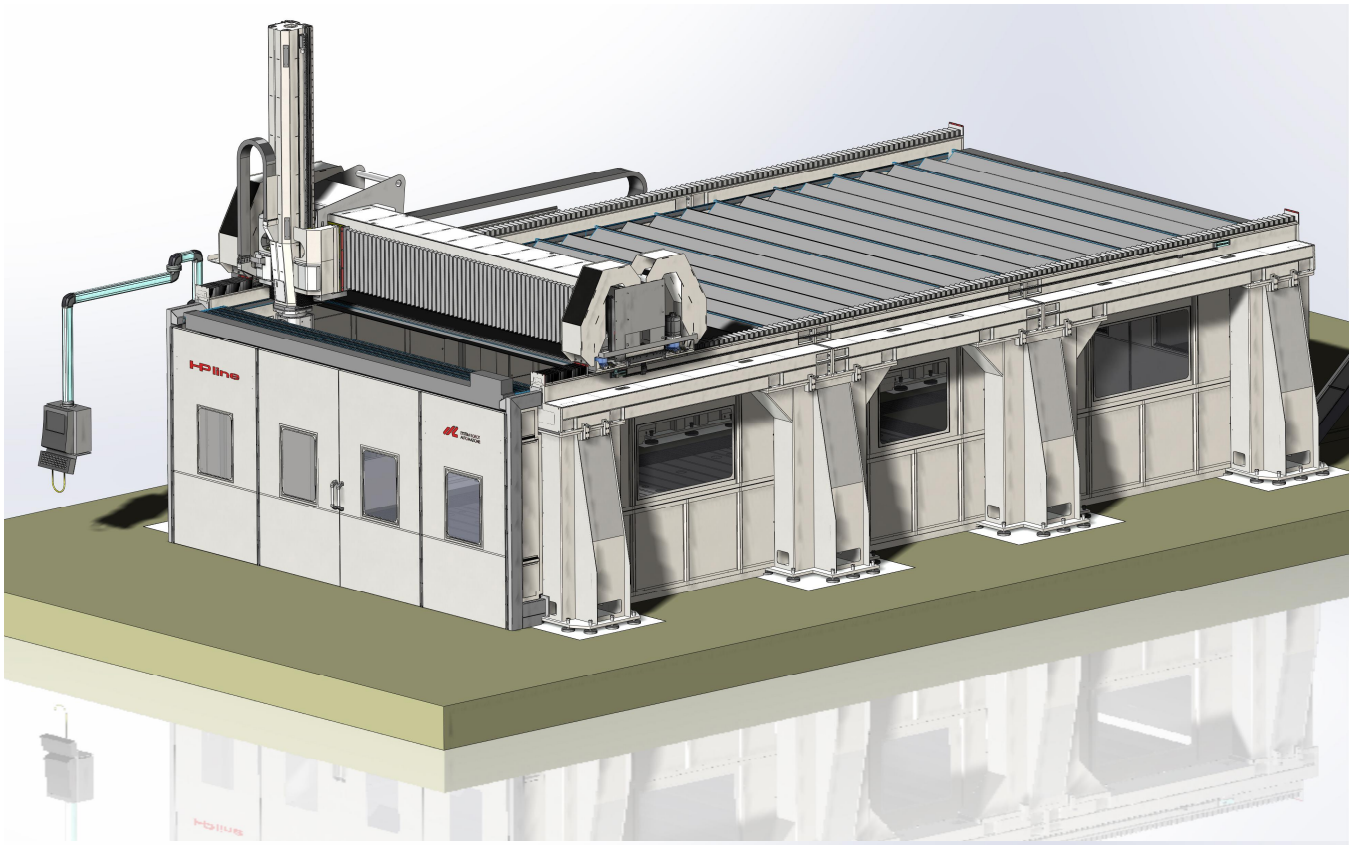
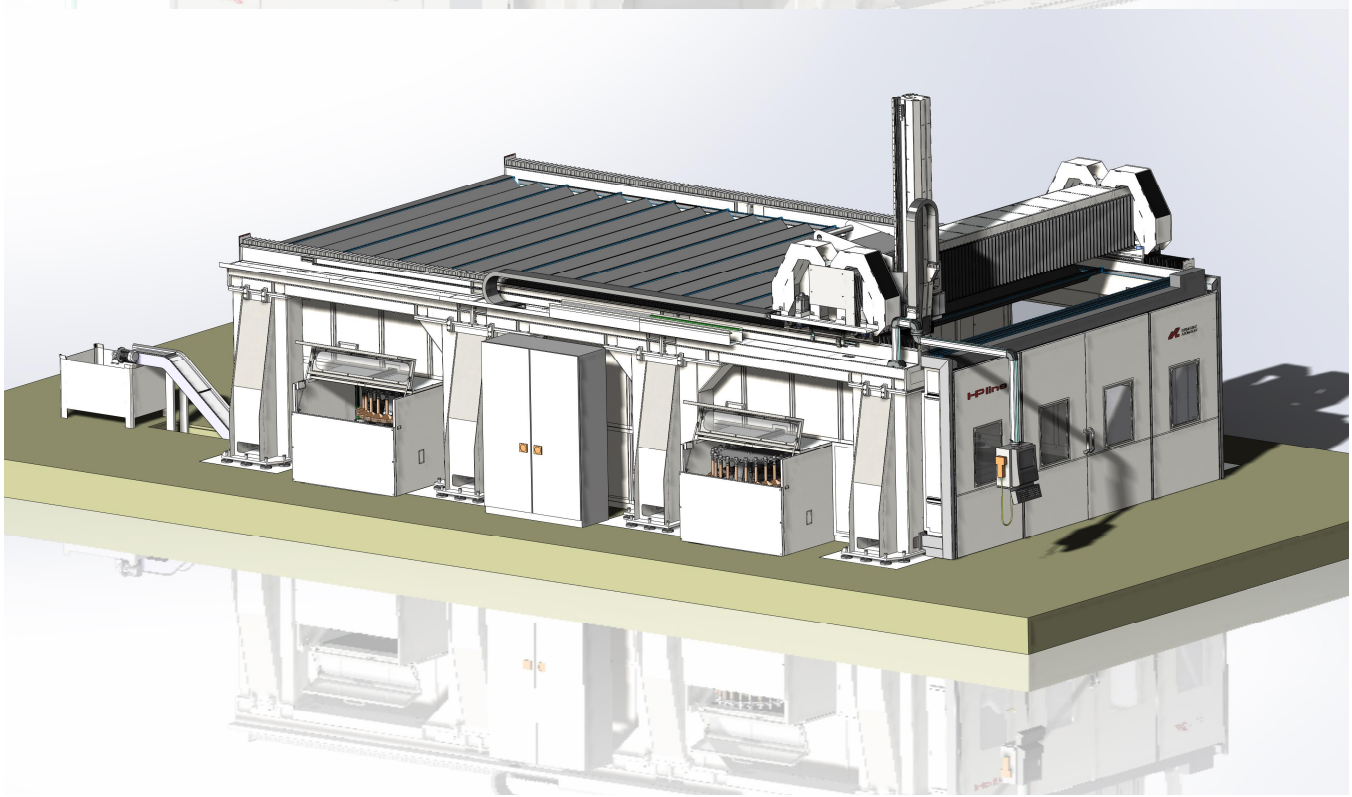
SYSTEM ROBOT AUTOMAZIONE s.r.l.
Unipersonale

