

SUCCESS STORY

1978-2025: FAMOR ENGINEERING's pioneering trajectory in tempering

Culminating in FAMOR ENGINEERING's new Business Unit for thermal tempering, which introduces state-of-the-art solutions for 2025 and beyond, the legacy of Falorni group and its specialized companies has overseen an evolution of thermal treatment within the glass industry that's marked by continuous innovation.

Beginning with early milestones for Famor Engineering, which date back to pioneering CFR developments in 1978, the company has since installed more than sixty lines worldwide over the

years - all dedicated to glass and ceramic thermal treatment.

THE FALORNI GIANFRANCO SRL HOLDING

Founded in 1958, Falorni Gianfranco Srl serves as the

holding company of the Falorni group, coordinating the activities of its operational subsidiaries and drawing on decades of technical expertise in the glass industry. It owns 100 percent of two primary companies: Falornitech Srl and Famor Engineering Srl, while also operating under the commercial brand Falorni Glass.

Falornitech Srl specializes in supplying melting technology for glass production and in designing and constructing turnkey industrial plants. Its work encompasses advanced solutions for the entire glass production process, with global reach in industrial glassworks. Famor Engineering Srl focuses on the design and manufacture of customized glass forming machines, tailored to both small- and large-scale production needs. Its technological offerings cover semi-automatic machines, automatic machines, flame polishing systems and handling and conveying equipment. These serve complete forming lines for a wide range of products, including tableware, kitchenware, stemware, lighting ware, high-voltage insulators, glass blocks, car headlight lenses and washing



machine windows. Falorni Glass, a commercial brand of Falornitech, serves small-scale manual and semi-automatic glassworks. While not a separate legal entity, it represents the group's longstanding relationship with artisanal production, with invoicing managed directly by Falornitech Srl. It is within this framework of coordinated expertise and technical specialization that

Famor Engineering has expanded into the field of thermal tempering.

FAMOR ENGINEERING'S NEW BUSINESS UNIT

The establishment of the thermal tempering division at Famor Engineering is led by Technical Advisor Rui Rolo and General Manager Renato Trotta, who bring together long-term expertise and

strategic vision. This new Business Unit is positioned to provide innovative thermal tempering lines for hollow glass articles produced via press, press-blow, or blow-blow forming processes.

THE IMPORTANCE OF THERMAL TEMPERING

Tempering is a fundamental thermal treatment that significantly



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functions. It reduces breakage during handling in catering, hospitality and domestic use; it enables glass articles to withstand sudden temperature changes; it increases the durability of colours applied during decoration; and it preserves brilliance even under the chemical action of detergents. Moreover, it minimizes losses during transport, storage and distribution. From a safety perspective, tempered glass shatters into small, blunt fragments rather than sharp shards, reducing the risk of injury.

THE TEMPERING PROCESS

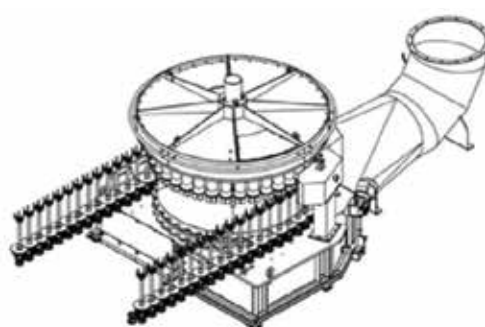
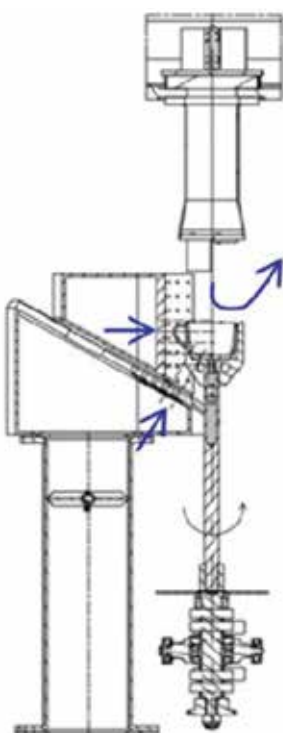
The thermal tempering process is precisely divided into three distinct phases.

In the first phase, heating and homogenization, the residual stresses from the forming process are eliminated as the glass is brought to the appropriate temperature range. The second phase introduces stresses in a controlled manner during the tempering step itself. The outer layers of the glass are rapidly cooled, contracting and creating compressive stresses on the surface, while the inner layers remain hot and expand. As the inner mass subsequently cools and contracts, it is constrained by the outer layers that have already solidified. This interaction between expansion and contraction generates a compressive state at the surface and tensile stresses inside the body of the glass.

The third phase cools the tempered article to room temperature, locking in these stresses and finalizing the transformation. This principle -cooling the outer skin faster than the internal glass wall- is at the core of Famor Engineering's tempering technology.

