Quotation

Date

Customer

VERTEC+MILL

Quotation Date

VERTEC+MILL is a Numerically Controlled vertical machine for working flat glass sheets rectangular and shaped. It can make holes with a max diameter of 60mm and milling of various profiles with restricted tolerance.

ADVANTAGES

CMS, thinking of its customer's needs, was the first company in the world to project and propose to the market flat glass working in vertical position. Here below is a list of the main benefits in relation to a traditional work centre and to a horizontal drilling-milling machine.

Practicability

- Considerable reduction in the dimensions of the machine as the dimensions are vertical instead of horizontal.

Flexibility

- Possibility of working sheets of various sizes, in all three dimensions;
- Possibility of working rectangular and shaped sheets (with at least one straight edge).

Productivity

- Time reduction in the setting up of the machine as the positioning and attaching of suction cups on the work top is completely eliminated, typical in a traditional work centre;
- Time elimination in tool change with the 9 positions tool crib;
- Time reduction during handling, from the moment of loading onto, and unloading from the machine, the sheet remains always in a vertical position;
- Reduction in idle production times, the working of the sheet in vertical position allows a continuous productivity flow, without manual adjustments for pieces different from each other.

Quality

- Possibility of making holes with various diameters (max. 60 mm) with edge-burring or countersinking of the edge;
- Possibility of drilling and milling both monolithic and laminated glass;
- Possibility of milling in the centre of the glass sheet;
- Possibility of making various types of profiles on the edge of the milled glass (pencil edge, flat edge, etc.);
- Possibility of working on glass treated with Low E.

Simplicity

- Intuitive programming software with integrated CAD, library of parametric shapes, syntactic and graphic helps, simplify the operator work.
- Possibility of importing .dxf shaped files of glass outline and millings profile, makes the machine programming and the work with customers/suppliers easier.
- Predisposition to bar code reader system (optional) reduce the operations on the machine.

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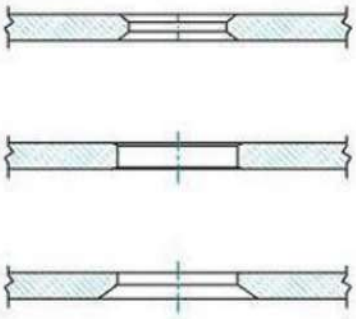
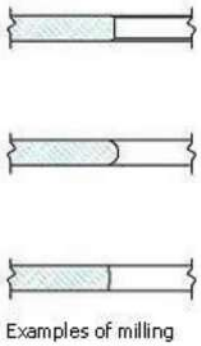
Examples of works possible



Examples of drilling



Examples of milling

STRUCTURE AND MAIN COMPONENTS

The dimensional structure was realised through a sophisticated programme of Finite element analysis (FEM), which verify also the dynamic loads of the components of the machine, allowing CMS to project the structure and chose the movement systems (precision guides and screw ball sliding blocks) which guarantee a high functioning power, geometric precision and work reliability at high speeds, also in the case of heavy works.

The bearing frame is in electro-welded thick steel, ribbed and normalized. It acts as a solid base ensuring the operating units an equilibrated stable and resistant support, with superior quality and precision performance.

To guarantee duration against corrosion the whole frame undergoes an antirust treatment with sanding, and ceramic painting.

OPERATING UNITS

The operating units are composed of two three phase asynchronous electro-spindles with 2 poles governed by static frequency converters cooled by air fan, maximum power 3,7 Kw at 6000 rpm at 50 Hz. The rotation speed of the electro-spindle can be programmed from 0-15.000 rpm and the water passage for cooling the working tool is coaxial to the electro-spindle itself.

The rotation of the spindle can be clockwise or anticlockwise on choice.

TOOL CRIB

N°2 rotating tool cribs (one for every spindle) and 9 positions managed by the NC, guarantee a high number of tools for every processing and reduce the operator's work.

The tool cribs are installed on a car fixed to the electrospindle, and have vertical pneumatic positioning activated at every tool change.

Tool cribs positioned on proximity of the electrospindle guarantee very short tool change.