Via Isorella, 32
25010 VISANO (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. ú. 600.000,00 i.v.

5-AXIS MACHINING CENTRE model ñHPline Plusò





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

MACHINE DESCRIPTION

The machining centre series ñHP lineò is a 5 axis Numerically Controlled milling Machining Centre having following characteristics:

- Cartesian suspended portal design:
  - Movable beam running on slide rails placed on lateral pillars: longitudinal axis ñYò
  - On the cross-beam moves the carriage of the transversal axis ñXò supporting the vertical arm movement for the ñZò axis
  - The arm bottom is the fixing element of the operating unit
- Bi-rotating working unit: ñCò and ñAò axis.
- Safety fences
- Electrical cabinet on the right side
- Numerical Control Unit
- Systems

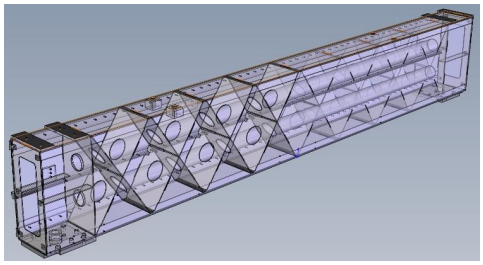
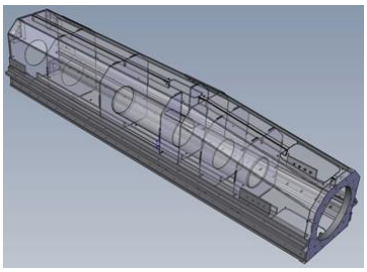
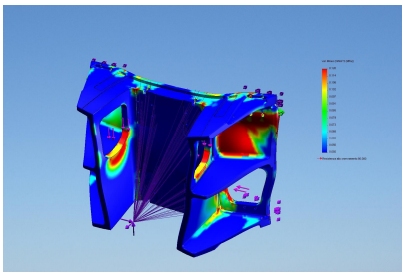
Specifically designed for the high-speed cutting of non-ferrous materials, it is a very flexible Working Centre combining typical characteristics such as precision, stiffness and reliability with high security standards and handling for milling, slotting, contouring, finishing and drilling operations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

simultaneously interpolated axis: it is ideal for the milling of complex large models surfaces made of aluminium, wood, foams, Styroform, pastes, GRP and CFRP.

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

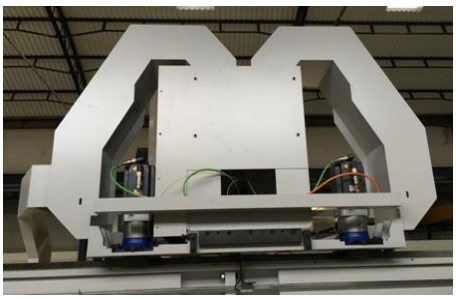
MACHINE CONSTRUCTION

The structures of the machine are made of welded and stabilized-treated steel and are designed and sized to maintain the maximum stiffness and stability even by high dynamic stresses arising from high speed displacements.
(Structures composed and sized according to the principles of finite element FEM integrated by the dynamic simulation)

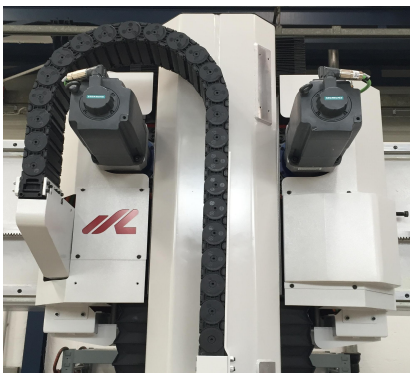
The transmission of the movement is made through brushless servomotors coupled to precision gears on which are fixed the pinions, which run on helical-toothed, hardened and grinded precision racks.

The crossbeam is motorized on both ends by 2 servomotors each side. Each servomotor command its precision gear/pinion to allow , to allow a better adjustment of the preload and backlash recovery with consequent maintenance of the precisions, and higher dynamic performance.
The movement system of the axes on both ends is electrically synchronised (Gantry System) allowing high quality and precision even with high speed and accelerations.



The motion of the carriage running on the crossbeam, transversal axis ñXò, is also managed by 2 servomotors.

On the vertical ñZò axis, the transmission of the movement is managed by double motorization. Both motors are equipped with brake and each one transmits the movement on a rack: one at the right side and one at the left side of the vertical arm.



This configuration with double pinion/gear/motor allows a better electronic regulation of the preload (depending from the different applied operative conditions) and the recovery of backlash with consequent maintaining of precision and higher dynamic performances

The sliding is made on prismatic precision rails with recirculation balls blocks.

Full digital pack of axes drivers and servomotors: type High Dynamic SIEMENS

Measuring positioning system: All linear axis are equipped with direct linear scale measuring system (inductive type lines).

Axes lubrication: forced lubrication of blocks with grease, centralized and automatic.

Limit switches are provided at both ends of the axes for limiting the maximum stroke, and security mechanical stops.

The machine electric System is composed by high flexibility cables that guarantee max life and they are connected with chains cable holders with right dimensions.

Dust protection:

- The ball blocks have an external protection composed of special double scrapers.
- Bellows cover all rails and racks of linear axis.

