CNC MACHINERY SALES AUSTRALIA

belotti cnc machining centers

NAVY

Product Presentation

Agenda

- **Advantages and Applications**
- **Main Features and Options**

ADVANTAGES AND APPLICATIONS

Better performances

Large parts machining	Higher Rigidity	Higher Speed and Dynamic	Safe & Clean Environment
Double independent bridge to halve the machining time of large parts.*	**M4** rack and pinion **module for greater rigidity**. **Preloaded runner blocks, elongated version, mounted on recirculating ball guides size 45.**	3D printing head for all in one machine **milling+3D printing.***	**Upper rolling shutter** to cointain dust and chips inside the working area.*
Telescopic Z-axis which allows to work large pieces by reducing the space required within the factory.*	**Increased number and distance between the runner blocks** for higher rigidity.	**M4** rack and pinion **module** to increase **the dynamics of the machine.**	**Customizable suction systems,** with air ducting **and requalification** (filtered air refilling) to **increase the internal cleaning of the working area.***
Electro-welded structure with thermal stabilization to guarantee **high precision and stability** overtime, with thickness dimension of 10 mm and including internal ribs.	**Low-backlash ALPHA planetary gearboxes ≤ 1 arcmin.**		**Dedicated cameras** set on the spindle housing to **verify the working cycle and monitor unattended machining.***

* Optional

Enhanced precision

EXAMPLE: NAVY 6042

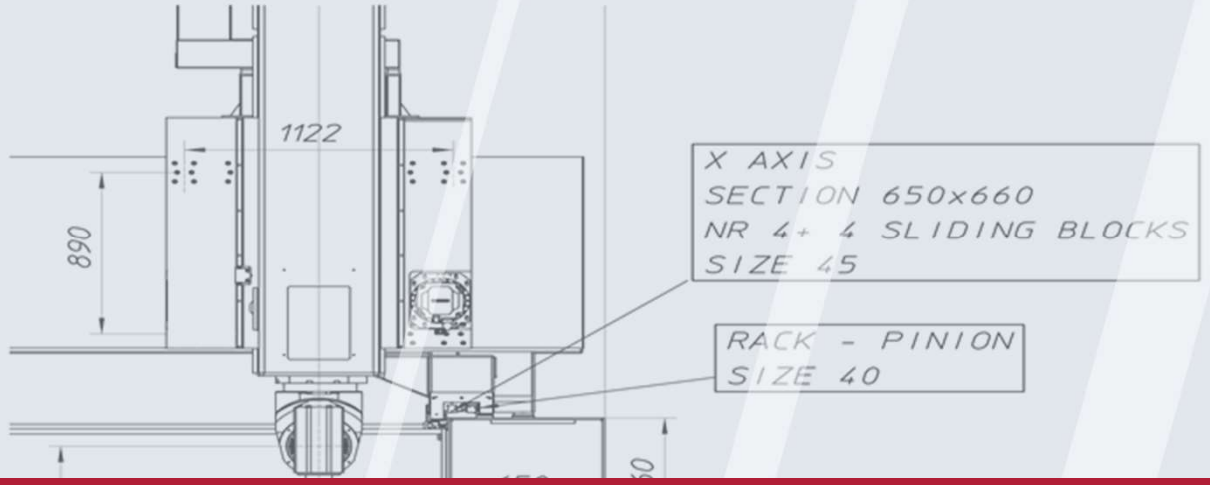
AXIS	TYPE	STROKE	POSITIONING PRECISION	REPEATABILITY
X	Linear	6000 mm	0,096 mm (≤ 0,035 mm/m)	0,053 mm
Y	Linear	4200 mm	0,074 mm (≤ 0,035 mm/m)	0,041 mm
Z	Linear	2000 mm	0,047 mm (≤ 0,035 mm/m)	0,026 mm
C	Rotary	+/- 270°	24 arcsec	12 arcsec
A	Rotary	+/- 120°	24 arcsec	12 arcsec

THE BEST SOLUTION FOR THE MARINE INDUSTRY AND LARGE SCALE MOULDS PRODUCTION.

