

Mazak

HCR-5000

S E R I E S

Mazak

HCR-5000 SERIES

YAMAZAKI MAZAK CORPORATION

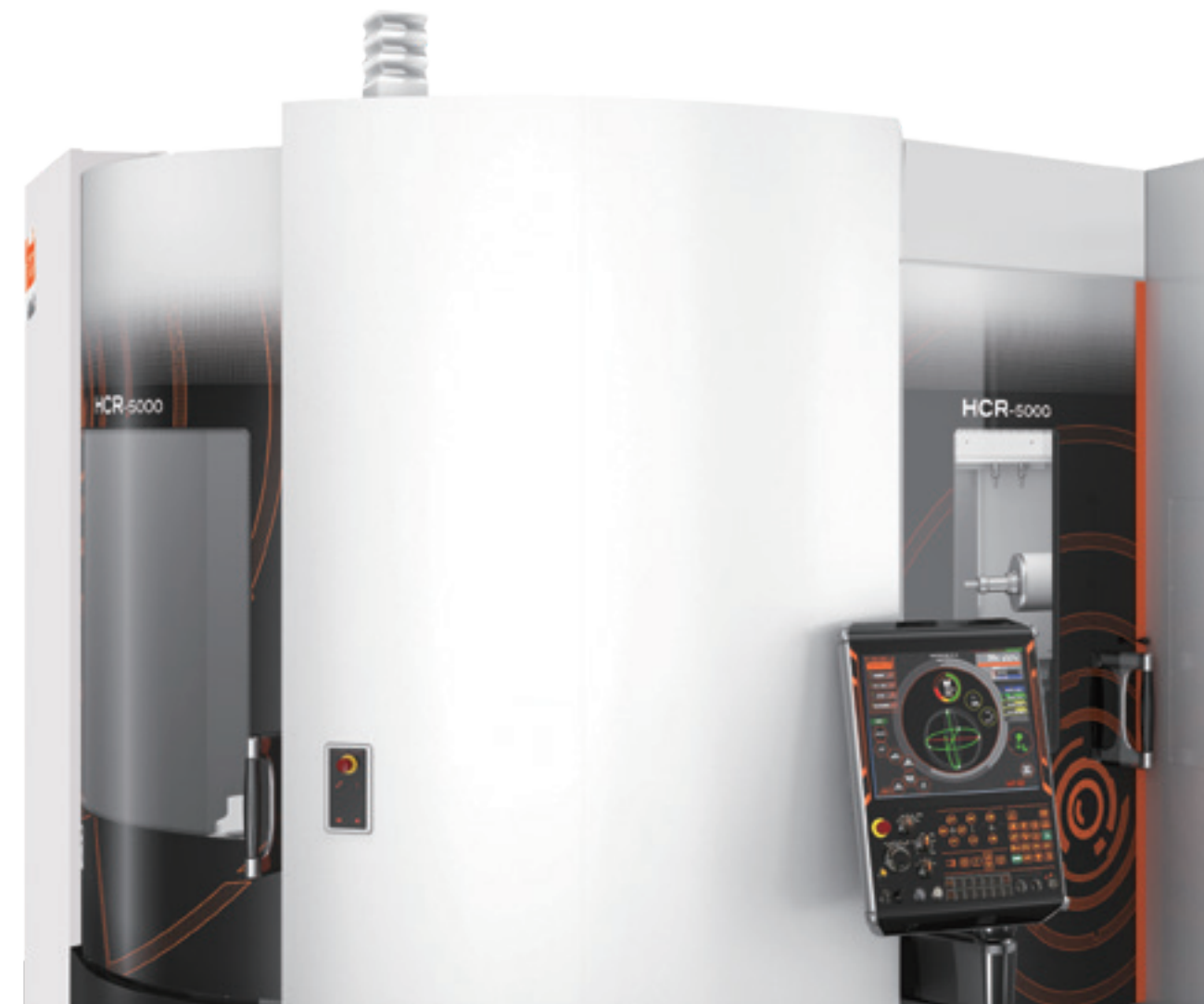
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HCR-5000 SERIES 19.07.0 A 99J342418E 1