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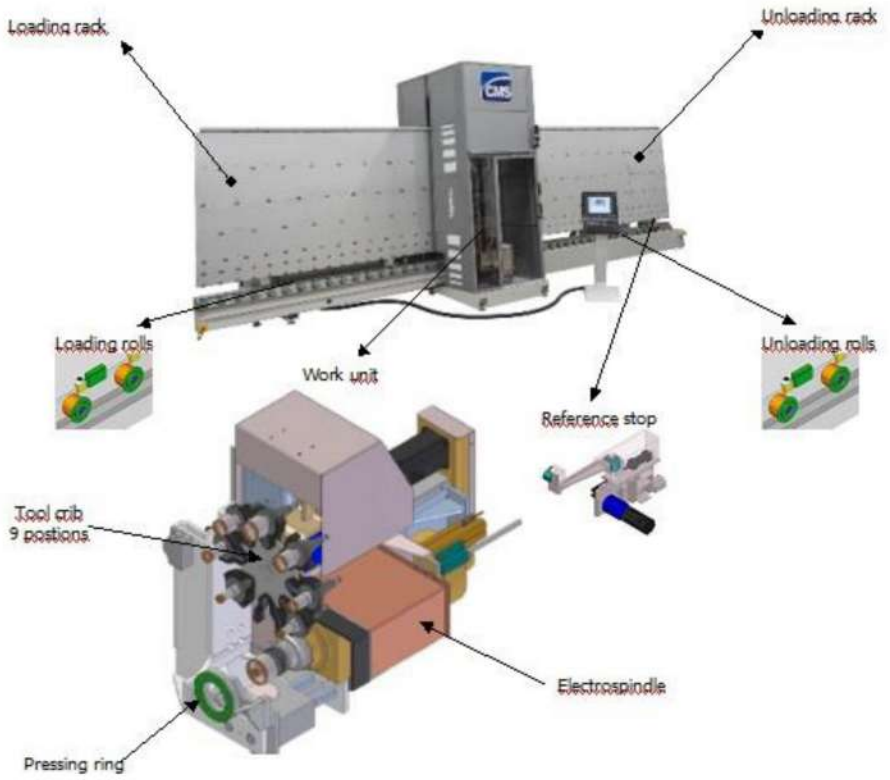
LOADING AND UNLOADING RACKS

The racks have a solid steel structure and give a stable support to the glass sheet during loading/unloading and transport.

To avoid scratches the free-running wheels, on which the back of the glass actually rests, are in teflon and, to guarantee an adequate safety on the machine, they are protected with aluminium panels.



Near to the end of the unloading rack two sensors are foreseen, the first to slow down the glass sheet and the second to stop the glass sheet.

LOADING AND UNLOADING

They are composed of a series of aligned rollers and covered with rubber. The last are:

- *Motorized:* with a chain movement to be able to transport the sheet in and out of the work area of the operating units.
- *Frictioned:* keeps the glass sheet continuously pushed against the reference stop so guaranteeing the maximum work precision.

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SUCTION CUPS GROUP

The entrance and exit suction cups groups are composed of N°3 suction cups each, installed on a support moving horizontally and with the possibility to move forward pneumatically. Each single suction cup has self-excluding function governed by the software.

The entrance suction cup group has the possibility to move itself only on the loading rack, while the exit group has the possibility of moving on the unloading rack.

CENTRALISED COMPRESSED AIR PLANT

The plant must be properly dimensioned to have air pressure of 6 bar and capacity of di 465 Nl/min.

The air is used for clamping the glass to the pressing rings, to clean the cones before tool change and for the rising/lowering of the tool crib in front of the electro-spindle.

CENTRALISED WATER PLANT

The need of clean water for the cooling of the tool is 20l/min for every operating unit at a pressure of 3bar. The refrigeration of the tool is guaranteed for:

- Passage of water coaxial to the electro-spindle (this needs clean tap water);
- Water cushion generated with a appropriate pump from the pressing rings.

LUBRICATION PLANT

Automatic computerized lubrication with forced injection for the axes *X, Y, Z, W, U, P and the vertical movement of the tool crib* governed by Numerical Control at foreseen intervals, without manual intervention and without stopping of the machine. Pressure control is indicated on a minimum level in the tank.

Safety and protections

The machine is equipped with all safety devices necessary to give the operator maximum protection during the normal running.

- The electric cables and the water pipes are supported by a cable rack chain.
- The safety pressure switch stops the machine should the compressed air be in short supply.
- A vacuum device stop the machine case of insufficient value of vacuum.
- A servo-valve stops the water flow when the machine is not working.
- Axes load limiting device prevent from working beyond the established threshold limits.
- The coverings in stainless steel and the bellows protect all moving parts against water and dust.
- Full-length frontal cover prevent access to the working area and reduces the sound level.

