

Shaping the future of glass manufacturing

Glass technology training courses

Introductory | advanced | in-company | online & on-site



2027



From technology to talent: hands-on training that drives smarter, more efficient glass production.

This is CelSian; the future of Glass starts here...



Harmen Kielstra | managing director

Our origin

Born from TNO Glass Group and Philips, CelSian became independent in 2012, partnering with glass manufacturers, suppliers, and industry leaders (to enhance quality, efficiency, and sustainable glass production) globally.

Our mission

We believe in a future for glass. Our goal is to drive innovation, reduce emissions and energy use, extend furnace life, tackle complex operational challenges, and enhance profitability across the glass industry.

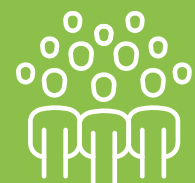


What we do

The key to today's challenges lies in technology and people. CelSian, with its passionate and expert team, offers innovative software models, R&D, experimental facilities, industrial sensor systems, and hands-on training to support the full spectrum of the glass industry.



35 years
of experience



2000+
participants

At the CelSian Academy, we believe progress starts with people. Our mission is to future-proof the glass industry by sharing the knowledge gained through over 35 years of industrial collaboration, research, and development.

Discover creative solutions and unlock a thriving career in the glass industry with the Academy

In today's fast-changing market, staying ahead means learning faster, thinking smarter, and applying knowledge where it counts. Our expert-led courses combine real-world exercises, interactive case studies, and cutting-edge innovations, helping newcomers and seasoned professionals tackle challenges, optimize production, and spark new ideas.

Join a global network of manufacturers, suppliers, and researchers, gain practical skills, build lasting connections, and leave ready to shape the future of glass.

What we offer

- General Glass Technology courses
- Topic-specific trainings
- In-company, tailor-made courses
- Webinar-based training sessions
- E-Learning Modules



Level of experience

- Introductory: for early-career professionals
- Advanced: for experienced staff seeking a deeper technical understanding

Where & how

- At your plant
- Online
- In-person:
 - at Eindhoven (NL)
 - or Toledo (USA)

Practical info

- Taught in EN, also in CN, ES, DE, FR, PT, NL, TR
- Includes certificate & course presentations and Glassbot Access
- **6th** participant = **free**
- Group deal **15%** discount

CelSian reserves the right to cancel up to two weeks prior to the training, proposing new dates or refunds. Training costs do not include accommodation, traveling, tax and duties.

Who is it for

Whether your career is built on glass or your curiosity has recently been sparked, you belong here.

Our audience includes:

- Furnace & batch engineers
- Quality & R&D teams
- Sustainability managers
- Suppliers & designers

... and anyone eager to discover, learn, and connect with the world of glass.

New in 2027

We are ready to offer all our courses in Spanish



In-company training courses

Equip your team with the skills that drive tangible results



From knowledge to action: train where it matters most for your team

Not finding the right topic? Planning to train 10+ people together? Or want to make learning accessible to your whole team? Bring training directly to your team, where it matters most.

In-company courses focus on your plant, your challenges, and your goals, ensuring every topic is relevant and actionable. You choose the topic, and we adapt exercises and real-world examples to match. Hands-on, cost-effective, and efficient, this approach rapidly builds team expertise.

With expert guidance on-site, your staff collaborates, applies new skills immediately, and drives measurable improvements in productivity, efficiency, and process control, turning knowledge into results where it counts. Schedule your in-company training now!



“

CARDINAL
Glass Industries

*I have been with the company for 7 years and have learned a lot, but **have not had this in-depth training.** I like that it was **tailored to our plants and process.**”*

Glass Technology training, 2023

“

MOLSON COORS
Beverage Company

*The training was able **to fill gaps in knowledge that were lacking in our department.** Questions were also given detailed and understandable answers. The **knowledge base of the instructors was top-notch.**”*

Furnace operation training, 2025

“

KNAUF

*It is **very informative** for me, especially for the position that I have. Able to stay connected with coworkers from different plants and **learning new knowledge together.** In my opinion, it is super helpful, especially for people that is new to the glass industry.”*

Glass Technology, 2025

“

Gallo Glass
California Pure

*Concepts were explained clearly, **giving a full picture of why we do certain things** and deeper insight into glass manufacturing.”*

Furnace training, 2024

“

ArdaghGroup **AG**

*Very well put together and **clear content.** Able to be easily digested and relatable to everyday operations.”*

2024

Why choose in-company training?



Tailored content

Training designed around your plant, your processes, and your challenges.



Team impact

Train everyone together, creating alignment and collaboration.



Efficient & cost-effective

Especially for 10+ employees, save time and travel costs.



Expert guidance

Trainers bring deep industry experience to solve your real challenges.



Immediate application

Practical exercises applied directly to your operations.

