Mazak

HCR-5000

SERIES

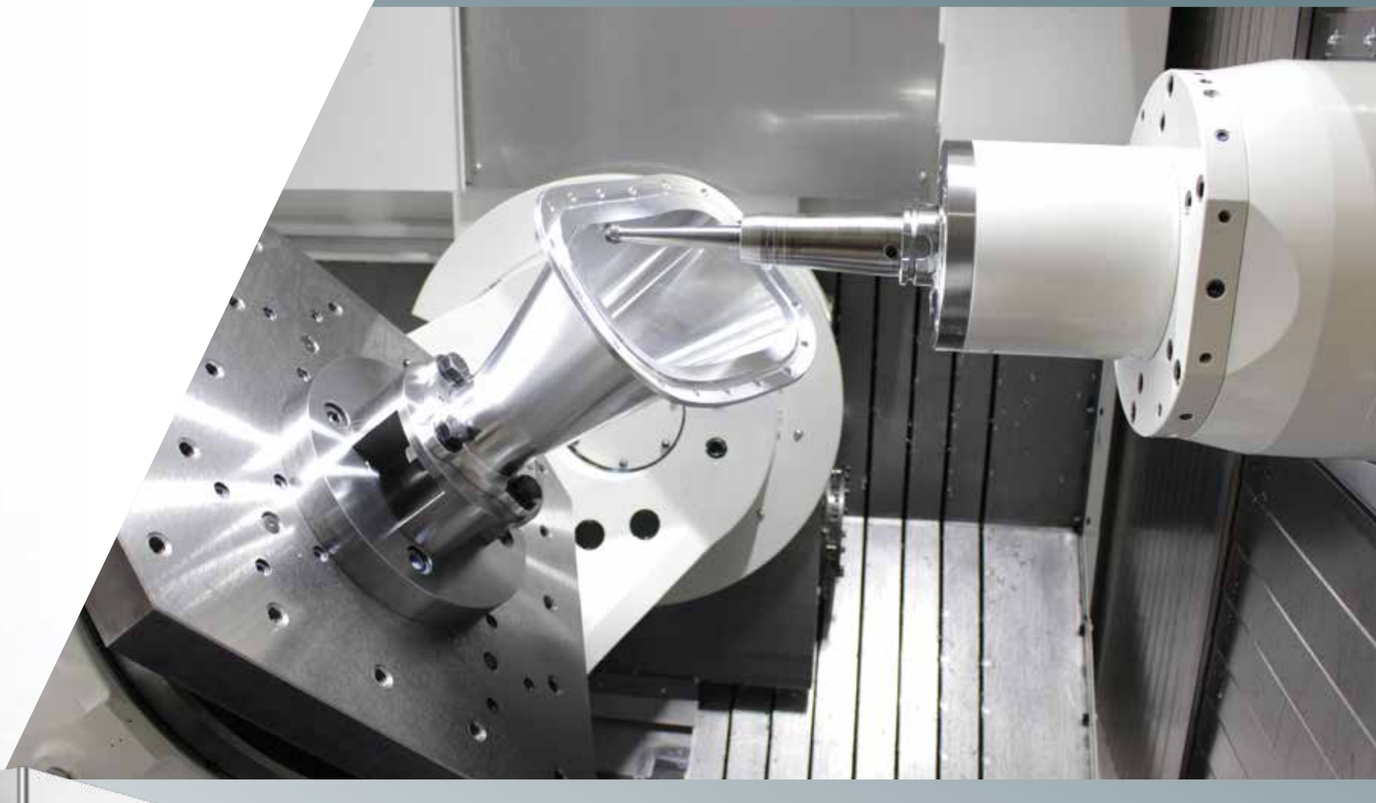
[5-Axis Horizontal Machining Center]

Simultaneous 5-axis horizontal machining centers

HCR-5000 SERIES

HCR-5000S
(Single table)

HCR-5000
(2-pallet changer)

