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GAME CHANGER LINE:

FORVET CHIARA 2000 MTP 8 MODULAR

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**FORVET NC WORKING CENTRE “FRANCESCA”
MODEL FC 32M 3300 MILL**





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CHIARA 2000 MTP 8 MODULAR

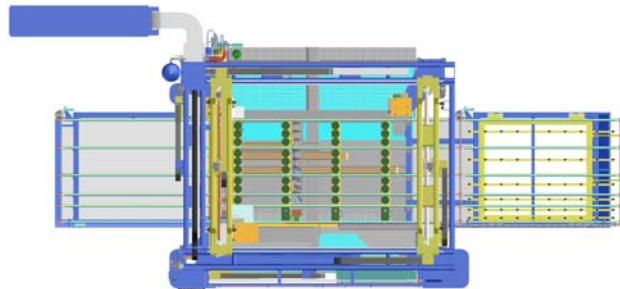
CHIARA MTP 8 MODULAR is the first machine where any kind of out-of-square glass with either 3, 4 or 5 sides can be automatically polished.

OPERATIVE FEATURES

CHIARA MTP 8 MODULAR is an automatic, numerically controlled machine capable of grinding and polishing all rectilinear glass edges. The process completes simultaneous polishing of all glass edges (patented system). Each glass side is ground / polished by an individual grinding head equipped with 8 cup wheels. The working cycle is completely automatic: the NC parameterises the approaching glass, controls the glass transport feed, adjusts for the dimensions and thickness of glass, controls wheels removal rate, feed speed and compensates for wheel wear.

MAIN FRAMES

The machine is composed of four main sections:

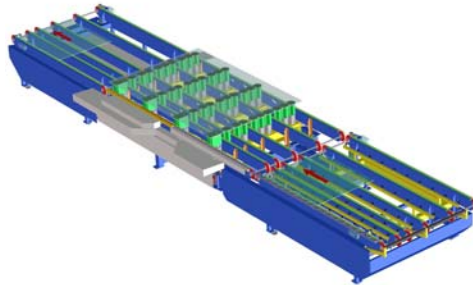


- Loading Conveyor, which moves the glass panels to the grinding area.
- Suction Cups Vacuum System Frame (patented), which automatically prepares the suction cup positions for the next glass size during the glass loading cycle.



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- Unloading Conveyor, which moves the glass panels from the grinding area.
- Overhead structure, which lays on 4 columns that are composed of 2 fixed and 2 mobile beams sustaining the 4 grinding heads. Each head has a linear movement along the beam. This motion follows the glass edge for the grinding and polishing. The combination of the interpolated movements of the head and beam allow for any out of square path, thus polishing any out of square glass.

ADDITIONAL FEATURES

- Stainless Steel Water Tanks
- Automatic Washing Cycle
- Corner Dubbing
- Software and Connections for Loading Monitor Display*
- * PC & Monitor Excluded

GRINDING HEADS

Each grinding head holds 8 grinding / polishing wheels. Two of the four heads are assembled over a fifth wheel that cope with the angles required for the glass edges. The interpolated motion between the head and beam can follow any diagonal path requested by the glass with the 8 grinding wheels parallel to the glass edge. The angle adjustment possibility of the heads grant perfect edge polish on triangles, rhomboids, pentagons, etc... On each head, each single spindle is automatically adjusted according to the glass thickness and wheel wear.

Another important feature of the machine is its ability to automatically adjust to be within tolerance upon entry of the first piece of glass into the machine after a full grinding/polishing wheel change. The avoidance of any manual adjustment offers a great advantage in saving time. A full diamond wheel change takes only a few minutes.



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The wheel composition for each head:

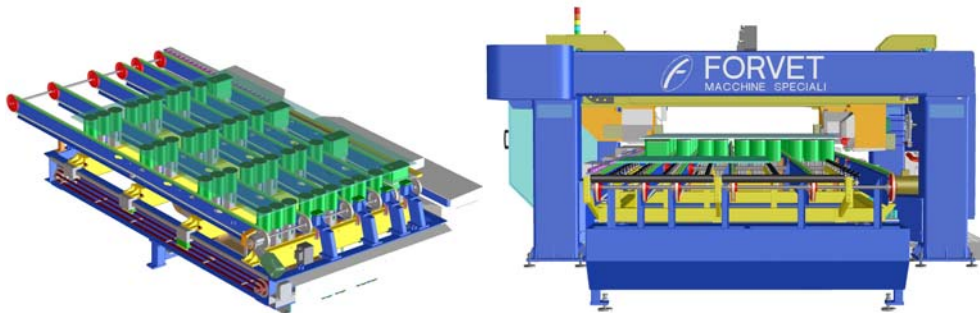
- 2 diamond wheels and 2 polishing cup wheels for the flat edge
- 2 diamond wheels and 2 polishing cup wheels for the arris
- Option for 1 wheel for corner dubbing system.