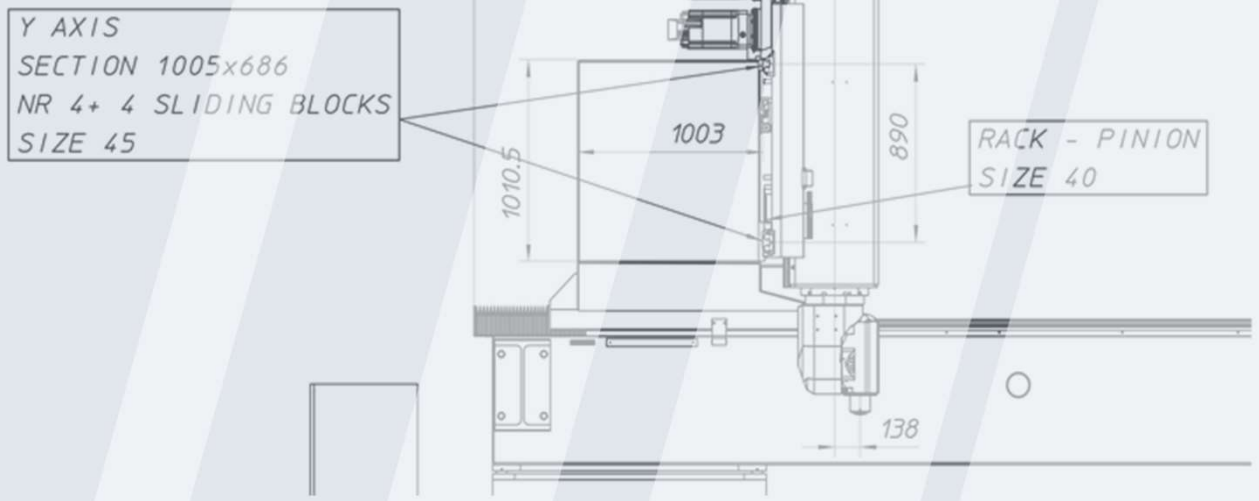
Processed materials: composites (carbon fiber, fiberglass, honeycomb) and **low density resins**.

Application sector:

RAILWAY | MARINE | ENERGY & BUILDING | PATTERNS & MOULDS



MAIN FEATURES AND OPTIONS



Description

NAVY 5-axis machining centres are designed **to meet the most important requirements of the marine – yachting sector and of patterns & moulds very large models**. Thanks to the wide choice of different sizes and machine configurations, NAVY is a **versatile solution**, allowing to process both the models and the final and structural parts of a medium-size boat: **cutting resin models, trimming fiberglass hulls and other high resistance composite materials**.

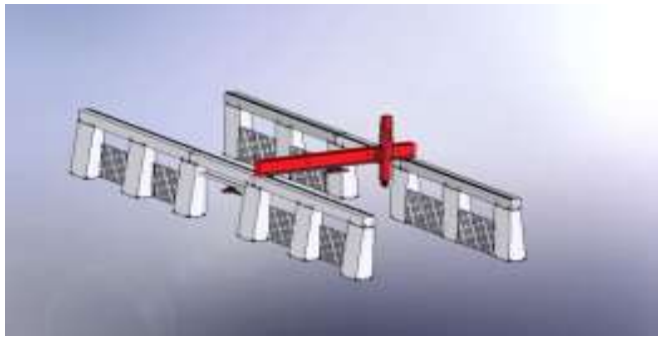
NAVY					
Axis	X	Y	Z	C	A
Sroke	2,6/6/8/12/17/20/ 23/30/43 m	4,2/6,2/ 7,2/8,8 m	1,5/2/3/3,3/4 4,2/5,3/6,9 m	+/- 270°	+/- 120°
Speed	100 m/min	45 m/min		44 rpm	40 rpm
Spindle	From 15 kW to 42 kW at 24.000 rpm max.				
CNC	Siemens, Heidenhain, Fanuc				
Tool change	From 18 to 60 positions				
Linear accuracy	≤ 0,035 mm/m for linear axes				
Rotary accuracy	+/- 24 arc sec for rotary axes				

Structure

The cartesian structure featuring a suspended bridge (made of very thick welded heat treated steel) **lays on a portal structure composed of modular beams and columns on both sides.**

The **rigid structure** is designed to offer a unique combination of performances: **short processing times, flexibility, high surface finish quality and durability**.

Rigid portal structure suspended on modular beams and columns on both sides.