How it works



1 Pick the topic relevant to your team.



2 We adapt content with exercises and real world examples.



3 Train on-site with practical hands-on sessions.



4 See results in productivity, efficiency and quality.

Companies we've recently supported with tailor-made training



Technology course



Technology course



Technology course



Bubbles / Refractor



Float



Glass structure



Furnace operator training



Technology course



Amber glass



Furnace operator training



Glass coloration



Hands on hot repair training



Forehearth operator training



Container glass strengthening

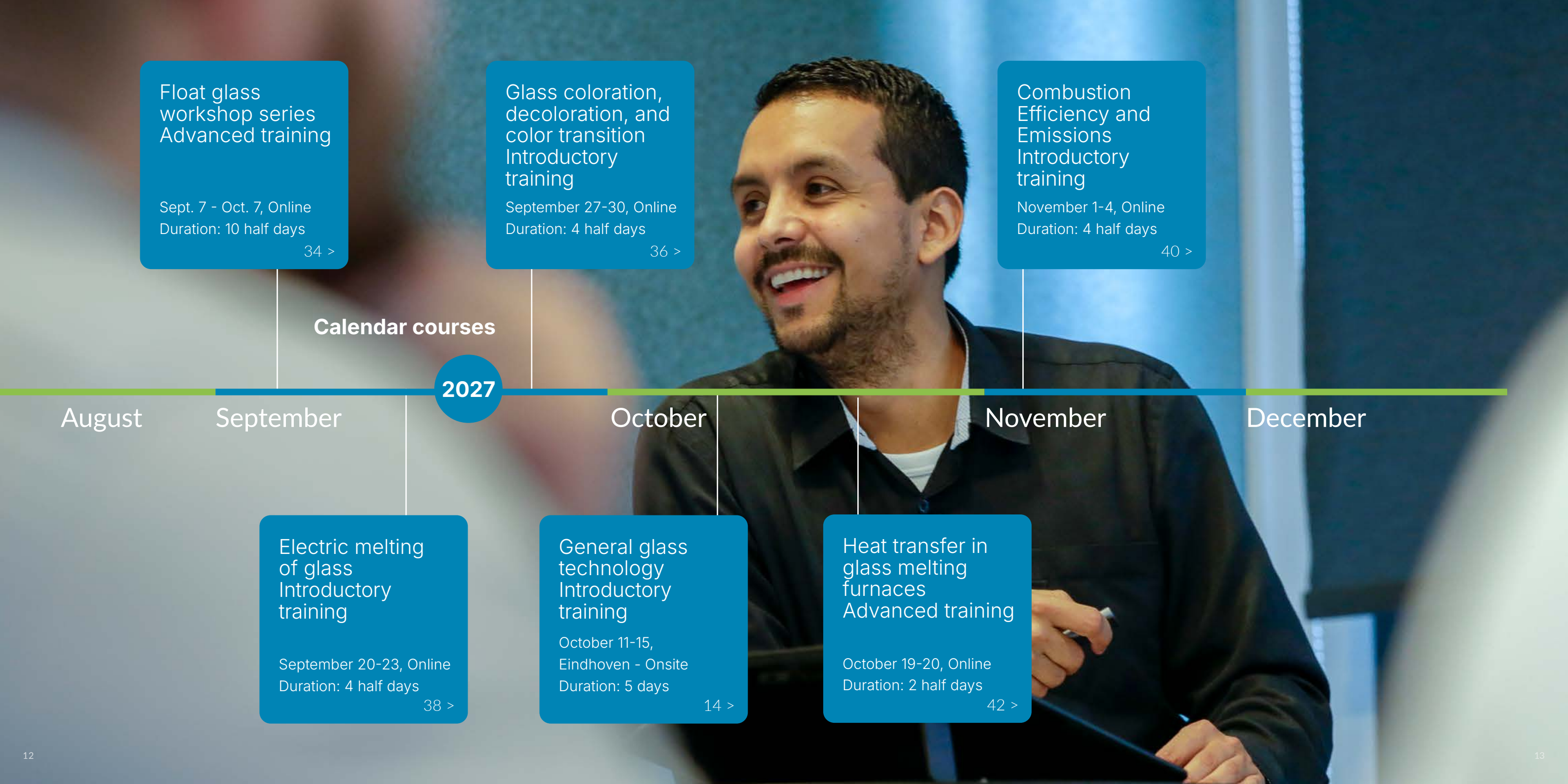
The training courses will give you the skills to increase productivity, make better or faster decisions to resolve a production issue. **Choose your topic, set the goals, and let us bring the expertise to your team. Schedule your in-company training today!**



Schedule your in-company training today!
www.celsian.com/in-company







Float glass
workshop series
Advanced training

Sept. 7 - Oct. 7, Online
Duration: 10 half days

34 >

Glass coloration,
decoloration, and
color transition
Introductory
training

September 27-30, Online
Duration: 4 half days

36 >

Combustion
Efficiency and
Emissions
Introductory
training

November 1-4, Online
Duration: 4 half days

40 >

Calendar courses

2027

August

September

October

November

December

Electric melting
of glass
Introductory
training

September 20-23, Online
Duration: 4 half days

38 >

General glass
technology
Introductory
training

October 11-15,
Eindhoven - Onsite
Duration: 5 days

14 >

Heat transfer in
glass melting
furnaces
Advanced training

October 19-20, Online
Duration: 2 half days

42 >

General glass technology training



This isn't just a course; it's a career-transforming experience.