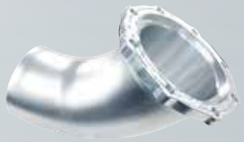


Workpiece: Blisk
Industry: Aerospace

Workpiece: Frame
Industry: Aerospace

Workpiece: Bracket
Industry: Aerospace

Workpiece: Satellite component
Industry: Aerospace



Workpiece: Aircraft duct
Industry: Aerospace

Workpiece: Cam cover
Industry: Automotive

Workpiece: Crank case
Industry: Automotive

Workpiece: Knuckle arm
Industry: Automotive

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

High speed and high accuracy

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

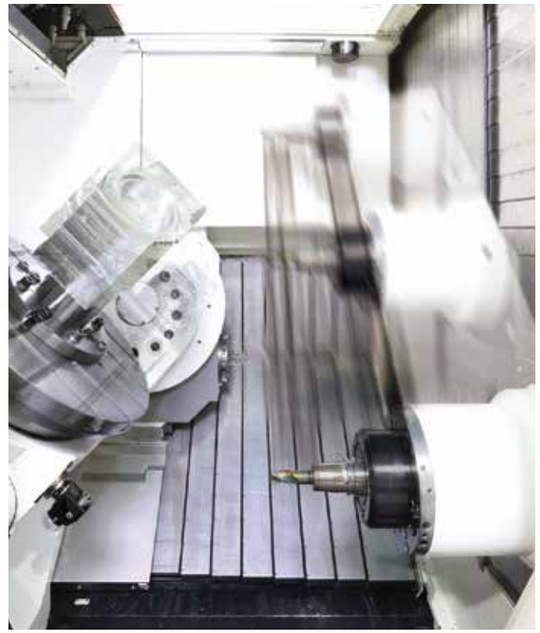
Center trough

Smoothly disposes of large numbers of machined chips

Faster simultaneous 5-axis machining cycle times by high-speed acceleration and jerk

Linear axes (X, Y, Z)

Jerk (change in the rate of acceleration)
(X, Y axis/Z axis): 175/175 m/sec^3 ← 41/40 m/sec^3
(comparable simultaneous 5-axis machining center)



Rotary table (A, C axis)

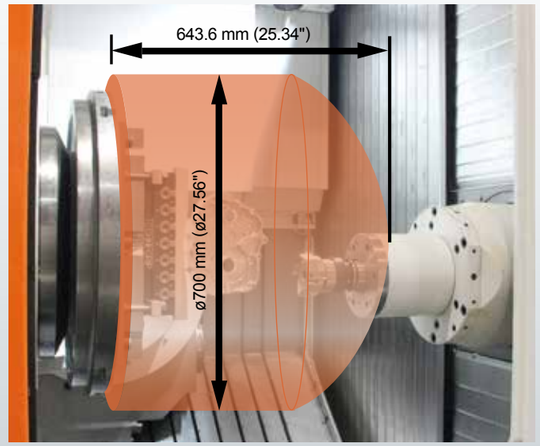
Rapid traverse rate
A axis: 30 rpm; C axis: 50 rpm

225°A-axis rotation
-90° ~ 135° A-axis rotation and ±360° C-axis rotation for machining 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 allow 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.

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 fall freely to the optional chip conveyor installed in the machine base center trough. Additionally, the internal walls of the machining area slope to prevent the accumulation of machined chips, which are flushed into the optional chip conveyor. The coolant system includes a large 800L (211 gal) coolant tank.

Spindle

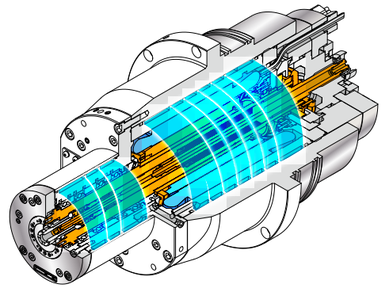
4 types of spindle specifications are available to meet your production requirements – 30,000 rpm 80 kW (106.6 HP) high-speed, high-output spindle is optionally available

Integral spindle/motor

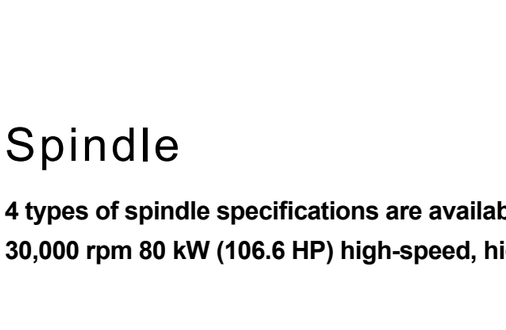
The integral spindle/motor design minimizes vibration during high-speed operation to ensure exceptional surface finishes and maximum tool life.

