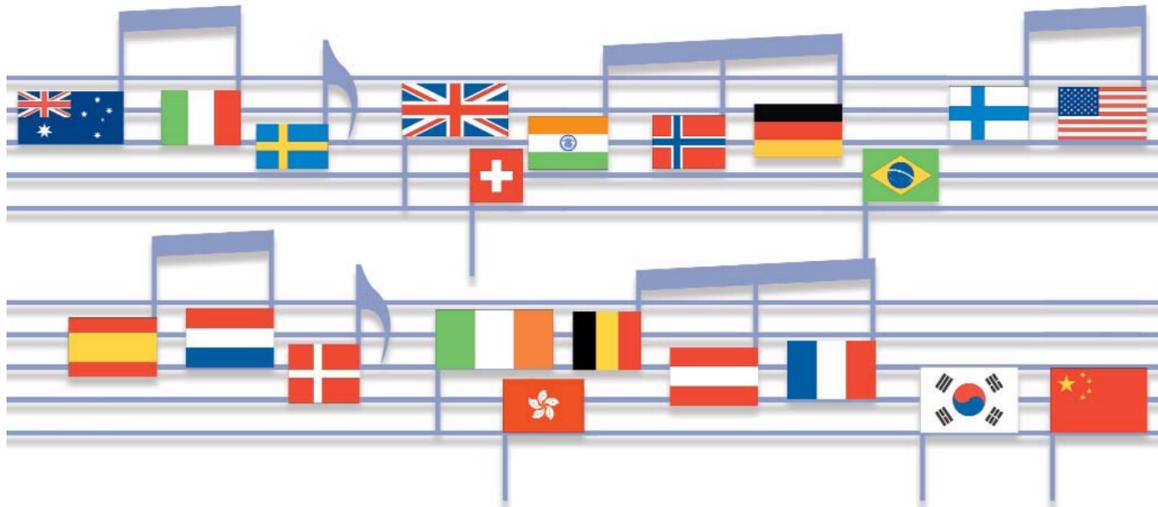


Eurotherm: International sales and service

Understanding and providing local support is a key part of Eurotherm's business. Complementing worldwide Eurotherm offices are a whole range of partners and a comprehensive technical support team... a soothing melody to ensure you get a service you will want to go back to.



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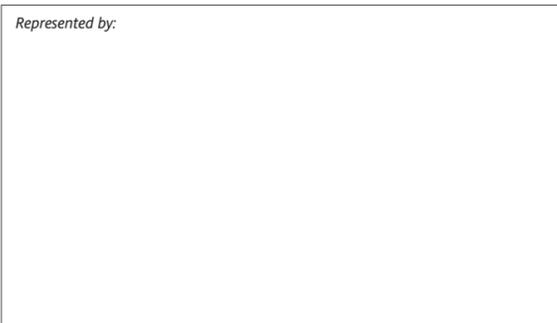
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Eurotherm is also represented in the following countries:

Algeria	Mali
Azerbaijan	Mexico
Bahrain	New Zealand
Bangladesh	Niger
Benin	Nigeria
Bosnia and Herzegovina	Oman
Bulgaria	Pakistan
Burkina Faso	Philippines
Cameroon	Poland
Canada	Puerto Rico
Czech Republic	Qatar
Egypt	Romania
Georgia	Russia
Greece	Saudi Arabia
Guinea-Conakry	Serbia and Montenegro
Hungary	Singapore
Indonesia	Slovak Republic
Iran	Slovenia
Iraq	South Africa
Israel	Sri Lanka
Ivory Coast	Thailand
Japan	Togo
Kazakhstan	Tunisia
Kenya	Turkey
Kuwait	Turkmenistan
Latvia	UAE
Lithuania	Ukraine
Malaysia	Uzbekistan

ED48
Represented by:



