Mazak

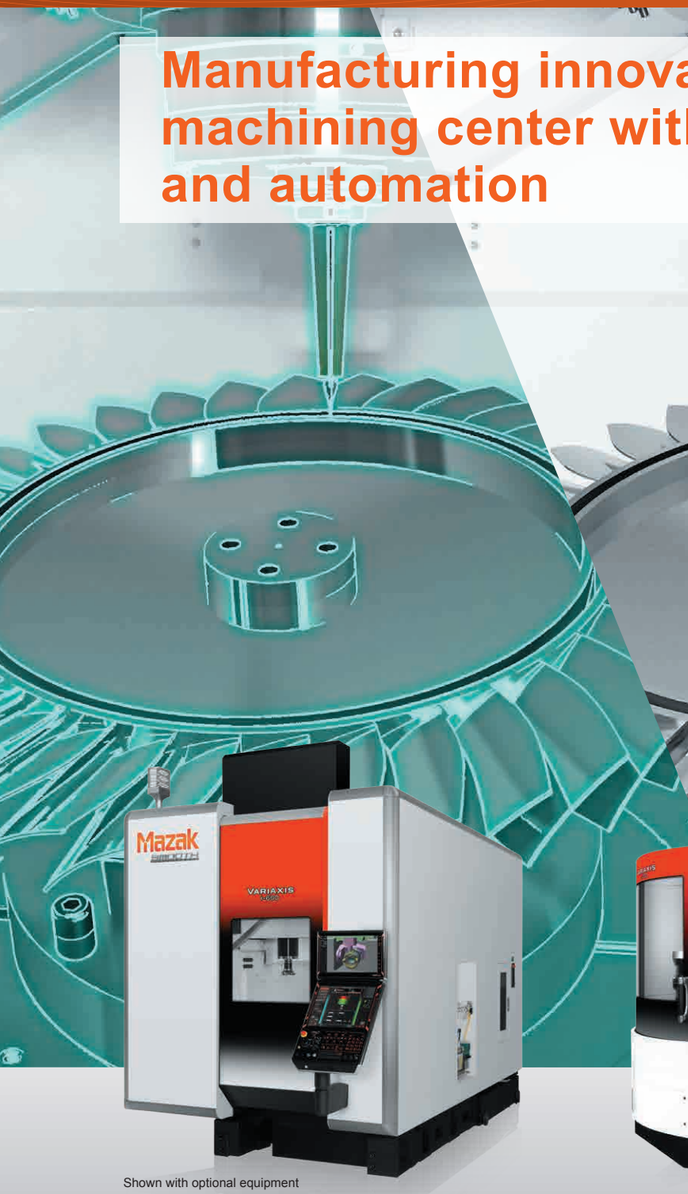
VARIAXIS i

SERIES

VARIAXIS i SERIES

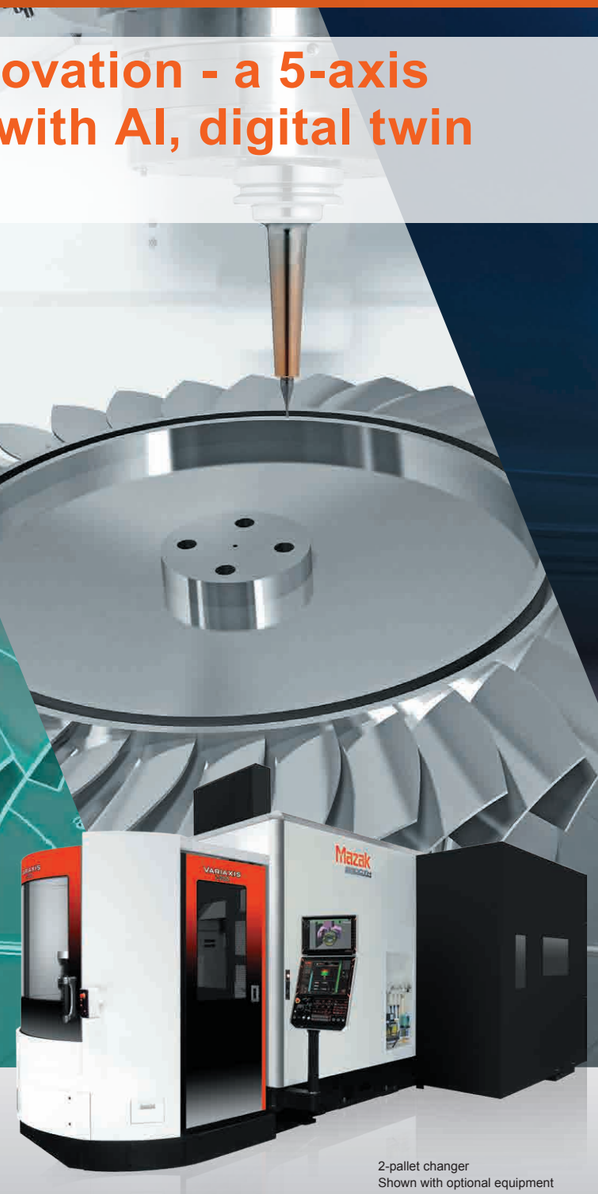
Manufacturing innovation - a 5-axis machining center with AI, digital twin and automation