Spindle temperature control

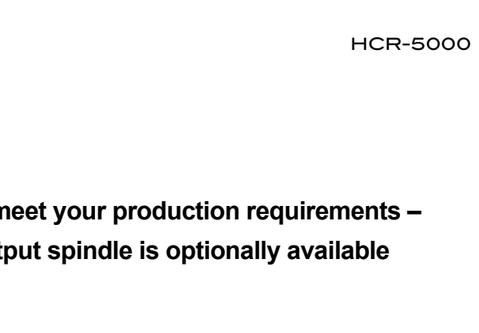
For high-accuracy machining, temperature-controlled cooling oil circulates around the spindle bearings and headstock to minimize any thermal change to the spindle.



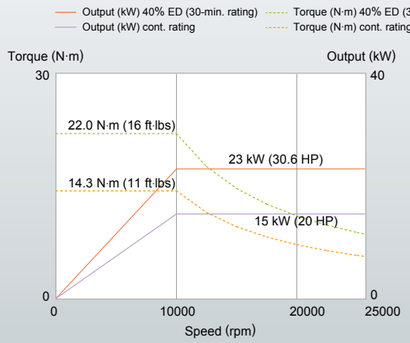
■ 12,000 rpm milling spindle output/torque diagram



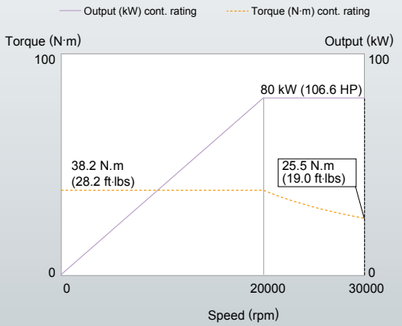
■ 18,000 rpm milling spindle output/torque diagram



■ 25,000 rpm milling spindle output/torque diagram



■ 30,000 rpm milling spindle output/torque diagram



Automation

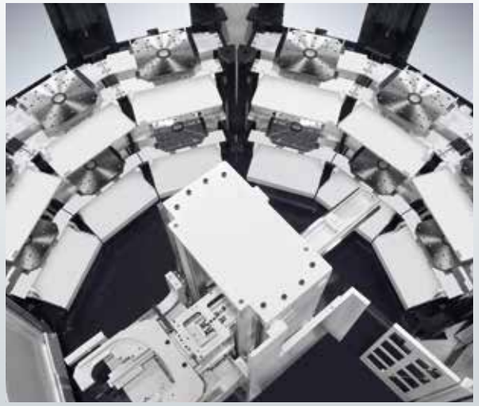
2-pallet changer *HCR-5000*

For higher productivity, set up the next workpiece while machining the current one.
Maximum workpiece size is the same for both the single table and 2-pallet changer.

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 producing small lots of a wide variety of parts. 6, 12 and 18-pallet storage capacities are available after initial machine installation.



12-pallet stocker

MPP (18 PC) + VARIAXIS i-600

PALLETECH SYSTEM *HCR-5000*

PALLETECH is designed for convenient expansion 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

PALLETECH system with multiple types of Mazak machines

Horizontal machining centers, 5-axis machining centers and Multi-Tasking machines can be integrated with the HCR-5000 in a PALLETECH system.

