



belotti[®]
cnc machining centers

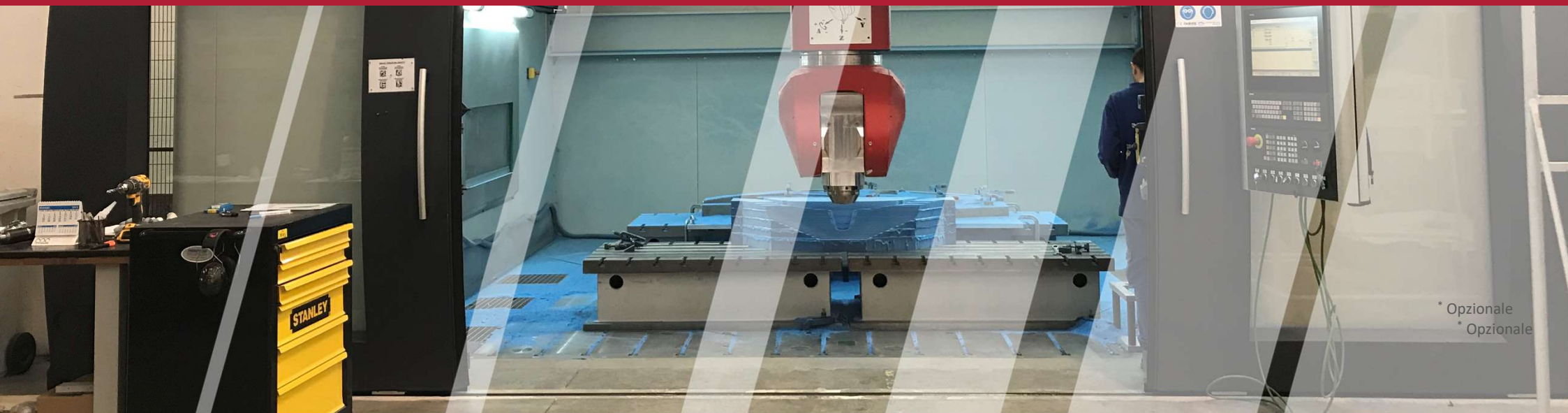
MDL

Product Presentation

- [Advantages and Applications](#)
- [Main Features and Options](#)



ADVANTAGES AND APPLICATIONS



* Opzionale
* Opzionale

Advantages and Applications

Better performances

Higher Precision & Backlash Recovery

Absolute linear glass scales* up to 4000 mm stroke, with no need of regulation: **less temperature deviations.**

Coded linear scales up to 30 m stroke, with modular housing in metal tape adjustable with a special Heidenhain device.

Higher Rigidity

Precision ball screws diameter 63 mm with controlled preload up to 3600 mm stroke.

Preloaded runner blocks - long version assembled on **recirculating ball guides** dimension 45.

Higher Speed and Dynamic

Fast exchange arm to avoid dust or chips in the tool holders.

Increased tool change speed up to 10 "

Safe & Clean Environment

Cooling system with filters and chip conveyor for aluminium high volume milling .

Chiller unit for coolant to stabilize the temperature of the liquid during the milling process for moulding applications.*

Electro-welded structure with thermal stabilization to guarantee **high precision and stability** overtime, with thickness dimension of 12 mm and including internal ribs.

Dual Drive System: double motor for X, Y and Z axes Z in order to increase positioning accuracy and eliminate backlash.*

Compact and rigid fork head with torque motors and hydraulic locking system on the rotary axes

Dual Drive System: double motor with electronic preload **to improve axis rigidity and stability.***

Feed rate self-adapting control during milling process. *

M3 rack and pinion module to increase **the dynamics of the machine.**

Chip reader system for automatic recognition and information on the tool life cycle. *

Tool changer with up to 200 positions, managed by a robot on the side of the machine

Vibration monitoring system with different configurations in order to preserve machine and spindle performances.

Dedicated cameras set on the spindle housing to **verify the working cycle and monitor unattended machining ***

* Optional

Enhanced precision

EXAMPLE: MDL 4026

| AXIS | TYPE | STROKE | POSITIONING PRECISION | REPEATABILITY |
|------|--------|-------------|--------------------------------|---------------|
| X | Linear | 4000 mm | 0,030 mm ($\leq 0,008/m$) | 0,015 mm |
| Y | Linear | 2600 mm | 0,019 mm ($\leq 0,008/m$) | 0,009 mm |
| Z | Linear | 1300 mm | 0,011 mm ($\leq 0,007/m$) | 0,006 mm |
| C | Rotary | +/- 360° | 20 arcsec | 10 arcsec |
| A | Rotary | +135°/-110° | 20 arcsec | 10arcsec |

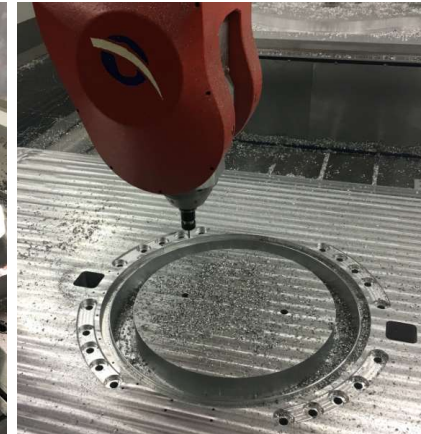
THE IDEAL SOLUTION FOR MACHINING PATTERNS AND MOULDS AND FOR TRIMMING OF COMPOSITE MATERIALS OF LARGE DIMENSIONS AND LIGHT ALLOYS.

Materials: composites (resins, carbon fiber, kevlar, fiberglass, SMC, honeycomb); aluminium and light alloys.

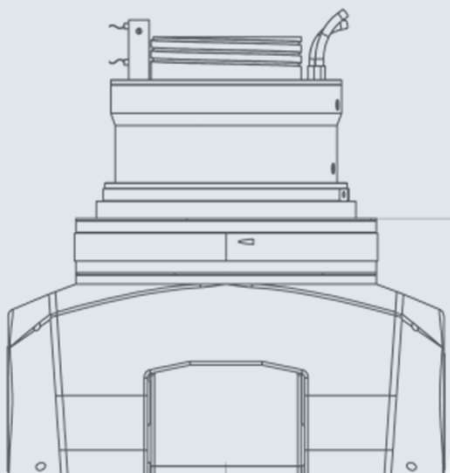
Application sectors:



AUTOMOTIVE | AEROSPACE | RAILWAY | MILITARY | PATTERNS & MOULDS



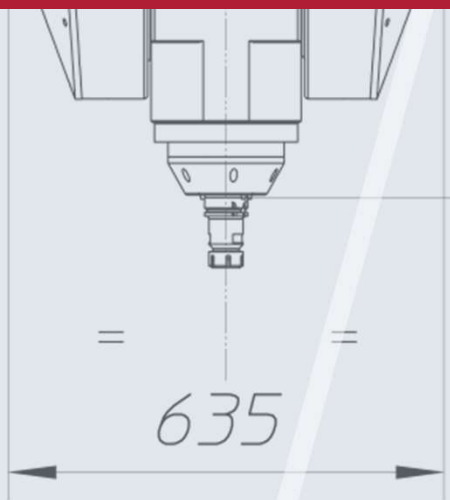
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MAIN FEATURES AND OPTIONS