EUROTHERM FLEXIBLE SOLUTIONS

GLASS

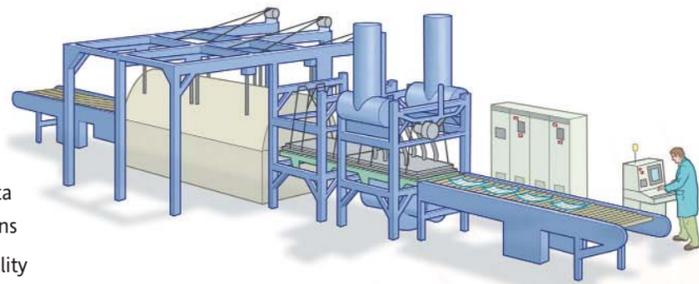
LEADING THE WAY
IN GLASS SOLUTIONS



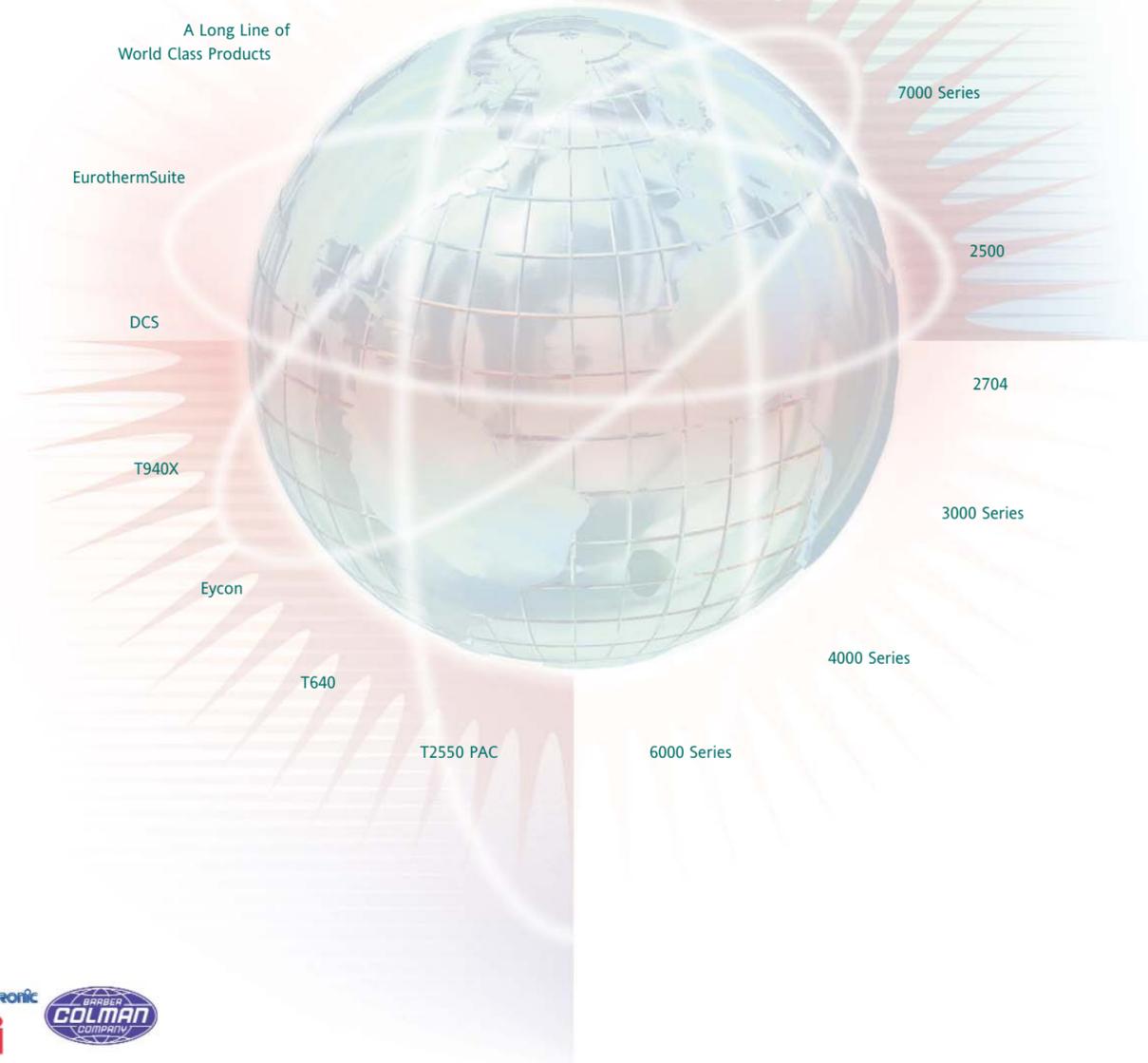
Confidence in our applications knowledge: we know how!

Why Eurotherm?

- Global expertise and experience in providing solutions within every major Glass manufacturing sector
- Proven track record in rapidly delivering solutions with optimum return on investment
- More than 40 years experience in control, data management and scalable automation solutions
- Cost-effective solutions to improve the reliability and efficiency of your processes, and the quality of your product
- Proven experience in working and integrating with multiple suppliers and platforms
- Specialist teams, deployed globally, with comprehensive experience in Glass systems
- Insulation
- Local spares supply and service support
- A team to work with your team, a partnership for success



A Long Line of World Class Products



Confidence in our applications knowledge

The Eurotherm Glass Team understands your plant and the business challenges you face day to day. We provide engineered solutions for plant automation throughout the world. Our hardware and software expertise can provide you with a solution to match your manufacturing requirements. Our solutions save energy, reduce gas emissions and maximise efficiency, productivity and ultimately your return on investment.

Experienced and dedicated, the Glass Team specialists are experienced in all majors sectors of the Glass industry:

- Float process
- Container glass
- Fibre glass
- Tubes/Bulbs
- Optical/Scientific
- Insulation
- Other special types

Confidence in measured value for your money

The Eurotherm Glass Team are committed to developing products and solutions to minimise plant operating costs, while maximising productivity and quality.

- Consultancy services to ensure you get exactly what you need.
- Global and plant wide consistency – re-using engineering to minimise costs.
- Scalable solutions – from full plant automation to a single loop
- Rapid installation during critical hot or cold rebuilds
- Reduced costly energy usage though advanced monitoring, fuel switching systems, oxygen/gas control and oxygen/fuel control
- Reduced labour costs and Standard Operating Procedures (SOPs) through automation
- Lifetime service level agreements to protect your investment.
- A complete range of services designed to provide you with the best value from your system –
 - System development
 - Installation
 - Commissioning
 - Calibration
 - Spares management
 - Technical support