With 6 expert trainers and a diverse group of 20+ professionals, you'll not only deepen your knowledge but also build valuable connections that can propel your career forward. Share insights, collaborate with industry leaders, and gain access to a network that opens doors to new opportunities and growth in the glassmaking industry. Don't miss the chance to invest in your future, connect, learn, and advance like never before.

*"I enjoyed the glass blowing course, learning about the colors of glass and the tours we went on! They were **great**. The instructors for the course were also **extremely helpful** and knowledgeable."*

Engineer – Fiberglass

Glassmaking is both an art and a science; whether you're just starting or have years of experience, understanding the full spectrum of glass technology is key to staying ahead.

In just one week, you'll gain hands-on experience, uncover industry best practices, and solve real-world challenges. Learn how to fine-tune your furnace and raw materials, manage redox issues, and effectively reduce defects. You'll also dive into critical topics like sustainability, energy efficiency, and process control, skills that are key to optimize your production for better quality, efficiency, and sustainability.

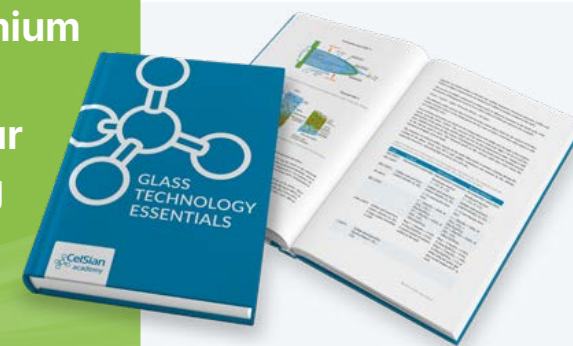
Expand your professional network!

In addition to learning, we offer networking opportunities and industry-specific experiences to help you advance your career.

What you take away:

- Understand how various raw materials can be used to adjust your glass chemistry, properties and melting behavior
- Know how to react when redox-based issues occur that impact heat transfer, fining, foaming and color of the glass
- Select process design and operation parameters to achieve emission reductions, energy savings and improve the sustainability of glass production
- Be prepared for future glass melting concepts

Access premium resources to enhance your glassmaking knowledge



Gain exclusive access to the **6th edition of the Glass Technology Handbook**, an in-depth reference that covers everything from glass structure and raw materials to advanced melting and energy efficiency strategies. This invaluable guide is designed to enhance your understanding of the glass industry at every level. Alongside the handbook, **GlassBot**, your personal, on-demand AI assistant, answers questions directly from the course content, helping you revisit key concepts and solve challenges quickly, anytime, anywhere.



Ask CelSian's GlassBot!

Your expert on Glass Technology Essentials. Instant answers, anytime!

*"The training was **extremely valuable** and really helped me gain a broader perspective on the glass industry and its challenges. I truly enjoyed both the technical sessions and the opportunity to exchange with everyone."*

Glass Sales Engineer | Supplier

Join the more than +1,000 professionals who have trusted us over the last three decades.

*"The class was **PACKED WITH TONS OF practical examples and real-life context** that made the ideas digestible."*

Glass Sales Engineer | Supplier

Your trainers



Introductory training



5 full days



US June 2027



Toledo - Ohio (USA)



Training costs \$2.975,- / € 2.750 per participant, excluding living costs, taxes, and duties. Fee includes 5 lunches and 2 dinners. The 6th participant from the same company joins **free**.

5 full days

EU October 11-15, 2027

Eindhoven (NL)

Glass Technology Training

(Non-Technical Audience)

 Introductory training

 8 hours (2 half days)

 March 2 - 3, 2027

 Online

 € 975 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.

 Your trainers:



In many glass companies, not everyone works directly on the production floor. Teams in sales, planning, procurement, HR, finance, and management make decisions every day that are closely connected to what happens inside the furnace. Yet the fundamentals of glass production—from raw materials and chemistry to melting and forming—often remain unfamiliar outside the production department.

*The crash course on glass melting process technology **exceeded my expectations**. Highlights included **interactive exercises**, open discussions with trainers, networking, and the plant visit. Lectures were informative, engaging, and practical."*

Associate Scientist - Purchasing assistant- Procurement

After delivering numerous technical training programs for engineers and production specialists across the glass industry, CelSian Academy recognized a recurring need: companies wanted a way to introduce their non-technical teams to the fundamentals of glass manufacturing.

To address this, CelSian developed Glass Technology Training for Industry Professionals, an in-company training designed specifically for teams working around glass production. Delivered on-site at your company, the course explains the essentials of glass manufacturing in clear, accessible language, helping employees understand how the production process works and how their roles connect to it.

*I appreciated the **real-life examples**, the **practical images and videos**. My goal was to refresh my knowledge, and this course did so **effectively!** The sessions were **well-designed and dynamic**."*

Coordinator - Planning department

Designed for professionals working in:

- Sales
- Planning
- Procurement
- HR
- Finance
- Management

By bringing this knowledge directly to your team, the training strengthens communication between departments, supports better decision-making, and builds a stronger connection between the office and the plant. The course explains the fundamentals of glass production in clear, accessible language.

What you take away:

- How glass is made
- Why furnaces operate the way they do
- How raw materials and recycling affect production
- Why quality and defects occur

No engineering background required, just curiosity about the industry you work in.