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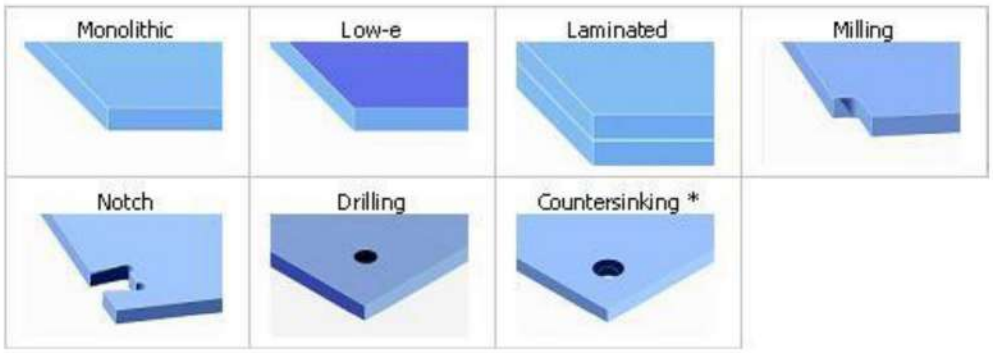
POSSIBLE PROCESSINGS



- For this processing it is required the addition of extra tools.

Quotation		Date
BASE MACHINE TECHNICAL DATA		
Inclination	degrees	5
Max. length of the glass	mm.*(inch.)*	Dependent on model
Max. height of the glass	mm.*(inch.)*	Dependent on model
Min. length of the glass(**)		420(16)
Min. height of the glass(**)		180(7)
Glass thickness(*)	mm.*(inch.)*	3÷30*(1/8÷5/4)*
Worktop	mm.*(inch.)*	535÷545 *(21 ÷21,5)*
Glass feed direction		From left to right
Max. milling length in X	mm.*(inch.)*	200*(8)*
Precision for two consecutive drills	mm.	±0,3
Precision of first drill form grinded edge	mm.	±0,3
Electro-spindle power	KW*(HP)*	3,7*(5)*
Electro-spindle rpm	Giri/min. *(rpm)*	0- 15000
Tool crib	type – n° positions	rotating - 9+9
Tools-holder /Cones		ISO 30 ½ gas
Tools diameter	mm.*(inch.)*	3÷60*(1/8÷5/2)*
Drilling bit length	mm.*(inch.)*	75*(3)*
Milling tools length	mm.*(inch.)*	*90(7/2)*
Water consumption	Lt/min.*(gal/min.)*	20+20*(5+5)*
Electro spindle internal water filter	µm	25
Min. water pressure	Bar*(PSI)*	3*(45)*
Min. air pressure	Bar*(PSI)*	6*(90)*
Air consumption	Nl/min.*(Ngal/min.)*	200*(53)*
Voltage and frequency	V – Hz.	400 – 50
Total installed power	KVA*(HP)*	25*(34)*
Medium sound level	DbA	75

(*) Max weight 150 Kg for linear meter.

(**) Milling: the minimum working size depends on the milling dimensions and on its position on the glass surface.

Note: data included in this table refers to the standard of base machine. If included, some optional will modify base data.

NOTE: the useful axis stroke indicated in the above chart are purely approximate. The machine layout (to be sent back to CMS signed for acceptance) indicates the specific useful stroke of each axis.

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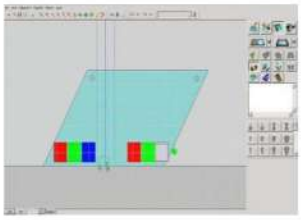
PROGRAMMING SOFTWARE EasyGlass

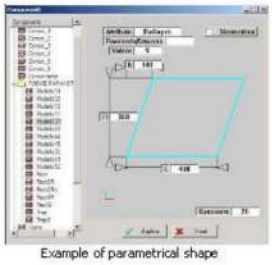


It is a CAD/CAM software package installed in a personal computer working in Windows for the generation of work programmes.

The software has syntactic aids and graphic icons which speed up the insertion of data and simplify the use of the machine.

EasyGlass enable to draw different shaped forms with the wariness to have a straight side (the one that leans on the rolls) and it is predisposed for the use of fundamental points that still further help the programming (eg. end of the line, centre, medium point, ecc.). Finally it automatically manage all the movement of the machine that are necessary to produce the glass sheet.

Tools data saving



Example of parametrical shape

All the tools available are managed from a schedule in the machine, so it is possible to recall the tools from an archive for every working request *(principal tools-data: kind, length, diameter, rotation speed, forward movement speed…)*

Additional buttons

Are auxiliary commands that immediately manage helpful functions like

- Recall of parametric presetted forms;
- Import the glass outline and millings profile in .dxf files (the customer can create a library of notches or request to his own supplier);
- Recall glass outline and millings profile previously crate and saved;
- Create drills and countersinks with the simple introduction of X and Y positions, diameter and eventually the width of countersink;
- Immediate generation of machine working programme.