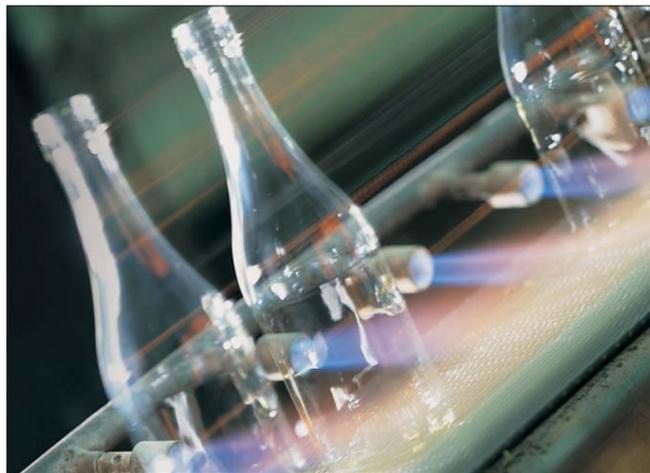
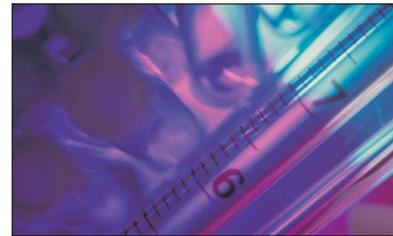


Glass solutions to ensure quality and lower production costs

Eurotherm provide engineered solutions for glass plant automation throughout the world. Our hardware and software expertise can provide you with a solution to match your manufacturing requirements and maximise efficiency, productivity and ultimately your return on investment. Our world-class accuracy of control also reduces gas emissions to save both money and the environment.

Eurotherm Glass team can provide you with:

- Automation and application expertise and experience
- World-class accuracy of control
- Global deployment, local support
- Delivery of proven solutions
- Scalable solutions – from single loop to full plant automation
- Rapid installation, during critical cold rebuilds



What does this mean to your production

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Rapid return on investment ■ Lower manufacturing costs ■ Reduced labour costs and SOPs through automation ■ Improved plant throughput with system redundancy options ■ Reduced cycle times and improved asset utilisation ■ Tighter tolerances to improve product quality and consistency | <ul style="list-style-type: none"> ■ Maximised efficiency and minimised production waste and interruption ■ Reduced costly energy usage, through advanced monitoring and fuel switching systems ■ Better combustion control ■ Improved reversal control ■ Oxygen/gas/fuel control to save the environment and money |
|--|--|

Full plant process support, from conception to retirement

Why Eurotherm?

- Strategic, long-term, global partner
- A complete service. A total solution
- Quality project engineering
- Specialist-level application expertise
- World-class, scalable deployment

What can Eurotherm do for you?

- Project specification assistance
- Fixed price and material/labor quotations
- Prime or sub-contract engineering
- Project management
- System and software design & integration
- Panel fabrication
- Acceptance testing
- Installation supervision and start-up
- Training and documentation
- 24/7 support



Complete Service
Application Expertise

GLASS SOLUTIONS

Energy Saving PROJECT ENGINEERING



Eurotherm Services brings the benefit of proven engineering capability, domain knowledge and control applications expertise to the support of installed equipment and the fulfilment of new project requirements. System Services delivers real value to the customer, reducing downtime, smoothing start-ups, optimizing performance, integrating functions, improving skills, and delivering turnkey projects.

Time-proven, modular, scalable control solutions

From simple loop control to information integration and plant wide DCS systems, Eurotherm can offer scalable, modular solutions to match your application and budget. As your requirements grow, new modules can be easily incorporated into your system.

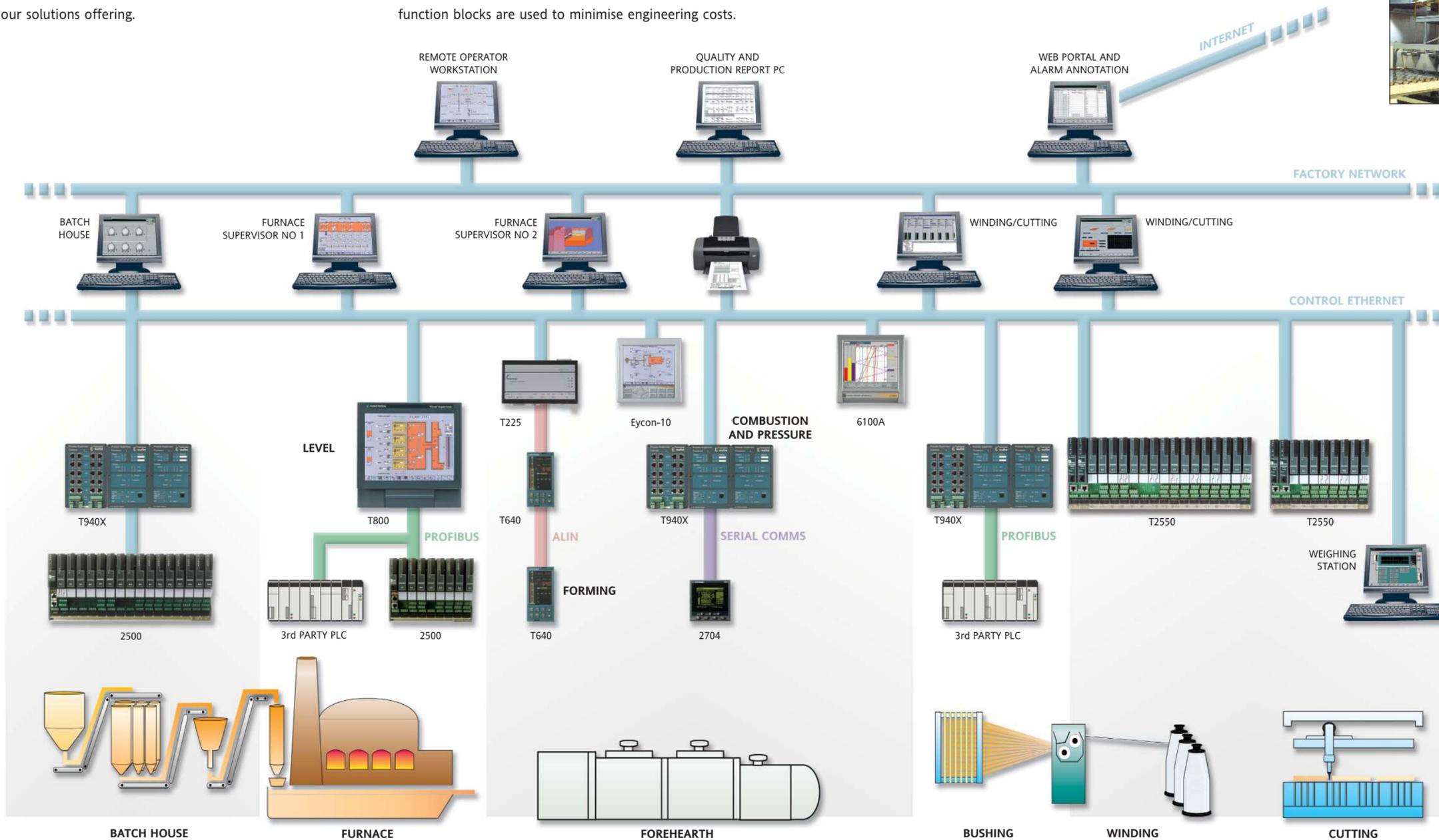
Integration is a key part of Eurotherm's offerings. Our products are designed to work on multiple communication platforms with connectivity at all levels. Where appropriate or necessary, 3rd party integration is an established part of our solutions offering.

