FOREL 45 years of passion and innovation

45 years of passion, ideas, successes, discoveries and relationships. This is the milestone reached this year by Forel, a brand worldwide known brand of glass machinery business, famous for its innovative technology and for a philosophy based on listening to the customer and on resourcefulness.

Forel was established in 1976 and is specialized in the manufacturing of flat glass and IG processing machinery. The company has two production plants in the of Treviso and Venice areas of north-east Italy, covering more than 30,000 square meters, and employing a total of approximately 250 people.

Continuous and important investments in R&D, a direct consequence of Forel's attention to customers, make the brand a 'supplier of competitiveness', for its ability to carry out highly innovative projects, anticipating market trends. This same attention to customers can also be seen in the company's after-sales service, entrusted to a Service Department capable of pro-

Vertical cutting line for laminated glass

viding quick and effective responses to the need for technical assistance, both directly (on site) and remotely (online).
Forel's product range is organized in five machinery categories.

VERTICAL STORAGE AND CUTTING

Vertical cutting line for laminated glass – Art. VC

The main philosophy of this machine can be summarized in two words: automation and ease of use. The cutting line can be supplied with automatic glass storage with multiple racks. Each rack has a loading capacity of 12 T which allows a massive glass storage volume. The line is equipped with two cutting bridges, capable of processing laminated glass sheets with thickness up to 8 mm + 4.56 mm PVB + 8 mm, with a maximum cutting length of up to 6,000 mm. The bridges have two opposite cutting heads and two breakout bars (front and rear), to allow the opening of the cuts uniformly and along its entire length. After cutting and breakout, a special infrared lamp and blade are used to separate the glasses. Between the two cutting bridges a patented rotating section allows the rotation of the glass sheets from landscape to portrait and vice versa. Both bridges can be equipped with a device for low-E coating removal. The fully automated cutting line can be managed by a single operator.

Other machineries

The Art. VC cutting table can be combined with:
- automatic stock selector unit Art. ST, for a quick and safe handling of the sheets from the storage stations to the line by means of a shuttle;
- automatic loader Art. AL;
- tilting table Art. TT at the end of the line, to turn the glass into horizontal position.

SORTING SYSTEM

The Sorting System, an intelligent logistics solution by Forel, is all of this and more. It is, in fact, an automated glass pane management system working within the production flow and capable of linking different production departments, creating a 'buffer stock' of semi-finished items managed automatically in relation to the production program.
The Art. SS Sorting System consists of highly customizable handling modules and sorting buffers, and its modularity allows it to adapt to the specific needs of the glass factory.

The work list is loaded into the management software of the system: regardless of the order in which material reaches the sorting system, the self-acquisition function identifies and attributes a unique ID to each individual item, and associates it with the order it belongs to. The position of the single sheet can therefore be monitored at any time from a PC station, and the progress of each single order is therefore always known.
When the system receives the instruction to proceed with a specific work list, it recalls all the items associated with the list and sends them to the next processing line. In case of a change in program while processing is in progress, the current order may be put on hold and a different order started by simply entering a different order.
The advantages of the Sorting System are clear: no bottlenecks, no mistakes, and no slow downs or indecision, and clear improvements in productivity, order, flexibility and safety.

VERTICAL PROCESSING

Arrissing machine Art. EG

The vertical arrissing machines series Art. EG remove the sharp edges of the glass sheets by eliminating irregularities, assuring safe and smooth finishes.
The Art. EG significantly increase the productivity of the arrissing operations as is equipped with two operating heads capable of working simultaneously on two different sheets of glass or by synchronizing both operating heads onto one sheet of glass.
The 'self-learning' mode automatically acquires the dimensions for the square shapes, while a separate device measures the thickness of the glass being processed. During the arrissing process the double suction cups carriages secure the sheets of glass and move them forward. Depending on the sizes of the glass sheets being processed, the suction cup carriages automatically move to the correct position.
The presence of the two independent suction cup carriages allows the Art. EG to reduce processing cycle time, guaranteeing high productivity.
The Art. EG can also process different shape of glass sheets.
The arrissing machine is able to process glass thickness between 3 and 20 mm with a processing speed up to 300 mm/sec.

