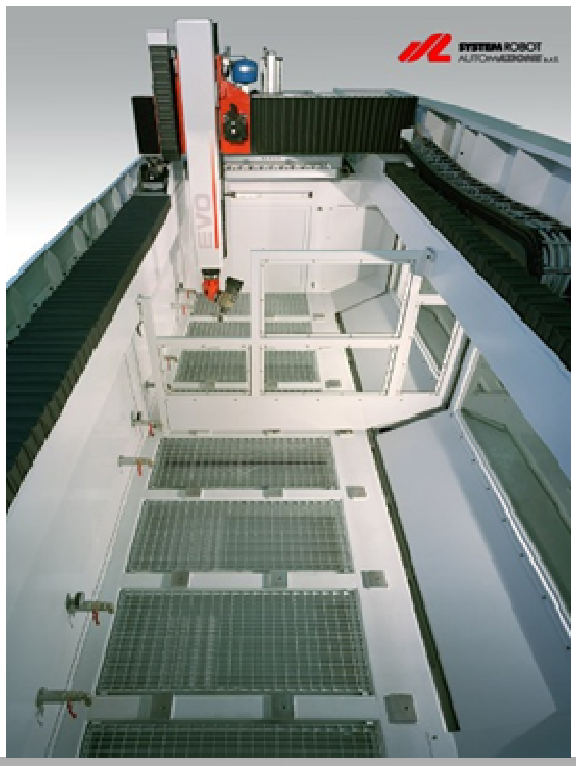
SYSTEM ROBOT AUTOMAZIONE s.r.l.

Via Industriale, 13/15
25018 MONTICHIARI (BS) ITALY
tel. +39 030 9961811
fax. +39 030 9962763
internet: www.systemrobot.it
E-Mail: info@systemrobot.it

Cod. Fisc. E Part. IVA
IT 01686890987
Registro imprese 01686890987
R.E.A. 340809/96
Cap. Soc. ú. 1.000.000,00 i.v.

5-AXIS MACHINING CENTRE
model ñEVOò

Segreteria Amministrativa: E-mail: administration@systemrobot.it ï **Segreteria commerciale**: E-mail: sales@systemrobot.it
Segreteria assistenza tecnica: E-mail: service@systemrobot.it ï **Segreteria produzione /Ufficio tecnico:** E-mail: info@systemrobot.it



DESCRIPTION OF THE SUPPLY

The machining centre series ñEVOò is a 5 axis Numerically Controlled milling Machining Centre with Cartesian structure MOVABLE BEAM having following characteristics:

- Structure of machine: cartesian suspended portal design
- Bi-rotating Working Unit
- Working table
- Protection
- Numerical Control Unit
- Portable terminal

- Electrical cabinet
- Systems

Specifically designed for the high-speed cutting of non-ferrous materials, it is a very flexible Working Centre combining typical characteristics such as precision, stiffness and reliability with high security standards and handling for milling, slotting, contouring, finishing and drilling operations and three-dimensional working up to 5 simultaneously interpolated axis: it is ideal for the milling of complex models surfaces and light moulds.

The machine complies the current European Standards regulations of security and it is equipped with all systems necessary to guarantee the safety of operators.

MACHINE CONSTRUCTION:

The machine structure is very rigid, made of welded and stabilized-treated steel allowing quick displacements and granting the maximum stiffness of the structure.

The base-frame supports, on the front and back sides, two girders with slide rails on which the cross-beam moves: transversal axis ñXò

The cross-beam is motorized on both ends: the system of movement with two electrically synchronized axes (Gantry System) allows precision performances even by very high speeds and accelerations.

The carriage of the longitudinal axis ñYò moves on the cross-beam and it supports the vertical arm movement for the ñZòaxis.

The arm bottom is the fixing element of the operating unit: ñCòand ñAòaxis.

The transmission of the movement is made through Brushless servomotors, coupled to precision gears on which are fixed the pinions which run on helical-toothed, hardened and grinded precision racks.
The sliding is made on prismatic precision rails with recirculation ball blocks.
Blocks are equipped with double external protection composed by special wipers.

Axis lubrication : Centralized and automatic forced grease lubrication of slide rails

Brushless motors integrate the system for the transmission of position information. The axis ñZòmotor include a brake.
Brushless motors and digital drives onto every axis allow to have high performance movement.

All rails and racks of linear axis are covered by bellows.