Eurotherm's expertise in process automation, accurate control, secure data recording and visualisation can be found at every level of our systems. High availability (redundancy) is available to maximise your productivity and standard function blocks are used to minimise engineering costs.

Our aim is to provide you with the right solution for the application as part of a complete service to minimise your costs and maximise your return on investment.



CNUD-EFCO
Glass Engineering Group of BMT s.a



Strength through vast application expertise...

Batch Control

- Recipe Management
- Hopper Sequencing
- Conveyer Belt and Mixer
- Intelligent Weighing System Interface
- Control Room (DCS/PLC) Interface
- Record Archiving for Each Batch

(Recipe Will Vary by Glass Type)

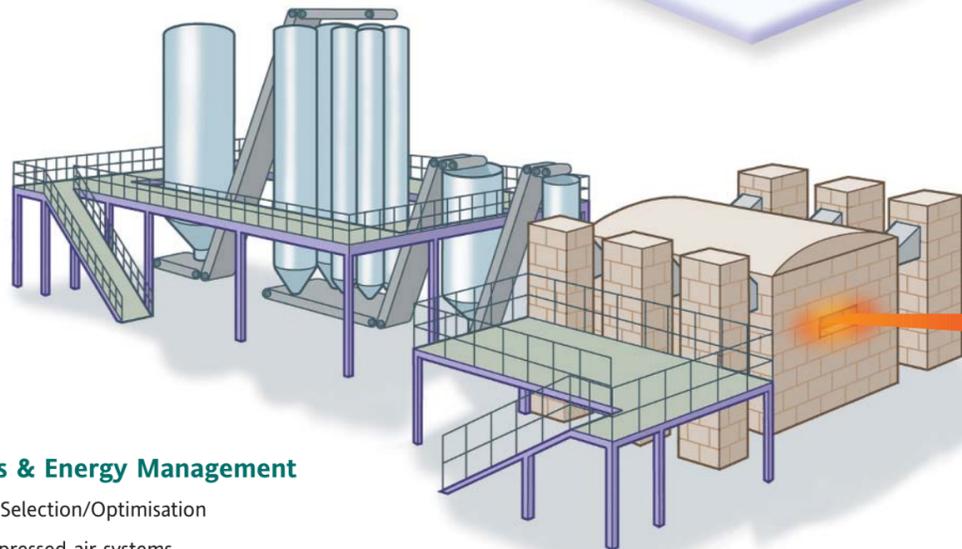
- Silica Sand -51%
- Cullet (Recycled Glass) -15%
- Soda Ash -16%
- Dolomite -13%
- Limestone -4%
- Sodium Sulphate -1%

Furnace Control

- Regeneration
- Recuperation
- Glass Melt
- Working End
- Distributor Control
- Combustion Control
- Oxygen Trim
- Furnace Pressure
- Reversal Control
- Glass Level
- Optimization
- Boosting Control
- Accurate and Repeatable Temperature Measurement