*After this week, I now have a **clearer understanding** of the reasoning behind certain practices."*

Officer finance

Register & learn more here.
www.celsian.com/academy



Recycled cullet: impact and usage

Unlock the value of recycled glass while managing quality and risk.

“

The course enhanced my knowledge of the industry and cullet itself .”

Quality technologist – Recycling

”

Very well taught, class went over all the topics that I believe are important for glass cullet.”

Ecosystem and services strategist – Recycling



Advanced training



16 hours (2 full days)



March 23 - 24, 2027



Toledo (Ohio), USA



€ 1.800 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.



Your trainers:



Cullet reduces energy use and emissions, but can introduce instability and defects if not managed well. This course teaches you how to inspect, clean, and optimize cullet streams, and how cullet use affects melting and furnace performance.

Attend if you are interested in:

Cullet Quality & Risks

- Types of cullet and contamination sources
- Visual inspection and acceptance criteria
- Plant-return vs. post-consumer management

System Impact

- Influence on energy, foaming, color, and furnace wear
- Cullet processing and cleaning technologies
- US recycling policies and infrastructure overview

What you take away:

- Hands-on experience to know how to inspect and assess cullet streams
- Identify risks that can impact melting or product quality
- Improve cullet handling and reduce variability
- Understand how recycling practices shape what's available

Register & learn more here.
www.celsian.com/academy



Refractory selection, maintenance and related defects

Maximize furnace lifespan and minimize costs.



Advanced training



16 hours (4 half days)



June 1 - 4, 2027



Online



€ 1.800 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.



Your trainers:



Refractory selection and maintenance provide cost-saving benefits: lower energy use, fewer glass defects, and optimized furnace performance. For every glass manufacturer, investing in the right refractory materials is pivotal. This course delivers essential insights into selecting refractories for different furnace parts, understanding their properties, and applying effective maintenance techniques to extend furnace life and minimize failures.

“

I found a lot of examples that could be applied to my job in order to make a continuous improvement ."

*Furnace maintenance and design specialist
– Container*

“

I can know more about the refractories, the trainers explained very well, and I can understand all."

Furnace maintenance and design specialist – Container

Attend if you are interested in:

- Key refractory types, properties, and requirements
- How refractories interact with glass and flue gases
- Testing methods and online monitoring techniques
- Preventive and corrective furnace maintenance, including hot repairs
- Identifying refractory-related defects and cords
- Hands-on exercises in:
 - Selecting refractories for furnace parts
 - Thermal insulation of walls
 - Defect identification
 - Maintenance techniques

What you take away:

- Have an overview of chemistry and properties of refractory types for the different parts of furnaces and their purpose
- Understand the corrosion mechanisms of refractories in contact with the glass melt, in the superstructure/crown and in the regenerators
- Have knowledge of techniques to test, monitor and control the thickness of refractory walls
- Understand the defect types that can originate from different refractories in the furnace
- Have some techniques for preventive and corrective maintenance of the furnace structure

Register & learn more here.
www.celsian.com/academy



Bubble diagnosis

From cause to cure, master the science and solutions for bubble control.

“

The course was **extremely helpful** in diagnosing bubbles and identifying defect sources. It gave me a clear perspective on the topic, and the **instructors' expertise** and support were **outstanding**.”

Process Engineer – Container

“

The course **thoroughly covered** bubble causes, with the final exercise reinforcing key concepts. The pace was **excellent**, and instructors added depth by sharing insights beyond the slides.”

Senior R&D Engineer – Guardian Glass LLC

 Introductory training

 8 hours (2 half days)

 April 20 - 21, 2027

 Online

 € 975 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



Bubbles and seeds are leading causes of production rejections in glass manufacturing. This course addresses the root causes of these defects, covering everything from batch-to-melt conversion to downstream gas sources during forming. It explores the chemical and physical processes that drive bubble formation and provides strategies for effectively managing bubble-related issues, ensuring superior glass quality throughout production.

Attend if you are interested in:

- Batch decarbonization, bubble formation, and interaction with the glass melt
- Bubble ascent and glass flow velocities
- Gas solubility, chemical fining and refining
- Physical fining
- Reboil mechanisms
- Downstream sources of gases and forming bubbles
- Practical guidelines in case of bubble upset

What you take away:

- Have a step-by-step approach to detect and resolve bubble problems
- Understand the many origins of bubbles
- Comprehend the numerous chemical and physical phenomena that contribute to bubble removal
- Understand how experimental and numerical tools can help identify and resolve root causes in the event of a bubble crisis

Register & learn more here.
www.celsian.com/academy



Feeder forehearth principle and operation

Optimize glass conditioning for consistent quality and performance.

 Introductory training

 8 hours (2 half days)

 May 20 - 21, 2027

 Online

 € 975 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.

 Your trainers:



The forehearth is critical in ensuring the glass melt is conditioned to the proper temperature and homogeneity before reaching the forming department. Proper feeder and forehearth control directly impacts the quality, consistency, and efficiency of glass production. This course provides the necessary knowledge to optimize glass conditioning and ensure stable operation, minimizing defects and maximizing product quality across a wide range of glass products, from containers to glass wool.