Edging machine Art. EM

The edging machine Art. EM, one of the most appreciated of the Forel range, is for the edge processing of monolithic and laminated glass sheets.
The machine can perform three different processing operations: arrissing, grinding, polishing. Thanks to the different technological measures used, Art. EM guarantees total stability and high processing speed during the different processes. It can also process low-E glass, without damaging the coating.
The operating head of the Art. EM edging machine is equipped with a patented system for the localized hold of the sheet.
The device consists of two self-adjusting glass-pressing wheels that rest on the glass sheet and hold it in place. The system guarantees a perfect hold, centring with respect to the tool and the absence of vibrations during processing.
Thanks to this device, Art. EM offers precise processing even when the glass sheet is not perfectly flat.
The Art.EM vertical edge processing machine is equipped with an exclusive feeler that controls the edge of the sheet locally during processing, 'guiding' the grinding wheel.
It can therefore operate in dynamic self-learning for rectangular glass, guaranteeing consistently uniform result in both arrissing and edging.
To ensure continuous a uniform result, the edging machine is equipped with a pre-setting system that controls the consumption and the approach of the tool.

Vertical Processing Line Art. EM-DM

Drilling and milling machine Art. DM

Enriched with specific features to guarantee precision and stability, the vertical drilling and milling machine Art. DM represents an irreplaceable resource, both for stand-alone use and in line with an Art. EM edging machine. The quality of processing of the glass panes depends mostly on the stability of the glass while the various tools are being used. For this reason, the Art. DM is equipped with two opposite operating heads (which are independent and equipped with an automatic tool change system, with 6+8 positions) and two exclusive suction cup systems, both patented. The first group of fixed suction cups offers a strong grip on the glass sheet, while a second group of smaller adjustable suction cups offers greater stability close to the processing tools. These suction cups can be positioned differently depending on production needs.

An additional system of suction cups can be applied directly on the rear spindle. In addition to ensuring greater stability during drilling and milling, the rear suction cup group holds the cuts and releases them into the bottom tank. Alternatively, a buffer can be set in contrast to the tool for the execution of particular processing operations. This tool can be applied both on the rear spindle and on the front spindle.

Combination EM-DM

The Art. DM vertical drilling and milling machine can work together with the Art. EM vertical edging machine (above). This configuration, by far one of Forel's most popular solutions, combines the arrissing, rough or polished edging, drilling and milling processes in a single line. As well as demonstrably improving the quality of the finished product, spreading the workload of edge processing over more machineries also over offers significantly better productivity than other solutions: indeed, while a glass sheet is being ground or polished, another one is already being drilled and another one is being washed. The line can be completed with an Art. VW vertical washing machine.

PVB LAMINATION LINE

The lamination line Art. LL has been designed and engineered specifically for the laminating of flat and tempered glass with PVB interlayers. The line is made up of the following operating zones:

• Loading area
• Washing: The washing zone features a six brushes washing machine (brushes diameter Ø 200 mm) equipped with a self-learning device for measuring the glass thickness. Low emissivity (low-E) glass is detected automatically. An antistatic bar can be fitted to the washer out-feed conveyor to prevent dust contamination of the glass surface.
• Transferring area: equipped with a suction cups system to pick up the glass sheets, with variable arrangements and glass sheets detection sensor.
• Interlayer positioning: a multiple PVB reels holder is located in a dedicated mezzanine within the clean room and is connected to line management software. The positioning station is equipped with an automatic sheet centring system that guarantees the perfect alignment of the glass in the pressing rollers.
• Heating and pressing: the pressing rollers are coned shaped in design to allows the exhaust of air from the centre of the glass out through the sides. The management of the rollers is independent of the glass thickness and is accurate in both dimension and pressure. The heating and pressing areas are made up of two temperature controlled zones and two sets of pressing rollers. Both ovens are equipped with thermo-regulated electronic resistors which work in conjunction with a forced air convection system.
• Unloading: The lamination line is equipped with a tilting table with lateral drive, with a capacity of 3,500 Kg.
• The lamination line can be supplied with an external rotary 8-station PVB magazine, with a table and semi-automatic cutter. The line is equipped with a self-diagnostic system that identifies faults with codes, descriptions and images with an additional system that allows remote assistance.