EVO LINEAR AXIS STROKES

LINEAR AXIS	STROKE mm	MAX SPEED m/min	RAPID ACCELERATION m/s²	* AXIS POSITION ACCURACY mm/m	* REPEATABILITY mm
TRANSVERSAL X	2400 / 3600 / 4600	80	up to 6	+/- 0,03	0,02
LONGITUDINAL Y	1200 / 1800 / 2600	80	up to 6	+/- 0,03	0,02
VERTICAL Z	800 / 1300	60	up to 6	+/- 0,03	0,02

* Referred to constant ambient temperature 20°C ± 1°

WORKING UNITS TOOL-CHANGER

Bi-rotating head ñPOWERò composed by:
Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
An integrated transmission inside the vertical arm and precision reduction gears are included. The combination of two rotating movements (C+A) allows the electric spindle to rotate both perpendicularly and co-axially respect to the vertical axis. The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.

ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C ROTATION	426°	125	up to 500	60	20
A ROTATION	+/-120°	125	up to 500	60	20

N° 01 Electro spindle with automatic cone change:
Mounted on the bi-rotating head and liquid cooled
Power **12 kW (10 kW continuous service S1)** at 12.000 rpm nominal speed
Rated speed **22.000 rpm max**
Integrated tool changer device for **HSK 63F cone**

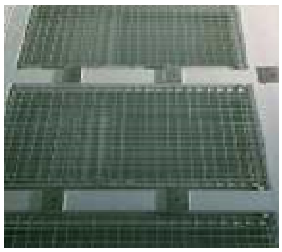
N° 01 Static frequency converter for electro-spindle:
Suitable to manage a rotation range from 1.500 to 22.000 rpm

N° 01 Electro spindle cooler:
Ultra compact cooler for glycol water complete with pump for electro spindle cooling circuit, interfaced with the Numerical Control for alarms management. It is equipped with control and maintain system for the optimal pressure, flow meter for the cooling re-circulating control, differential probe for self-regulation of delta temperature between environment and spindle to avoid thermal shock and consequent formation of condensation.

N°01 Tools changer:
It is composed by a 12 positions tools magazine placed on the internal back machine shoulder, equipped with cones pressurized cover.

WORKING PLANE

N° 01 The table is integral part of machine frame, and it is made of a reticular structure, electric-welded carpentry. Beams have blocks with machined plane parallel to X Y axis strokes, and complete with threaded holes for positioning and locking of piece-holders, other tables, or for rough material blocks to be machined directly.
The plane is provided with holes at 625 mm in X and 550 in Y
Height from floor: about 580 mm.
The particular execution of the internal area allows the evacuation of chips on suitable removable tanks placed under the working plane; in fact, between one beam and the other there is a walkable anti - slide grid.



SAFETY FENCES

N° 01 **Safety fences:**
To guarantee the maximum safety of operator during working cycle, the machine is equipped with a peripheral protection made of panels integrated to the structure on back and lateral sides. The front is protected by two sliding doors with large inspection windows.
Accessories:
N. 02 External keyboards with push buttons for "start", "stop", "emergency" and "vacuum circuit start" functions, integrated in the front cover panels.

OPTION **N. 01 Removable central bulkhead dividing the working area into two zones.**
The presence of this bulkhead protects the operator during the loading / unloading operations on one side, while the machine is working on the other one, allowing the "alternate" cycle working and optimizing the productivity.
The presence of this bulkhead allows the independent management of the doors: partially in case of "alternate" cycle working, or totally for large parts which have to be machined along the whole longitudinal axis stroke (X).

NUMERICAL CONTROL UNIT

N° 01 **NUMERICAL CONTROL UNIT OSAI 10/510i**
Located in the electrical cabinet and composed by:
Central Unit:

- CPU 850 MHz
- Silicon Disk 64 MB, HDU 2 GB
- 2 Slot bus ISA
- 2 ports RS232
- 1 Ethernet interface
- 24 VDC power supply

Operator Panel WinMedia BASIC:
on the electrical panel

- Colour TFT display 15ò1024 x 768 pixel resolution
- 64 bit Pentium 600 Mhz CPU
- 40 GB HDU
- 1 port RS232
- 1 port RS232 / RS422
- Interface keyboard / mouse mini-din PS/2
- 1 connector USB 2.0 on the front
- 2 connectors USB 2.0 on the rear
- 1 Ethernet interface (RJ45)
- 1 expansion slot PC104 / PC104-PLUS
- Feeder 24 VDC
- Keyboard + mouse pad
- 256 MBYTE RAM SODDR
- WinXP SP2 embedded (multilanguage)

Control Unit 6 digital axis Mechatrolink:

- 1 digitizing input
- 2 analogical inputs 12 bit - 1 analogical output 8 bit
- Canbus card on bus ISA for I/O management
- Kit Software MC
- Kit SW WinNBI
- Bit Dos Real Time (E 58)
- **TCP** function (5 axis Tool Center Point management)
- **FLT** function (high speed interpolation management)

N° 01 Portable terminal for manual axis movement and for self-learning programming.