12 pallet stocker
Smooth PMC
1 loading station
VORTEX i-630V/6
HCN-6800

PALLETECH system specifications with multiple types of machines

PALLETECH system pallet size	Horizontal machining center	5-axis machining center	Multi-Tasking machine
500 mm × 500 mm	HCN-5000* HCN-5000/50*	HCR-5000 VARIAXIS i-700	INTEGREX i-500V/5

*WITH MAZATROL SMOOTH G CNC

MAZATROL CNC System

Unsurpassed ease of operation with touch screen

MAZATROL SMOOTH X

5 process home screens

Programming, confirmation, editing and tool-data registration

Convenient Parameter Setting and Fine-Tuning Function

SMOOTH MACHINING CONFIGURATION

Adjust machining features including cycle time, finished surface and machining shape with 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 they can be used again easily in the future.

Variable Acceleration Control Function

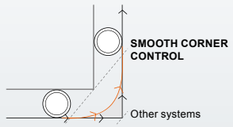
·VARIABLE ACCELERATION CONTROL

Variable acceleration control is a new function that 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

Optimized acceleration/deceleration when machining corners improves finished surfaces and reduces cycle time.



Reduce cycle time by **10~20%**

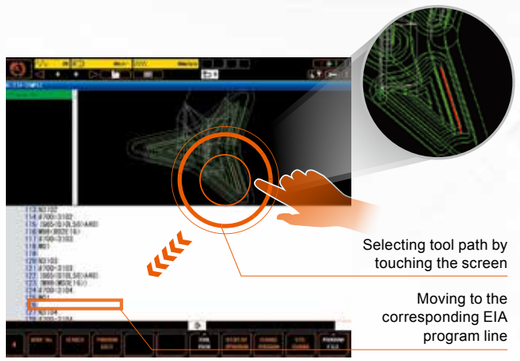
(Test results for reference only)

Ease of programming

EIA program check

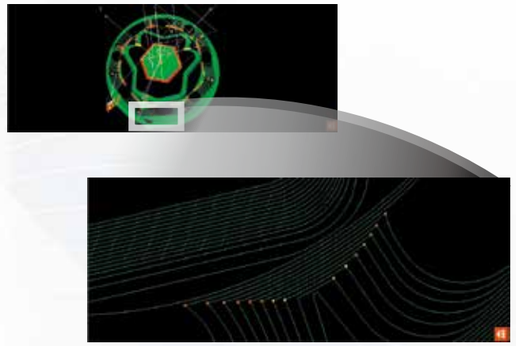
QUICK EIA

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

Analyze the tool path to visualize any predictable failure on the finished surface. Perform program modification before machining to minimize the time for test cutting.



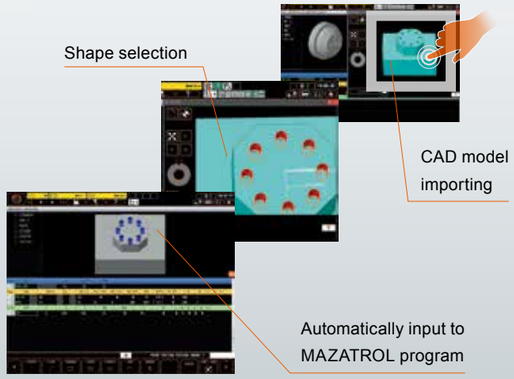
MAZATROL conversational program

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 displayed immediately to check for any programming error easily and quickly.

3D ASSIST

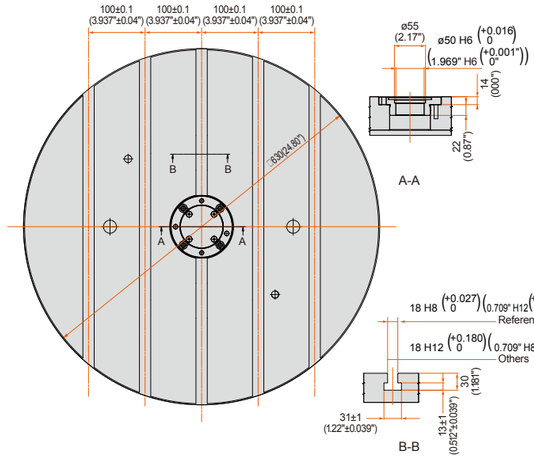
Workpiece and coordinate data can be imported from 3D CAD data to a MAZATROL program. No coordinate value inputs are required. This can reduce input errors and the time for program checking.