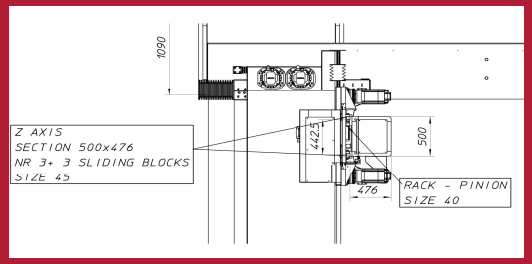
Handling and axes

The Z axis is **provided with a double motor system** with two helicoidal pinions matched on the same rack, and is equipped with **electrical and brake balancing on the servomotors for locking the movement in the event of a power failure**.

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

The rotating axes are equipped with special gearbox having a system for the backlash recovery.

Z Axis



Handling and axes

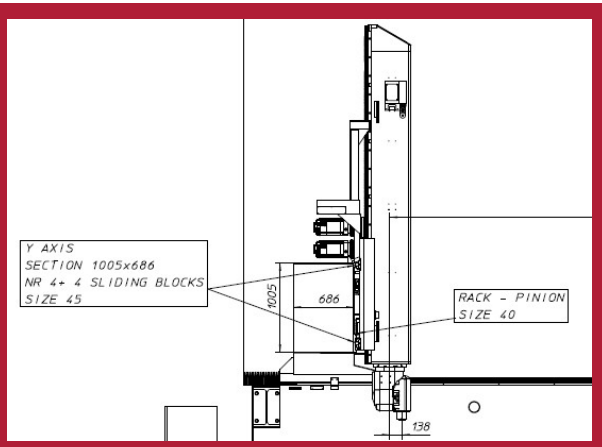
STRUCTURE AS AN ADVANTAGE: Y AXIS

4 + 4 recirculating runner blocks size 45

Distance between the external runner blocks NEW SERIES 1120x890 mm

ADVANTAGES

- The performance of the NAVY Series new generation has been improved by increasing the number and the distance between the external runner blocks, to achieve greater rigidity



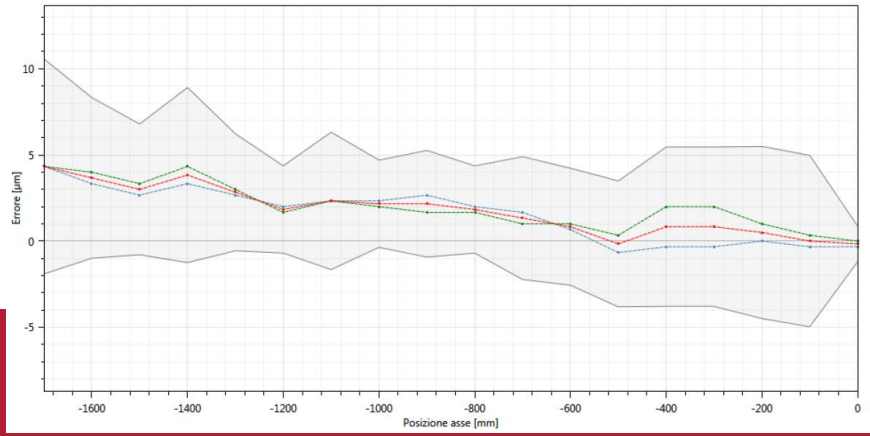
Handling and axes

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.

VDI 3441 **AXIS X DPC**



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 = 25 µm
Repeatability	PS= 6 µm