Safety fences:

The peripheral protection guarantees the maximum safety of the operator during working operations of the machine. The protection is made by sheet panels integrated to the structure on the back and on lateral sides. The front of the machine is protected by two manual opening doors with large inspection windows -*stratified glass tempered*- and complete with safety switches to guarantee the control of doors closed while machine is running/working.

Accessories included:

- Interior lighting
- Air diffusors pistol for cleaning within the work area.
- Emergency buttons placed inside the work area

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 aluminium guide using rollers.
Motorized system for automatic opening / closing one side



LINEAR AXIS STROKE

LINEAR AXIS	STROKE mm	RAPID SPEED m/min	RAPID ACCELERATION m/s²	* AXIS POSITION ACCURACY mm/m	* REPEATABILITY mm
TRANSVERSAL X	2800 / 4000	70	up to 3	0,015	0,015
LONGITUDINAL Y	4000 / 6000 / 8000 / 10000 é é ..	70	up to 3	0,015	0,015
VERTICAL Z	1500 / 2000	60	up to 3	0,015	0,015

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

WORKING UNIT

N° 01 **Bi-rotating head HS678**

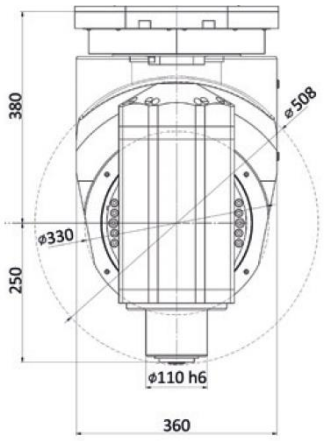
Universal head with 2 simultaneously controlled axes:
- rotating axis ñCò co-axial to the vertical axis
- rotating axis ñAò perpendicular to the vertical axis.

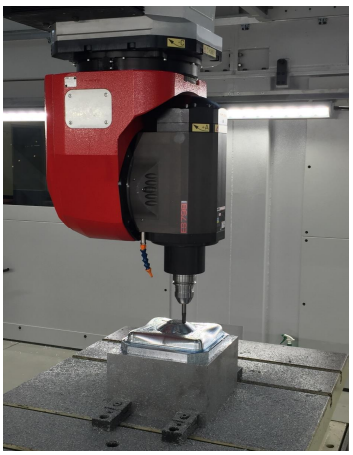
The movement transmission is driven through servo-assisted Brushless motor (Siemens) and allows the programmable positioning at any point of rotation.

A and C axis are equipped with brake with pneumatic attivation to block the axis in fixed position: this allows higher rigidity during the operations in which the interpolation of such axis is not requested.

Axis stall torque Nm: A = 470 (1400 max) C = 480 (1450 max)
Clamping torque (brake): A = 1800 Nm C = 1800 Nm

Direct measuring devices on rotating axis through angular transducers. (Heidenhain).



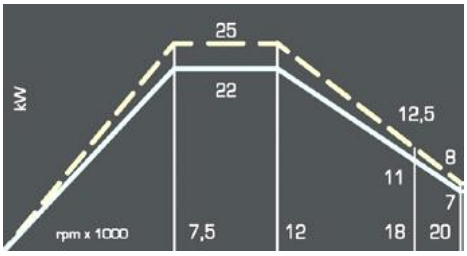


ASSI ROTANTI	ROTAZIONE GRADI	VELOCITAô °/sec	ACCELERAZIONE IN RAPIDO °/s²	*PRECISIONE POSIZIONAMENTO arcsec	RIPETIBILITÁ arcsec
C	+/-270°	90 (max 200)	max 500	30	10
A	+/-120°	70 (max 120)	max 500	30	10

* Max deviation , with RTCP active, at the distance from Pivot axis of 350mm = 0,05 mm

Electrospindle (ES798) with automatic cone change:

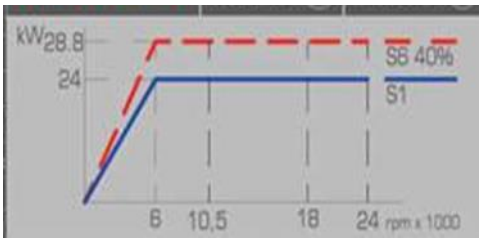
Power: **22 kW in continuous service S1 (25kW in S6)** at nominal speed of 7.500 rpm
Torque max = 28 Nm in S1 (32 Nm in S6)
Rated speed **max. 20.000 rpm**
Integrated tool changer device for **HSK A63 cone**
Liquid cooled
Encoder for the control of the position of rotation, it allows screw threads