Or

N° 01 Programming and teach-in ñAdvancedò System. Composed by:

Operator portable terminal.

It allows in a friendly way to move manually the machine axis, to carry out setting operations and the teach-in of points for the programs generation. It can also be used as an alternative to the main interface located on the electrical board to make other operations. For safety reasons the axis movement in the working area is only possible at limited speed and it does not permit the starting up of the automatic cycle and the spindle rotation.

- 10 meters cable with connector for electrical board
- 10òTFT colour display **touch - screen type with interface similar to the NC display**
- **Joystick** - 3 free sides
- N. 1 potentiometer for movement feed adjusting
- N. 1 ñemergencyòhead and ñstartòand ñstopòpush buttons
- N. 1 safety push button on the handgrip

Teach-in Software with 3D graphic simulation.
The programming through terminal is made by self-learning, i.e. moving the tool. Or its simulacrum, to the required point and setting the reached position by simply pressing a push button on the terminal. This allows to define the path the machine has to run to achieve the working cycle.
The points of the profile can also be introduced directly into the appropriate area of the editor and the position is instantly displayed in the graphics.
The points introduced can be connected with different movements that generate three different functions: linear, circular, spline.
The software allows the introduction of the logic functions and commands using preset menus that guide the user by facilitating the programming phases.

The software also allows further processing and modifying the path.
For the analysis phase of the profile self-learned, the DIGICAD provides a series of commands and graphics performance (rototranslation, zoom, selection of a point, etc.) that allow the operator to achieve optimal viewing graphics in order to identify quickly and easily any critical points of the profile.

Or, as alternative

NUMERICAL CONTROL UNIT Servo motor and Drive Units MITSUBISHI

N° 01 NUMERICAL CONTROL MITSUBISHI M700V Series :

Display and panel located on the electrical cabinet

Hardware architecture with high calculation power for high speed milling (HSM) of complex surfaces, and Functions for 5 axes simultaneous interpolation

Composed by:

- NC Unit 750VW-M with software for 16 axes max. control
- Display Unit (PC) with colour 15ò TFT display and Windows XP embedded as operating system
- Keyboard QWERTY
- Operative panel
- Integrated PLC
- RISC 64 bit for high speed machining
- Standard slot for FC Card + USB
- Ethernet connection
- Hard Disk
- **Portable operating panel with hand wheel**, LCD display four lines, keyboard and emergency button. Cable 5 m longer.
- 5 axes High Speed management:
- The Nano-Control technology supports all processing in nano-units from NC operation to servo-drives obtaining the highest machining and high accuracy achievable machining up to 151.000 blocks per minute.
- The functions OMR-Control and SSS-Control, ensure to match the real machine tool position to the commands and the automatic optimisation of speed and deceleration by judging the shape realizing smooth surfaces in shorter machine time as possible.
- TCPô function to control the 5 axes positioning and speed referred to the tool center point.

- 20GB memory on the Hard Disk of the display unit, and 2 MB of internal CN memory.
- The programs can be executed from the internal memory and also from the Hard Disk. Could be possible also from CF Card, USB or remote PC
- ISO programming
- Interpolation on 5 axis
- Management of Gantry and Master/Slave axis couple
- 3 axes Spline and NURBS are available
- 3D tooling correction
- 3D Graphic simulation of scheduled paths (only 3 axes). As option, Is available an additional software for the 5 axes machining with the interference control to load directly on the CN
- Position Teach-in
- Clearance adjustment and measure system error adjustment
- SW and HW end stroke sensor control
- Messages and alarms in language

GENERAL FEATURES

Electrical cabinet
Separate electrical cabinet placed at the right side of the machine:
- Air conditioning included
- Degree of protection IP54

Power supply
- Power supply: 400V 50Hz 3 Phases + Earth + Neutral
Connection pre-arranged inside the electrical cabinet
- Installed power: 36 KVA

Compressed air
A connection is foreseen on the machine for the coupling to the Customerôs centralized system.
The connection is complete with filter, pressure regulator, lubrication and minimum pressure control, further safety drier on the line.
Minimum required pressure: 6 bar