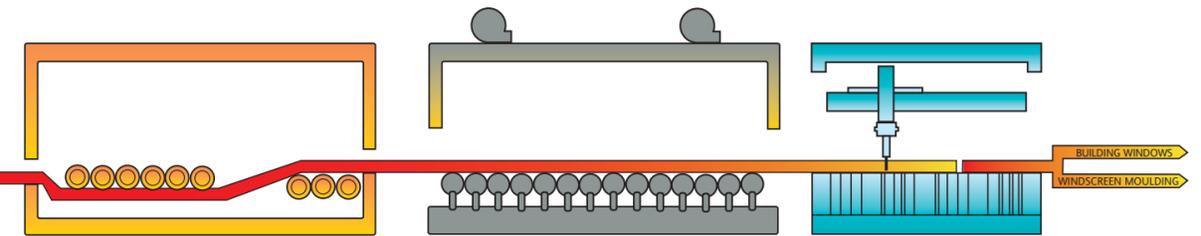
Utilities & Energy Management

- Fuel Selection/Optimisation
- Compressed air systems
- Water supply
- Energy monitoring & reporting
- Power distribution monitoring
- Emissions monitoring

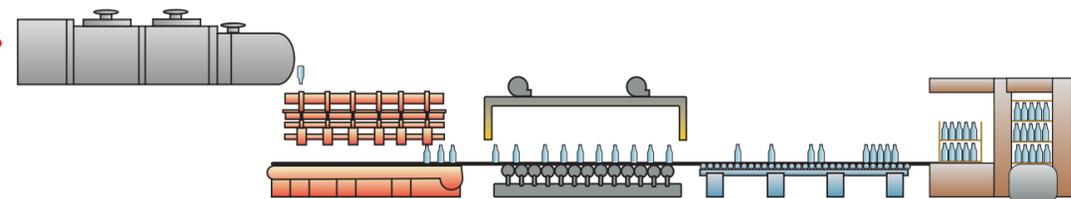


...spanning all glass types

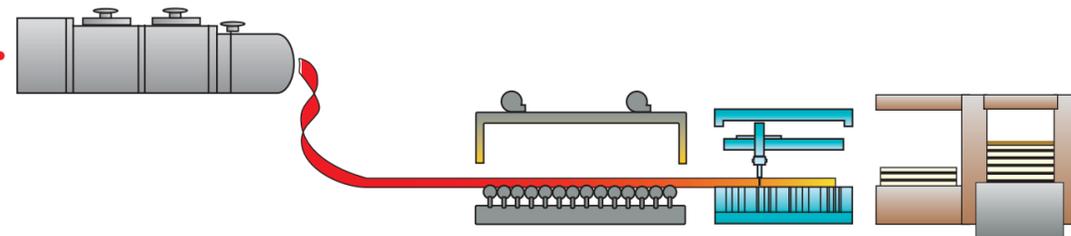
FLOAT GLASS



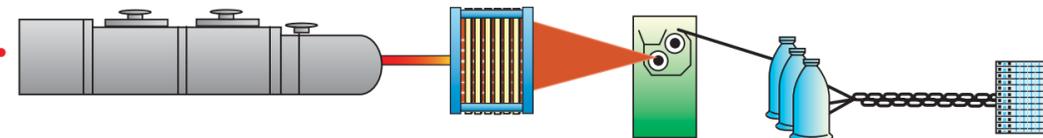
CONTAINER GLASS



TUBE GLASS



FIBRE GLASS



Strength through wide-ranging application experience

Our range of application experience could help you to increase productivity and lower costs. All of our solutions into the Glass industry are flexible and scalable to suit the process exactly.

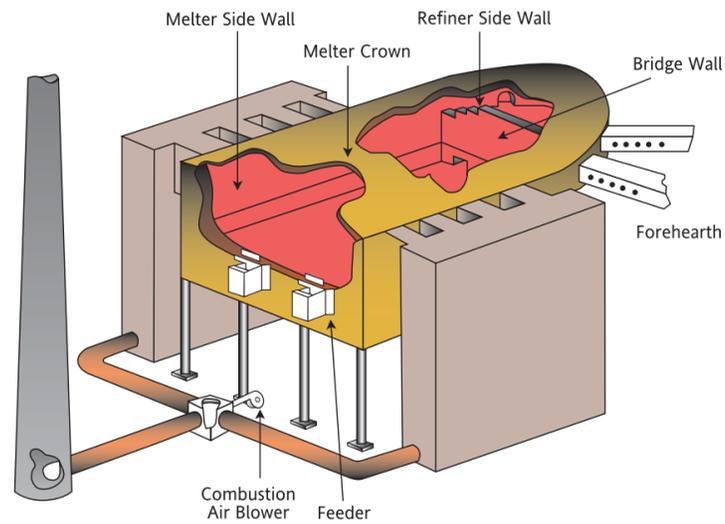


Example applications

Furnace Control

Glass manufacture requires a high level of accuracy and reliability in the control of the furnace to achieve consistent glass quality, to avoid energy losses and to keep emissions within legislated boundaries. Reliability is particularly important at critical stages in the process such as the Furnace Reversal. Eurotherm's T2550 PAC is designed with integral redundancy and is synchronised to a real time clock to ensure that this process can be managed safely and efficiently.