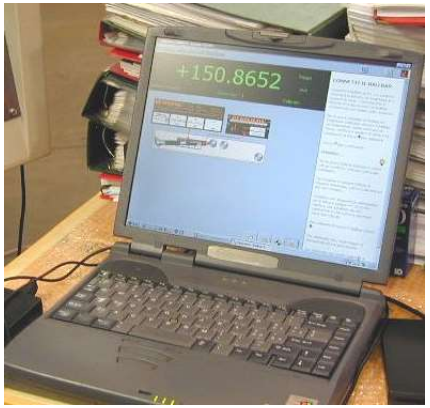
* Optional

Handling and axes

BALL-BAR

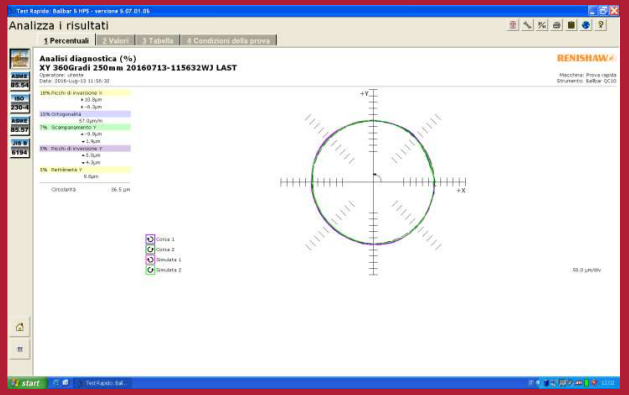
Ball-Bar systems is used **to test the dynamic behavior of two interpolated axes**.

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

STEEL TABLE WITH T-SLOTS

The working table consists of a steel table with **T-slots for piece fixing**: 250 mm interaxis with **loading capacity of 500 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:** the table is mechanically connected to the monolithic structure of the machine and allows to have a single machine/piece body, granting stability and machining precision.
- Particularly suitable for mechanically clamping equipment and pieces to the table.

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

HP2 HIGH PERFORMANCE HEAD

This **5-axes head** is equipped with YRT roll bearings reinforcing the head and the C axis in order to **decrease the vibration and therefore increase the rigidity** of the head itself.

It is equipped with servomotors with reducers, a pneumatic locking system and encoders mounted directly on the rotary axes, it is able to **guarantee movement precision**.

- Axis C +/-270°
- Axis A +/-120°
- Rotary axes accuracy: 24 arc/sec
- Repeatability: 12 arc/sec
- Pneumatic rotary axes brakes
- C axis clamping force: **1400 Nm**
- A axis clamping force: **840 Nm**

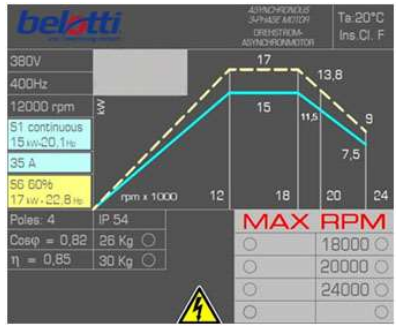
ADVANTAGES

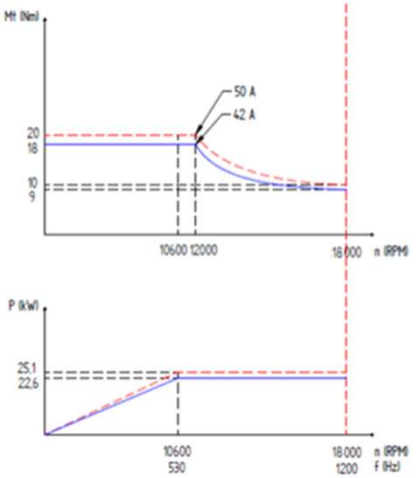
- **Greater rigidity and doble braking forces** than the traditional HP performance solution
- **Compact design to decrease collisions' incidence**: the head can be very close to the part to be machined on the side of the electrospindle, due to its limited encumbrance.
- **Particularly suitable for working in small and indoor spaces**

Electrospindle for 5-axis head

15 kW ELECTROSPINDLE HSK A63 OR HSK F63

- Electrospindle power **15 kW (S1)** and **18 kW (S6),** 12 Nm at 12.000 rpm
- Liquid cooled spindle
- Automatic tool change system
- Grease bearings lubrication
- **HSK A63 tool shaft**, maximum rotation 20.000 rpm; **HSK F63 tool shaft,** maximum rotation 24.000 rpm





22 kW ELECTROSPINDLE HSK A63 OR HSK F63

- Electrospindle power **22 kW (S1)** and **25 kW (S6),** 18 Nm at 12.000 rpm
- Liquid cooled spindle
- Automatic tool change system
- Grease bearings lubrication
- Maximum rotation 18.000 rpm*
- Cutting tool lubrication through the spindle*

* Optional

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 a scale inductive type measuring system which grant high **dynamic and accuracy performances**.