The transformation of production processes utilizing data and digital technology is progressing rapidly in the manufacturing sector.
Mazak's new VARIAXIS i series has been developed to take a production site to the next level.
The evolution of 5-axis machining center provides highly efficient digital manufacturing solutions that incorporate AI and digital twin technology to respond quickly to ever-changing production demands.



Shown with optional equipment

VARIAXIS i-600



2-pallet changer
Shown with optional equipment

VARIAXIS i-700

MAZATROL SmoothAi

Shown with optional MAZATROL SmoothAi dual monitor

MPP (18PC)
VARIAXIS i-600

Ai

- Optimum compensation for vibration control and heat displacement control by AI analysis
- Stable high accuracy and high quality machining

DIGITAL TWIN

- MAZATROL TWINS software utilizing digital twin technology replicates digital screen in office set-up
- Provides a reduced set-up time for machines and improves the efficiency of machining the initial product and prototype

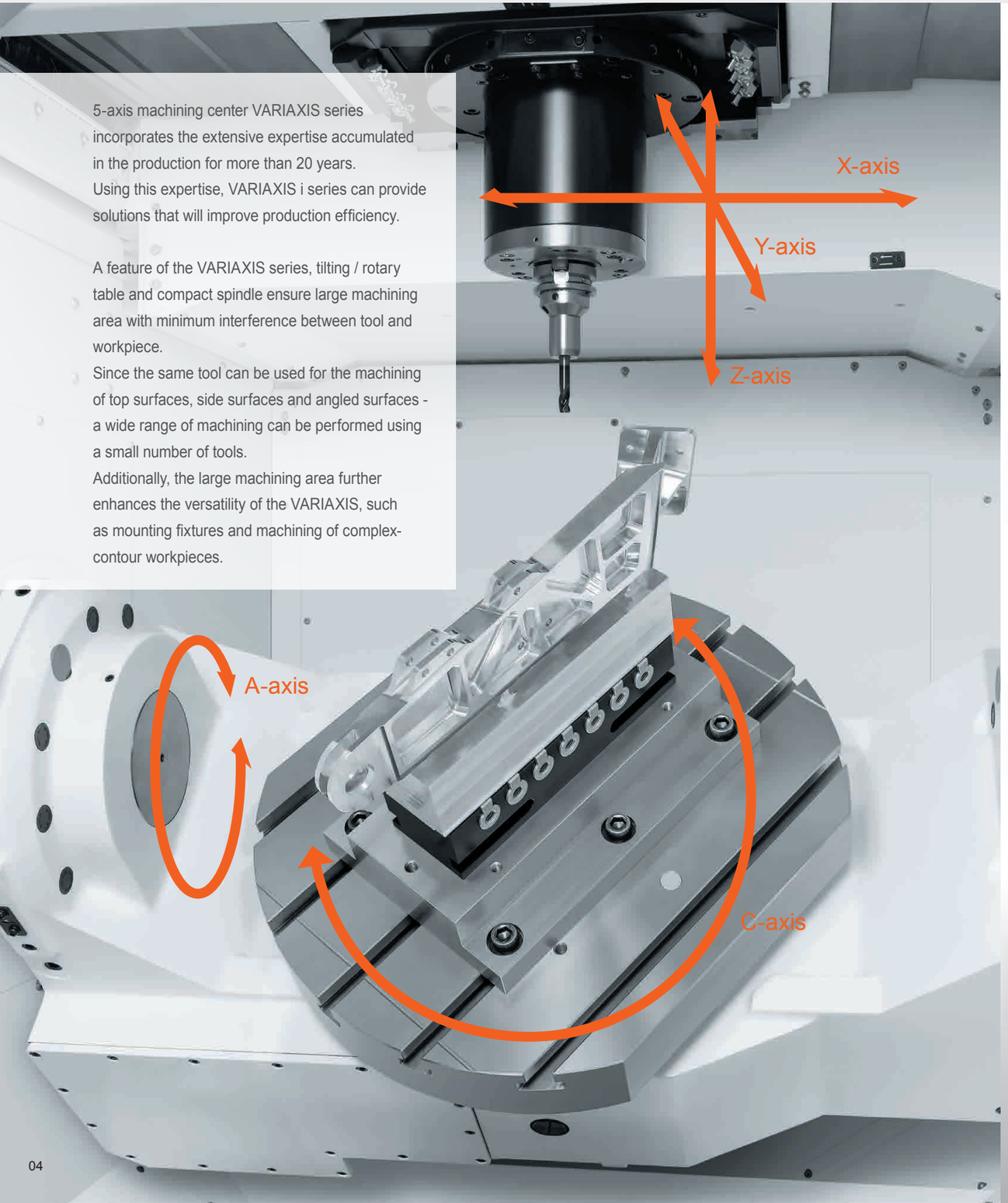
AUTOMATION

- Wide variety of automation equipment available - such as a 2-pallet changer, MPP (MULTI PALLET POOL) , modular PALLETECH flexible manufacturing system and a robot system

Applications

5-axis machining center VARIAXIS series incorporates the extensive expertise accumulated in the production for more than 20 years.
Using this expertise, VARIAXIS i series can provide solutions that will improve production efficiency.

A feature of the VARIAXIS series, tilting / rotary table and compact spindle ensure large machining area with minimum interference between tool and workpiece.
Since the same tool can be used for the machining of top surfaces, side surfaces and angled surfaces - a wide range of machining can be performed using a small number of tools.