- High availability with dual redundant processors
- World renown accuracy of control
- Continuous, precise glass level control
- Cross-limiting lead/lag combustion control
- Fuel flow/ratio control
- Oxygen trim
- Fuel switch over control

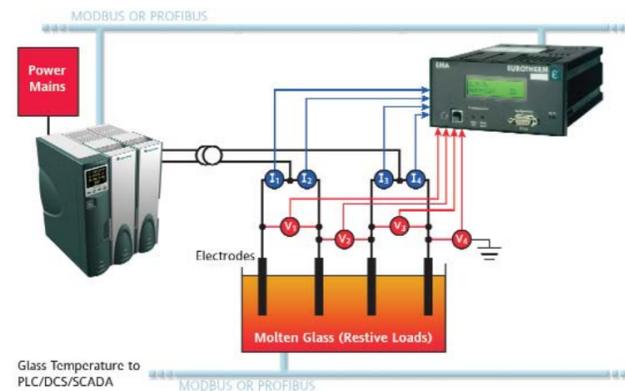


Boosting Power Control and Monitoring

Molten glass is a conductor of electricity. Passing high currents through the glass produces direct heating in the resistance presented by the glass. This heating is beneficial as it heats the 'colder' bottom glass in the furnace. This heated bottom glass rises towards the top and has a stirring effect which helps with melting and heat transfer. Boosting is often used to meet periodic fluctuations in demand or to support the pull rate of a furnace at the end of its operating life. Boosting may also help to reduce NOx emissions.

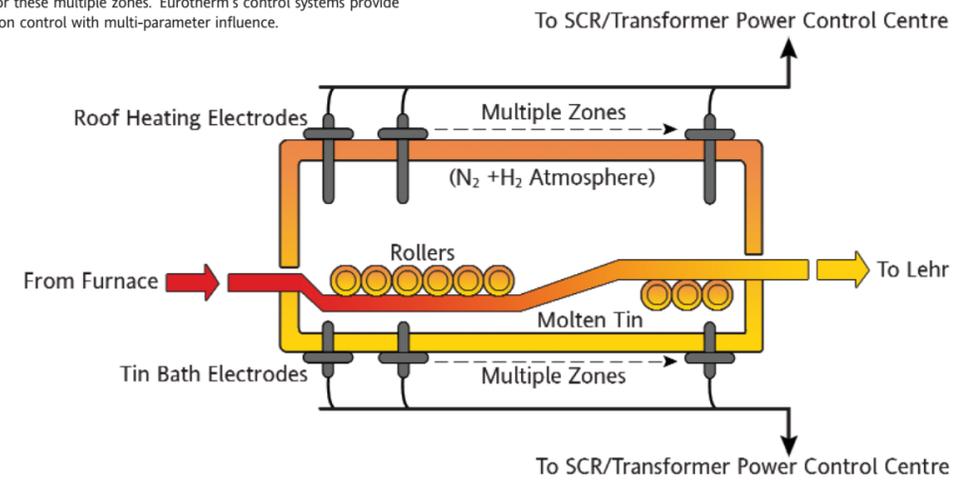
For electrical power control and monitoring in fibre glass, float glass, containers and insulation applications, Eurotherm supplies the complete systems including the electrical cabinets, power controllers and necessary transformers.

- Environment protection with electro-static filters to control particle emissions
- Controlled convection currents to promote homogeneity



Tin Bath and Roof Heating

The bath is the forming part in a flat glass production process where it is taken from the furnace spout at 1100°C and leaves the bath at 600°C when it is solid. While in the bath the glass travels through heating, fire polishing and cooling zones. Modern flat glass systems require precise temperature control for these multiple zones. Eurotherm's control systems provide combustion control with multi-parameter influence.



Annealing Lehr

Glass enters the annealing lehr at about 600°C, at which temperature it can support its own weight but still has many internal stresses. Annealing lehrs have several temperature control zones through which the glass is warmed and cooled. These must be properly monitored and controlled for consistency and quality of the glass. This cooling process is critical for the maximum yield of finished glass.



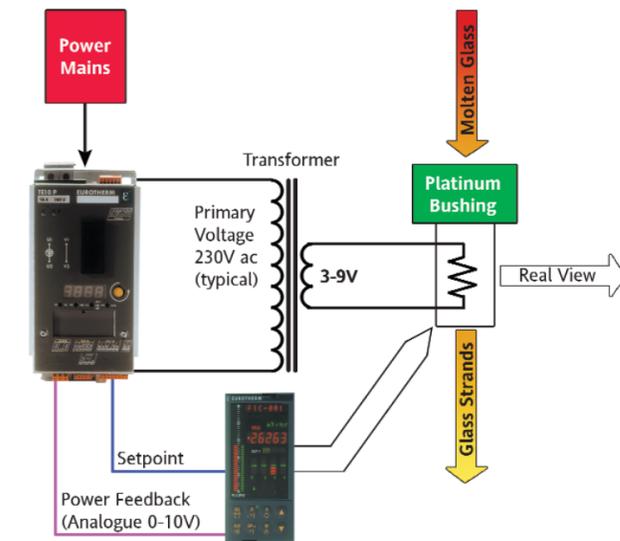
- Multi-zone temperature control
- Easy monitoring with local and central HMI solutions
- Heat-cool
- Speed control
- Setpoint changes and control stability to 0.5°C in a range of 0-2000°C

Bushing Temperature Control

Glass fibre manufacture requires a high level of accuracy and reliability to achieve a consistent quality in the fibre produced.

Eurotherm's bushing temperature control application has been specifically designed to control temperature cycling in glass fibre manufacture and has been shown to bring:

- Increased efficiency
- Improved recovery time
- Increased availability and productivity
- Setpoint depression and ramping – allowing control of the temperature profile during a production cycle
- 'Cold bushing' protection – preventing thermal shock to the bushings in the event of operational or mechanical failure
- Better than 1°C resolution
- Operation with one or two thermocouples – efficient implementation in complex control systems requiring programmed start-up of a heat sensitive process from stand-by condition



Example applications

Electrical Motor Control

Throughout the glass industry electrical motors are used in raw material transport, in exhaust gas handling, in glass forming, in annealing, in cutting and many more applications. Speed, torque and position are critical process parameters in obtaining quality products and should be controlled with high accuracy and reliability.