Attend if you are interested in:

- Principles of the feeder and forehearth system
- Thermal heat transfer and temperature homogeneity
- Impact of gas heating and electrical boosting
- Devitrification at the cold spots
- Mixing and coloring
- Equipment and measurement devices
- Control and automation

What you take away:

- Know what parameters impact the behavior to deliver a homogeneous glass at the proper temperature
- Optimize job changes
- Monitor feeder behavior based on available measurements
- Recognize and take action in the event of quality issues related to the forehearth

Register & learn more here.
www.celsian.com/academy



Raw materials and melting

Unlock improved melting, fewer defects, and lower emissions, starting with your batch.

“

The course exceeded my expectations! The content was highly relevant to my work and well delivered. The exercises gave a great opportunity to engage with the material, making it far more than just presentations.”

*Liam B., Advanced Technologist
Decarbonisation Technology – Flat Glass (2024)*

”

The course met my expectations. Much of the content was a refresher, but I still gained new insights and useful knowledge. Overall, I was very satisfied.”

Sr. Technology Engineer – Float Glass

 Introductory training

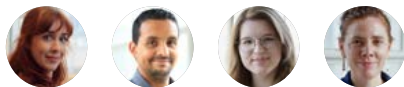
 16 hours (4 half days)

 May 11 - 14, 2027

 Online

 € 1.800 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.

 Your trainers:



The batch defines your melt.
This course explains how raw material choices impact redox, energy use, foaming, and emissions. You'll also learn about cullet, segregation, moisture, and how to prepare a stable, optimized mix.

Attend if you are interested in:

Batch Fundamentals

- Raw material properties and specifications
- Batch recipe formulation and redox potential
- Impact of water and fines

Melting Behavior

- Cullet use, segregation, and handling
- Melting reactions and energy needs
- Redox, foaming, and emissions

What you take away:

- Select raw materials that support your melting and quality targets
- Minimize handling issues like segregation and moisture imbalances
- Adjust redox and batch composition to improve energy efficiency
- Evaluate innovations that can reduce emissions or costs

Register & learn more here.
www.celsian.com/academy



Oxy-fuel

Enhance efficiency, cut emissions,
and optimize furnace performance.

 Advanced training

 16 hours (4 half days)

 April 12 - 15, 2027

 Online

 € 1.800 per participant
(excl. tax and duties).
The 6th participant from the
same company joins **free**.

 Your trainers:



In today's glass industry, rising fuel costs and strict emissions regulations demand innovative solutions. Oxy-fuel combustion is a powerful method to improve melting efficiency, cut emissions, and enhance furnace performance. Learn from experts how to implement gas-oxygen combustion effectively, with practical insights into refractory management, furnace maintenance, and troubleshooting, and discover when, where, why, how, and with whom it is the right solution.

*"With little prior experience in Oxy-fuel furnaces, I left with **vast knowledge** and now **feel equipped** to discuss this technology for our current project."*

*Assistant Batch and Furnace Manager
– Tableware*

*"After completing the course, I now have a **much deeper understanding** of furnace operations and the role of oxy-fuel firing in improving– certain conditions."*

Glass Sales Engineer – Supplier

Attend if you are interested in:

- Oxy-Fuel Combustion – theory and practice for
 - Oxygen enrichment or lancing for recovery
 - Boosting
 - 100% oxy-combustion for natural gas, oil, and hydrogen fuels
- Burner designs, selection and integration to the furnace
- Commissioning
- Control and calibration
- Operational trouble-shooting for quality, energy & emissions
- Long-term consideration: refractory corrosion
- Financial considerations

What you take away:

- Know the correct questions to ask before investigating an oxygen-based project
- Identify the type of personnel and companies to approach for support in defining the scope of both the project and the budget
- Consider the internal and external approvals from Local Authority/EPA for planning/permits, HSE (operator training), Unions, HAZOP, Insurance, etc.
- Plan for some contingency in project execution and ongoing planned maintenance, including spares and security of supply
- Know how to adapt and troubleshoot process, regardless of the time or operations issue

Register & learn more here.
www.celsian.com/academy



Redox, fining and glass quality

Master redox and fining, the key to consistent quality and performance in glass production.

”

It was good to see a more scientific approach to help explain what is happening to support what I see as results"

*Senior Batch and Furnace Manager
– Container*

”

Now I understand all the variables that affect the redox state."

Raw Materials Coordinator – Container

 Advanced training

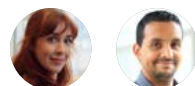
 16 hours (4 half days)

 April 5 - 8, 2027

 Online

 € 1.800 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



Redox is a critical factor throughout glass production, affecting melting, fining, foaming, seed development, and color. This course will equip you with the skills to quickly identify and resolve redox-related issues, ensuring consistent glass quality, clarity, and color. Learn to monitor and control the redox state at every stage, from batch to finished product.