Additionally, the large machining area further enhances the versatility of the VARIAXIS, such as mounting fixtures and machining of complex-contour workpieces.



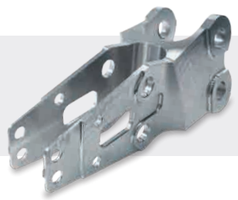
Extensive machining applications by VARIAXIS i series

Aerospace component
Joint

Automotive component
Control arm

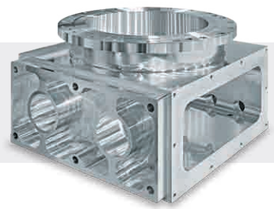
Aerospace component
Impeller

Aerospace component
Arm fitting



Aerospace component
Blade grip

Industrial machinery
Industrial camera body



Semiconductor production equipment
Vacuum chamber

Construction machinery component
Housing

Industrial machinery
Optical device component

Aerospace component
Helicopter flapping hinge

Aerospace component
Engine case

Aerospace component
Blisk

Process Integration

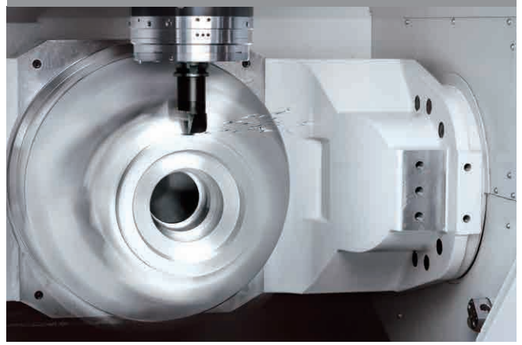
The VARIAXIS i series incorporates all machining processes from raw material input through final machining - in just one machine. Process integration by turning and milling can provide the following advantages ;

- Reduce number of machine set-ups
- Reduce production lead time
- Reduction of mounting fixtures and facility costs
- Reduce floor space
- Minimize cumulative error by process integration and ensure high accuracy machining

Process integration by VARIAXIS i-T series with turning capability

VARIAXIS i series performs all machining process from turning to milling in just one machine for continuous machining in a single setup.

Facing O.D and side surface machining

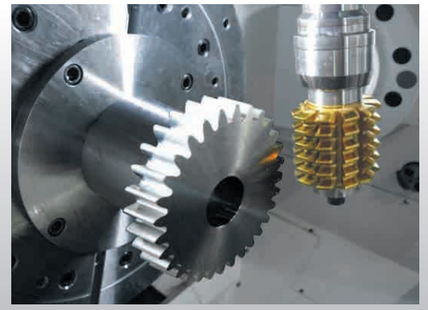


Boring O.D / I.D and side surface machining

Additional process integration - Gear machining

Smooth Gear Milling

Thanks to conversational input, gear machining programs can be easily made without expensive CAD / CAM software. Gear machining can be performed with standard endmills, expensive gear tooling is not required. Machining time and cost are considerably reduced for the production of gears in small size lots.