Communication

Transfer of file to the machine, through: CD Rom, serial line, connection to the network and USB.

The supply includes one (1) software key and one (1) Cd Rom.

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WORK CYCLE

The sheet is loaded manually (or automatically, as an option) on the loading rack resting the long side on the relative rolls; the rolls start their course to take the glass, place it against the reference stop and start the work cycle. The glass is then transported to X work position. The rolls, having friction, will always maintain the glass sheet in position against the reference stop.

The operating units position themselves at start of work position (Y position) and will make the drilling or milling.

To carry out different works a new positioning of axes X and Y and/or tool change is verified through the rotation of the relative tool crib during the movement of the axes.

At the end of the cycle the reference stop is disengaged, advancing by about 50 cm through a pneumatic system; the unloading rollers transport the sheet to the exit of the unloading rack to be placed manually (or automatically in option) on the glass rack.

Details of drilling work

The glass sheet is taken to the drilling position through the relative stop.

The operating units position themselves at the requested position and the pressing rings clamp on the glass sheet in high pressure locally counteracting the force generated during the drilling.

The drilling is then carried out with the entrance in the glass thickness, first by the tool mounted on the rear operating unit and then the tool mounted on the front operating unit.

Details of milling work

The glass sheet, referred to through the relative stop, is first taken to the work position, then clamped on the rear side by the suction cup. The entrance suction cups, the exit suction cups, and/or both will function depending on the milling and the dimension of the glass sheet.

The operating units position themselves on the requested position, the pressing rings close [about 0,2 mm from the glass] and generate a high pressure anti-scratch and anti-vibrating, with cleaning effect.

The tool is sent to work position by the spindle head and the milling is then carried out through a combination of movements of the suction cups and operating units with tool advancing speed normally included between 0,5 e 1,2 m/min.

Quotation		Date
JA.50.33	STANDARD Voltage 400V +10% / -15%	N. 1
JA.50.31	Frequency 50 Hz +/-1%	N. 1
JA.50.86	Numerical Control OSAI Open-M	N. 1

Electrical Cabinet and Control Panel

All the electric and electronic equipment's are fitted in an electrical cabinet positioned on the machine back side. It is equipped with first-choice components available on the market and provided with all safety devices needed for its functioning. The cabinet is cooled by an air conditioner.

Protection level: IP 54.

The control panel has all the main controls for the machine working. The control unit consists of a **Numerical Control OSAI Open-M with integrated PC** fitted into the electrical cabinet. *The PC make it easier to programme the machine and grant great user-friendliness operating with the NC.* The working cycles can be programmed directly from the PC keyboard and mouse. 15'' TFT colour video (industrial type).

- Digital technology granting quick and safe data transfers.
- Up to 10 axes control, 5 of them interpolated.
- Responsive and uniform axes accelerations and decelerations, reducing tool path errors even in case of high tolerance toolpaths.
- The NC is equipped with industry standard Ethernet card to transmit any amount of data among PC simultaneously.
- The software enables for the dynamic control of the tool radius wear and relevant correction.
- User-friendly interface allowing to install on the PC different software applications.

Numerical Control main features: series OPEN-M control unit, CPU Celeron 1 GHz, 256 MB of RAM memory, user memory 1 GB.

Quotation		Date
JA.02.63	Metric data input	N. 1
JA.53.38	Software License Easyglass Base	N. 1

PROGRAMMING SOFTWARE EASYGLASS BASE LEVEL

It is a CAD/CAM software package installed in a personal computer working in Windows for the generation of work programmes.

Generals Functions

- On line manual with index of research.
- Automatic e-mail setting for request of assistance.

CAD Functions

- Free design of geometrical entities (arcs, bi-arcs, lines, rectangles, squares, ellipses, circles, regular polygons, fillets, chamfers, construction plans, etc.).
- Design from predefined parametric models in library.
- Sensing from drawings or templates by means of measurement (drafting Machines, graphic tablets, measuring arms etc.).
- DXF, ISO, CAL, CSF, BYS, etc. import and export.
- Dimensions.

CAM Functions

- Generation of roughing, drilling, finishing, profiling, polishing, cycles etc.
- Automatic generation of engravings with mill, pockets, notches, countersinkings etc.
- Machining time estimation.
- Part program generation optimized for CNC.