You should attend if you are interested in:

- Defining and understanding redox:
 - Batch redox number
 - Relations with oxygen partial pressure and temperature
 - Optical measurements on the glass
- Glass color: amber chromophore, reduced green, decoloration
- Radiative heat transfer
- Sulfur solubility in the melt
- Fining principle and mechanisms
- Mechanisms and root causes of foaming
- Cullet and redox control
- Identifying the origin of seeds and bubbles

What you take away:

- Know how to optimize your batch recipe and monitor your raw materials to obtain a satisfactory redox
- Know the available technology to track the redox state of the melt in the furnace
- Identify the ideal fining conditions for the manufacture of glass
- Quickly troubleshoot process or quality concerns (e.g., foaming, energy consumption, color, seeds, bubbles) and detect redox issues

Register & learn more here.
www.celsian.com/academy



Annealing, tempering

Increase strength, control stress, and deliver reliable performance across industries.

“

As someone who is new to this part of the process, I found the course **very informative** and enjoyed the group participation exercises. **Very well delivered** and good use of the annotation tool.”

Forehearth Specialist - Container

“

Covered a **wide range of topics** relating to annealing and tempering, and **helped me to improve my knowledge.**”

Technologist- Flat Glass

 Introductory training

 8 hours (2 half days)

 June 21 - 22, 2027

 Online

 € 975 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainer:



Manufacturing glass is a meticulous process, and ensuring its durability is crucial. Strengthening techniques like annealing and tempering play a vital role, ensuring that glass products, from bottles to architectural glass, withstand pressure and break safely. This course provides the essential insights to master these processes and optimize the mechanical properties of glass for critical applications.

Attend if you are interested in:

- Glass composition (soda-lime, borosilicate, crystal) and atomic structure
- Structural relation to Young's modulus and thermal expansion
- Glass surface conditions
- Thermal shock resistance
- Relaxing stress: annealing
- Tailoring stress: heat strengthening and tempering
- Special glasses and chemical tempering

What you take away:

- Understand why various glass types have different characteristics
- Recognize the significance of protecting the surface of glass
- Estimate a glass product's thermal shock resistance
- Calculate a theoretical annealing schedule for optimal glass relaxation
- Understand how tempering impacts stress and improves the mechanical resistance of glass

Register & learn more here.
www.celsian.com/academy



Float glass workshop series

From melting to forming, improve efficiency, quality and performance for float glass manufacturing.

“

*I am very satisfied with the training. I gained many practical solutions for problems in my work area. The sessions were **highly informative**.”*

hot end manager – Float glass

”

I learned many new things directly related to current challenges. The training went smoothly. Everything was well organized.”

chief operating officer – Float glass

- Introductory training
- 10 half days, 2 half days a week
- September 7 - October 7, 2027
- Online
- € 2.500 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

Your trainers:



For anyone in float glass production, gaining a high-level understanding of the melting and forming processes is crucial to improving efficiency and product quality. By focusing on real-world challenges, participants will learn how to optimize energy use, reduce defects, and enhance glass quality. This training offers actionable solutions that can be directly applied to improve furnace performance, minimize risks, and achieve measurable results.

You should attend if you are interested in:

- Float glass properties
- Raw materials and batch preparation
- Melting, fining and homogenization
- Combustion and emissions
- Furnace operation
- Energy consumption
- Interactive session on some float glass melting parameters
- Furnace operation and defects
- Float glass forming best practices
- Float bath chemistry and optimization
- Float bath related defects

What you take away:

- Understand impact of raw material properties and batch preparation
- Know how glass properties affect melting and forming
- Can manipulate key melting characteristics for glass quality and furnace efficiency
- Can optimize critical float glass forming parameters
- Controlled tin-bath chemistry
- Gained an actionable plan to address at least one of your plant challenges

Register & learn more here.
www.celsian.com/academy



Glass coloration, decoloration and color transition

Understand the art and science behind color in glass production.

“

The course was **very complete**, and the interaction between participants and the trainer was valuable. Covered the entire process and gave everyone, even those less familiar with color changes, a **clear understanding**.”

Batch and Furnace Manager – Container

“

The course **met all my expectations**, with clear explanations on redox, color, and accurate calculations for color changes. Particularly valuable for young B&F Supervisors to deepen their understanding of these critical processes.”

Director – Container

 Introductory training

 16 hours (4 half days)

 September 27 - 30, 2027

 Online

 € 1.800 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



Glass coloration is vital not only for aesthetics but also for functionality—protecting against UV and reducing infrared radiation. This course explores the science of coloration and the complexities of color transitions, covering methods to manage changes, minimize defects, and maintain consistent quality. Practical insights into transition challenges help optimize processes and improve overall glass quality.

Attend if you are interested in:

- Definition of color, colorimetry, and color spaces
- Influence of various coloring agents on glass color
- Principles and limits of glass decoloration
- Impact of redox control and reduced colors
- Color transition: calculation and limitation
- Operational parameter changes during the color change

What you take away:

- Be able to determine how conventional coloring agents influence the color of a glass and describe that color in different colorimetric units and spaces
- Understand decoloration principles and limits
- Recognize the need for redox control in colored glass manufacturing, how to check it and act on it
- Calculate simple color transitions and which operating parameters must be monitored

Register & learn more here.
www.celsian.com/academy



Electric melting of glass

Speed up your transition to lower-carbon melting with deep insight into electric heating technologies.

"The course met my expectations by explaining the full electrical system from grid to electrode. A highlight was learning what works best, what to avoid, and gaining valuable alternative perspectives."