Smooth Gear Hobbing

By the simultaneous control of the tool axis and workpiece axis rotation, gear hobbing can be performed. Gear hobbing programs are quickly and easily made by conversational programming.

Extensive Series Range

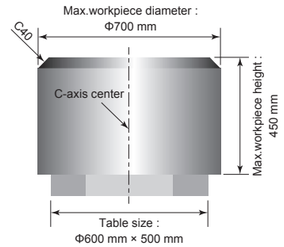
6 machine models available to meet a wide variety of machining requirements

5-axis machining center for process integration and higher productivity

VARIAXIS i -600

Travel
X-axis : 510 mm
Y-axis : 910 mm
Z-axis : 510 mm
A-axis : -120° ~ + 30°
(table tilt)
C-axis : ±360° (table rotation)

Max.load : 500 kg

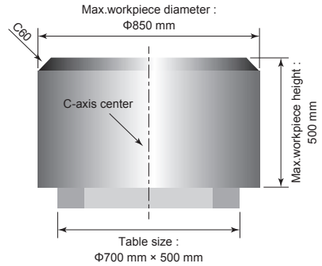


5-axis machining center for process integration and higher productivity

VARIAXIS i -700

Travel
X-axis : 630 mm
Y-axis : 1100 mm
Z-axis : 600 mm
A-axis : -120° ~ + 30°
(table tilt)
C-axis : ±360° (table rotation)

Max.load : 700 kg

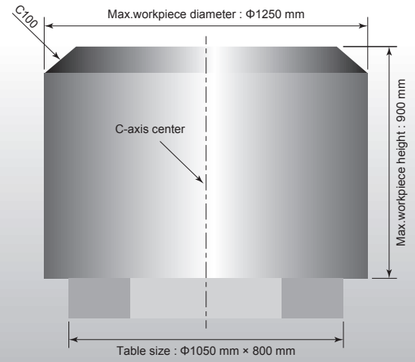


No. 50 taper spindle for large / heavy workpieces

VARIAXIS i -1050

Travel
X-axis : 1200 mm
Y-axis : 1385 mm
Z-axis : 900 mm
A-axis : -150° ~ + 130°
(table tilt)
C-axis : ±360° (table rotation)

Max.load : 2000 kg



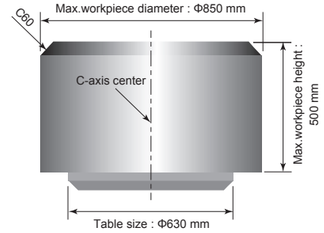
5-axis machining center with turning capability for process integration

Turning capability for additional process integration

VARIAXIS i -700T

Travel
X-axis : 630 mm
Y-axis : 1100 mm
Z-axis : 600 mm
A-axis : -120° ~ + 30°
(table tilt)
C-axis : ±360° (table rotation)

Max.load : 700 kg

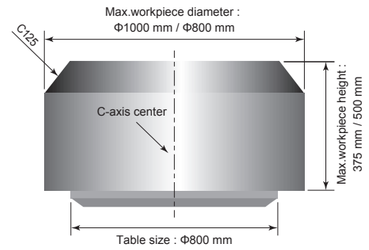


5-axis machining center with No. 50 taper spindle plus turning

VARIAXIS i -800T

Travel
X-axis : 730 mm
Y-axis : 850 mm
Z-axis : 560 mm
A-axis : -130° ~ + 30°
(table tilt)
C-axis : ±360° (table rotation)

Max.load : 1000 kg

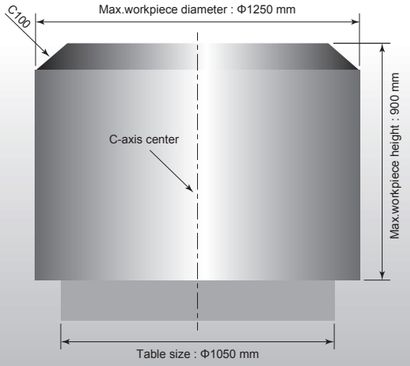


No. 50 taper spindle for large / heavy workpieces with turning requirements

VARIAXIS i -1050T

Travel
X-axis : 1200 mm
Y-axis : 1385 mm
Z-axis : 900 mm
A-axis : -150° ~ + 130°
(table tilt)
C-axis : ±360° (table rotation)