Simultaneous 5-axis horizontal machining centers

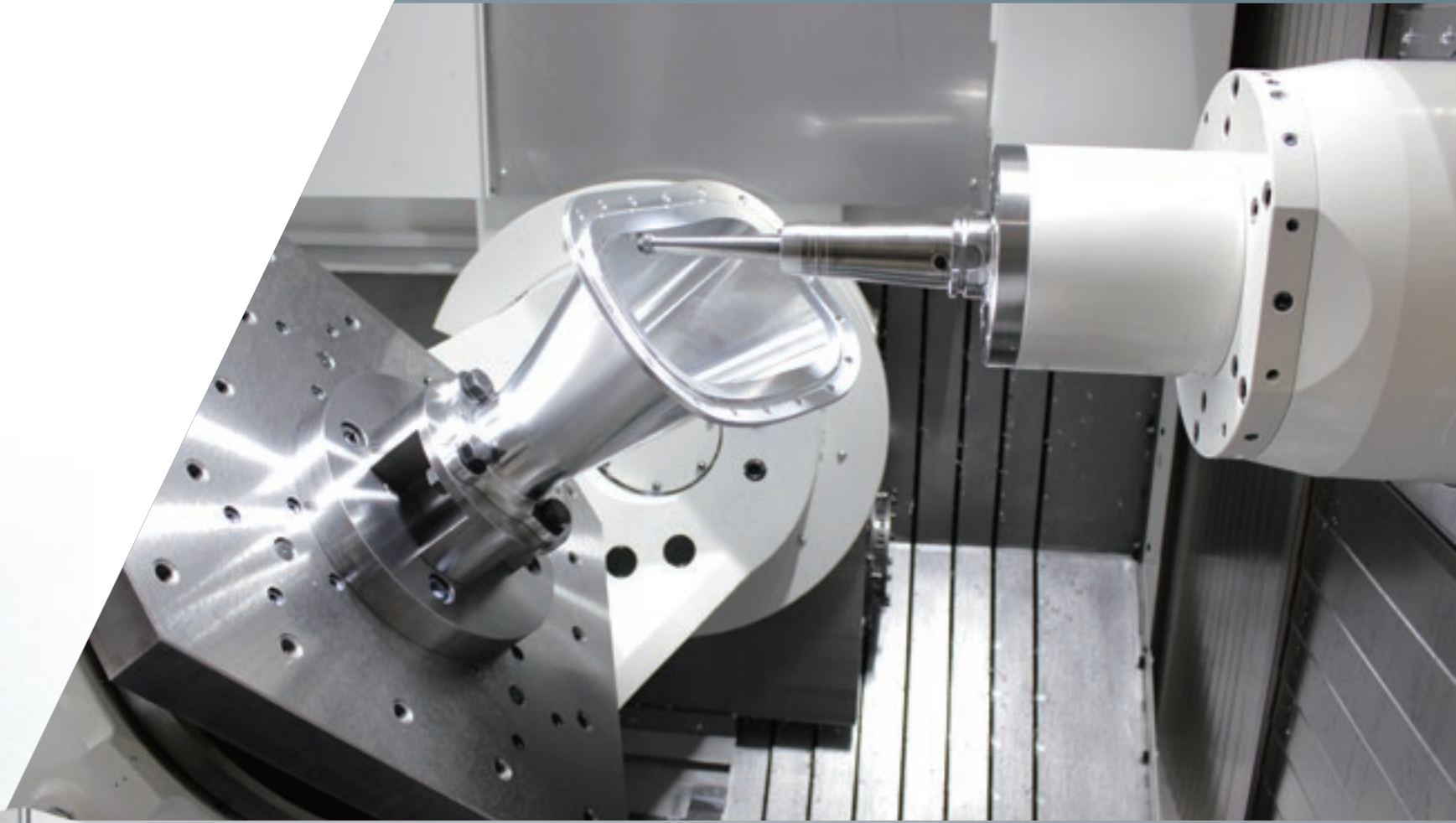
HCR-5000 SERIES



HCR-5000S
(Single table)



HCR-5000
(2-pallet changer)



High-speed spindle and axial acceleration / deceleration

Unique tilting rotary table

Efficient disposal of large volumes of chips thanks to chip conveyor (option) in the center trough

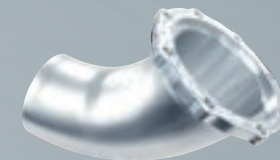
Spindle specifications available to meet a variety of production requirements.



Workpiece name : Blisk
Material : Inconel
Industry : Aerospace



Workpiece name : Frame
Material : Aluminum
Industry : Aerospace



Workpiece name : Aircraft duct
Material : Aluminum
Industry : Aerospace



Workpiece name : Satellite component
Material : Aluminum
Industry : Aerospace



Workpiece name : Cam cover
Material : Aluminum
Industry : Automotive



Workpiece name : Control arm
Material : Carbon steel
Industry : Automotive



Workpiece name : link
Material : Carbon steel
Industry : Automotive



Workpiece name : Knuckle arm
Material : Ductile cast iron
Industry : Automotive

High-speed & High-accuracy

High-speed and high-accuracy machining by integrating the expertise accumulated over many years in the production of simultaneous 5-axis and horizontal machining centers



Center trough
Smoothly disposes large amount of machined chips

Faster simultaneous 5-axis machining cycle times

Linear axes (X-, Y-, Z-axis)

High speed X-, Y-,Z-axis rapid traverse rate: 60000 mm/min

Rotary table (A-, C-axis)

Rapid traverse rate

A-axis : 30 rpm C-axis : 50 rpm

225°A-axis rotation

-90° ~ 135°A-axis rotation and ±360°C-axis rotation for the machining of complex workpiece contours