As alternative:

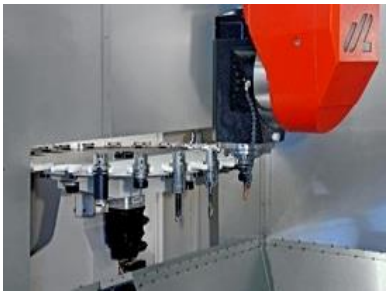
N° 01 Electrospindle (ES510) with automatic cone change:

Power : **24 kW in continuous service S1 (28,8 kW in S6)**
at rated speed of 6000 rpm
Torque max = 38 Nm in S1 (46 Nm in S6)
Max speed **18.000 rpm**
Integrated tool changer device for HSK A63 cone, tool clamp position controlled
Liquid cooled (automatic fluid circulation closed circuit), with spindle temperature control
Encoder for the control of the position of rotation, it allows direct screw threads



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 **Tool magazine:**
Equipped **with 24 stations**, it is placed on the lateral side of the machine and is provided with automatic protection door



Accessories:
N° 8 HSK tool-holders complete with elastic pliers for the tool locking.

WORKING TABLE

Cast iron working table

Cast iron tables fixed on the floor or recessed in the floor so that the surface of the plane is flush with the floor . The tables are completed with ñTò slot type 22, centre distance 250 mm and parallel to the ñXò axis for reference and locking of pieces fixed on the plane.
Thickness: 240 mm
(Max Total dimensions of the plane 4000x12000 mm)

NUMERICAL CONTROL UNIT

N° 01 **NUMERICAL CONTROL HEIDENHAIN MOD. iTNC530 HSCI:**
Located in the electrical cabinet.
Display and operative panel located on the hanging console

Logic Unit MC 7522 i7-3 :
- Colour Display TFT 15òwith soft key
- 2 Fast Ethernet port 100MB
- 1 USB available on the front and 2 USB inside
- Processor Intel Core i7-3 1.7 GHz Dual Core
- 4 GB RAM
- SSDR Solid State Disc 32 GB (free 21,4 GB)
- Bus digital HSCI (Based on Ethernet Hardware)

Axes Controller Unit CC61xx, 2CPU :
- Position controller cycle time: 0,2 ms
- Speed controller cycle time: 0,2 ms
- Block processing time: 0,5 ms (3-D straight line without radius compensation)
- Xx Control loops of speed and position with Input 1Vpp or Endat. Max 20 Control loops (18 axes + 2 spindles)
- Bus digital HSCI (Based on Ethernet Hardware)

Operative panel TE730
- Axis Keys and Operating Mode Keys
- Ascii Keyboard and TouchPad Mouse
- Spindle-speed and feed-rate override potentiometer

Macchina Keyboard MB720 HSCI
- 36 keys with status LED, freely definable via PLC
- Operating elements: NC start, NC stop, emergency stop button, control voltage on and 2 holes for additional keys or keylock switches

Five-axis machining with swivel head:
- Inclination of the working plane
- TCPM (Tool Center Point Management)
- 3-D tool compensation
- Fast execution through short block processing times
  - Look-ahead 1024 blocks and Spline interpolation
  - n.2 Input dedicated to the tool setter and piece touch-probe including the fix probing cycles.
  - Compensation of Linear and non-linear errors, and backlash

PORTABLE KEYBOARD HR410 with Electronic hand wheel, with 3 m extensible cable, or 10 m linear cable.

Or as alternative:

N° 01 **NUMERICAL CONTROL SIEMENS MOD. 840D sl**
Display and operation panel located on the hanging console on the right side.

Hardware architecture with high calculation power for high speed milling (HSM) of complex surfaces.