Electrical Engineer – Insulation

"Before the training, my knowledge of electrical glass melting was limited. This comprehensive and explanatory program gave me a deeper perspective and helped me understand the principles behind electric glass melting."

Junior Researcher – Container

 Introductory training

 16 hours (4 half days)

 September 20 - 23, 2027

 Online

 € 1.800 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



Electric melting is a proven option for specialty glass and an emerging solution for decarbonizing larger-scale production. This course explains how electric systems operate, how to boost melting zones efficiently, and what's needed to integrate them into your plant setup, from power input to electrodes and control.

Attend if you are interested in:

Power & Energy

- How electricity flows from the source to the transformer to the electrode
 - Joule's law, heat transfer, and efficiency fundamentals
 - Sustainability benefits of electrical boosting
- ### System Design
- Melting zone, barrier, throat, and feeder boosting strategies
 - Electrode types, holders, cooling, and placement (in/out of furnace)

What you take away:

- Understand the key advantages of electric melting and boosting
- Know what systems and decisions affect electrical efficiency
- Be able to select appropriate equipment for your production goals
- Calculate relevant properties like resistivity and resistance
- Operate and troubleshoot electric systems more confidently

Register & learn more here.
www.celsian.com/academy



Burners, Combustion, NOx emissions & Introductory Combustion Decarbonization

Optimizing energy use and reducing emissions in glass production.



“

I really enjoyed the *interactive training* with group brainstorming sessions and instructor-directed questions. ”

Batch and Furnace Manager – Tableware

“

The course provided an *excellent* overview of available combustion technologies and how they can be applied effectively in glass manufacturing.”

Research engineer – supplier

 Introductory training

 16 hours (4 half days)

 November 1 - 4, 2027

 Online

 € 1.800 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



The use of fossil fuels in glass furnaces significantly impacts energy consumption and emissions. This course covers the combustion mechanisms and burner types that influence heat transfer and the production of harmful emissions like NOx. Strategies to reduce emissions will be explored using both primary (process-integrated) and secondary (end-of-pipe) techniques. A new section will focus on decarbonization, covering the role of biogas, biofuels, and hydrogen combustion.

Attend if you are interested in:

- Combustion mechanisms
- Emissions sources and legislation
- Glass furnace energy balance
- Radiation and heat transfer
- NOx formation
- Burner types
- Staged combustion
- Carry-over and evaporation
- Impact of combustion on redox
- Combustion monitoring & control
- Abatement technologies
- Introduction to decarbonization
- Biogas and Bio fuels
- Hydrogen combustion

What you take away:

- Recognize the mutual connection between batch components and the combustion atmosphere on the one hand, and glass quality and furnace lifetime on the other
- Know how to calculate industrially reasonable emission limits for various glass and furnace types
- Gain familiarity with emissions-reducing measures
- Identify the sources of emissions and develop mitigation strategies

Register & learn more here.
www.celsian.com/academy



Heat transfer in glass melting furnaces

Improve furnace performance through heat transfer insights.

Understanding heat transfer is vital for optimizing glass melting and ensuring high-quality results. This course explores heat transfer mechanisms in the combustion space, batch blanket, and glass melt, with focus on how redox state and coloring ions affect radiative transfer. Emerging technologies like hydrogen combustion and electric melting are also addressed, showing their impact on furnace performance, energy efficiency, and sustainable production.

 Introductory training

 8 hours (2 half days)

 October 19 - 20, 2027

 Online

 € 975 per participant (excl. tax and duties).
The 6th participant from the same company joins **free**.

 Your trainers:



Attend if you are interested in:

- Heat transfer in the combustion space
 - Flame emissivity
 - Effect of soot
 - Hydrogen-rich flames
- Heat penetration in batch
 - In combustion furnaces
 - In electric cold-top furnaces
 - Effect of cullet type and content
- Heat transfer in the glass melt
 - Radiative heat transfer using a new model for predicting thermal radiation conductivity
 - Convection in melting tanks

What you take away:

- Can estimate the impact of the nature and preparation of raw materials on the heat penetration in the batch blanket
- Assess the effect of glass chemistry, color and redox on radiative heat transfer in the glass melt
- Evaluate the effects of furnace design on convective heat transfer

Register & learn more here.
www.celsian.com/academy



Meet your trainers



Corinne Claireaux

Earned her Ph.D. from the Sorbonne University in Paris in 2014 after studying glass and materials chemistry in Rennes. She developed innovative glass formulations for different businesses and products (float, glass wool, glass-ceramics) as an R&D project leader for Saint-Gobain and was an internal trainer. She joined CelSian in 2019 as a glass scientist.



Johan Lotter

Completed a master's program in chemical engineering at the University of the Witwatersrand. He was a technical department manager in two plants, a furnace engineer, and a technical expert at PFG Building Glass. He gained plenty of experience in melting, defect analysis, raw materials, and the float process. Currently employed at CelSian as a trainer and float glass process specialist, overseeing operations.

Aled Meulenbroek

Completed his master's in applied physics in 2019, followed by a Ph.D. in mechanical engineering at Power & Flow, focusing on clean and efficient combustion and process technology. His research explored electrolytic hydrogen bubble production using CFD simulations, alongside projects in electrolysis, convective heat transfer, and Marangoni flow. He also engaged with fluid dynamics topics, including Poiseuille flow, convective heat transfer, and turbulence. In 2024, Aled joined CelSian as a CFD engineer and trainer, applying his expertise to glass technology.