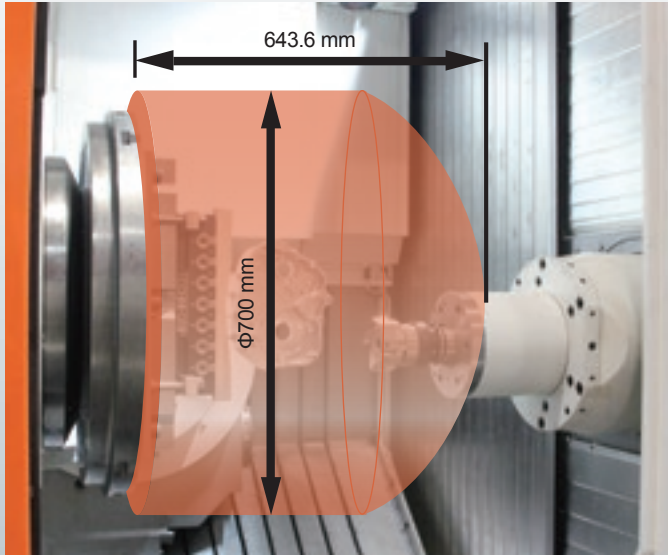
Roller gear cam

Both the A- and C-axis utilize a roller gear cam system for 0.0001° positioning increments and high-accuracy performance.



Max. workpiece dimensions

Same maximum workpiece size for both the single table and 2-pallet changer specifications.



Unsurpassed machining performance



The high-speed spindle and high-speed axial drive system are designed for high-speed machining and allows the latest advanced tooling to be used to its full potential. High productivity is realized in the high-speed machining of aluminum, near net shape aluminum die casting and cast-iron workpieces.

Spindle

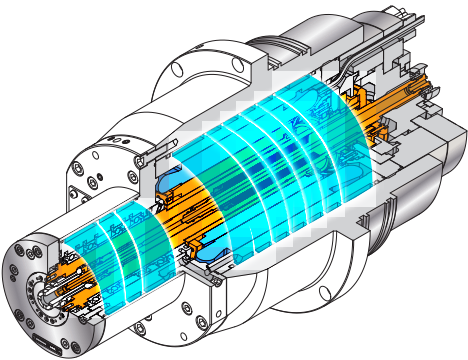
4 types of spindle specifications are available to meet your production requirements – 30000 rpm 80 kW (106.6 HP) high-speed, high-output spindle is optionally available

Integral spindle / motor

Thanks to the integral spindle / motor design, vibration is minimized during high-speed operation to ensure exceptional surface finishes and maximum tool life.

Spindle temperature control

For high-accuracy machining, temperature controlled cooling oil is circulated around the spindle bearings and headstock to minimize any thermal change to the spindle.



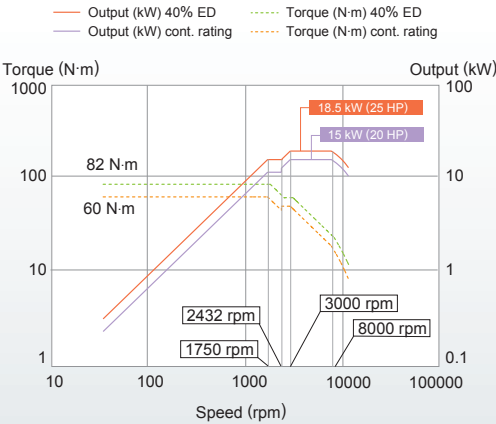
Excellent chip disposal

Large capacity coolant system and machine construction ensures smooth chip disposal

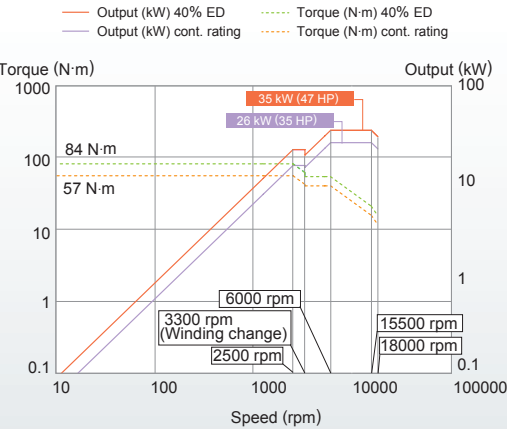


By inverting the tilting table (A-axis), chips accumulated on the workpiece and pallet freely fall to the optional chip conveyor installed in the machine base center trough. Additionally, the internal walls of the machining area are sloped to prevent the accumulation of machined chips which are flushed into the optional chip conveyor by the coolant system which has a large 800L coolant tank.

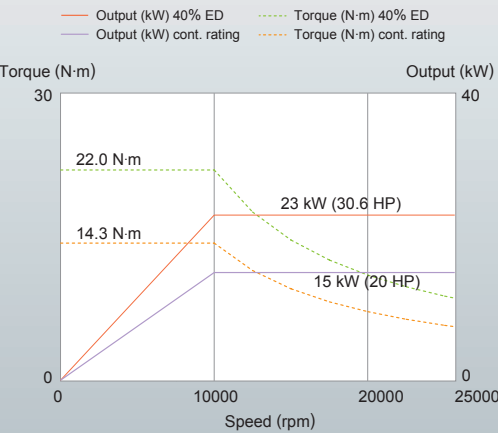
12000 rpm Milling spindle output / torque diagram