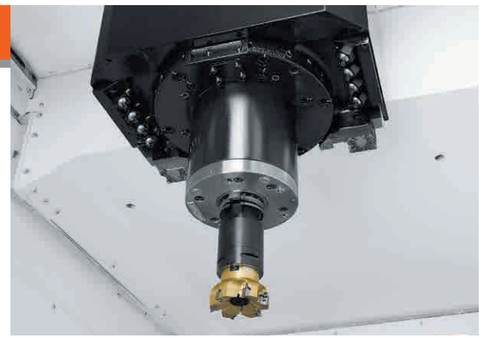
Max.load : 2000 kg



Higher Productivity

Spindle specifications to meet a wide variety of machining requirements

The high rigidity spindle can perform heavy duty machining of steel as well as high speed machining of non-ferrous materials such as aluminum. High speed, high torque and turning specifications are available.



VARIAXIS i-600, i-700

Speed	Standard	High torque OPTION	High speed OPTION		
	12000 rpm	12000 rpm	18000 rpm	25000 rpm	30000 rpm
Output (40% ED)	22 kW (30 HP)	22 kW (30 HP)	35 kW (47 HP)	23 kW (31 HP)	23 kW (31 HP)
Max. torque (40% ED)	71.6 N·m	118 N·m	134 N·m	22 N·m	22 N·m
Tool shank	BT-40 / BBT-40 / HSK-A63	BT-40 / BBT-40 / HSK-A63	BT-40 / BBT-40 / HSK-A63	HSK-A63	HSK-F63

VARIAXIS i-1050

Speed	Standard	High torque OPTION	High speed OPTION		
	10000 rpm	7000 rpm	18000 rpm	18000 rpm	25000 rpm
Output (40% ED)	37 kW (50 HP)	30 kW (40 HP)	55 kW (74 HP)	35 kW (47 HP)	23 kW (31 HP)
Max. torque (40% ED)	350 N·m	442 N·m	105 N·m	134 N·m	22 N·m
Tool shank	BT-50 / BBT-50 / HSK-A100	BT-50 / BBT-50 / HSK-A100	HSK-A100	HSK-A63	HSK-A63

VARIAXIS i-700T (turning)

Speed	Standard
	18000 rpm
Output (40% ED)	30 kW (40 HP)
Max. torque (40% ED)	122 N·m
Tool shank	BT-40 / BBT-40 / HSK-T63 / CAPTO C6

VARIAXIS i-800T, i-1050T (turning)

Speed	Standard	High torque OPTION	High speed OPTION
	10000 rpm	5000 rpm	15000 rpm
Output (40% ED)	37 kW (50 HP)	37 kW (50 HP)	56 kW (75 HP)
Max. torque (40% ED)	302 N·m	715 N·m	143 N·m
Tool shank	BT-50 / BBT-50 / HSK-T100 / CAPTO C8	BT-50 / BBT-50 / HSK-T100 / CAPTO C8	HSK-T100

See P27, 28 and 29 for spindle output / torque diagram

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. Additionally, the compact spindle cartridge allows workpieces to be efficiently machined at the optimum cutting conditions.

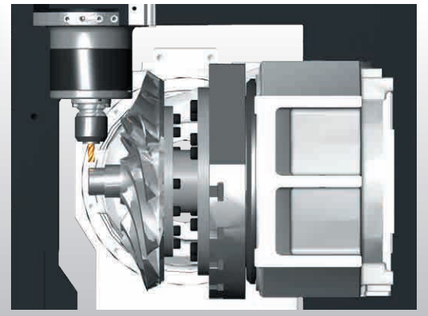


Table (VARIAXIS i-700T, i-800T, i-1050T)

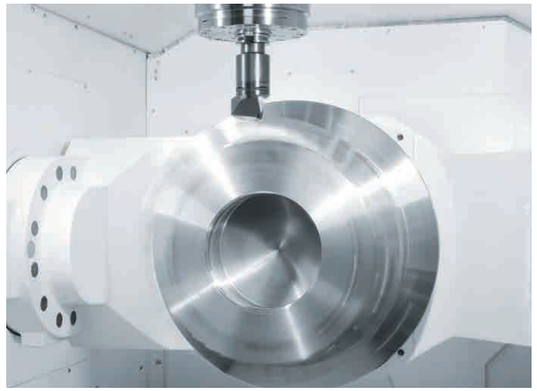
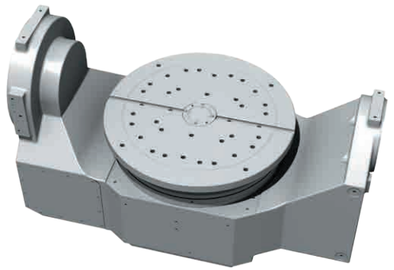