INSULATING GLASS LINES

The extensive choice of solutions of insulating glass is the pride of the Forel range. Versatile and configurable to cater for a wide variety of needs, these machines are the result of over 40 years of research and development in this sector. Boasting a host of exclusive, patented technological solutions, Forel products are a strategic choice, helping businesses

High Tech IG line with Thermoplastic Applicator


Residential IG Line

attain the highest possible productivity and process quality. Forel offers four different series of solutions for insulating glass production: Residential, High Tech, No Limits and High Speed.

Residential IG Line

The Residential IG line is mainly designed for the production of double- and triple insulating glass units, with sizes, thicknesses and conveying weight capacity suited to residential architecture. This range consists of Forel's classic offering of machines for the industrial production of insulating glass. Designed to offer Forel quality in a version focused on a specific goal: IG units in commonly-used sizes, with rigid or flexible spacer. Compact, but still with outstanding performance, this is the ideal solution for standardised production. The line is capable of working with individual glass sheets of up to 4,000 mm length and 2500 mm height, weighing up to 200 kg/linear meter. It can also process up to two chambers using up to two different sealing products.

High Tech IG line

The cornerstone of the range of Forel products for insulating glass. The result of Forel's decades of experience in this field, the High Tech range is complemented by a choice of exclusive devices and systems for working with offset panes, shaped panes and for double-, triple- and quadruple IG units. This line can process assembled glass units up to 6.000 x 3.300 mm in size, weighing up to 400 kg per linear metre (assembled panel), and up to 100 mm in thickness. Equipped with a flat plate coupling press with gas filling function (argon/krypton) and sealing machines, the High Tech line can process rigid, flexible or thermoplastic spacers and can use up to three different sealing products. Special technology allows also the management of possible curvatures of the glass sheets.

No Limits IG line

The No Limits IG line meets all requisites for the ultra large size and facade markets: capable of managing the sheet curvatures, weights and stepped units required by the extra-jumbo format, No Limits IG line goes beyond the restrictions of commercial architecture: it can process extra-Jumbo units up to 12 meters in length and 3.3 meters height, with a capacity per linear meter of up to 350 kg for single panes and 550 kg for assembled panes, with thicknesses up to 40 mm (single) and 100 mm (unit). No Limits IG Line can also assemble units with up to three chambers and is able to handle offsets up to 250 mm on the upper and lower edge and 1,000 mm on the leading and trailing side, thanks to the dynamic support of the coupled panes. Each machine that makes up the line is equipped with devices developed specifically to handle large dimensions, substantial weights and any non-planarity throughout every phase. The line can process both rigid and flexible spacer and the sealing robot can use up to three different sealing products in a continuous sealing mode, offering an astonishing productivity.

High Speed IG line

The High Speed IG line represents the speed in the insulating glass units production and allows astonishing productivity. Designed to offer extremely reduced production cycle times, the High Speed line offers its best performance in dual mode. The line indeed is equipped with a double flexible spacer applicators, with a tandem coupling press with gas filling and with two sealing robots: so High Speed IG line can process two IG unit at the same time up to 1,200 x 1,200 mm size, of double and triple glazing. This line can sustain up to 200 kg for linear meter and, if necessary, can be used also in 'single mode', processing pane up to 3,200 m x 2,000 mm size.

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