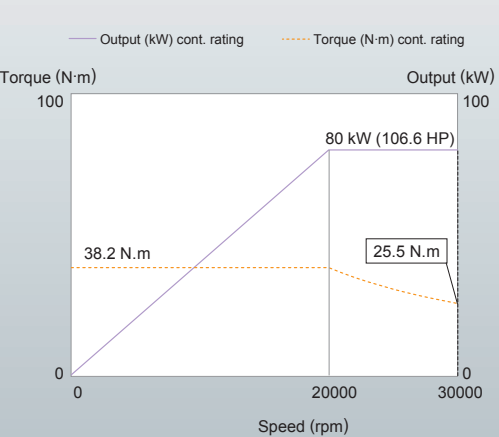
18000 rpm Milling spindle output / torque diagram



25000 rpm Milling spindle output / torque diagram



30000 rpm Milling spindle output / torque diagram



Automation

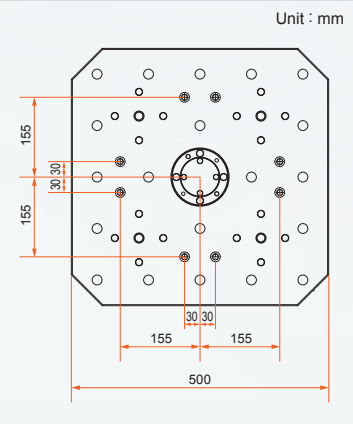
Hydraulic power supply Option

The optional hydraulic power supply is used for the operation of hydraulic fixtures for workpiece machining. Hydraulic power is supplied to the supply port on the pallet bottom by a leak-free coupling at the setup station for the HCR-5000. Hydraulic power is continuously supplied to the table HCR-5000S.

HCR-5000 (2-pallet changer)

Set-up station : Hydraulic clamp 2port, Hydraulic unclamp 2port, Air gap detector 1 port
Table : Hydraulic clamp 1port, Hydraulic unclamp 1port

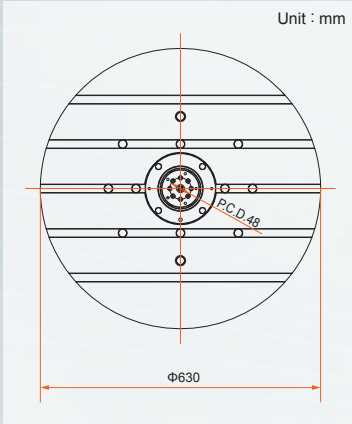
Port position can be selected.



HCR-5000S (Single table)

Table: Hydraulic clamp 2port, Hydraulic unclamp 2port

Port position can be selected.



2-pallet changer HCR-5000

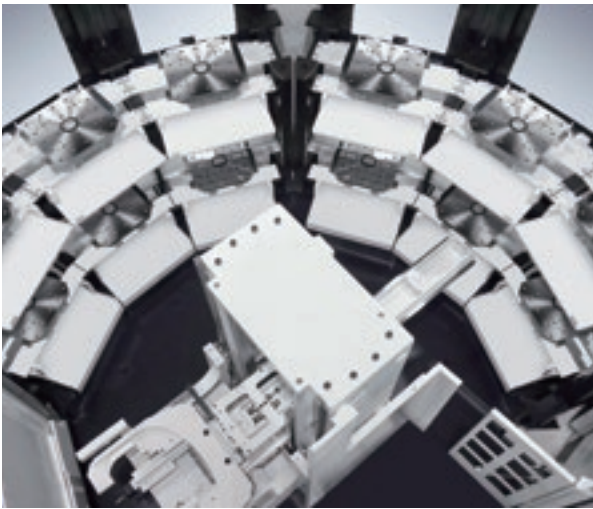
The next workpiece can be setup during the machining of the current workpiece for higher productivity. The maximum workpiece size is the same for both the single table and 2-pallet changer specifications.



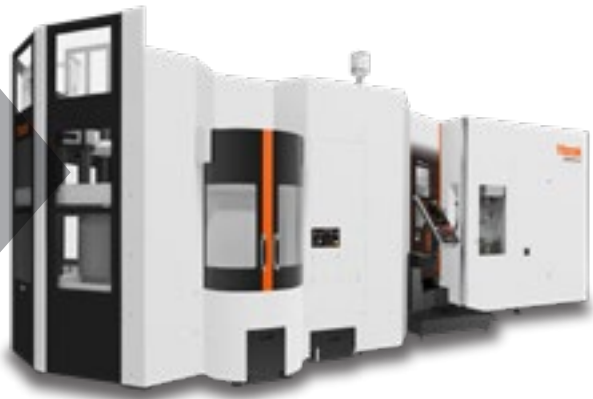
HCR-5000
Shown with optional equipment

MPP HCR-5000S

The MPP (MULTI PALLET POOL) is a new system to meet the increasing worldwide demand for automation. It is designed to provide high productivity in the production of a wide variety of parts in small size lots. 6, 12 and 18 pallet storage capacities are available after initial machine installation.



12-pallet stocker



HCR-5000S + MPP (18PC)

PALLETECH SYSTEM HCR-5000

The PALLETECH is designed for convenient expansion of the initial system installation in response to increased production requirements.