The extremely tight mechanical tolerances joined with the state-of-the-art Siemens NC controllers provide for ultra professional software programming capabilities that combine in full synergy to manage the perfect control of the angle and path that the grinding wheels will follow.

The square / rectangular finished glass produced by the **CHIARA MTP 8 MODULAR** maintains a tolerance of ± 0.2 mm/m over the two diagonals without influence from the cutting tolerance. Therefore, the **CHIARA MTP 8 MODULAR** is a machine released from the requirements of glass trimming during optimization resulting in glass squareness, thus improving optimal yield. The tolerance related to the final shape of the out of square pieces remains within 0.3mm

AUTOMATIC VACUUM SYSTEM

The automatic vacuum suction cup system is managed by the NC according to the different glass dimensions and holds the glass during the grinding process. As a result, **CHIARA MTP 8 MODULAR** is the only edge processor that can operate LOW-E glass without contacting the coated surface, regardless the type of coating.



CNC CONTROLLER

The machine NC control and the technical solutions applied make the machine extremely versatile. In fact, the machine can accept different glass sizes and thicknesses without affecting the cycle time with setting requirement in continuous sequence. All the settings necessary for the different glass are executed automatically while the glass is loaded. The



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numerical control is connected via Ethernet to a PC with an operator interface (Windows XP Professional®) manages all the machine functions.

The system includes:

- Siemens Numerical Control
- Industrial keyboard
- Personal computer

To ease sequencing glass loading, particularly the out of square ones, the shape of the glass is displayed on the machine control panel. As option, an additional monitor can be installed on the infeed conveyor to indicate the proper glass orienting.

Another advantage of the **CHIARA MTP 8 MODULAR** is the possibility to operate each side of the same piece of glass with a different kind of finish, i.e. one side polished, one side ground, one side arrises only, one side clean score, etc... The operator can choose the edge finish quality between each piece of glass without manual settings.

PROGRAMMING

Due to the well-known Microsoft Windows® software, the programming operations are easy to manage and consist of three different types: manual, sequential, on line.

- **Manual:** the operator enters the thickness and dimensions of the glass into the NC and loads the piece on the infeed conveyor.
- **Sequential:** the operator enters the sequence and the number of panels with the dimensions and thickness into the NC. Using sequential programming, each piece of glass can consist of a different dimension and thickness from the previous piece.
- **On line:** this program is similar to sequential programming except that the information is imported by an external line such as a PC connection, bar-code reader, main frame, etc...

CHIARA MTP 8 MODULAR can be the heart of a production cell: it can be placed in line with any further glass processing.

TECHNICAL DATA

Max. glass dimension:	2000 x 3000 mm
Min. glass dimension:	400 x 500 mm
Glass thickness:	3 to 19 mm
Heads achievable angles:	-45° +90°
Grinding speed:	0.5 to 10 m. /min.
Axes feed speed:	40 m/min.
Wheels rotation speed:	10,000 rpm



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TECHNICAL DATA (cont)

Square-up tolerance:	+/- 0.2 mm/m of diagonal
Air pressure:	>6 BAR
Water pressure:	4 BAR
Installed electric power:	85 Kw

MAIN ADVANTAGES

1. Process four or more out of square glass sides simultaneously
2. Size accuracy within +/-0.2mm
3. Size repeatability
4. Granted size squareness (+/-0.2mm/m)
5. On short runs, can produce up to double of a traditional double edger
6. Max glass removal 10mm on 19mm glass thickness without speed reduction
7. Independent electronically controlled spindle positioning
8. Independent electronic control of electro spindles RPM
9. Electronically controlled corner dubbing units
10. Dubbing sizes set by keyboard
11. Rust proof construction (zinc & stainless steel)
12. Automatic and centralized lubrication system
13. Fast wheel change (down to 30 min. for 32 grinding wheels)
14. Automatic, independent control and adjustment for each wheel wear
15. Does not require set up time at production change
16. Grinding operation with glass in stand still position
17. Machine parameters adjustable to match individual customer requirements
18. When grinding wheels are worn out & replaced the first piece of glass is within tolerance
19. Low power consumption
20. Low water consumption
21. Machine footprint equal to 1/3 of comparable traditional double edger (same max. glass size)
22. Remote control for arris sizes
23. Keyboards selection of glass edge finish (arris only, ground edge, polished)
24. Glass edge profile change without down time
25. Possibility to operate 4 different edge finishes on same piece of glass
26. Low e glass processing without coating contact
27. Random size sequence without set up time
28. Random thickness sequence without set up time
29. Automatic alarm detection in case incorrect glass is loaded
30. State of the art electronic technology