Operative panel OP12 with:

- Colour 12,1òTFT display
- SVGA graphic card
- Membrane keyboard with 59 buttons and 32 soft keys of which 16 can be configured
- Integrated mouse and USB interface
- PCU 50.5 ï C
- Processor 1,86GHz / RAM 1024Mbyte / Memory 40G
- Sinumerik Operate Interface
- Windows XP operating system
- Ethernet connection

Interfaces: 2x Ethernet RJ45 / 4x USB 2.0 / 1x RS232C
NCU 720.3 managing max 31 axis (max 20 interpolated)

- CNC user memory 3 MB expandable to 15MB
- Look Ahead function (500 blocks) and dynamic feed-forward buffer
- Programmable acceleration management with jerk limitation
- ISO programming
- Interpolation on 5 axis
- Block change time 0,6 msec
- Management of Gantry and Master/Slave axis couple
- 5 axes spline
- RTCP
- Possibility to manage two feeler
- Up to 16 levels of sub-programs
- High level language by scheduling and writing variables, calculation and angular functions, control structures and macro technique
- Graphic simulation of scheduled paths
- Position Teach-in
- Compensation of backlash and of measure system error
- SW and HW end stroke sensor control
- Messages and alarms in language
- SINUMERIK MCP 483C keyboard with mechanical buttons and interface MPI potentiometers

N° 01 Handheld Terminal SINUMERIK HT2

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: 400 V 50Hz 3 phase + Neutral + Earth
  Connection pre-arranged inside the electrical cabinet
- Installed power: 80 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.
Compressed air pressure (minimum required): 6 bar

Colours:
Machine structure: light grey RAL 7047

Foundation minimal requirement:
Industrial floor with the following data:
Class 250 concrete
Steel for the concrete = Fe B 44K checked in the establishment
Ground tensions 0,3 Kg / cm^2
K Winkler 4,00 kg / cm^3
Suggested min thickness 300 mm

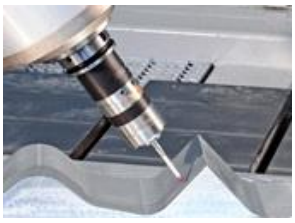
N°01 **Technical documentation according to the European Standards:**
A copy of the documentation supplied **on CD in English language** will be sent along with the machine. It will include:
- Technical dossier of the machine, including all the diagrams all the plants and mechanical drawings with the identification and classification of components
- Maintenance manual
- Programming manual
- Operational manual
- Technical documentation of components

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 - 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 infrared 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) (m&h)**
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

Ceiling bellows cover

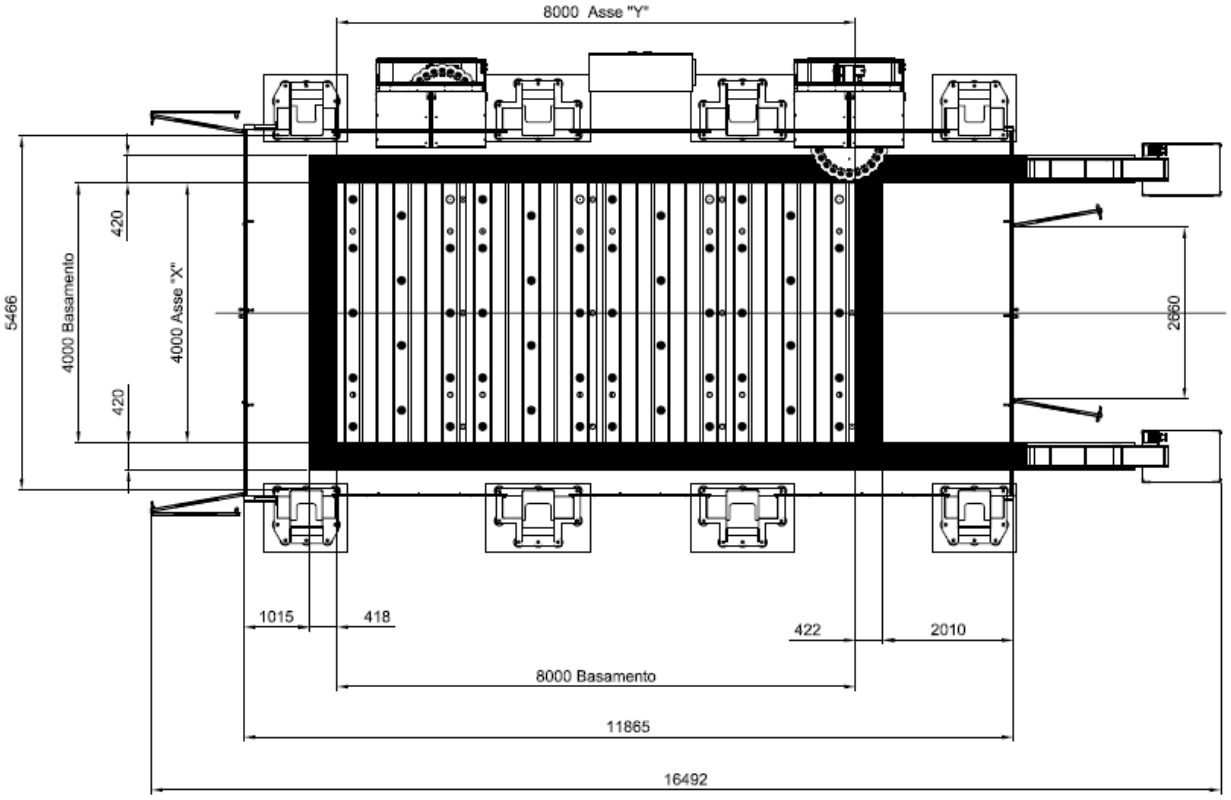
Protection bellows mounted on ceiling of the machine. Moves at the moving of the crosshead.
His special translucent tissue allows the brightness of the work area.
Structured aluminium frame.
Sliding on aluminium guide using rollers.
Motorized system for automatic opening / closing one side