System specifications

		Minimum	Maximum
Machine(s)		1	15
Number of pallets	1 level	6	240
	2 level	12	240
	3 level	18	240
Loading station(s)		1	8
Loader		1	1

MAZATROL CNC System



Three color
status indicator

19" touch panel

USB port

SD card slot

Operation switches

Dials

Unsurpassed ease of
operation with touch screen

MAZATROL **SMOOTHX**

5 process home screens

Programming, confirmation, editing and tool data registration



Convenient Parameter Setting and Fine Tuning Function SMOOTH MACHINING CONFIGURATION

Machining features including cycle time, finished surface and machining shape can be adjusted by slider switches on the display according to material requirements and machining methods. This is especially effective for complex workpiece contours defined in small program increments. Once the desired results are obtained, the settings can be stored in memory so that they can be easily used again in the future.

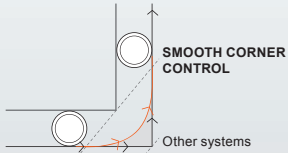


Variable Acceleration Control Function • VARIABLE ACCELERATION CONTROL

Variable acceleration control is a new function which permits the faster acceleration capability of linear axes to be used whenever possible. The slower acceleration of the rotary axes is not used for all program commands, resulting in faster machining cycle times.

Seamless Corner Control • SMOOTH CORNER CONTROL

Improved finished surfaces and reduced cycle times by optimized acceleration / deceleration when machining corners.



Cycle time reduced by **10~20%**
(Test results for reference only)

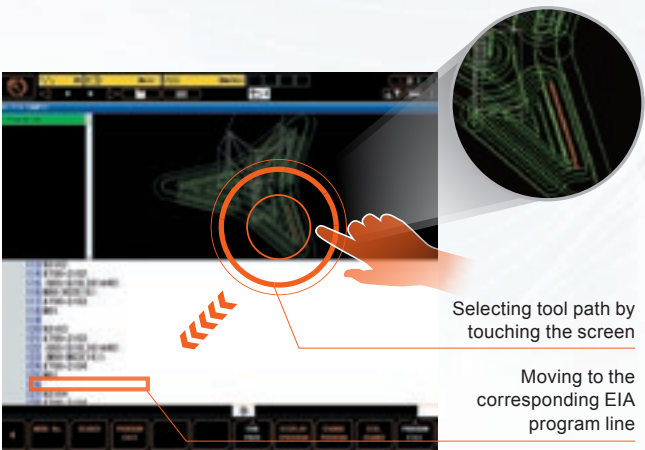


Ease of Programming

EIA program check

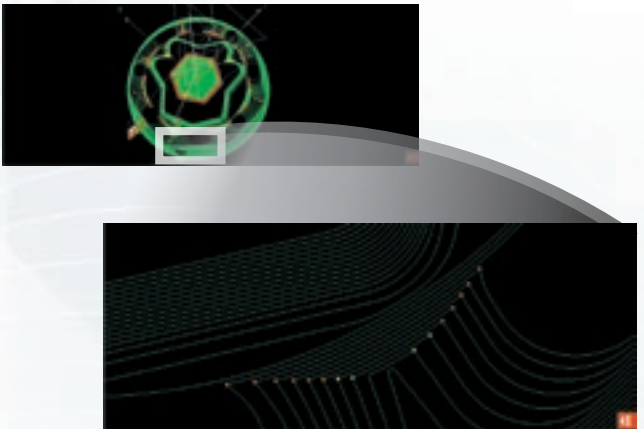
QUICK EIA

Program, process list and 3D tool path display are linked to each other. Visible search on touch screen can reduce the time for program checking.



VIEW SURF

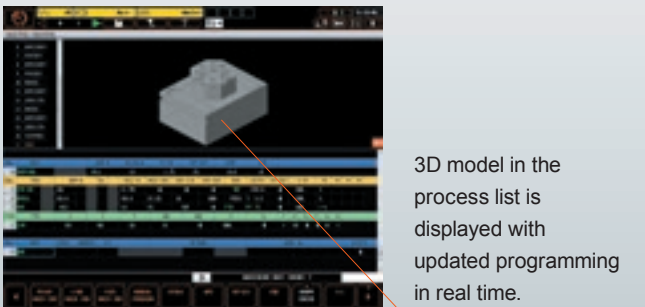
By analyzing the tool path, any predictable failure on the finished surface can be visualized. Program modification can be done before machining to minimize the time for test cutting.



MAZATROL conversational program

QUICK MAZATROL

MAZATROL program, unit list and 3D workpiece shape are linked to each other. After defining a machining unit in a MAZATROL program, the 3D shape is immediately displayed to easily and quickly check for any programming error.



3D ASSIST

Workpiece and coordinates data can be imported from 3D CAD data to a MAZATROL program. No coordinate value inputs are required. Can reduce input errors and time for program checking.