PP

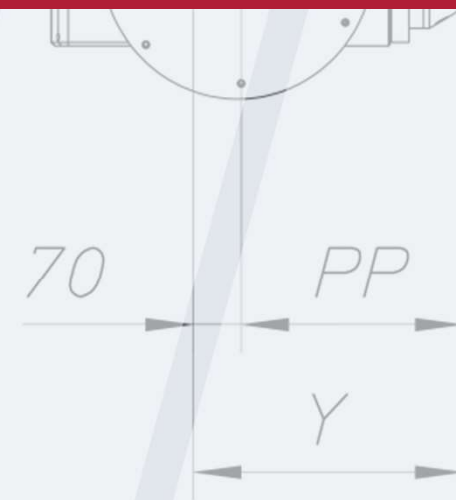
635



X

70

PP



70

PP

Y

Description

The 5-axis MDL machining centers are the **ideal solution for the aerospace and automotive sectors**. Used with **great versatility for the milling and trimming of carbon fiber structural elements** (eg. racing car bodies and supercars), they guarantee:

- **maximum precision**, very important for the gluing phase of the different carbon components, thanks to the extremely rigid structure, the 5-axis head with torque motors and the scales on the linear axes;
- **production optimization**: possibility to perform more processes without stopping the machine thanks to tool changes and reducing cycle time;
- **clean and safe working environment**, thanks to the dust/chip extraction and evacuation systems and to the integral protections.

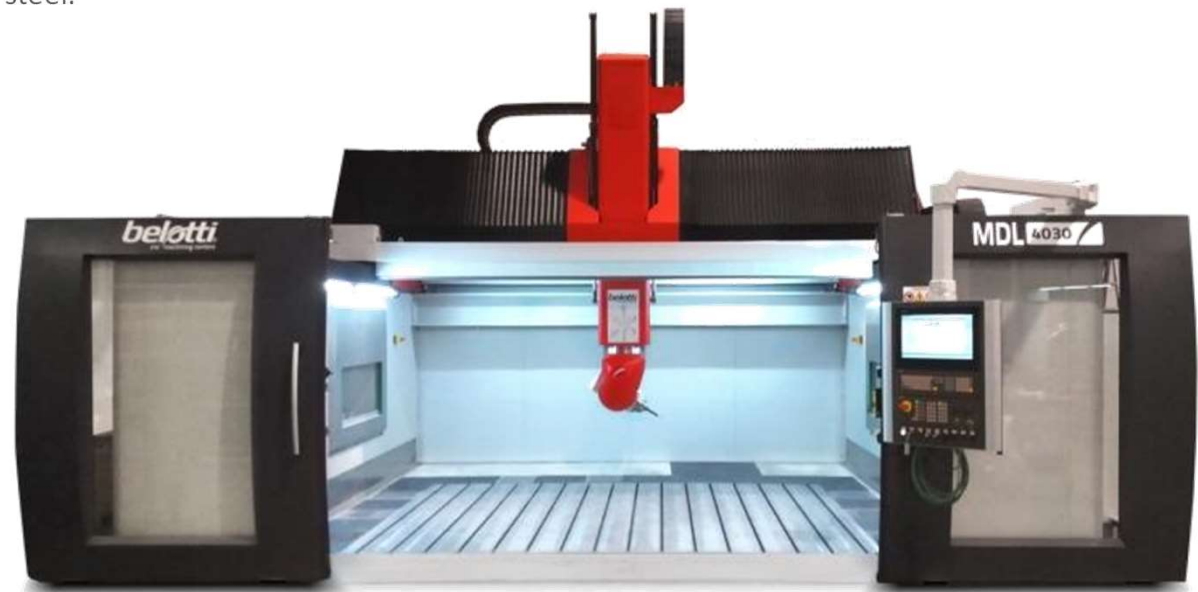
MDL

| Axis | X | Y | Z | C | A |
|--------------------|---|---------------------------|--------------------------------|----------|----------------|
| Stroke | 4/6/8/12/16/ 23/30 m | 2,6/3/3,6/4/ 4,8/6,5 m | 1,3/1,5/1,75/2/ 2,5/3/4,5 m | +/- 360° | + 135° /- 110° |
| Speed | 50 m/min | | 30 m/min | 60 rpm | 60 rpm |
| Spindle | From 30 kW up to 50 kW at 24.000 rpm max. | | | | |
| CNC | Siemens, Heidenhain, Fanuc | | | | |
| Tool change | From 18 to 60 positions | | | | |
| Linear accuracy | ≤ 0,010 mm/m for linear axes | | | | |
| Rotary accuracy | +/- 10 arc sec for rotary axes | | | | |
| Measurement system | Heidenhain glass linear scales, 5 micron resolution | | | | |

Main Features and Options

Structure

MDL Series machines are 5-axis simultaneous CNC High Speed Gantry Machining Centres featuring a motorized suspended bridge structure sliding on the two extremities which is made of extremely high gauge welded heat treated steel.



Main Features and Options

Structure

The longitudinal movement (Y axis) is made by a **weight-optimized and structurally rigid portal**.

For **highly dynamic performance and precision**, the transversal movement (X axis) is made by the carriage running on the bridge, on which is mounted a vertical ram (Z axis) with high bending strength for large ranges.

The Z axis is provided **with balancing and stop devices preventing the machine from damages in case of voltage drop**.

The **fourth axis (C)** rotates the unit around the vertical Z-axis and the **fifth axis (A)** tilt the spindle in the vertical plane.

The **rotary axes** can be **equipped with special gearbox to eliminate the backlash**.



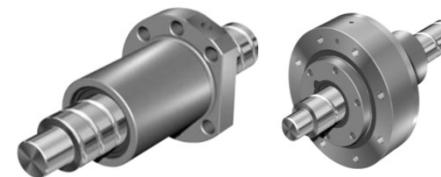
Handling and axes

RECIRCULATING BALL SCREWS

The movement is driven by ball screws (diameter 63 mm, pitch 40 m) for strokes less than 3.600 mm.