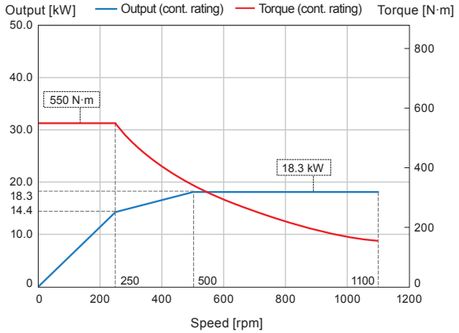
Table rotation speed	
VARIAXIS i-700T	1100 rpm
VARIAXIS i-800T	800 rpm
VARIAXIS i-1050T	500 rpm

Direct drive motor

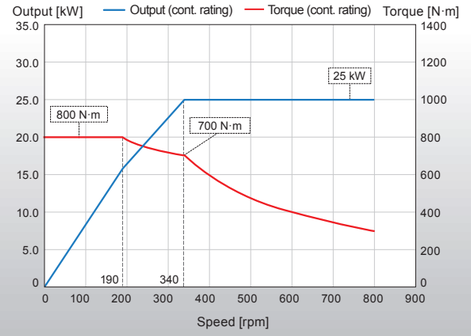
The rotary table (C-axis) is driven by a direct drive motor for both C-axis positioning and turning operation. Turning is performed with the A-axis in the 0 degree position or 90 degree position. Since the A-axis is rigidly clamped on a coupling in the 0 or 90 degree position for turning operations, high accuracy machining over extended periods of operation is ensured.



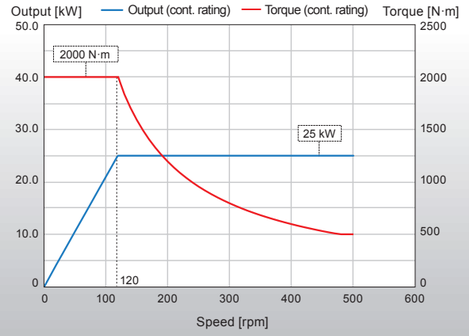
VARIAXIS i-700T
1100 rpm direct drive motor output / torque diagram