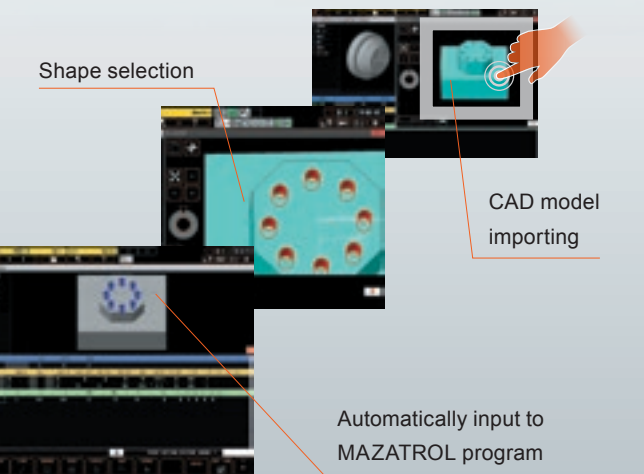
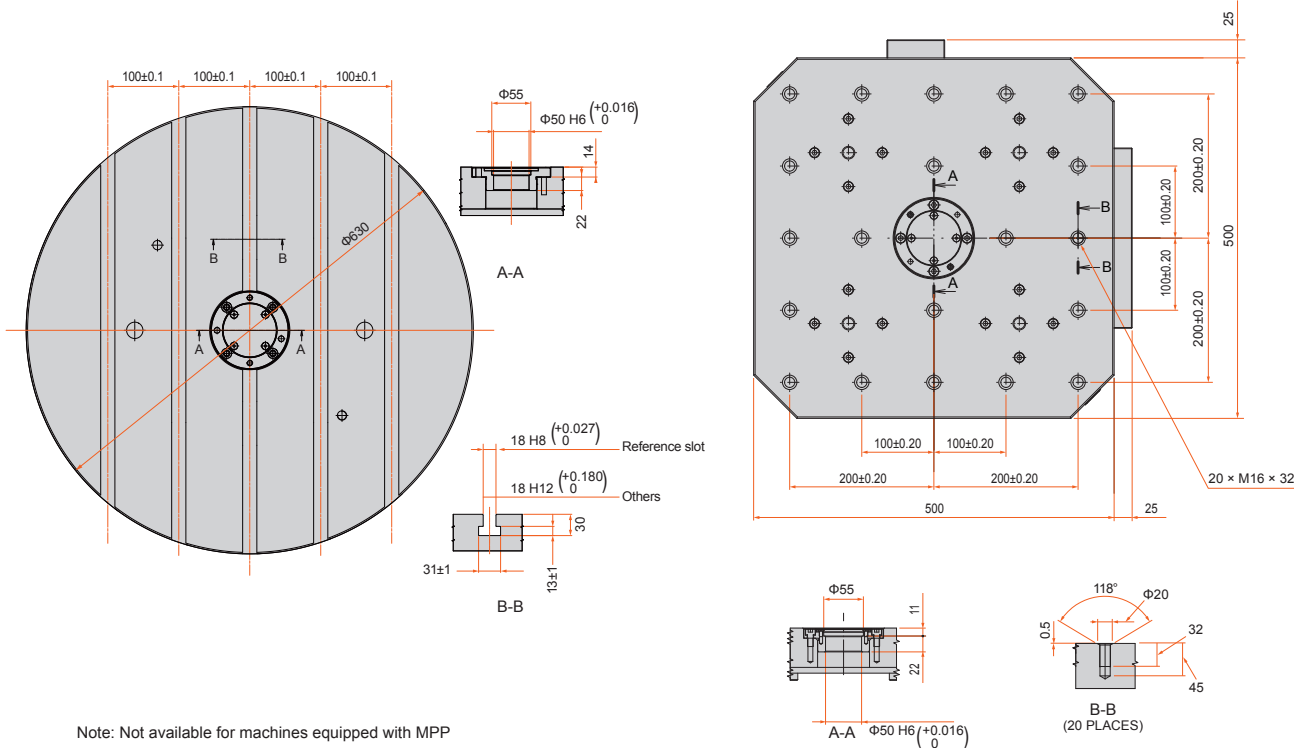