The position is controlled by Heidenhain linear scales with 5 micron accuracy.

| Axis | Type | Dimension | Pitch | Thrust | Feed rate | Accelerati on | Recirculating screws supplier | Kinematics | Lubrication |
|------|------|-----------|-------|----------|-----------|-----------------------|-------------------------------|----------------|-------------|
| Y | Ball | Ø 63 | 40 mm | 27.000 N | 50 m/min | 3 m/sec. ² | Bosch-Rexroth | Pre-loaded nut | Automatic |
| Z | Ball | Ø 50 | 20 mm | 10.000 N | 30 m/min | 3 m/sec. ² | Bosch-Rexroth | Pre-loaded nut | Automatic |



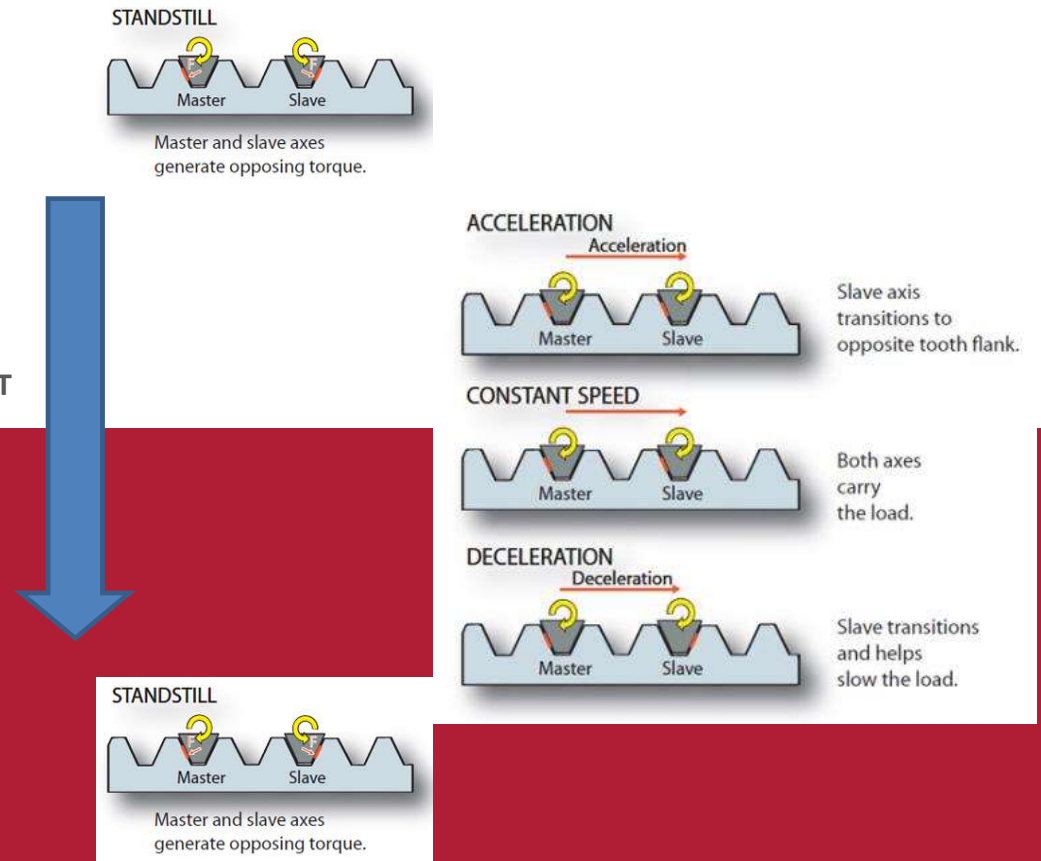
Handling and axes

DOUBLE MOTOR ELECTRONIC PRELOAD

This technical solution for strokes more than 3.600 mm allows the **recovery of the backlash due to the inversion movement of the axis.**

The diagrams alongside explain how the system works.

MOVEMENT



ADVANTAGES

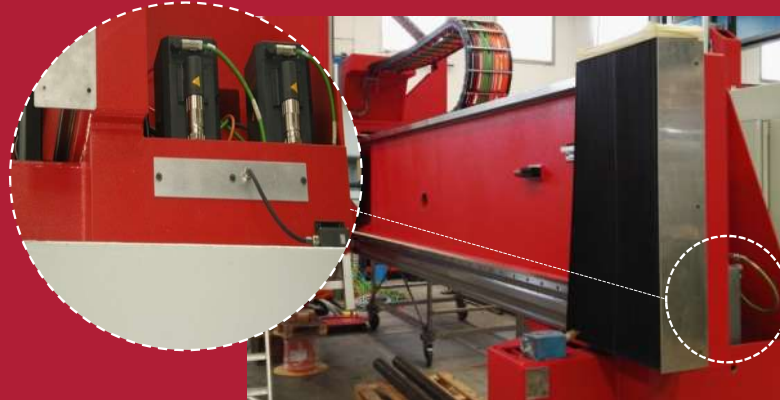
- The electronic preloading system of the linear axes, compared to a single motor system, **eliminates the backlash and makes the axis rigider and ready for the machining load.**

Handling and axes

Longitudinal movement (X axis): made by a weight-optimized and structurally rigid portal, for high dynamic performance and precision.

Transversal movement (Y axis): made by the carriage which runs on the bridge, and on which is mounted a vertical ram (Z axis) with high bending strength for large ranges.

The X and Y axes are driven by a system realized by two motors having two helicoidal pinions matched on the same rack. **The backlash recovery and mechanical compensation reduction** are obtained thanks to **the digital servo-drive, which generates a mechanical preload between the two pinions.**

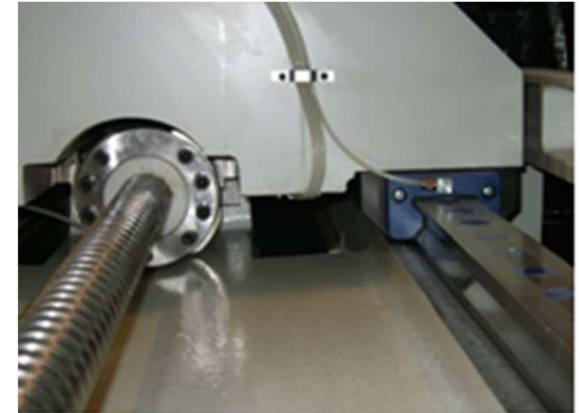


X axis

Handling and axes

| Axis | Diam./Pitch | Thrust | Feed rate | Acceleration |
|------|-------------|----------|-----------|-----------------------|
| X | M3 | 27.000 N | 50 m/min | 3 m/sec. ² |
| Y | 63/40 mm | 13.500 N | 50 m/min | 3 m/sec. ² |
| Z | 50/20 mm | 10.000 N | 30 m/min | 3 m/sec. ² |

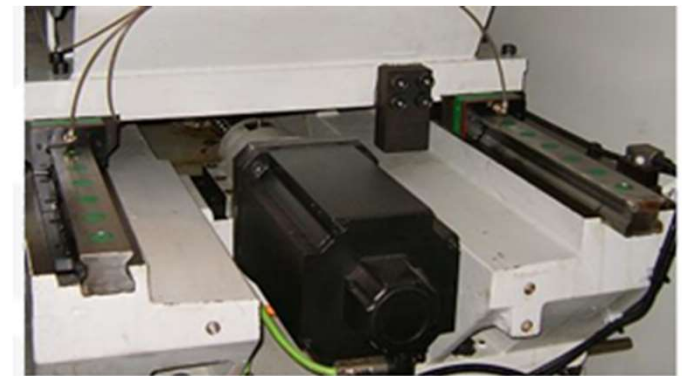
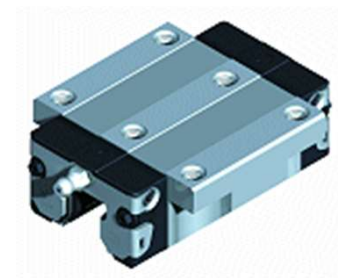
| Axis | Recirculating screws supplier | Kinematics |
|------|-------------------------------|------------------------------|
| X | GFM | Rack-pinion |
| Y | Bosch-Rexroth/GFM | Pre-loaded nut / Rack-pinion |
| Z | Bosch-Rexroth | Pre-loaded nut |