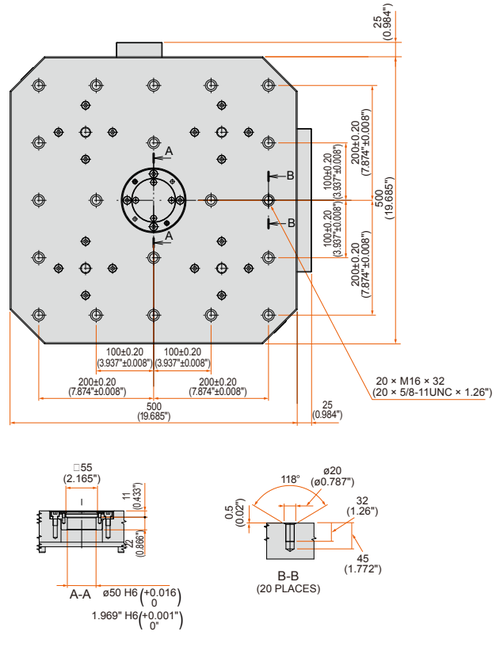
Table/Pallet Dimensions

Unit: mm (inch)

HCR-5000S Table



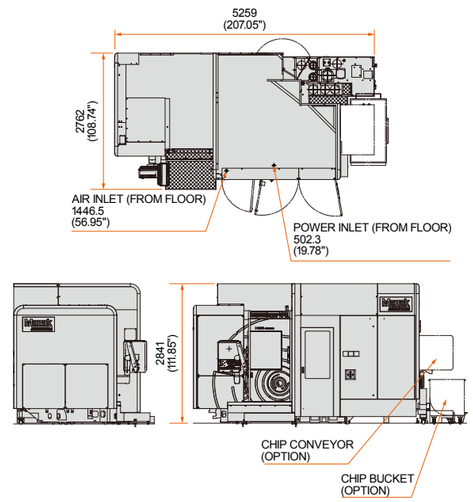
HCR-5000 pallet



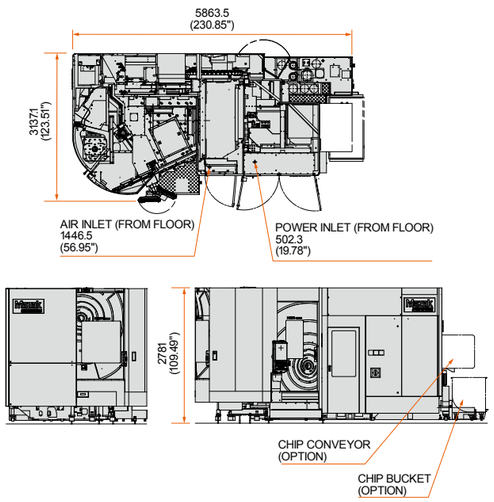
Machine Dimensions

Unit: mm (inch)