N°02 Belt type chip conveyors

Placed under the working plane, composed by:

- Tub acting as chips collector inside which the conveyor belt runs
- Conveyor belt to move the chips up to the evacuation mouth placed at the end of the ramp placed outside of the machine
- Gear motor for belt movement



DUST COLLECTING DEVICES:

N° 01 Dust collection hood:

Dust hood around the spindle exit, on the working unit, arranged with mounts to be connected by flexible tubes with an external suction device, to capture and suck good part of the dust generated during machining.
The hood is retractable via programmed command or by NC button.
Allows: the automatic tool change and adjust the position to the tool length
The limits of the stroke will be informed accordingly.

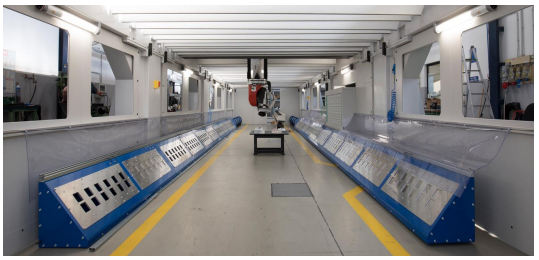
Facility and tubes in trenches along all runs of the linear axes for its connection to the suction and filtration device by an easy connection in a fixed location, at the back right corner of the machine

N. 02 Suction pipelines positioned inside the working area beside the table.

The piping from the ground will be along the Y axis with an indicative dimension of 12000 mm and therefore will be fitted, each branch, of n. 5 suction tubs resting on close to the side shoulder structure of the machine.

Each pipe have 5 tubs each with a pneumatic piston for opening/closing shutter controlled by solenoid valve. The opening/closing of the tubs outlet canl be automatically managed in accordance with the position of the head during the machining.
The maximum number of vents (tubs) open will be 4, 2 per side, for a total suction flow rate of 6000 m3/h

The ground piping, made in bent sheet metal 20/10 of the thickness, will have a triangular cross-section of adequate size according to the extent and speed to get a correct transport of the powders. The terminal will be equipped with the hopper section change: from triangular to circular.



N° 01 Security system for detection of collisions (Montronix)

The system "Montronix Spectra Pulse" is a system of monitoring in real time, vibrational 3-axis based, able to detect and quickly lock the machine tool or the production process before it causes serious damage to the machine.
The sensor Spectra Pulse is able to provide a stop signal to the machine in 1 millisecond from the collision.
In addition, the sensor is equipped with a non-volatile memory, and non-deletable, where are registered up to 8000 events not comply.
A software is loaded on the PC of the numeric control, allows the visualization of the signal and the modification of the limits and parameters relating to the monitoring.