Handling and axes

RECIRCULATING SLIDING BLOCKS ROLLER TYPE

| Axis | Type | Dimension | Blocks | Lubrication |
|------|------|-----------|--------|-------------|
| X | Ball | RA 45 | 6 | Automatic |
| Y | Ball | RA 45 | 8 | Automatic |
| Z | Ball | RA 45 | 6 | Automatic |



Handling and axes

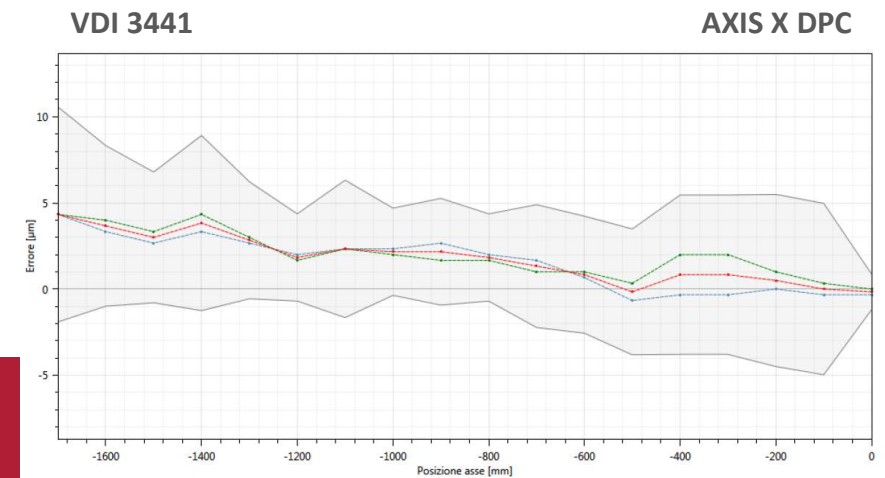
VDI-DGQ 3441

Specified machine accuracy can be achieved at a constant environmental temperature of 20°C (+/-2°C).

Even in the absence of linear scales, accuracy can be optimized by creating a calibration table with axis position detection by means of an interferometer. The calibration table is stored in the CNC memory. The CNC uses this data to automatically compensate the positions of the axes. The laser interferometric system issues a positioning accuracy certificate based on the VDI-DGQ 3441.

ADVANTAGES

- **Guaranteed performances in terms of precision and repeatability as well as complete calibration of the linear and rotative axes at the initial levels (of the installation).**
- It is possible to create **different tables of compensation that can be activated directly from the CNC**, in case of non-air-conditioned environments with temperature variations upon season changes. *



Accuracy (10 axis strokes test):

Positioning accuracy

P = 16 µm

Repeatability

PS= 6 µm

* Optional

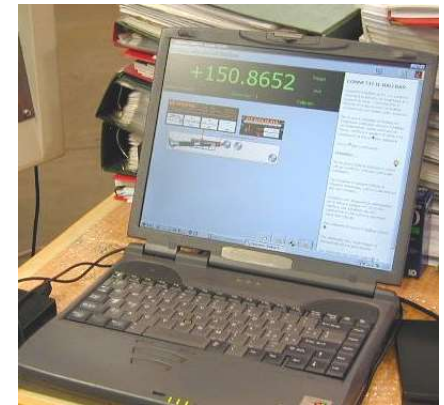
Main Features and Options

Handling and axes

BALL-BAR

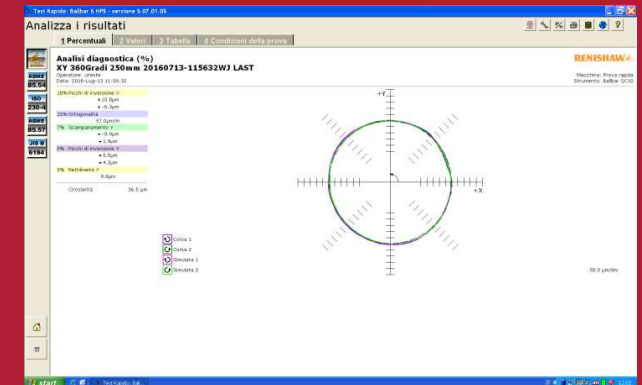
Ball-Bar systems is used **to test the dynamic behavior of two interpolated axes.**

Thanks to the detection of the ball-bar, static and dynamic errors of the axes are corrected, improving the performance of the machine and obtaining better quality on the machined piece.



ADVANTAGES

- **Greater accuracy** thanks to the constant control of interpolation errors between the axes, mechanical backlash, dynamic errors of the axes and orthogonality.



Working table

ALUMINIUM VACUUM TABLE

Specifically designed for aluminium plate machining, this aluminium table is provided with a grid matrix with grooves for vacuum-evacuation through rubber seals. It is also equipped with a metal insert hole matrix for mechanical clamping/vacuum passage.

ADVANTAGES

- **Clamping area adjustable** according to the size and position of the piece.
- **Clamping area delimited by the arrangement of the gasket in the channels of the table:** it is possible to clamp the piece directly on the table or combine it with a expendable surface.
- **Mechanical clamping** is possible using vacuum screws and clamps.



Working table

CAST IRON TABLE WITH T-SLOTS

The working table consists of a cast iron table with **T-slots for fixing**: 22 mm H12, 250 mm interaxis, with **loading capacity of 5.000 kg/m²**.

The table is equipped with a special V-shaped processing, which avoids the gluing of the piece to the table due to the vacuum during machining with coolant.

ADVANTAGES

- **The most rigid and precise solution: stronger monolithic structure**, the table mechanically connected to the monolithic structure of the machine allows to have a single machine/piece body and guarantees stability and machining precision.
- Particularly suitable for mechanically clamping equipment and pieces to the table.



Working table

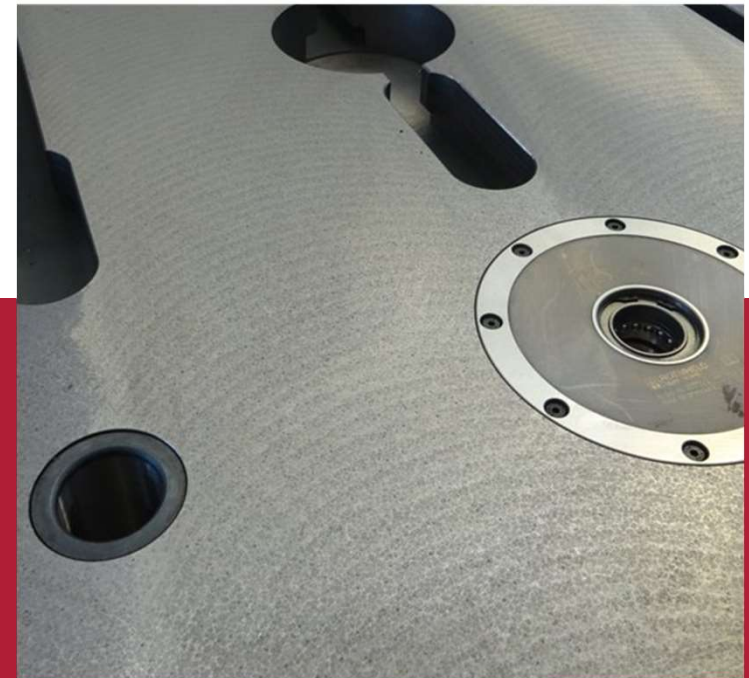
TABLE WITH T-SLOTS AND ZERO POINT

The T-slot table could be customized with embedded zero point connection, pneumatic or hydraulic, according to the clamping force required.