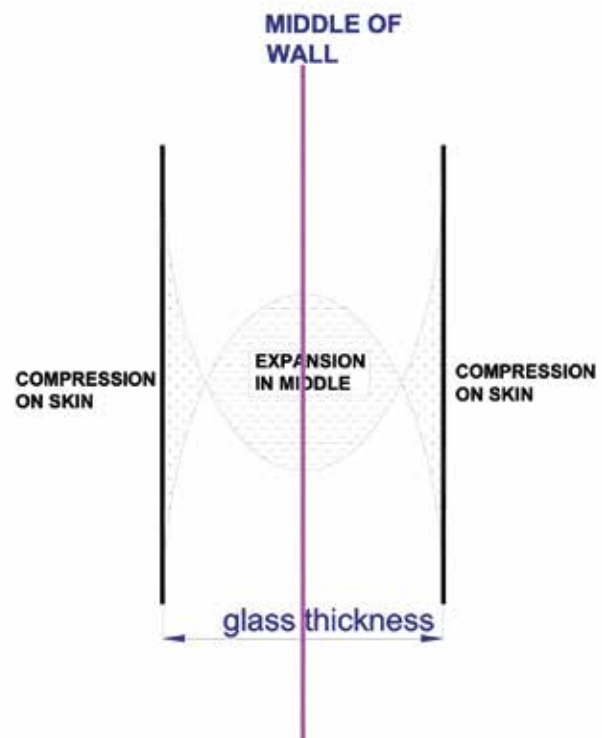
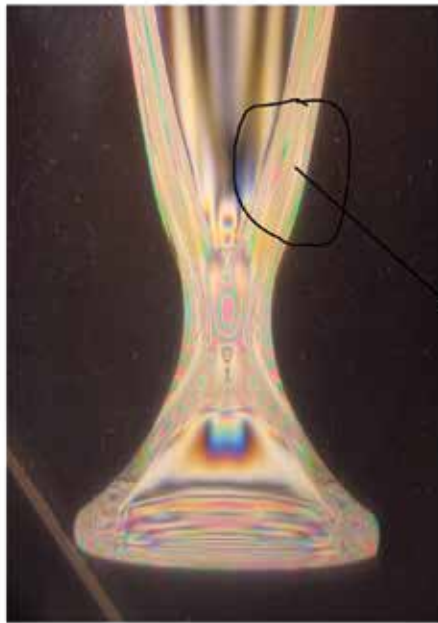
BELT- AND SPINDLE-BASED TEMPERING LINES

Famor Engineering's tempering portfolio comprises belt-based and spindle-based systems, with the choice determined by the geometry



increases the resistance of glass articles to thermal shock, mechanical impact and scratching. It is applicable to both soda-lime and borosilicate glass and it delivers crucial advantages in terms of strength, durability and safety. For hollow glassware such as tableware, cookware, ovenware, high-voltage insulators and washing machine windows, tempering serves several essential

COOLING FASTER THE SKIN THAN THE INTERNAL GLASS WALL



and stability of the articles being treated. Belt-based lines are suited to articles with large bases and stable geometries, such as dinner plates, bowls, salad bowls, fridge containers, washing machine windows and similar items. Their flatness and stability allow efficient handling across the belt during the heating and cooling cycles. The size of the belt is determined by

the dimensions of the articles and the required production rate (pcs./min). Spindle-based lines are dedicated to items with more complex geometries or reduced stability, including stemware, coffee and tea cups, ice-cream cups, beer mugs, tumblers, glass insulators and deep-drawn shapes. These lines can operate either on-line -loading articles directly after forming

while still hot- or off-line, with articles tempered after annealing and decoration at ambient temperature. A distinctive innovation developed by Famor Engineering for spindle tempering is a rotating machine system, in which air is directed simultaneously from the top, sides and bottom while articles rotate continuously. This ensures uniform cooling and stress distribution even in challenging geometries, leading to superior tempering quality.



RIM TEMPERING

In addition to full-body tempering, Famor Engineering also provides solutions for partial tempering - most notably rim tempering. This process strengthens only the rim or lid of an article, leaving the remainder untreated. Rim tempering is particularly valuable when full tempering is unnecessary or undesirable, but additional reinforcement is required in localized areas - such as drinking glasses or cookware lids.

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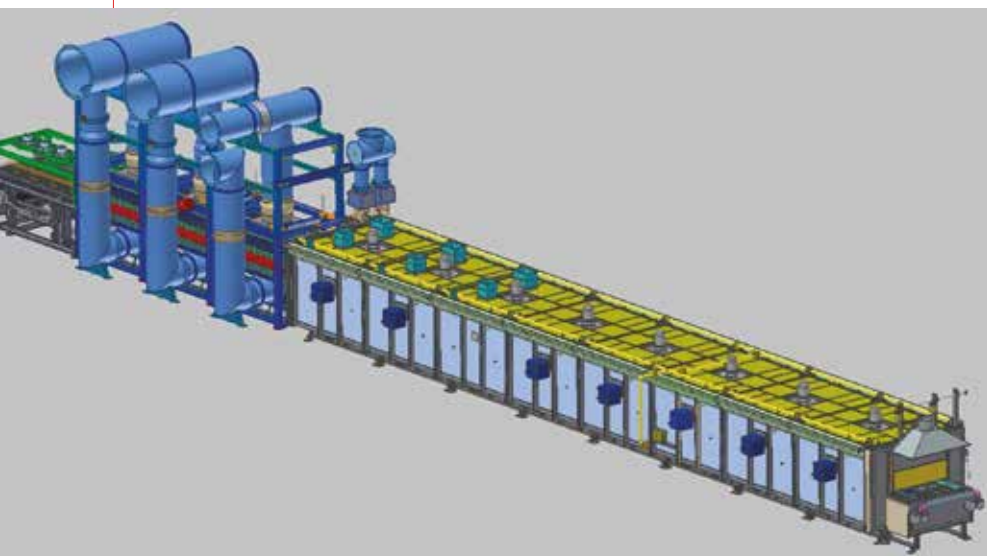


OUTLOOK

The development of Famor Engineering's thermal tempering division demonstrates the company's commitment to technical innovation within the glass industry. By integrating decades of expertise in

forming machines with advanced thermal treatment solutions, Famor Engineering provides its customers with new possibilities for durability, safety and production efficiency. From pioneering CFR developments back in 1978 to the launch

of innovative 2025 tempering lines, the group has consistently advanced the science of glass thermal treatment. Today, with belt and spindle tempering systems, rotating air-flow technology and rim tempering capabilities, Famor Engineering is positioned as a reference point for the future of thermal treatment in hollow glass production. ■



FAMOR
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