

VARIAXIS i-300 AWC

Mazak

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Compact simultaneous 5-axis machining center with automatic work changer

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5-axis machining center with exceptional productivity

The VARIAXIS i-300 AWC is designed for the machining of a wide variety of small- to medium-sized components in small lots





VARIAXIS i-300 AWC

Compact Simultaneous 5-axis Machining Center with Automatic Work Changer





VARIAXIS i-300 AWC shown with optional 32 work stocker and tool magazine (205 tools)



Compact automation system for a wide variety of small- to medium-size components in small-lot production

The smallest VARIAXIS Series machine, VARIAXIS i-300 AWC is designed for continuous unmanned operation with its automatic work changer, tool stocker and AWC management software SMOOTH AWC



Versatile Mazak software for AWC management and operation is incorporated in the MAZATROL SmoothX CNC





Automatic work changer (AWC) 40 work stocker (maximum)



Automatic work changer (AWC) and work holder

Automatic work changer loads workpieces from the stocker and unloads finished workpiece and stock on work stocker. Work holders are clamped onto the machine table by the HSK-A100 interface.





Automatic Work Changer

The capacity of the stocker can be expanded from 32 to 40 work holders after the initial installation of the AWC in response to increased production requirements.



*2 For 40 work stocker, maximum workpiece diameter is Φ 300 mm for 12 storage locations (Highlighted in orange, stocker number: 6-15, 39 and 40)



Work holder

Work holders are clamped on the machine table by the HSK-A100 interface.



Work holder specification



For accurate work mounting, compensation using touch probe, etc. is required. High-precision mounting surfaces for work holders are optionally available.

	Standard	High accuracy
Parallelism①	0.02	0.005
Flatness②	0.02	0.002/130
Height ③	60 ± 0.05	60 ± 0.005



Smooth AWC

For convenient operation, SMOOTH AWC software is incorporated in the **MAZATROL Smooth CNC**

- 19" touch panel operation
- Simplified operation of AWC system

TOTH

AWC

- Easy input of production schedule
- Workpiece loading instructions







Smooth AWC

Tool resource check

Check machining program, required tool and tool life during automatic operation

✓ If tools required for the upcoming production schedule are not in the tool magazine, a list of missing tools is displayed.

Tool resource check over the next 12H.

Elim	inate ma	ichine d	downtime	due to	missing
tool	S ★使田工目				
90* ✓ Th	e remair	on-n. ing toc	ellife of th	e tools	in the

magazine are checked to determine that there is sufficient tool life to perform production over the next 12 hours.

Interface for an external automatic operation personal computer (OPTION) Can access production schedule from external PC via network connection Note: Interface for an external personal computer is available upon request

✓ Tool resource check is available during



Multiple drum tool magazine

Large tool magazine automatically supplies tools to the machine's 25-tool magazine. For ease of operation, operator can load/unload tools and input tool data at the tool magazine operation panel.



Can store up to 505 tools



Multiple drum tool magazines

Multiple drum tool magazines can be expanded to hold up to 505 tools (including tools in tool magazine inside machine) in order to meet increased production requirements after the initial installation. Tool storage capacity can be expanded in increments of 60 tools



145 tools (STANDARD)

505 tools (Maximum storage)





385 tools

445 tools



505 tools



Multiple drum tool magazine

Each 30-tool drum magazine is stacked, taking up minimal floor space







Tool data management

By centrally managing tools and registering tool data and setup, non-cutting time can be reduced. This software can also eliminate tool information input errors in the CNC to improve productivity.



Tool ID allows automatic input and update of tool data into the CNC for machines in a network. It eliminates mistakes when loading tools into the magazine, tool data input and reducing setup time.

SMOOTH TOOL MANAGEMENT (OPTION)

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Magazine tool data display

- Centralized management of data for all tools inside the factory
- Tool data inputted by tool presetter
- Tool management using tool IDs

Note: Balluff tool ID is available



Standard Machine Specifications





Spindle

Wide variety of specifications to meet any production requirement

- High-torque specifications designed for heavy-duty cutting of steel and cast iron
- High-speed cutting for high-accuracy aerospace industry components

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.



Speed	Standard	High torque	OPTION		
Speed	12,000 rpm 18,000 rpm		25,000 rpm	30,000 rpm	
Output (40% ED)	22 kW (30 HP)	35kW(47HP)	23 kW (31 HP)	23 kW (31 HP)	
Max. torque (40% ED)	71.6 N•m	134 N · m	22 N · m	22 N∙m	
Tool shank	BT-40/BBT-40/ HSK-A63	BBT-40/HSK-A63	HSK-A63	HSK-F63	



Spindle output/torque diagram

12000 rpm spindle



25000 rpm spindle

OPTION

STANDARD







High-rigidity tilting rotary table

The A axis features a trunnion design to provide added rigidity for high-accuracy machining. Thanks to indexing increments at a minimum of 0.0001° (A axis/C axis), high-accuracy machining of complex workpiece contours is ensured.



*Maximum machining is limited by AWC maximum transport size



Compact spindle cartridge

The spindle is designed to provide an increased machining area and features a compact spindle cartridge for excellent workpiece accessibility with minimum interference, allowing for fully optimized machining.



In order to avoid interference with table, the workpiece needs to be slightly raised





Designed for High Accuracy

Ball screw core cooling

Temperature-controlled cooling oil circulates through the ball screw cores to ensure stable machining accuracy over extended periods of high-speed operation



Linear roller guides utilized on the X, Y and Z axes

The linear roller guides on the X, Y and Z axes utilized by the VARIAXIS i-300 AWC provide high-accuracy positioning. Additionally, with their high rigidity and considerably lower friction, high-speed feedrates can be used for a wide range of machining applications, from heavy-duty to high-speed cutting.