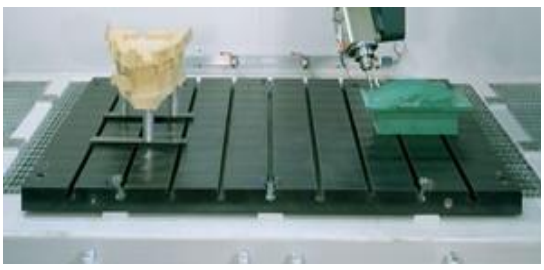
Colours
Structure: light grey RAL 7047
Operating unit: orange RAL 2002

N° 01 **Technical documentation according to the European Standards:**
A copy of the documentation supplied **on CD in language** will be sent along with the machine:
It will include:
- Maintenance manual
- Programming manual
- Technical documentation

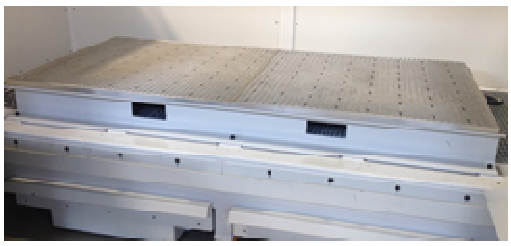
N° 01 **Teleservice:**
This service allows to reproduce on the remote control PC, through Internet, the condition of running machines connected; this permits the assistance personnel to effect remotely the diagnosis and suggest the solution of the possible anomaly.
The connection between CNC and Internet service is at Customerôs care.

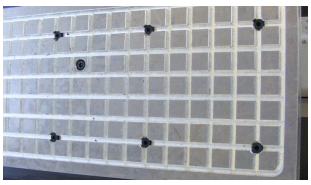
MAIN OPTIONS WORKING PLANE

TOOL plane:
Cast iron table with 22 mm ñTò slots (for insert M20) centre distance 250 mm and parallel to the Y axis for reference and locking of pieces fixed on the plane.
Fixed on carpentry plane.
Thickness 80 mm

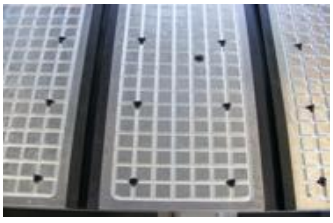


N° 01 **Removable Vacuum plane:**
Aluminium plane having 28 mm thickness properly worked on the surface with grooves having 30 mm distance for the vacuum diffusion and for housing of gaskets necessary to limit the blocking vacuum zone. The plane is provided with M8 threaded holes at 150 mm distance for the air passage through threaded nuts which can be used for the mechanical fixing of the jigs.





N° 01 Vacuum plane with ñT slotsò on top of table carpentry:
The surface of the aluminum plate also includes steel inserts at a distance of 300 mm with hollow "T" 16 parallel to axis "Y", for the reference and clamping parts.



N° 01 Vacuum System
The vacuum circuit for independent control of two working areas, can be activated manually or automatically by program. Every line of the vacuum circuit is equipped with filter to avoid the pumps stopping. To guarantee a suitable blocking of the jigs to the suction units, connections inside each working area are foreseen for a fast and easy coupling.
Foreseen vacuum pump : N° é . of é . m³/h *(to be defined based on the application)*

N° 01 Predisposition for connection to suction system
On the back side the tanks are complete with nozzles prepared for possible connection to the suction system (suction and filtration system not included))

N° 01 **Rotary table with 2 working planes:**
The rotation and changing station is electrically driven through motor reducer.
It includes two integrated working tables with piece-holders, separated by a central bulkhead. **This type of structure allows the operator to make, under maximum safety, the unloading and loading operations simultaneously.**

The two tables are made of machine frame, and it is made of a reticular structure, electric-welded carpentry, normalized, worked and painted, complete with threaded holes for positioning and locking of piece-holders.
The particular execution allows the evacuation of waste suitable thanks removable through hoppers or conveyer placed in the working area underlying the plane.
In the internal working position, the plane is referred by a double pneumatic graft of centring pins.

Height from floor about 650 mm
Rotation time: about 7 sec.
The rotation speed of the plane can be manually adjustable through a special potentiometer located on the switchboard.
Max. admissible load for each station: 300 kgs
The external rotation area is limited by safety fences and safety lights.

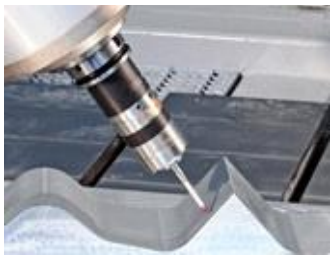
MAIN OPTIONAL ACCESSORIES

N° 01 Device for tool setting and re-qualification of the origin of the headôs rotary axes

The Optical Tool Setter works with the transmission of radio signals.
This device allows the reliable and precise measurement of the length and the tool radius.
Equipping the spindle with a calibrated pin, it can also be used for the control of the alignment of the rotary axes A and C; procedure useful especially as a result of an excessive effort of work or in case of collision.