Cristian Hernández

Obtained a degree in materials engineering from the University of Antioquia, Colombia, and graduated from the University of São Paulo with a master's degree in metallurgical and materials science. He spent eight years at OI as a glass science engineer, helping several South American plants with color changes, glass quality issues, furnace and batch house ramp-ups, standardization of raw materials, and implementation of new ones. He is a project leader for CelSian and is a technical advisor for the industry.



Oscar Verheijen

He earned his Ph.D. from Eindhoven Technical University before working as a business development manager and R&D project manager for sustainable technologies at TNO. He is currently in charge of CelSian's laboratory services and is heading the glass industry's R&D efforts. Oscar also serves as the chairman of GlassTrend, is a member of the Dutch Glass Association's (VNG) steering committee, the secretary of the NCNG's technical committee, and a VNG representative in Europe.

Katelyn Kirchner

Earned her Ph.D. in Materials Science and Engineering from the Pennsylvania State University, USA. She holds two collegiate-level Teaching Certifications and is a certified online and in-person professor. In addition to her 4 years of experience teaching, Katelyn brings 8 years of experience investigating structure-property-performance relationships in glass. Her expertise centers around glass structure, statistical mechanics of glass forming, and the physics of critical atomic glass behaviors, including glass viscosity, relaxation, crystallization, crack propagation, and heat transfer.



Scott Cooper

Joined CelSian in 2023 to lead a strategic US expansion. He brings with him over 11 years of glass technology industry experience. Scott has overseen multinational teams that supported operations and R&D concerning the formulation, characteristics, and melting of glass. In addition to his Ph.D. in materials science, he has been awarded thirteen US patents.

Meet your trainers



Sjoerd Stelwagen

Attended the Eindhoven University of Technology to study chemical engineering. He began working in Ardagh Glass's furnace department in Dongen, the Netherlands, as a Technical Specialist right after finishing his studies. He advanced to the Batch and Furnace Manager position and subsequently the Benelux plants' EHS manager. He joined CelSian in 2021 as a project manager and trainer, bringing over 16 years of practical experience in glassmaking.

Christian Rübiger

Studied process engineering at the Technical University of Freiberg, focusing on glass, ceramics, and building materials. Worked in Sorg's technology department for 8 years, designing, modeling, and optimizing several glass furnaces to improve energy demand and production quality. Then moved to Swarco for four years, where his responsibilities included planning furnace reconstructions and new builds, R&D, and project management. In 2023, he joined CelSian as technical director for the EU region.



Arca İyiel

Studied metallurgical and materials engineering in Ankara (Middle East Technical University) and obtained her Ph.D. from Istanbul Technical University in 2009. She worked as a furnace designer and glass properties manager for Şişecam, improving, trouble-shooting or developing new glass formulations for different businesses and products (float, container, glassware, e-glass and technological glasses). She joined CelSian as laboratory manager, furnace operations and trainer in 2024.



Jeff Watts

Attended Ohio State University, majoring in ceramic engineering. Worked at PPG Industries as a production engineer. At Anchor Hocking, he researched raw materials to improve glass quality and reduce costs. Spent 18 years at O-I, starting as a senior global furnace operations engineer. He was promoted to global furnace operations leader and later to corporate furnace discipline leader. In this role, he led an international team and oversaw developing and implementing a global standard for furnace operations. In 2024, he joined CelSian as operations project leader.



Marco van Kersbergen

He studied Chemical Engineering at the HTS Eindhoven and joined CelSian in 1993. Over more than three decades, he has specialized in glass furnace measurements, emissions monitoring, and the development of advanced laboratory facilities that replicate industrial glass melting conditions. Marco supports glass manufacturers worldwide through research projects, plant measurements, and process optimization activities. He is also an active member of ICG TC-13, contributing to international knowledge development on emissions from glass furnaces, measurement methods, and flue gas cleaning technologies.



Eugenia Cruz

She earned her Chemical Engineering degree from the Universidad Tecnológica Nacional in Buenos Aires before pursuing postgraduate studies in Geology and Nanomaterials. She built a strong industrial background at VASA. (NSG/Saint-Gobain), where she worked in various technical and operational leadership positions, including Raw Materials and Batch Manager. She subsequently conducted Ph.D. research at the Glass and Ceramic Institute (CSIC) in Spain on innovative nano-glass-ceramic materials. The following 3 years she came back to the industry as Batch and Furnace Manager for OI at Spanish and French container plants. María Eugenia joined CelSian in 2026 as a glass scientist, combining hands-on manufacturing expertise with advanced research capabilities.



Eric Muskovin

He earned his B.S. in Ceramic Engineering and M.S. in Materials Science and Engineering from the Missouri University of Science and Technology in 2018. After working as a Batch & Furnace Engineer in glass manufacturing, he moved into R&D as a Glass Scientist. By combining industrial production experience with scientific expertise, Eric helps bridge the gap between glass science and manufacturing practice. He joined CelSian as a glass scientist and supports customers worldwide with process optimization, troubleshooting, and applied research.





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