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MAIN ADVANTAGES (cont)

31. Interface with automatic measuring devices
32. Bar code interface
33. Remote trouble shooting
34. Network connectable
35. Does not require 90° transfer table
36. In line loading, processing, unloading
37. User friendly interface
38. Grinding machine with the higher number of international patents in the glass field
39. Cleaner environment impact

FRANCESCA FC 32M 3300

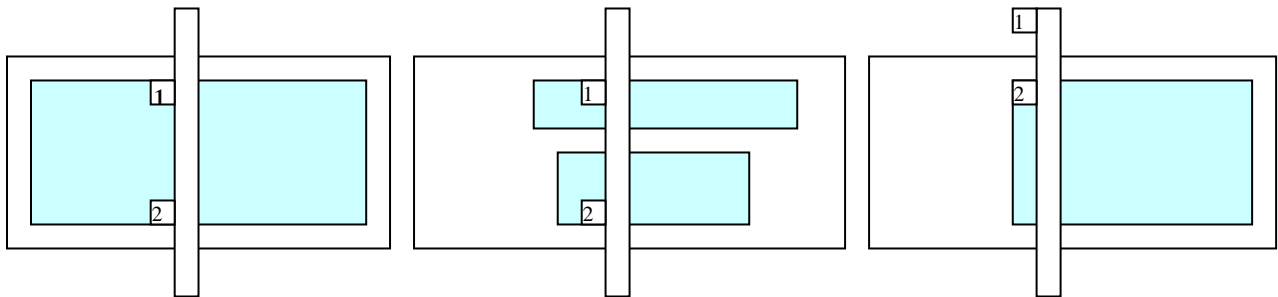
OPERATIVE FEATURE

The **FRANCESCA FC 32M 3300** is a fully Numerically Controlled (NC) glass working centre, capable of performing drilling, countersinking and milling operations on flat glass sheets, ranging in thickness from 3 to 19 mm. (25 mm. optional), including “**out of square**” pieces.

FRANCESCA FC 32M 3300 is the only NC equipment in the world that can load, work and unload **two glass panels simultaneously**, without intermediate handling.

The drilling operation is capable of drilling a maximum diameter of 65 mm. (70 mm. optional) with larger diameters achieved by the milling feature. The max. useful working field for width is 3300 mm. and without limits for length. Additionally, there is no inter-axis restriction between holes locations.

It is possible to operate on this machine either one piece of glass max. 3300x6000 mm (according to conveyor size) or two simultaneous pieces of different sizes and thickness (within 1600mm of width).



DRILLING, COUNTERSINKING AND MILLING OPERATION

The machine is equipped with **four multi-spindles rotating heads** (2 upper and 2 bottom, each one holding 8 tools) that can operate simultaneously, independently or in conjunction with each other in the full glass width so that the operator has 16+16 different tools and diameters to choose from. The working cycle is completely automatic, without any manual intervention.

The multi-spindle heads are manufactured of a light alloy material and have a particular patented method of operation. It permits the rotation of only one spindle at a time (the spindle in working position) and creates a speed of 10,000 r.p.m. without any vibration, providing the



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advantage of high processing quality and fast execution time. The **drilling** operation is simultaneously made by the upper and bottom spindles and entails completely automatic

sequences according to the glass thickness and dimension. Additionally, there is no inter-axis restriction between holes locations.

The countersinking operations, if requested, are performed in fully automatic cycle without manual operation or data input requested to the operator on all the different diameters. The NC automatically manages the desired countersinking depth, for both the upper and lower sides of the hole.

In addition to the drilling and countersinking operations, the machine is capable of milling various shape of glass, ranging in thickness up to 19 mm. It produces straight slots in the glasswork piece in either the X or Y direction, and interpolating the axes, it achieves any possible design.

In case the milling operations have to be made on two independent pieces of glass, the heads are working independently as two fully self-reliant machines (thanks to the two split, self-controlled, conveyors drive).

The milling tools can be installed regardless the position over the heads.

GLASS TRANSPORT/ HOLDING SYSTEM

FRANCESCA FC 32M 3300 holds the glass by special belts executed with integrated suction slots (patented system): this way, the glass motion during the various phases of the production process, is constantly controlled. The special belts are automatically positioned according to the glass dimension. This newly patented transport device is based on a dynamic vacuum system and grants the glass to be perfectly held by its lower surface only, allowing operations on any kind of LOW-E glass. This system also reduces the normal production cycle time of 50%.

The main entry and exit conveyors, 3500 mm. standard size (4600mm, 6000mm upon request), are equipped with special belts and lifting pivoting wheels. This double transport system allows an easy glass movement during the milling operations.



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main entry conveyor

The machine has installed on board a self lubricating system that minimizes the down time for the routine maintenance and improves the machine life, providing the lubricant to all the relevant points, in due time and quantity.