The head is equipped with a pneumatic rotary axis locking system which allows a **higher machining rigidity.**

ADVANTAGES

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

Head and Electrospindle

22 kW SINGLE SHOULDER HEAD

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

Equipped with:

22 kW ELECTROSPINDLE

- 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 pneumatic tool changer
- Rotary joint tool lubrication*

* Optional

Double bridge

DOUBLE INDEPENDENT BRIDGE

The second independent bridge is the best solution to increase productivity and flexibility.

It can be equipped with the same head of the first bridge or with different heads.

ADVANTAGES

- **Versatility:** with two different heads it is possible to carry out special processes with the same machine.
- **Higher productivity:** possibility of machining even large pieces, as in the case of the nautical sector.

Telescopic Z axis

It is possible to create a retractable telescopic Z system in case of machines with Z axis greater than 4500mm.

It is also possible to size the height of the machine according to the height of the plant.

ADVANTAGES

- **Versatility**: possibility of machining large size parts, even within low height plants.

Tool changer

16-POSITIONS AUTOMATIC TOOL CHANGER
Mounted under the machine stroke ways and protected against dust by a retracting door.
Tool max weight: 10 kg
Tool max diameter: 350 mm
Tool max length: up to70 with 4 central positions, up to 160 mm with 12 positions

ADVANTAGES

- Thanks to the tool changer location outside the working area, tools can be replaced **while the machine is in operation.**
- **Suitable for tools of greater size and weight compared to the carousel solution**.

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.**

Protection system

PERIMETER PROTECTION WITH MANUAL-OPENING FRONT DOORS

The perimeter enclosure is provided with **wide windows for visual inspection and is realised with sound absorbing panels in order to reduce noise level in the working area.**

Doors are equipped with safety and locking devices to enable access to the working area only when machine is stopped.

ADVANTAGES

- **Greater safety: it is impossible to access the work area while the machine is working**.

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.**

Dust suction system

GROUND OR SIDE SUCTION SYSTEM FOR HIGH REMOVAL VOLUMES

10.000 – 12.000 – 18.000 – 24.000 m^3 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.

Suction system

PUSH & PULL SUCTION SYSTEM

System with different flow rates according to the machine volume, complete with suction inlets on one side of the enclosure and inlets for re-integration of filtered air on the opposite side.

Also available in ATEX version.

ADVANTAGES

- **Cleanliness and safety: efficient evacuation of dust generated upon machining**, thanks to the air flow that inside the enclosure.
- **Particularly suitable for dusty environments**.

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

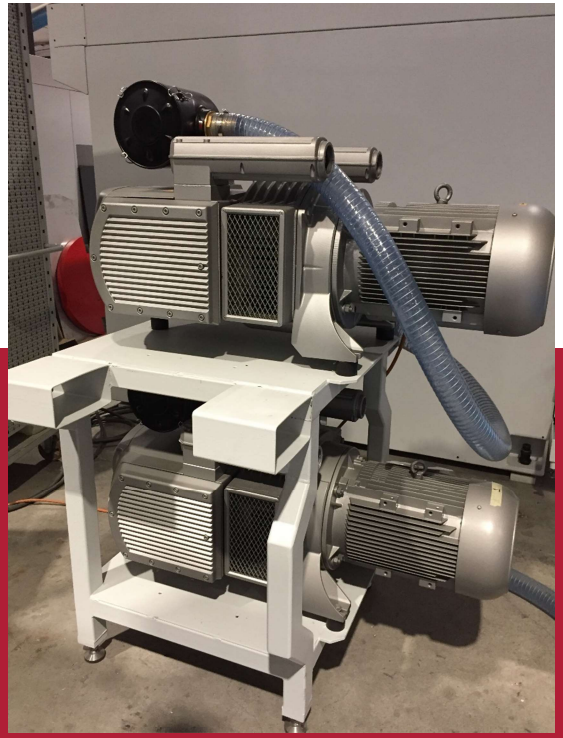
- During the milling of aluminium, chip gluing is avoided, vibrations are reduced and the tool temperature is kept low.
- **Higher surface finishing quality.**
- **Increased tool life.**
- **Increased productivity:** higher working speed during aluminium milling.

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.

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


LC 181 * S.Nr. 11132830D * Id.Nr. 341240-07

Hersteller-Prüfzertifikat

Manufacturer's Inspection Certificate

HEIDENHAIN

Messprotokoll

Calibration chart

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**.