VARIAXIS i-800T
800 rpm direct drive motor output / torque diagram



VARIAXIS i-1050T
500 rpm direct drive motor output / torque diagram

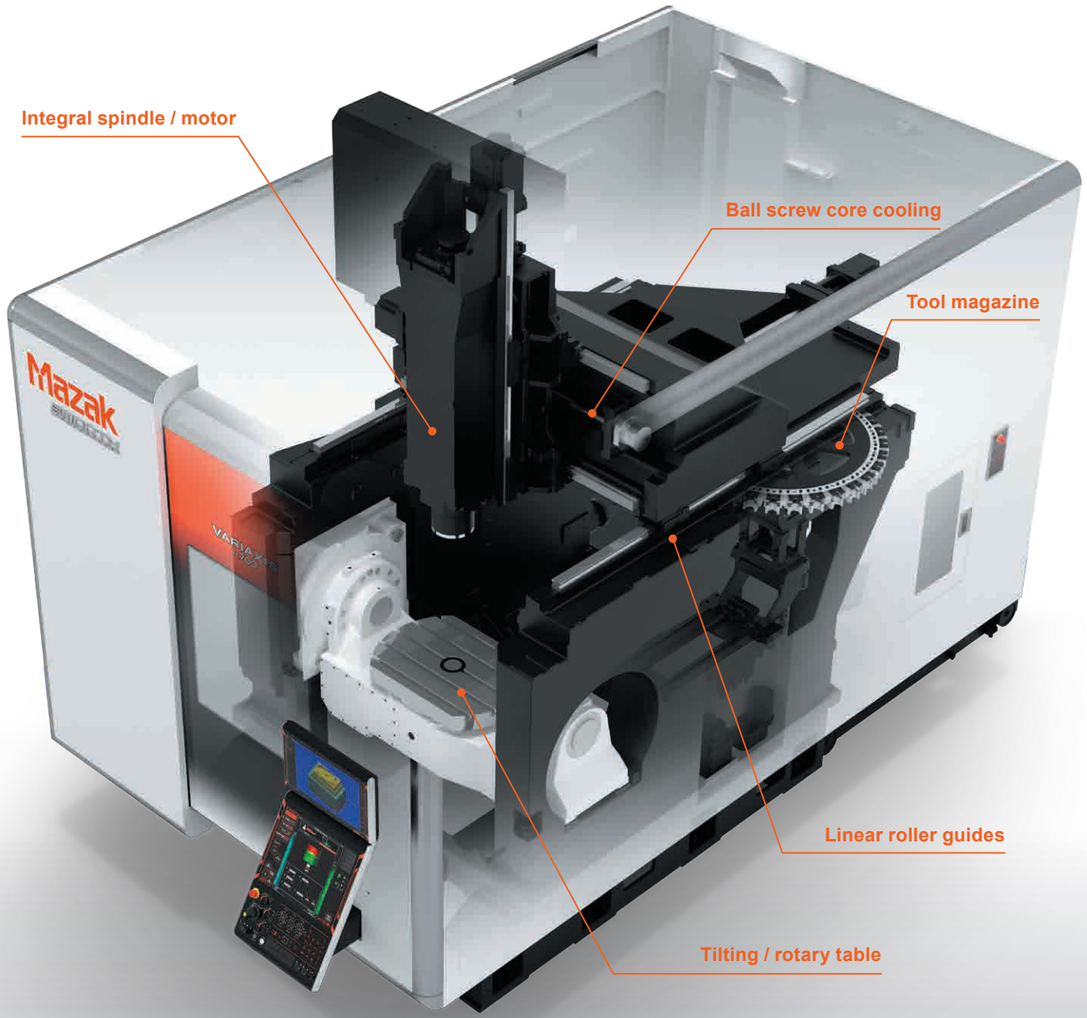


Machine Design

High rigidity construction ensures high speed machining with high accuracy over extended periods of operation

Full gantry construction without overhang

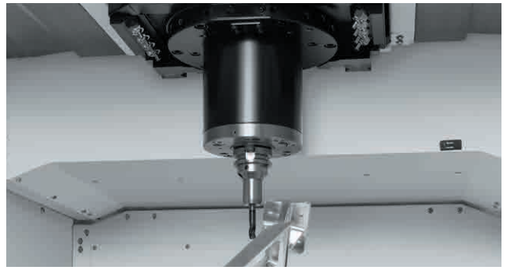
Machine construction was designed utilizing FEM analysis. Vibration is minimized during acceleration / deceleration to ensure high accuracy machining stability.



VARIAXIS i-700 with standard 30-tools magazine and optional MAZATROL SmoothAi dual monitor are shown

Integral spindle / motor

Thanks to the integral spindle / motor design, vibration is minimized during high speed operation. For high accuracy machining, temperature controlled cooling oil is circulated around the spindle bearings and headstock to minimize any thermal change to the spindle.



Tool magazine

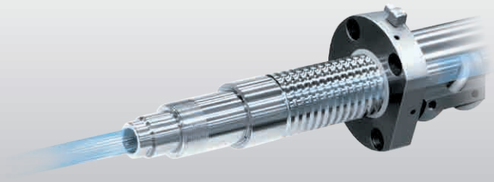
The standard tool magazine has a storage capacity of 30 tools - 40, 80, 120 tools are optionally available.
The generous magazine capacity provides ample tool storage for complex workpieces and high-mix production as well as spare tools for prolonged continuous operations.

High rigidity table

The A-axis features a trunnion design to provide high rigidity. Additionally, A-,C-axis utilizes a roller gear cam for high speed and high accuracy machining.

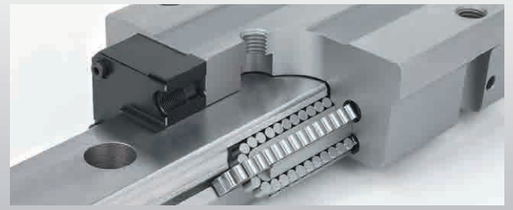
Ball screw core cooling

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

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

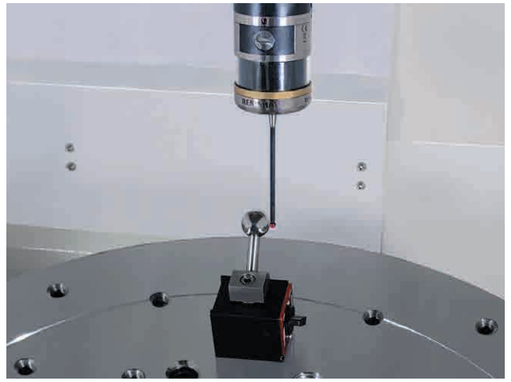


Higher Accuracy

For high accuracy 5-axis machining

High accuracy 5-axis calibration - MAZA-CHECK

Position misalignment and incline of the rotary axes can automatically be measured and compensated to realize high accuracy 5-axis machining. The centers of rotation of both the C and B axes can be automatically measured and compensated.