Table / Pallet Dimensions

Unit : mm

HCR-5000S Table

HCR-5000 Pallet

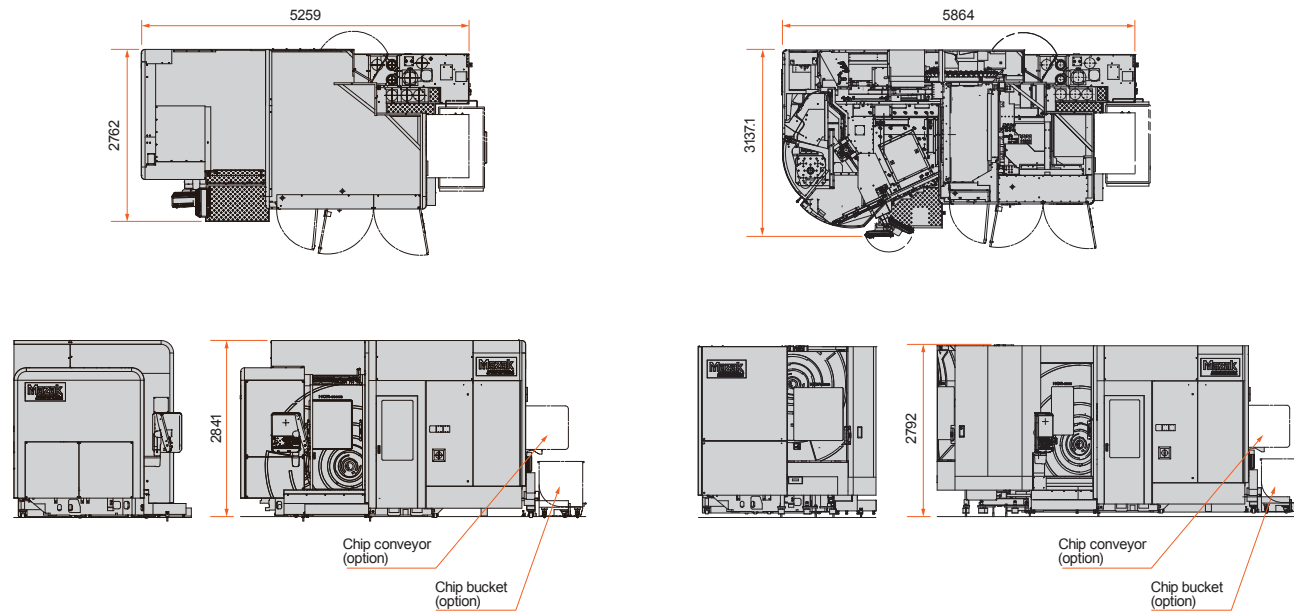


Machine Dimensions

Unit : mm

HCR-5000S

HCR-5000



Standard Machine Specifications

		HCR-5000S	HCR-5000
Stroke	X-axis × Y-axis × Z-axis	730 mm × 730 mm × 730 mm	
	A-axis (tilt table)	−90° ~ +135°	
	C-axis (table rotating)	±360°	
Table	Table size	Φ630 mm	500 mm × 500 mm
	Table top surface	18 mm T-slot × 5	M16 × P2.0, 20places, 100 mm pitch
	Max. workpiece dimensions (diameter × height)	Φ700 mm × 643.6 mm	
	Table load capacity (evenly distributed)	500 kg	
Spindle	Max. spindle speed	12000 rpm	
	Spindle taper	No.40	
Feedrate	Rapid traverse rate (X-, Y-, Z-axis)**	60000 mm/min	
	Rapid traverse rate (A-, C-axis)	30 rpm, 50 rpm	
	Cutting feedrate (X-, Y-, Z-axis)**	1 ~ 60000 mm/min	
	Cutting feedrate (A-, C-axis)	1 ~ 30 rpm	
Automatic tool changer system	Tool storage capacity	40	
	Max. tool diameter / length (from gauge line) / weight	Φ95 mm / 400 mm / 12 kg	
	Max. tool diameter (when adjacent pockets empty)	Φ170 mm	
	Tool selection method	MAZATROL random memory	
Automatic pallet changer	Number of pallets	-	2
Machine size	Machine height	2841 mm	2792 mm
	Machine width × length	2762 mm × 5259 mm [ConSep]	3137.1 mm × 5863.5 mm [ConSep]
	Machine weight	12800 kg	14210 kg
Sound	Equivalent continuous sound pressure level at operator position (depend on equipmentoptions)	Less than 80 db (A)	

** Limited feedrate with continuous axis movement

Standard and Optional Equipment

● : Standard ○ : Option - : N / A

		HCR-5000S	HCR-5000
Spindle	12000 rpm (CAT No.40)	●	●
	12000 rpm (BBT-40, HSK-A63)	○	○
	18000 rpm (CAT No.40, BIG-PLUS No.40, HSK-A63)	○	○
	25000 rpm (HSK-A63)	○	○
	30000 rpm (HSK-A63)	○	○
	500 mm × 500 mm tapped pallet with center bore	-	●
Pallet changer	2 pallet changer	-	●
Tool magazine	40 tool drum type tool magazine	●	●
	60 tool drum type tool magazine	○	○
	80 tool chain type	○	○
	120 tool chain type	○	○
	160 tool chain type	○	○
	180 tool rack type (TOOL HIVE)	○	○
	240 tool rack type (TOOL HIVE)	○	○
	348 tool rack type (TOOL HIVE)	○	○
	Automatic tool length measurement & tool breakage detection	○	○
	RENISHAW NC 4 laser tool length measurement	○	○
Setup	Tool breakage detection	○	○
	Tool ID magazine operation panel	○	○
	Mazak monitoring systemB RMP60	○	○
	Remote manual pulse generator (wired)	○	○