Transfer Conveyors

To increase the machine flexibility, it is advisable to consider transfer conveyors before and after the machine. The in-feed conveyor will move the glass toward the first available section of the machine and the out-feed will put the two pieces in sequence at the entry of the possible narrower washing machine.

The Francesca FC 32M 3300 is the only equipment that allows the insertion of the drilling and milling processes in automatic lines of production when it is equipped with the load - positioning - unloading as it is completely automatic. Thanks to its extreme speed and possibilities to work with two plates, it eliminates the deceleration to the grinding line of all the traditional machines.



SOFTWARE OPTION #1: CAD-CAM FORCAM

The Francesca FC model with milling uses the CD-CAM Forcam System specifically developed for glass operation. This system can automatically define every kind of complex shapes, can generate geometric profiles or it can import the geometry from other sources via a DXF interface.

The programming of the requested job can be performed in real time with the machine in operation. Alternatively, the off line programming software in the office will can do it. Other options include bar code reading or network connectivity. The user-friendly interface and a well established fully comprehensive documentation guarantee a quick learning curve and full use of the software programming capabilities.

OR

SOFTWARE OPTION #2: FOREASY CAM

The FOREASY CAM module can describe the detailed work to be done on the glass. The description of the glass starts from the definition of the glass, both rectangular and shaped, with position of holes and the eventual countersinking and milling.



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SOFTWARE OPTION #2: FOREASY CAM (cont)

The cut out (milling) can be downloaded from different sources such as:

- From the integrated notches catalogue built in the FOREASY software. The same catalogue can be expanded with imported or directly drawn notches.
- Imported from DXF prepared with any other CAD system
- Parametric shapes generated by the catalogue.

This module can be installed in the office to prepare the working programs off line or it can be installed on board the Forvet to directly create the jobs that are to be made. It is also used to describe the non-rectangular shapes for the glass grinding machine, the **CHIARA MTP8 MODULAR**.

FC32M 3300 Mill

The entire system includes:

- Numerical Control 32 Axes
- Industrial Keyboard with Track Pad Mouse
- Personal Computer with Pentium Processor (Floppy disk drive included)
- Industrial Color Monitor, TFT
- Auto CNC-PLC Diagnostic
- CAD CAM Forcam System (Windows XP®) OR FOREASY CAM
- During each productive process, the NC analyzes all of the machine's functions in real time, identifies eventual faults and defines their causes.

TECHNICAL DATA

One glass:

X axis Min. 500mm, Max. 3500mm

Y axis Min. 400mm, Max. 3300mm

Double piece:

X axis Min. 500mm, Max. 3500mm

Y axis Min. 400mm, Max. 1600mm

Glass thickness from 3 to 19 mm. (25 mm optional)

Max drilling diameter 65 mm. (70 mm. optional)



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Number of spindles 32 (8 each head)

TECHNICAL DATA (cont)

Spindles rotation speed	0-10,000 rpm
Spindles feed	0.2-3 mm/sec.
Axes positioning speed	25 m./min.
Milling speed	from 2 to 25mm/sec.
Axes positioning accuracy	+/- 0.25 mm/m.
Compressed air	> 6 BAR
Water pressure	> 2 BAR
Max Glass weight	720 kg
Installed electrical power	70 KW, 380V 50Hz
Machine weight	16,500 KG

MAIN ADVANTAGES

1. Two glasses even of different dimension and thickness are processed simultaneously
2. Positioning accuracy within +/-0,2mm
3. Great positioning repeatability
4. Glass positioned with patented dynamic vacuum belts
5. Operate either one piece up to 3300 mm wide or two pieces up to 1600 mm wide
6. Electronically controlled spindles positioning.
7. Independent electronically control motor RPM
8. Solid mechanic coupling between drill bits and motor
9. Independent heads positioning
10. Milling capability without size restrain
11. 32 tools available up to 3300mm width
12. Process of OUT OF SQUARE PIECES
13. Vacuum belts lateral positioning to optimize glass support and hold
14. Vacuum generated without pumps
15. Tools change cycle in less than 1 sec.
16. Rust proof construction (zinc & stainless steel)
17. Automatic and centralized lubrication system
18. Automatic and independent recovering of tool wearing
19. Does not require set up time at production change
20. Machine parameters adjustable to match individual customer requirements
21. Glass process change without down time
22. Low-E glass processing without coating contact
23. Random size sequence without set up time



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MAIN ADVANTAGES (cont)

24. Random thickness sequence without set up time
25. State of the art electronic technology
26. Bar code interface
27. Remote trouble shooting
28. Network connect ability
29. User friendly interface
30. The NC working machine with the higher number of international patent in the glass fields
31. Cleaner environment impact