The zero point distance can be agree with the jig size. The operator can also open or close the zero point using a dedicated M function, that will guarantee the positioning.

ADVANTAGES

- **The zero point system is the fastest way to change jigs:** the pieces or equipment can be positioned within the working area with a repeatability <0,01mm, without changing alignment/positioning and using customized reference pins.



Head and Electrospindle

SINGLE SHOULDER HEAD

This simultaneous 5-axis machining head **enables tool inclination and orientation in any 3D direction**. It is equipped with servomotors with gearboxes and direct measurement system to grant **high dynamism and accuracy performances**.

It is also provided with a pneumatic/oil-dynamic axis locking system for the rotating axes which allows a **higher machining rigidity**.

ADVANTAGES

- **Compact design to decrease collision issues:** the spindle can be very close to the part, without using very long tool holders.
- **Particularly suitable for working in small and indoor spaces.**



Main Features and Options

Head and Electerspindle

22kW SINGLE SHOULDER HEAD

- Axis C +/-270°
- Axis A +/-120°
- Rotary axes accuracy: 30 arc/sec
- Repeatability: 12 arc/sec
- Pneumatic rotary axes brakes
- C axis clamping force: **1.100 Nm**
- A axis clamping force: **1.100 Nm**

Equipped with:

ELECTROSPINDLE 22 kW

- Power: **22kW** (S1)
- Max. rotation speed: **20.000 rpm**
- Max. torque: **28 Nm** at 7.500 rpm (S1)
- Tool taper: **HSK A63**
- Liquid cooled spindle
- Permanent grease lubrication
- Automatic tool changer
- Rotary joint tool lubrication *

42kW SINGLE SHOULDER HEAD

- Axis C +/-270°
- Axis A +/-100°
- Rotary axes accuracy: 20 arc/sec
- Repeatability: 10 arc/sec
- Oil-dynamic rotary axes brakes
- C axis clamping force: **3.000 Nm**
- A axis clamping force: **2.000 Nm**

Equipped with:

ELECTROSPINDLE 42 kW

- Power: **42kW** (S1)
- Max rotation speed: **24.000 rpm (18.000 rpm** grease lubrication)
- Max. torque: **67 Nm** at 6.000 rpm (S1)
- Tool taper: **HSK A63**
- Liquid cooled spindle
- DLS (oil) or permanent grease lubrication
- Automatic tool changer
- Rotary joint tool lubrication *

* Optional

Main Features and Options

Head and Electrospindle

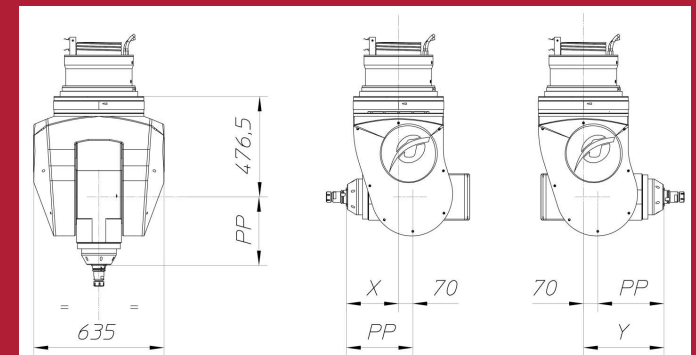
FORK HEAD TORQUE

This fork head is made of spheroidal cast iron and is equipped with hydraulic brakes on the rotary axes A and C. C axis movement is managed by a torque motor, while the A axis is activated by double motor with torque multiplier and backlash resetting.



ADVANTAGES

- Suggested for **increasing the component finishing quality** during the **simultaneous machining of linear axes interpolated with rotary axes A and C.**
- Designed to reach undercuts processing up to **45°**, allowing the **machining of the piece in the lower part.**
- Thanks to its symmetry, **better stability and rigidity**, it is particularly suitable for aluminium machining and ideal for the automotive, aeronautical and mechanical sectors.



Head and Electrospindle

FORK HEAD TORQUE

- Axis C +/-360°
- Axis A +135° -110°
- Rotary axes accuracy: 20 arc/sec
- Repeatability: 10 arc/sec
- Oil-dynamic rotary axes brakes
- C axis clamping force: **2.000 Nm**
- A axis clamping force: **2.000 Nm**

Equipped with:

30 kW ELECTROSPINDLE (IBAG)

- Power: **30kW** (S1)
- Max. rotation speed: **24.000 rpm**
- Max. torque: **29 Nm** at 10.000 rpm (S1)
- Tool taper: **HSK A63**
- Liquid cooled spindle
- Permanent grease lubrication
- Automatic tool changer
- Rotary joint tool lubrication*

or:

42 kW ELECTROSPINDLE (IBAG/FISCHER)

- Power: **42kW** (S1)
- Max. rotation speed: **24.000 rpm**
- Max. torque.: **67 Nm** at 6.000 rpm (S1)
- Tool taper : **HSK A63**
- Liquid cooled spindle
- DLS (oil) or permanent grease lubrication
- Automatic tool changer
- Rotary joint tool lubrication*

* Optional

Tool changer

18/24/30-POSITION AUTOMATIC TOOL CHANGER

The tool changer is integrated on the right/left side of the machine structure and **it consists of a carousel featuring HSK F63, HSK A63 toolholder collets.**

The carousel is driven by a gearbox and brushless motor with a maximum rotation of 180°/s to guarantee a faster movement for tool changing, a pneumatic cylinder move the carousel inside the working area during tool changes operations.

Tool dimensions: 110 mm diameter in the adjacent position, 300 mm length and 5 kg weight.



ADVANTAGES

- Thanks to the tool changer location outside the working area, **tools can be replaced manually through a safe side access.**
- **Greater safety:** each station is controlled by a **photocell that checks the presence of the tool holder, avoiding collisions caused by operator errors.**

Tool changer

TOOL CHANGER WITH ROBOT SOLUTION UP TO 200-POSITIONS

The ring or chain **tool changer with 200-positions** is managed by a robot on the right/left side of the machine. The robot arm is equipped with a clamping system which pre-loads the next tool automatically, **in order to decrease the tool change cycle time.**

Tool taper: HSK A63.

200 positions: maximum diameter is 130 mm in adjacent position, maximum length is 300 mm and weight is 10 kg.



ADVANTAGES

- **Greater safety and cleanliness:** tool changer installed outside of the working area with external protections.
- **Efficiency and safety:** it is possible to change the tools from the racks outside the machine while it is working.
- **Flexibility:** it is possible to manage very large tools such as angular heads and saw blades.



