk/

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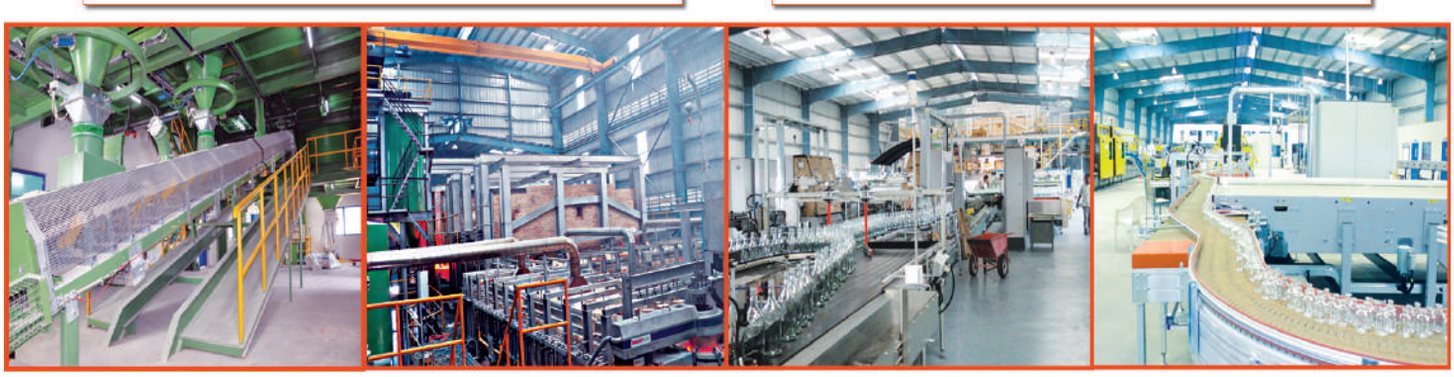

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Membership of the Federation

Members of the Federation are classified into two categories; manufacturers of primary glass articles are enrolled as **Ordinary Members** of the Federation and suppliers to the glass industry viz., suppliers of machinery, raw materials, consultants and others connected with the glass industry are enrolled as **Affiliate Members**.

Foreign Companies supplying machinery etc., to the glass industry are also enrolled as **Affiliate Members**.

Membership forms can be downloaded from www.aigmf.com/membership.php

Members of the Federation are enrolled on the recommendation of Zonal Associations viz.:

- Eastern India Glass Manufacturers' Association (EIGMA)
- Northern India Glass Manufacturers' Association (NIGMA)
- South India Glass Manufacturers' Association (SIGMA)
- Uttar Pradesh Glass Manufacturers' Syndicate (UPGMS)
- Western India Glass Manufacturers' Association (WIGMA)

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Ordinary Members:

- Admission fee ₹ 5,000/-
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2025 AIGMF Glass Awards

In recognition of the tremendous contribution to Indian Glass Industry, The All India Glass Manufacturers' Federation (AIGMF) announces C K Somany Award for Excellence and Balkrishna Gupta Award for Exports.

C K Somany Award for Excellence will be given to an individual who has made significant contributions to the glass industry in the fields of manufacturing, product development, environmental factors, business performance/growth, research and development, science/technology, etc.

Balkrishna Gupta Award for Exports will be given to a unit who has contributed towards identification or growth of new potential markets/volume of exports/reaching no. of countries or any other area showcasing valuable contribution in Glass Exports.

Winners

Year	CK Somany Award for Excellence	Balkrishna Gupta Award for Exports
2024	Dr. Manoj Choudhary, Former President, International Commission on Glass	M/s Schott Poonawalla Pvt. Ltd.
2023	Mr. Pulkit Gaur, Gridbots Technologies Pvt. Ltd.	M/s Schott Glass India Ltd.
2022	Mr. Eric L'Heureux, Schott Poonawalla Pvt. Ltd.	M/s Schott Poonawalla Pvt. Ltd.
2021	Mr. Udit Kapoor, Kapoor Glass India Pvt. Ltd.	M/s Borosil Renewables Ltd.
2020	Dr. Mukul Chandra Paul, CSIR-CGCRI	M/s La Opala RG Ltd.
2019	Mr. B L Kheruka, Gujarat Borosil Ltd. *(Now, Borosil Ltd.)*	M/s Firozabad Glass Shell Industries
2018	Mr. S K Jhunjhunwala, La Opala RG Ltd.	M/s Piramal Glass Pvt. Ltd. *(Now, PGP Glass Pvt. Ltd.)*

Referral applications can also be submitted by Regional Associations: U.P. Glass Manufacturers' Syndicate (UPGMS)- FIROZABAD; South India Glass Manufacturers' Association (SIGMA)- HYDERABAD; Western India Glass Manufacturers' Association (WIGMA)-MUMBAI; Northern India Glass Manufacturers' Association (NIGMA)- Bahadurgarh, HARYANA and Eastern India Glass Manufacturers' Association (EIGMA)- KOLKATA, who may give recommendations for giving an award to a likely individual.

AIGMF may consult Banaras Hindu University (IIT BHU-Ceramic Glass Division), CGCRI (Central Glass and Ceramic Research Institute), CCPS (Confederation of Construction Products and Services) and FOSG (Federation of Safety Glass) for identifying suitable candidates for the award.

2025 Glass Awards in these categories would be given during the Annual General Meeting in Aug/Sept 2025.

The jury for the awards comprise of:

- Dr. K Annapurna, Chief Scientist, Glass Division, CSIR-Central Glass & Ceramic Research Institute (CSIR-CGCRI) and Member Editorial Board KANCH
- Mr. Dave Fordham, Former Publisher, Glass Worldwide, London (UK); Member Editorial Board KANCH and Global Engagement Lead, Glass Futures, St. Helens (UK)
- Mr. Amit Malhotra, President, Confederation of Construction Products and Services; Treasurer, uPVC Window & Door Manufacturers Association and Managing Director, McCoy Silicones Ltd.
- Mr. Pawan Kumar Shukla, Hon. Treasurer AIGMF and President / Managing Director, Schott Glass India Pvt. Ltd.

Applications are invited at info@aigmf.com from all those connected with the Indian glass industry who may submit a brief write-up/CV in support of their candidature latest by August 5, 2025.

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