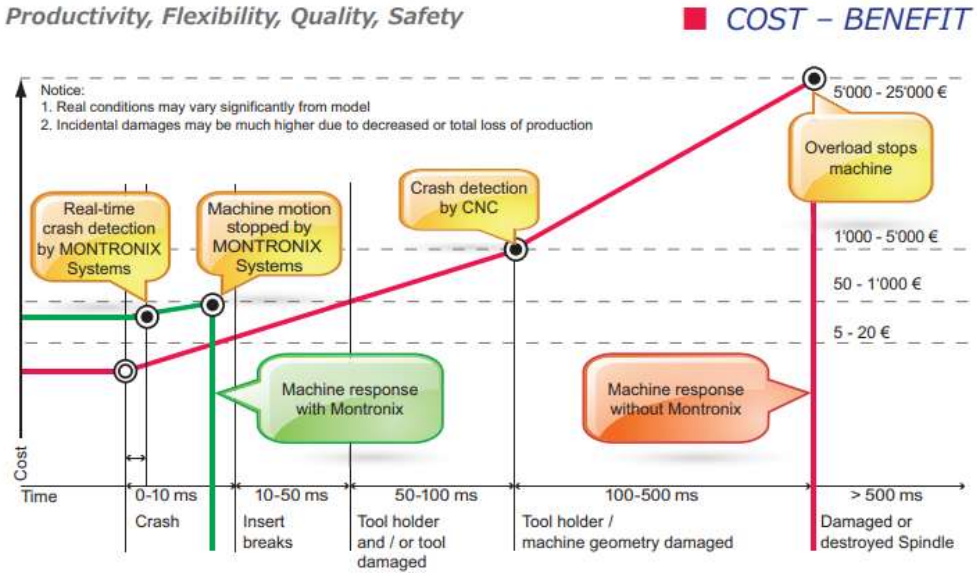
ADVANTAGES

- **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

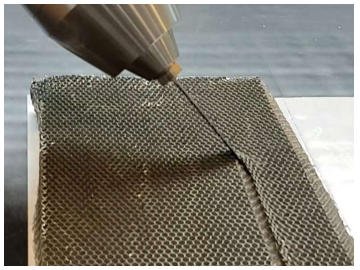


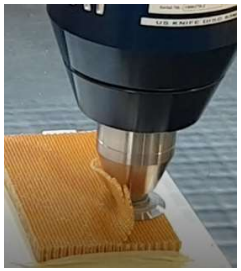
Options

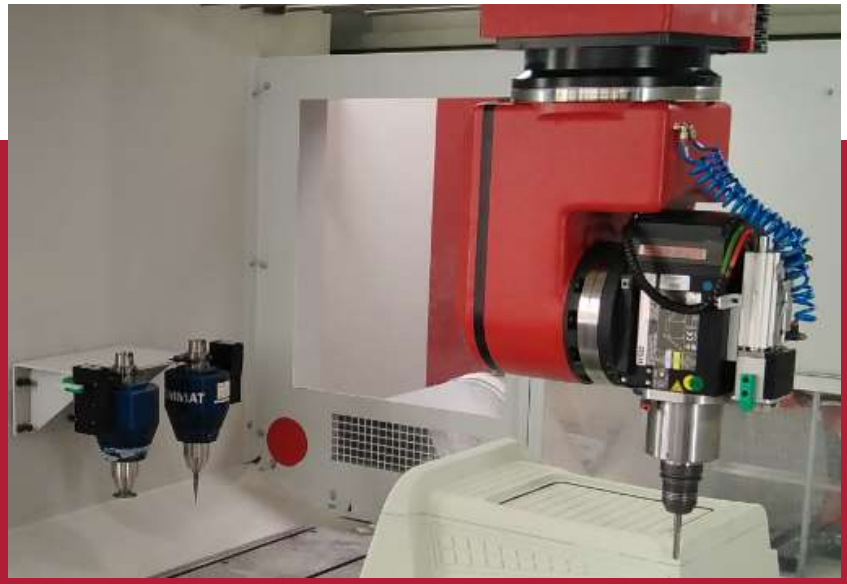
ULTRASONIC TECHNOLOGY

The ultrasonic cutting system allows to work special materials (honeycomb) using an **ultrasonic frequency up to 20 Kilohertz**. 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.

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THANK YOU