N° 01 Automatic feeler system (Radio Probe)

Electronic measuring probe mounted on the tool holder with signal transmission via radio. In contact with an element, this device allows to detect the coordinates of a point. It is useful for measurement or survey of the exact position of the working piece referring to one or more predetermined references.



N° 01 Tool Minimal lubrication:

(necessary in case of aluminium working).
Box and distribution plant with diffuser nozzle mounted outside the spindle nose, for the minimal lubrication of the tool (chemical for cut pure sprayed with compressed air).
- 3 litres tank.
- Possibility of flow regulation and from Numerical Control activation
- Possibility to use only air

N° 01 **Full enclosure:**
Machine cover also on the upper part of the working area.

or

N° 01 **Ceiling bellows cover**
Protection bellows mounted on ceiling of the machine Moves at the moving of the crosshead.
His special translucent tissue allows the brightness of the work area.
Structured aluminium frame.
Sliding on aluminum guide using rollers.

OPTIONS - OPERATING UNITS

WORKING UNIT R2

N° 01 **Bi-rotating head composed by:**
Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
An integrated transmission inside the vertical arm and precision reduction gears are included. The combination of two rotating movements (C+A) allows the electric spindle to rotate both perpendicularly and co-axially with respect to the vertical axis.
The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.
The particular head shape, brings the spindle's axis to 233 mm outside the vertical
axis centre, allowing the working of flat parts having dimensions increased by 400 mm
of the X and Y strokes.

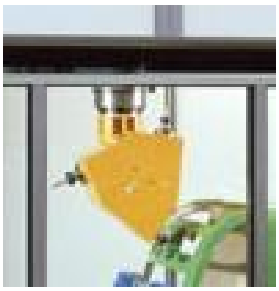
ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID SPEED °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C ROTATION	426	300	500	60	20
A ROTATION	295	200	500	60	20

N° 02 **Electro spindles:**
Mounted on the bi-rotating and air cooled.
Power 2 kW (continuous service S1), rated speed 24.000 rpm max
ER20 collet for tools locking with shaft diameter 16 mm max.

WORKING UNIT R3

N° 01 Bi-rotating head composed by:

Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
An integrated transmission inside the vertical arm and precision reduction gears are included. The combination of two rotating movements (C+A) allows the electric spindle to rotate both perpendicularly and co-axially with respect to the vertical axis. The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.



N°01 Revolver with 3 spindles:

- N°1 Power 2 kW at 24.000 rpm max and with ER25 collet
- N°2 Power 1 kW at 24.000 rpm max and with ER20 collet

Air cooled
*(on request all 3 spindles can be rated for 2 kW power).

ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C ROTATION	+/-220	210	up to 500	60	20
A ROTATION	+160/-178	210	up to 500	60	20

WORKING UNIT R4

N° 01 Bi-rotating head composed by:

Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
An integrated transmission inside the vertical arm and precision reduction gears are included. The combination of two rotating movements (C+A) allows the electric spindle to rotate both perpendicularly and co-axially with respect to the vertical axis. The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.

N°01 Revolver with 4 spindles

- N° 1 Power 2 kW at 24.000 rpm max and with ER25 collet
- N° 3 Power 1 kW at 24.000 rpm max and with ER20 collet

Air cooled
*(on request all 4 spindles can be rated for 2 kW power).

ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C ROTATION	426	82	up to 500	60	20
A ROTATION	+10 /-305	82	up to 500	60	20

WORKING UNIT ñBASICò

N° 01 Bi-rotating head ñBASICò composed by:

Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
An integrated transmission inside the vertical arm and precision reduction gears are included. The combination of two rotating movements (C+A) allows the electric spindle to rotate both perpendicularly and co-axially respect to the vertical axis. The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.
The particular head shape, brings the spindleôs axis to 233 mm outside the vertical axis centre, allowing the working of flat parts having dimensions increased by 400 mm
of the X and Y strokes.

ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C ROTATION	440	300	500	60	20
A ROTATION	+180/-120	200	500	60	20

N° 01 Electro spindle with automatic cone change:

Mounted on the bi-rotating head and liquid cooled
Power 8 kW (6,5 kW continuous service S1) at 12.000 rpm nominal speed,
Rated speed 30.000 rpm max
Integrated tool change device for HSK 50F cone.