Main Features and Options

Protection system

PERIMETER ENCLOSURE WITH MANUAL FRONT DOOR

The perimeter enclosure is equipped with **wide windows for visual inspection** of the working area and is made up of **sound absorbing panels to reduce noise while ensuring a clean environment** inside the working area.

Doors are equipped with **safety and locking devices** to allow **access to the working area only if the machine is stopped**.

ADVANTAGES

- **Checking the milling operation in safety condition** – it's also possible to go inside the working area with the machine in hold modality.



Main Features and Options

Protection system

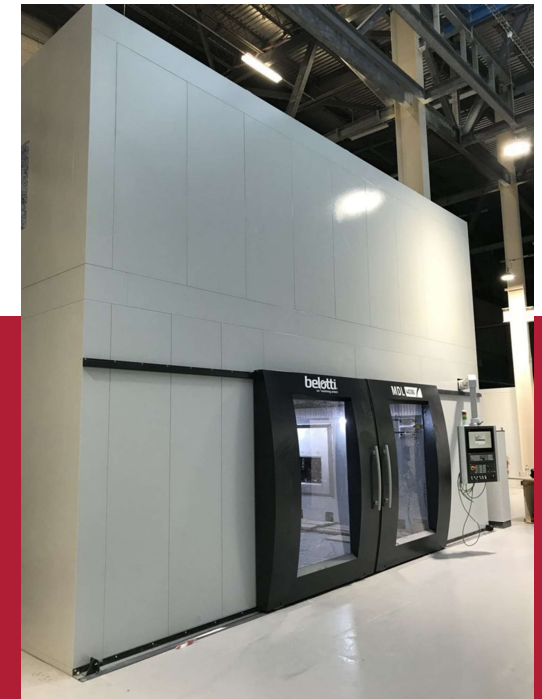
TOTAL ENCLOSURE

The total enclosure is designed to guarantee compliance to the current European noise rules for machining centers.

Structure with sound proof panels are both made of galvanized and painted steel sheet. The doors to the loading/unloading area are manual and slide outside the fixed front wall of the enclosure. They also move on ball screws linear guides to make the opening and closing soundless while providing excellent vision into the machine. Doors are equipped with safety and locking devices to allow access to the working area only if the machine is stopped.

ADVANTAGES

- Soundproof cabin: noise lower than 80 dba.



Protection system

TOTAL ENCLOSURE WITH OPEN ROOF

This enclosure, totally compliant to the current European noise rules for machining centers, is equipped with **automatic upper doors for loading of parts by means of an overhead crane**. Even the manual lower doors have a wide opening to enable loading of pieces according to the strokes.

ADVANTAGES

- **Cleanliness and soundproof cabin: guaranteed hermetic solution from dust and noise lower than 80 dba.**
- **Maximum usability:** the motorized upper doors can open completely the working area, allowing the access of pieces from above with an overhead crane as well as from the front of the machine.



Protection system

MOTORIZED UPPER ROLLING SHUTTER

The motorized rolling shutter limits the **escape of chips from the working area** and **makes the opening and closing operations easy and quick**, allowing loading by means of an overhead crane.

The special translucent fabric guarantees **ample light in the working area**, already artificially illuminated.

ADVANTAGES

- **Cleanliness and safety:** the rolling shutter closes completely the top of the machine, containing chips inside the working area during 5-axis operations.
- **Flexibility:** the motorized bellows can open completely the working area, allowing the access of pieces or equipment that must be loaded from above with an overhead crane, reducing time drastically.



Dust suction system

HIGH PRESSURE SUCTION SYSTEM for 5-axis head with pneumatic control for the removal of dust and shavings in the milling area. Also available in ATEX version.



PNEUMATIC SUCTION HOOD

To keep the hood close to the piece, increasing the effectiveness of the suction. The hood positioning is managed by M codes with different intermediate positions.

ADVANTAGES

- It allows to locate the high pressure suction flow near the tool tip.
- **Versatility:** the operator can manage by M codes different positioning according to the tool length.



Dust suction system

HIGH PRESSURE SUCTION SYSTEM for 5-axis head with electronic control for the removal of dust and shavings in the milling area. Also available in ATEX version.



MOTORIZED SUCTION HOOD

The extension of the electronic hood can be managed by the working program and adapts automatically according to the length of the tool and the machining depth of the piece.

ADVANTAGES

- **Efficient suction** guaranteed thanks to the possibility of locating the high pressure flow rate in contact with the piece and electronically adjusting the position of the hood during cutting operations.
- Possibility to control the hood as an axis, from the cutting program.
- **Particularly suitable for dusty materials and for the composite profiling of composite, to avoid collisions or damage to the parts.**



Main Features and Options

Dust suction system

GROUND OR SIDE SUCTION SYSTEM FOR HIGH REMOVAL VOLUMES

10.000 – 12.000 – 18.000 – 24.000 m³ capacity depending on the volume of the machine, with static and dynamic dust extraction ports.

Also available in ATEX version.



GRIDS

The machining center is equipped with dust extraction grids positioned under the two runways, or on the side panels of the machine that allow good dust extraction during milling operations.



Main Features and Options

Cooling liquid system

COOLING LIQUID SYSTEM WITH CHIP CONVEYOR, LIQUID COLLECTION TANK WITH MECHANICAL PAPER FILTER AND HIGH / LOW PRESSURE PUMPS

Chip conveyor

- Watertight body with 250 l lubro-coolant liquid collection tank
- Belt with 400 mm centre distance and 3,5 m/’ feed
- Chip conveyor opening dimensions: mm 3100 x 250
- Booster/transfer pump with 180 l/min capacity
- Safety microswitch for rotation control with protection cover
- Dredging service lift with 60° inclination and chips exit at 1 m height

Coolant collection tank

- Paper filter with 220 l/min at 35µm filtering fabric
- Level adjustment for filtering fabric automatic feed
- Microswitch to signal roll end
- Control panel and filter control
- Dirty liquid conveyor
- Electrowelded steel sheet tank for collection of filtered emulsion, equipped with pump housings with the following dimensions: mm. 1.600 x 800 x H 700 – Net capacity 800 l
- Sheet steel tank for mud and used filtering fabric collection, with the following dimensions: mm. 800 x 200 x h 515 mm

Liquid coolant chiller*



* Optional

Cooling liquid system

LOW PRESSURE COOLING

Usually required when it is necessary to remove the scraps from the part and the machine table. The cooling liquid comes out from the nozzles mounted on the head. Electro-pump for delivery of low-pressure lubro-coolant (with different capacity and bar pressure, depending on the Serie) to the nozzles mounted on the spindle.

HIGH PRESSURE COOLING

Usually required when drilling with drilled bits and when milling with inserts. The cooling liquid comes out from the machine electrospindle. Electro-pump for delivery of high-pressure lubro-coolant with 30 l/min capacity and 40 bar pressure, equipped with no. 2 cartridge filters for liquid filtration at 10 μ m absolute.

In option, a rotary joint suitable for feeding the lubro-coolant through the tool at a 40 bar pressure and a 30.000 rpm rotation, or for spray-mist operation.