		HCR-5000S	HCR-5000
Automation	Robot interface	○	○
	Hydraulic power supply for fixtures	○	○
	Preparation for MPP	○	-
	Preparation for PALLETECH	-	○
	Automatic power ON / OFF + warm-up operation	●	●
Coolant / chip disposal	Flood coolant	●	●
	Coolant through spindle 0.8 MPa (8 kgf·cm ²)	○	○
	Coolant through spindle 1.5 MPa (15 kgf·cm ²)	○	○
	SUPERFLOW coolant system 7.0 MPa (70 kgf/cm ²)	○	○
	Niagara coolant	○	○
	Secondary coolant filter for aluminum	○	○
	Hand held coolant nozzle	-	○
	Oil skimmer (RB-200)	○	○
	Mist collector	○	○
	Preparation for chip conveyor (rear disposal, ConSep 2000)	●	●
High accuracy	Chip conveyor (rear disposal, ConSep 2000)	○	○
	Ball screw core cooling (X-, Y-, Z-axis)	●	●
	Chiller unit	●	●
	Coolant temperature control	○	○
	Scale feedback (X-, Y-, Z-axis)	○	○

MAZATROL SmoothX Specifications

		MAZATROL	EIA
Number of controlled axes		Simultaneous 2 ~ 4 axes	Simultaneous 5 axes
Least input increment		0.0001 mm, 0.00001 inch, 0.0001 deg	
High speed, high precision control		Shape compensation, Smooth corner control, Rapid traverse overlap, Rotary axis shape compensation	Shape compensation, Smooth corner control, Rapid traverse overlap, Rotary axis shape compensation, High-speed machining mode,High-speed smoothing control, 5-axis spline*
Interpolation		Positioning (interpolation), Positioning (non-interpolation), Linear interpolation, Circular interpolation, Cylindrical interpolation, Polar coordinate interpolation, Synchronous tapping*	Positioning (interpolation), Positioning (non-interpolation), Linear interpolation, Circular interpolation, Spiral interpolation, Helical interpolation, Cylindrical interpolation*, Involute interpolation*, Fine spline interpolation*, NURBS interpolation*, Polar coordinate interpolation*, Synchronous tapping*
Feedrate		Rapid traverse, Cutting feed, Cutting feed (per minute), Cutting feed (per revolution), Dwell (time / rotation), Rapid traverse override, Cutting feed override, G0 speed variable control, Feedrate limitation, Variable acceleration control, G0 slope constant	Rapid traverse, Cutting feed, Cutting feed (per minute), Cutting feed (per revolution), Inverse time feed, Dwell (time / rotation), Rapid traverse override, Cutting feed override, G0 speed variable control, Feedrate limitation, Time constant changing for G1, Variable acceleration control, G0 slope constant*
Program registration		Number of programs : 256 (Standard) / 960 (Max.), Program memory : 2 MB, Program memory expansion : 8 MB*, Program memory expansion : 32 MB*	
Control display		Display : 19" touch panel, Resolution : SXGA	
Spindle functions		S code output, Spindle speed limitation, Spindle speed override, Spindle speed reaching detection, Multiple position orient, Constant surface speed, Spindle speed command with decimal digits, Synchronized spindle control, Spindle speed range setting	
Tool functions		Number of tool offset : 4000, T code output for tool number, Tool life monitoring (time), Tool life monitoring (number of machined workpieces)	Number of tool offset : 4000, T code output for tool number, T code output for group number, Tool life monitoring (time), Tool life monitoring (number of machined workpieces)
Miscellaneous functions		M code output, Simultaneous output of multiple M codes	
Tool offset functions		Tool position offset, Tool length offset, Tool diameter / tool nose R offset, Tool wear offset	
Coordinate system		Machine coordinate system, Work coordinate system, Local coordinate system, Additional work coordinates (300 set)	
Machine functions		-	Rotary axis prefilter, Tilted working plane, Polygonal machining*, Hobbing II*, Shaping function*, Dynamic compensation II*, Tool center point control*, Tool radius compensation for 5-axis machining*, Workpiece positioning error compensation*
Machine compensation		Backlash compensation, Pitch error compensation, Geometric deviation compensation, Volumetric compensation*	
Protection functions		Emergency stop, Interlock, Pre-move stroke check, Barrier, SAFETY SHIELD (manual mode), SAFETY SHIELD (automatic mode),VOICE ADVISER	
Automatic operation mode		Memory operation	Memory operation, Tape operation, MDI operation, EtherNet operation
Automatic operation control		Optional stop, Dry run, Manual handle interruption, MDI interruption, TPS, Restart, Single process, Machine lock	Optional block skip, Optional stop, Dry run, Manual handle interruption, MDI interruption,TPS, Restart, Restart 2, Collation stop, Machine lock
Manual measuring functions		Tool length teach, Touch sensor coordinates measurement, Workpiece offset measurement, WPC coordinate measurement, Measurement on machine	Tool length teach, Tool offset teach, Touch sensor coordinates measurement, Workpiece offset measurement, WPC coordinate measurement, Measurement on machine
Automatic measuring functions		WPC coordinate measurement, Automatic tool length measurement, Laser tool length / diameter measurement, Sensor calibration, Tool breakage detection, External tool breakage detection*	Automatic tool length measurement, Laser tool length / diameter measurement, Sensor calibration, Tool breakage detection, External tool breakage detection*
MDI measurement		Coordinate measurement, Laser measurement	
Peripheral network		PROFIBUS-DP*, EtherNet/IP*, CC-Link*	
Interface		SD card interface, USB	
EtherNet		10 M / 100 M / 1 Gbps	

*Option