For speed and motion control Eurotherm supplies the complete systems including the motors, AC DC or servo drives and electrical cabinets. Eurotherm is particularly well known for its expertise in synchronising speed and torque in multiple motor applications such as top roll control in a tin bath, or squeezing roll and unwind control in the rolled wired glass process.

- Open or closed loop vector control
- Wind/unwind control
- Speed or torque synchronisation
- Top roll control
- Squeezing roll control
- Conveyor control
- Cooling fan control

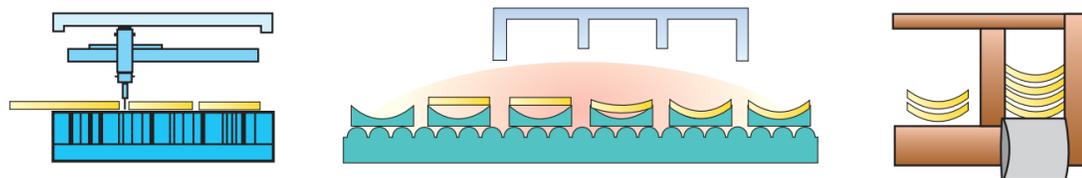


Windscreen Forming

Windscreens are formed by feeding flat sheets of glass through a tunnel furnace. Each sheet is carried by a very precise mould. The temperature rise will soften the glass and gravity will let the glass take the form of the mould. The tunnel furnace has a temperature controlled pre-heating zone and an electrical power controlled forming zone. The thermal energy from metallic resistor elements or from medium wave infra-red elements is transferred to the screen in a combination of air-heating and infra-red emission. The forming zone has always been divided in hundreds of sub-zones. With the car industry demanding more and more tightly banded tolerances and introducing more complicated forms and shapes such as top roofs the number of sub-zones is increasing rapidly.

Complete Eurotherm temperature control, power control and supervisory systems for windscreen forming are in operation world-wide

- Accurate multi-zone temperature control
- Accurate open or closed loop power control
- High packing density of power controllers to reduce cabinet and floor space
- Advanced single cycling for infra-red elements, eliminating DC components
- Power controller setpoint transfer and monitoring by digital communication, reducing the I/O requirements of the control system
- Feed through control



Environmental monitoring

In protecting our habitat the glass industry is making major contributions with the reduction of pollutant emissions to air, land and water. Monitoring of emissions is the starting point of emission reduction.

Eurotherm has over 40 years of experience in providing process and environmental monitoring systems.

- Continuous NOx, SO2, Chlorides, Fluorides etc. monitoring
- Filter pollution monitoring and automatic filter cleaning control
- Tamper proof ready data logging

Process modelling

Process modelling and simulation is becoming more and more common in process development activities or advanced furnace and feeder control. Modelling and simulation requires vast amounts of process data. Process control systems are the main data source and should therefore have an easy to implement and use interface with modelling and simulation systems.

Eurotherm Control and Monitoring Systems are known for its easy to implement and use OPC and ODBC interfaces.

- OPC Servers with tag browse facilities
- ODBC Interfaces
- Data collection in relational databases

Production of glass for the life science industry

More and more life science industry companies are forcing their suppliers to adhere to Good Manufacturing Practices. A requirement for GMP production facilities is to make use of GAMP 4 validated control and monitoring systems.

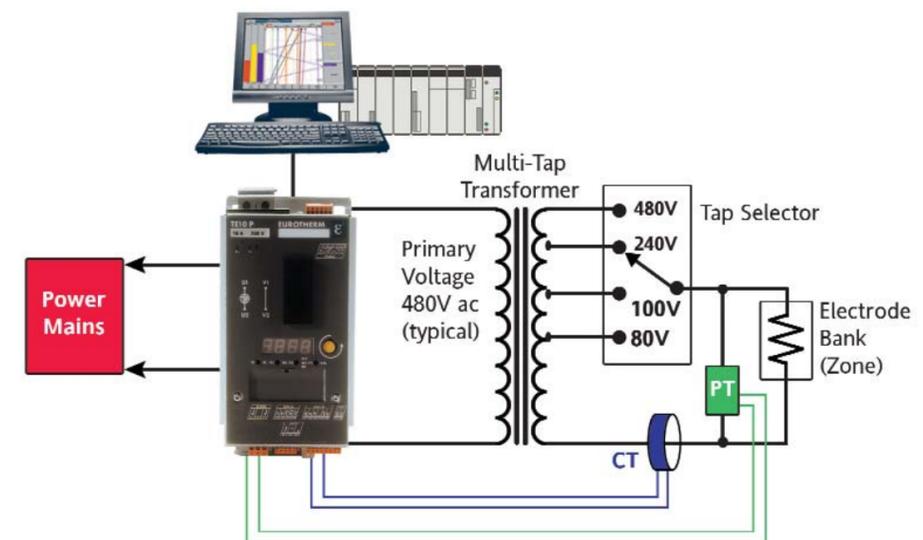
With its vast experience in the Life Science Industry Eurotherm is extremely well fitted to assist the glass industry with the complex implementation of GAMP 4 validatable systems.