HCR-5000S



HCR-5000



Standard Machine Specifications

		HCR-5000S	HCR-5000
Stroke	X axis × Y axis × Z axis	730 mm × 730 mm × 730 mm (28.74" × 28.74" × 28.74")	
	A-axis (tilt table)	–90° ~ +135°	
	C-axis (table rotating)	±360°	
Table	Table size	ø630 mm (ø24.80")	500 mm × 500 mm (19.69" × 19.69")
	Table top surface	18 mm (0.709") T-slot × 5	M16 × P2.0 (5/8-11UNC) 20 100 mm (3.937") pitch
	Max. workpiece dimensions (diameter × height)	ø700 mm × 643.6 mm (ø27.56 × 25.34")	
	Table load capacity (evenly distributed)	500 kg (1102 lbs)	
Spindle	Max. spindle speed	12000 rpm	
	Spindle taper	No. 40	
Feedrate	Rapid traverse rate (X, Y, Z axis)*1	60000 mm/min (2362 IPM)	
	Rapid traverse rate (A, C axis)	30 rpm, 50 rpm	
	Cutting feedrate (X, Y, Z axis)*1	1 ~ 60000 mm/min (0.04 ~ 2362 IPM)	
	Cutting feedrate (A, C axis)	1 ~ 30 rpm	
Automatic tool changer	Tool storage capacity	40	
	Max. tool diameter/length (from gauge line)/weight	ø95 mm/400 mm/12 kg (ø3.74"/15.75"/26 lbs)	
	Max. tool diameter (when adjacent pockets empty)	ø170 mm (ø6.69")	
Automatic pallet changer	Number of pallets	-	2
Machine size	Machine height	2841 mm (111.85")	2781 mm (109.49")
	Machine width × length	2762 mm × 5259 mm [ConSep] (108.74" × 207.05")	3137.1 mm × 5863.5 mm [ConSep] (123.51" × 230.85")
	Machine weight	12800 kg (28219 lbs)	14210 kg (31327 lbs)

*1 Limited feedrate with continuous axis movement

Standard and Optional Equipment

●: Standard ○: Option –: N / A

		HCR-5000S	HCR-5000
Spindle	12000 min^{-1} (rpm) (CAT No.40)	●	●
	12000 min^{-1} (rpm) (BBT-40, HSK-A63)	○	○
	18000 min^{-1} (rpm) (CAT No. 40, BIG-PLUS No. 40, HSK-A63)	○	○
	25000 min^{-1} (rpm) (HSK-A63)	○	○
	30000 min^{-1} (rpm) (HSK-A63)	○	○
Pallet	500 mm × 500 mm tapped pallet with center bore	○	○
Pallet changer	2-pallet changer	○	●
Tool magazine	40-tool drum type tool magazine (tool storage position: MAZATROL random memory)	–	●
	60-tool drum type tool magazine (tool storage position: MAZATROL random memory)	●	●
	80-tool chain type	○	○
	120-tool chain type	○	○
	160-tool chain type	○	○
	180-tool rack type (TOOL HIVE)	○	○
	204-tool rack type (TOOL HIVE)	○	○
	240-tool rack type (TOOL HIVE)	○	○
	288-tool rack type (TOOL HIVE)	○	○
	312-tool rack type (TOOL HIVE)	○	○
	348-tool rack type (TOOL HIVE)	○	○
Setup	Automatic tool length measurement & tool breakage detection	○	○
	RENISHAW NC 4 laser tool length measurement	○	○
	Tool breakage detection	○	○
	Tool ID magazine operation panel	○	○
	Mazak monitoring system B RMP60	○	○
	Remote manual pulse generator (wired)	○	○

*Pallet weight not included.

		HCR-5000S	HCR-5000
Automation	Robot interface	○	○
	Preparation for MPP	○	-
	Preparation for PALLETECH	-	○
	Automatic power ON/OFF + warm-up operation	●	●
Coolant/ chip disposal	Flood coolant	●	●
	Coolant through spindle 0.8 MPa (116 PSI)	○	○
	Coolant through spindle 1.5 MPa (218 PSI), 3.5 MPa (508 PSI)	○	○
	SUPERFLOW coolant system	○	○
	Niagara coolant	○	○
	Secondary coolant filter for aluminum	○	○
	Hand held coolant nozzle (for cleaning pallet changer)	○	○
	Oil skimmer (RB-200)	○	○
	Mist collector	○	○
	Preparation for chip conveyor (rear disposal, ConSep 2000)	●	●
	Chip conveyor (rear disposal, ConSep 2000)	○	○
High accuracy	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: 2MB, Program memory expansion: 8MB*, Program memory expansion: 32MB*	
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	
Interface	PROFIBUS-DP*, EtherNet/IP*, CC-Link*	
Card interface	SD card interface, USB	
EtherNet	10M/100M/1Gbps	

*Option

HCR-5000 SERIES

Mazak

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