Automation system with compact floor space



205/265 optional multiple-drum tool magazine shown



Smooth Technology for ease of operation

MAZA-CHECK High-accuracy 5-axis calibration

Position misalignment and the incline of the rotary axes and the C and B axes can be automatically measured and corrected for highaccuracy 5-axis machining.



THERMAL SHIELD Heat displacement control

The THERMAL SHIELD is an automatic compensation for temperature changes, maintaining enhanced and continuous machining accuracy.



Temperature and compensation are displayed on screen. Operator can adjust compensation by looking at the data.



Design focus on ergonomics provides unsurpassed ease of operation

Excellent Accessibility

The operator has excellent access to the table from the front of the machine for convenient workpiece loading/unloading and machine setup.

Excellent visibility The large front door window allows workpiece machining to be easily monitored by the operator.

Maintenance area

Items requiring frequent access for machine maintenance, such as the hydraulic pressure unit, pneumatic pressure unit and lubrication unit are arranged in one central location.









Environmentally Friendly

Energy Dashboard



The Energy Dashboard provides a convenient wau to visually monitor energy consumption and analysis.

Process screen display

• Total energy consumption (of workpiece in operation)

Current energy consumption







Clean coolant system



Dedicated cyclone filter and coolant tank can extend coolant life. Thanks to these features, the frequency of tank and filter cleaning is significantly reduced.



Sludge settled in the collecting drain cup is removed

More than 98 % of particles larger than 10 μ m are removed by the dedicated cyclone filter



MAZATROL SmoothX



MAZATROL SMODTHX

New interface with touch operation ensures convenient data processing, programming, confirmation, editing and tool data registration

Five different home process screens displays the appropriate data in an easy-to-understand manner. Icons can be touched in each screen for additional processes.



Programming



Tool data



Setup



Machining



Maintenance



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.



Reduced cycle time

Improved finished surface

Machining time for blade was reduced by 10-20% using this function

*test results for reference only

Variable Acceleration Control Function (VAC)

Variable acceleration control is a new function which permits the faster acceleration capability of linear axes to be used whenever possible.

Seamless Corner Control (SCC)

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



Seamless Corner Control

Other systems

Other Systems

Active Vibration Control (AVC)





Feedrate-3000 mm/mi

Active Vibration Control (AVC)

Minimized vibration function for high-speed, high-accuracy machining and longer tool life.

TRACTOR CONTRACTOR OFFICE



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EIA programming

QUICK EIA

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



VIEW SURE

By analyzing 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.





Turned workpiece features on a machining center

OPTION

Made possible by the high-speed feed performance of the VARIAXIS i-300 AWC and the high-speed, high-accuracy MAZATROL SmoothX CNC.

Machining of taper bores

Machining of different bore diameters by a single tool

A single tool can machine a wide range of bore sizes and outer diameters



The spindle orientation is controlled so that the boring tool tip can machine turning features while it moves in an arc along the X and Y axes. As a result, turning features can be machined without a U-axis controlled tool.





Mazak iSMART Factory[™] solution









OPTION SMOOTH Tool Management / Tool ID

The SMOOTH Tool Management software is perfect for managing large amounts of tool data. By centrally managing tools and registering tool data and tool setup, non-cutting time can be reduced.

Centralized management of data for all tools inside the factory

This software provides centralized MAZATROL tool data management for all registered tools in a factory. The remaining time and state of wear of tools in a machine magazine can be easily checked over the network. (When Mazak ID is used)

Inputting tool data by tool presetter



Tool diameter and length data measured by a tool presetter can be inputted into the tool database over a network. Tool data are tied to a unique tool ID for each tool.

Tool management using tool IDs

Each tool has a chip housing a unique tool ID that is used to register tool data in the network. When the tool ID is read, the tool data are automatically downloaded into a machine's CNC. This software can also eliminate tool information input errors in the CNC to improve productivity.





Machine Dimensions





^{205 / 265} optional multiple drum tool magazine shown



Stroke diagram





Tool Interference (during ATC operation)

Q350 **φ**130





Unit: mm



Standard Machine Specifications

Stroke	X-axis travel (spindle head left / right)	350 mm		
	Y-axis travel (spindle head back / forth)	550 mm		
	Z-axis travel (spindle head up / down)	510 mm		
	A-axis travel (table tilting)	$-120^{\circ} \sim +30^{\circ}$		
	C-axis travel (table rotating)	±360°		
Table	Work holder clamp interface	HSK-A100		
	Work holder diameter	Φ130 mm		
	Max. workpiece size	Φ350 mm × 315 mm		
	Max. load (evenly distributed)	65 kg (Includes work holder weight)		
Spindle	Max. spindle speed	12000 min-1 (rpm)		
Feedrate	Rapid traverse rate (X, Y axes / Z axis / A, C axes)	60 m/min / 56 m/min / 50 rpm		
	Rapid traverse acceleration	0.7G		
	Simultaneously controlled axes	5		
Automatic tool changer	Tool shank configuration	BT-40		
	Tool storage capacity	145		
	Max. tool diameter / length (from gauge line) / weight	Ф90 mm / 350 mm / 8 kg		
	Max. tool diameter with adjacent tool pockets empty	Ф130 mm		
	Tool selection method	Random selection / shortest path		
Automatic work changer (AWC)	Work holder storage	32		
Motors	Spindle motor (40 % ED / Cont. rating)	22.0 kW (30 HP) / 15.0 kW (20 HP)		
Machine size	Machine height	2990 mm		
	Floor space requirement	3430 mm × 4930 mm		