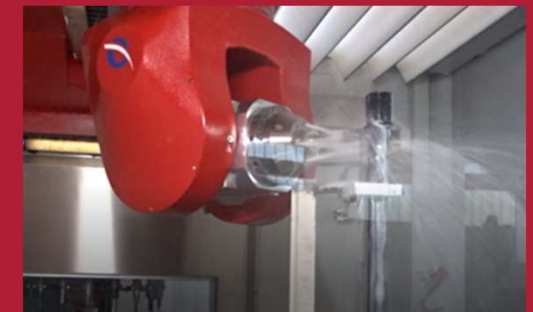


Cooling liquid system for composite materials

Specific cooling liquid system with filtering capacity 3/5 μm .

ADVANTAGES

- **Increased cutting tool life: up to 3 times** comparing to the MQL system.
- **Completely clean milling zone - no chips and small scraps** – thanks to the coolant pressure and flow during milling operations.
- **Ideal for very high precision machining:**
 - no melting of the material on the cutting edges thanks to the high pressure with dedicated cutting tools for internal coolant, **avoiding breakage or damage to the surface;**
 - control of the coolant temperature **avoiding thermal distortion of the part during milling process.**



Options

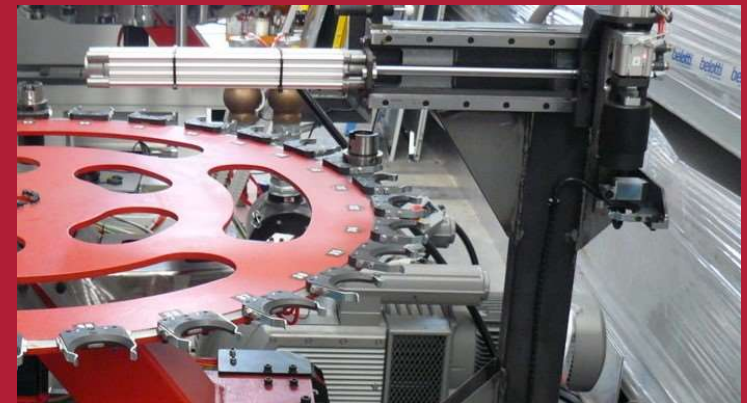
CHIP READER*

Automatic reading and writing system of all tool parameters, which are written with a pre-setting external to the machining center. The CNC can automatically write the residual life in the chip when unloading the tool from the magazine.



ADVANTAGES

- **All information and parameters written automatically outside the machine**, during the tool holder loading operations.
- **Greater safety**: the recording of all data in the NC and the detection of the tool position allow to **minimize errors from operator**.



* Optional

Options

MQL – MINIMAL QUANTITY LEVEL

The MQL system, in the presence of a rotating joint, is used to **generate aerosols for internal and external lubrication**. This system refills itself automatically out of a separate tank and can be determined via parameter settings from the CNC-control regarding the requirements of the cutting operation.

ROTARY JOINT

The spindle can be equipped with a rotary joint to allow **the passage of the lubricant-coolant or air through the tool**. **The lubrication is carried out directly on the cutting edge, even in the presence of a suction hood.**

ADVANTAGES

- During the milling of aluminium, chip gluing is avoided, vibrations are reduced and the tool temperature is kept low.
- **Higher surface finishing quality.**
- **Increased tool life.**
- **Increased productivity:** higher working speed during aluminium milling.



Options

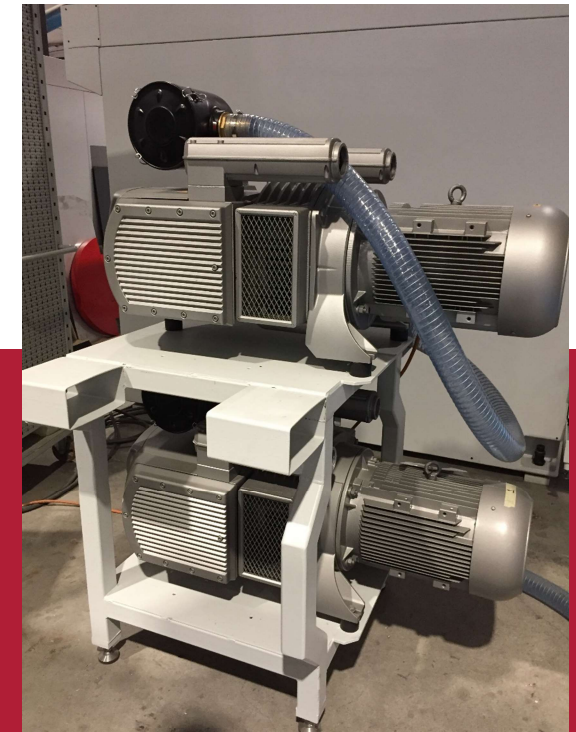
CLAMPING SYSTEM WITH VACUUM

In order to guarantee the highest level of precision for a fast and safety milling cycle, the clamping system with vacuum is a fundamental component for obtaining maximum performance.

The system consists of high depression dry vacuum pumps from 100 to 1050 m³/h, filters for protection from dust and chips, vacuum solenoid valves and adjustable vacuum switches for the control of the minimum vacuum threshold on the workpiece.

ADVANTAGES

- **Ease to use and maximum efficiency:** the clamping system with vacuum guarantees a rigid grip, avoiding any cluttered brackets and reducing the risk of collisions and damage to the piece and the machining center.



Options

SDS (Self Diagnostic System) MEASURING SYSTEM FOR ROTARY AXES AND TOOLS

This system allows to control the rotary axes alignment and the tool length measurement through a M function pre-installed in the NC.

The system is assembled on a **telescopic arm**, protected by dust or chips.

All operations take place in mechanical contact.



ADVANTAGES

- **One single system for axis requalification, length control and tool breakage.**
- **Automatic control.**
- **Possibility to manually recall the cycle with an M code, keeping the tool protected from dust or chips.**

Options

NON-CONTACT TOOL SETTING SYSTEM

Useful for monitoring the tool status and for tool life management, this is a **flexible laser** system with ultra-compact laser tool setting transmitter and receiver units.

It can quickly perform operations of:

- length and diameter pre-setting
- contactless breakage detection and tool wear upon real conditions at the spindle working speed.

ADVANTAGES

- **Ideal for non-contact and very high precision diameter and tool length measurements:** the fixed positioning in the working area ensures a micrometric measurement of the rotating tools.
- Possible **connection to the automatic tool recognition system** for status control.



Main Features and Options

Options

HEIDENHAIN LINEAR SCALES

Direct incremental measuring system for all linear axes with graduated metal and pressurized line.