Please refer to our Life Science Brochures for more detailed information on this subject.

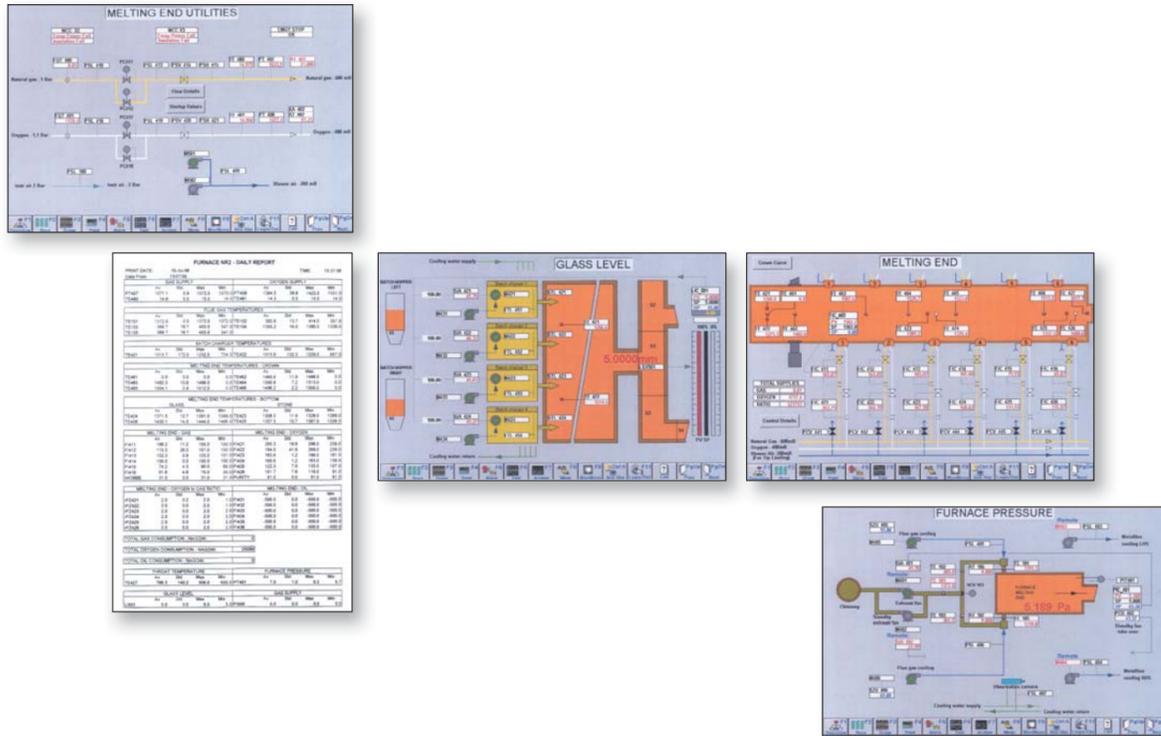


Electrode Power Control Centre (Single Zone Shown)

- Electro-static filter to control gas emissions and respect the environment



Custom control room HMIs, based on any software platform



Eurotherm Glass Solutions Expertise: Our Satisfied Customers...

- | | |
|--|--|
| ■ AGC Automotive (Belgium, Russia, Italy) | ■ Owens Illinois (France Spain, Italy) |
| ■ Arc International (France) | ■ Philips Eclairage (France) |
| ■ Bormioli Rocco (France) | ■ Philips Lighting (Holland, Poland) |
| ■ Barbosa & Almedia (Portugal) | ■ Pilkington (NSG) (Worldwide) |
| ■ CNUD (Belgium) | ■ PPG Fiberglass (USA) |
| ■ Corning (France, USA) | ■ PPG Industries (USA & Holland) |
| ■ Cristallerie d'Arc (France) | ■ Riedel Group (Germany, Austria) |
| ■ Cristalleries Baccarat (France) | ■ Rio glass (France) |
| ■ CVL (Brazil) | ■ Rockware Glass (UK) |
| ■ Demaglass (UK) | ■ Rubber Maid (France) |
| ■ E W Bowman (USA) | ■ Saint Gobain - Glass, Vetrotex, Isover, Emballage, Seva, Sekurit |
| ■ EMGO (Belgium) | ■ Sandoglass (Poland) |
| ■ Essilor (France) | ■ Schott Glass (Germany, USA) |
| ■ Eurokera (France) | ■ Shanghai Bulbs (China) |
| ■ GAF Corporation (USA) | ■ St. Georges Crystal (USA) |
| ■ Glaverbel (Asahi) (France, Belgium, India) | ■ Triplex Safety Glass (UK) |
| ■ Hankuk (Korea) | ■ United Glass Ltd (UK) |
| ■ IOF Technologies (USA) | ■ Verlipak (Belgium) |
| ■ Irish Glass (Ireland) | ■ Vertex (Czech Republic) |
| ■ Ivila (Venezuela) | ■ Vidrala (Spain) |
| ■ Keraglass (France) | ■ Vidrios Lirquen S.A (Chile) |
| ■ LibbeyOwens Ford (USA) | ■ Wheaton Tubing (USA) |
| ■ Louie Glass Company (USA) | ■ Xian Tan (China) |
| ■ Manville Sales (USA) | |
| ■ Optical Coatings (UK) | |
| ■ Owens Corning (USA) | |