TOOLS

- Aggregate control.
- Tool store control.
- Definition, modification and saving of the machining kits (tools sequences).

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DISPOSITION

- Graphic interactive arrangement of pieces on the machine table (one or more pieces even different each other).
- Graphic interactive arrangement of sub-pieces on the machine table as: vacuums, vices, references, modules, etc.
- Automatic check of the interferences between the machinings and the sub-pieces.

POSTPROCESSOR

- Transfer of machining programs via: floppy drive, serial, network

SIMULATION

- Graphic 3D simulation of the machining process: it is done using the CNC machine 3D model which reproduces the table, the motors, the tools, the sub-pieces and the pieces.

JA.03.54	Antivirus-Standard microsoft	N. 1
JA.02.30	Remote diagnostics	N. 1

This diagnostic package permits CMS operators to check and modify on line machine configurations, parameters and programmes, as well as to execute data back up operations, therefore making remote assistance possible.

The link requires an Internet access, which can be done through the Intranet.

JA.52.25	Standard Colour Vertec+Mill	N. 1
JA.58.46	Standard complete front cabin	N. 1

Frontal cabin of protection with front access door with electro lock.

Quotation		Date
JA.00.72	Machine Installation, Use and Maintenance Manual in ENGLISH (provided on CD-ROM)	N. 1
JA.00.82	Programming and Use NC Manual in ENGLISH (provided on CD-ROM)	N. 1
JA.00.87	Operating System in ENGLISH language	N. 1
JA.02.46	NC messages in ENGLISH language	N. 1

Pictographs for electrical control plates.

JA.00.62	Machine COMPLYING WITH CE STANDARDS	N. 1

The machine complies with the applicable parts of the following Directives:

Directive 2006/42/CE

Directive 2004/108/CE

JA.50.27	Standard minimum glass dimensions 420x180mm	N. 1
JA.50.25	Glass feed direction: from left to right	N. 1

Glass feed direction from Right to Left.

JA.52.09	STAND ALONE Machine	N. 1

Quotation		Date
JA.50.21	Tool holder cone ISO 30 - 1/2 gas connection	N. 18

Tool holder cone in stainless steel, ISO 30 connection, ½ gas attachment. Used for cutting mills and diamond drills. (cod. GRP1001677)

JA.50.28	Precision tool measurer with liquid crystals digital reading for ISO30 cones	N. 1

Measurement precision tools on ISO30 cone with digital LCD.

Cod. DP09GR1122

	Drilling bits sharpening and automatic measuring	N. 1

Drilling bits dressing and drilling bits length measuring system are installed on pneumatic cars: two for the front spioindle and two for the back one.

The cars are positioned in a safe position during the normal processing and come in front of the two spindles when the tools are to be sharpened or measured by pneumatic pistons.

Dressing of drilling bits and drilling beats measuring are managed by a specific cycle.

JA.51.29	Module for automatic CAM Processing	N. 1

The CamAuto is a software module of Easyglass or Easystone (it works only in presence of one of the two CAD-CAM) and can be viewed as a table of correspondence between a level (or layer name), and a kit of processing inside a library previously created. The sequence of these associations allows Easyglass or Easystone, scrolling all the various layers present in the DXF drawing or in the CAD-CAM project, to insert in the list of machining the appropriate kit.

Quotation		Date
JA.50.15	Software SPM (Smart Production Manager)	N. 1

Software owned by CMS that automatically allows to plan, organize and manage the production of glass on vertical machines CMS, stand alone or in line, composing a list of pieces to be produced realized by reading bar codes, or via manual input.
You can also record in a database, all data relating to production carried out, such as: date and time of production, machine and operator, size, cycle time, area, any bar code, etc..

Glass & Stone Division

JA.53.44	Recycling tanks for working water capacity 1000l	N. 1

N°2 polypropylene tanks connected in series for recovery, decantation and recycling of working water. To be used for the external cooling line electro-spindle. Capacity 1000l.

-	Machine COMPLYING WITH CE STANDARDS, with installation at distributor charge and care.	N. 1

The machine complies with the applicable parts of the following Directives:

Directive 2006/42/CE

Directive 2004/108/CE

The responsibility of the installation to be executed complying with the instructions given by the machine manufacturer will be at distributor charge and care.

CMS will send one technician to support during the installation phase at the agent's charge.

The layout and the “MEC0138” are the documents defining the conditions for the machine

assembling; distributor will be supplied with these documents as soon as possible.

You are requested to return a signed copy of the installation documents to CMS.

Quotation Date

Customer

Total Euro

Payment Terms