- up to 4 m in a single body with glass optical band
- from 4m up to 72m in modular body with steel optical band



Direct measuring system for all rotary axes



Linear axes thermal compensation system



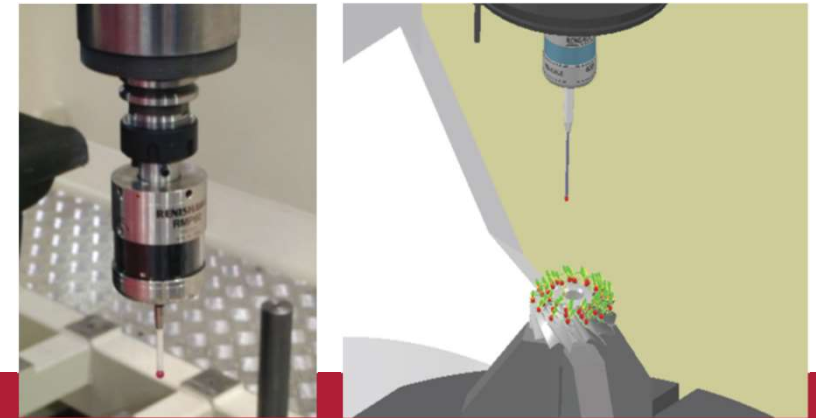
Original factory certificate

Opzioni

3D probing system with radio transmission

This system gets automatically the position of the piece and enables to auto-centre the cutting program taking into consideration possible piece deformations.

RPM 60 via radio mobile model is settled in the tool stock and is picked up automatically by the electrospindle without any manual operation.



OPTIONAL Kinematics inspection system*



* Only with 5-axes head

Options

VIBRATION MONITORING SYSTEM

Miniaturized monitoring system particularly recommended in aerospace sector and aluminium milling applications, to preserve spindle and CNC machine performance.

Using advanced monitoring modular techniques together with 8 different configurations, the device can monitor every machine tool or product process in real time.



ADVANTAGES

- **Increased production capability.**
- **Higher performance control** by planned maintenance to avoid drastic damage, minimize collision effect and **decrease time machine down time and repair costs.**
- **Reduction of the impact of damage by 25/30 times** thanks to the high reactivity of the machining center equipped with MONTRONIX: **10 milli/sec from collision detection to machine downtime; 500milli/sec time interval for the machining center motors overload stop.**
- **The system detects any tool imbalances, giving the alarm and avoiding damage to the electrospindle bearings.**

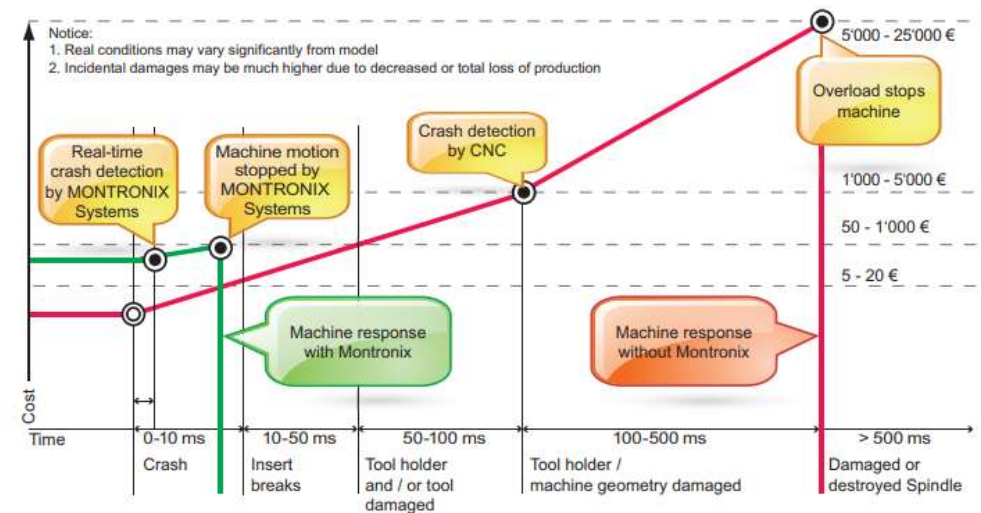
Options

MONTRONIX SOLUTIONS

- Reducing costs by avoiding machine shut downs
- Optimizing processing and station times
- Effectively generating and reading analytical data
- Protecting machines
- Protecting tools
- Protecting parts
- Assuring parts quality
- Securing the process chain for single and multi-part production
- Optimizing processes
- Assisting with preventive maintenance
- Extending tools and machine life

Productivity, Flexibility, Quality, Safety

■ COST - BENEFIT

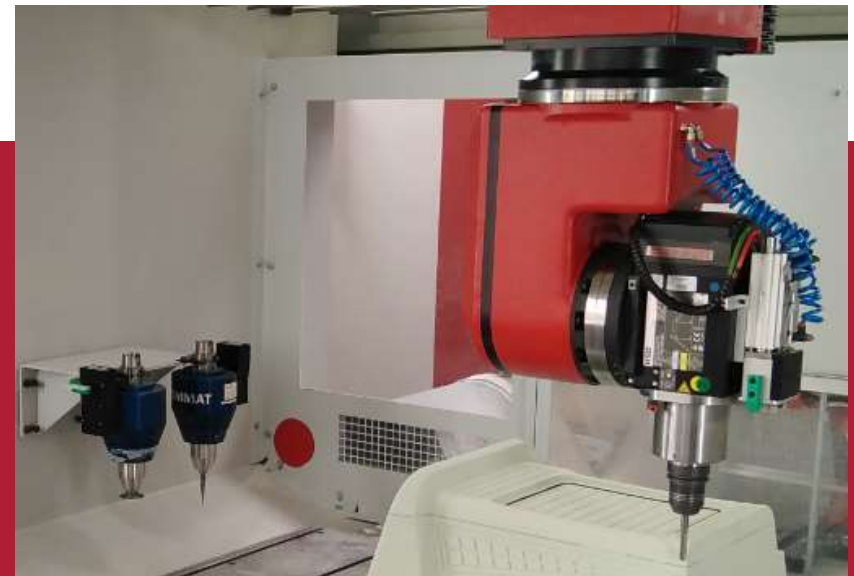
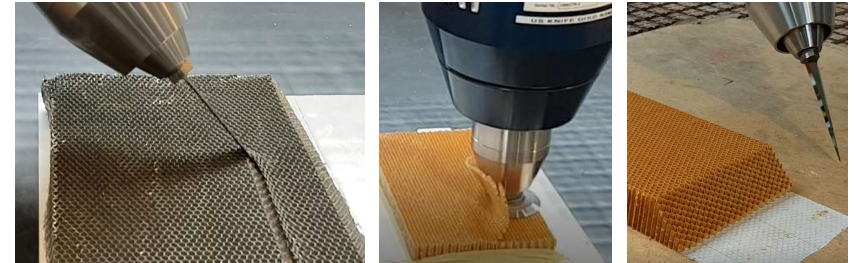


Options

ULTRASONIC TECHNOLOGY

The ultrasonic cutting system allows to work special materials (honeycomb) using an **ultrasonic frequency up to 20 Kiloherztz**. The system is supplied with automatic tool changer and can be equipped with **two cutting systems**:

- **oscillating blade** of different lengths that is oriented according to the geometry, controlled by CNC and interpolated with the movement of all linear and rotary axes;
- **oscillating and rotating disc** both clockwise and anticlockwise, controlled by CNC.



ADVANTAGES

- **Particularly suitable for processing soft materials:** fabrics, phenolic honeycomb, aluminium honeycomb, rock wool, carpet etc.
- **Accuracy and cleanliness:** thanks to the high frequency of blade oscillation, the separation of the material does not produce dust and, in the case of honeycomb, does not produce cells crushing.



THANK YOU