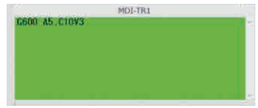


Wireless touch probe RMP600 is optional equipment.

Measurement item selection

Measurement information setting

Automatic measurement program generation



Convenient screen display assists measurement operation.

Ai Thermal Shield

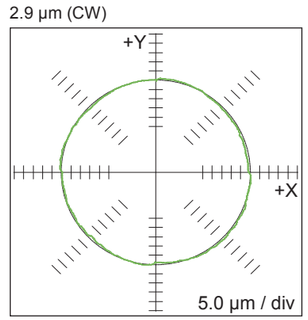
New algorithms automatically determine the amount of compensation to be automatically applied according to changes in the temperature to ensure even higher machining accuracy.

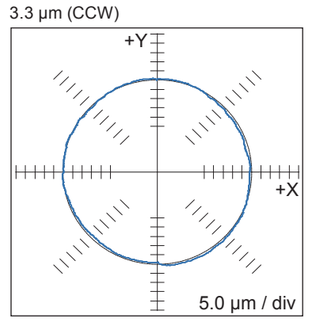
High rigidity construction combined with the MAZATROL SmoothAi ensure high accuracy machining

DBB (VARIAXIS i-600 test results)

X-Y plane measured results
2.9 µm (CW)
3.3 µm (CCW)

Machine	VARIAXIS i-600
Diameter	200 mm
Feedrate	560 mm/min





Positioning accuracy and positioning repeatability (VARIAXIS i-600 test results)

Mazak precision results

Positioning accuracy	X-axis	3.05 µm
	Y-axis	2.97 µm
	Z-axis	2.44 µm

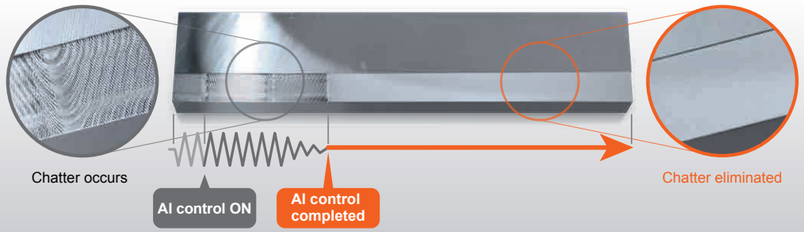
Positioning repeatability	X-axis	0.74 µm
	Y-axis	1.18 µm
	Z-axis	0.53 µm

Note : The inspection is conducted according to ISO-230 on a recommended foundation with room temperature controlled to 22°C±1°C after the machine has reached operation temperature.

Smooth Ai Spindle — OPTION

Using AI, milling spindle vibration is detected and machining conditions are automatically changed to produce unsurpassed surface finishes and high productivity. Thanks to AI, adjustments can be easily made in a short time without a skilled operator.

Ai SMOOTH Ai SPINDLE



Ergonomics

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.

Convenient operation when using an overhead crane

The VARIAXIS i series has unsurpassed access to the machine table for convenient workpiece loading / unloading.
An overhead crane can be easily used for the loading / unloading of heavy workpieces and fixtures thanks to the automatic retractable top cover.

Large window with easy-to-view machining status

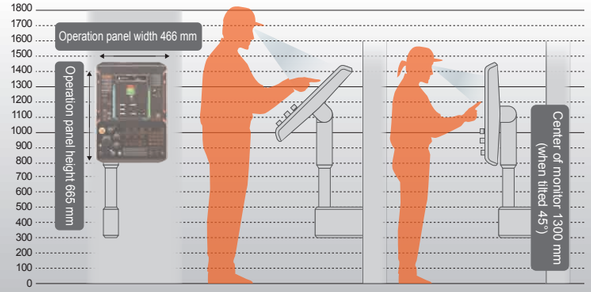
The large front window allows workpiece machining to be easily monitored by the operator.

Maintenance area

Items requiring frequent access for machine maintenance are arranged in one central location.

Adjustable CNC touch panel

Operation touch panel can be tilted and rotated to the optimum position for any operator's height to ensure ease of operation.



Automation

2-pallet changer

OPTION

The next workpiece can be setup during the machining of the current workpiece for higher productivity

The 2 pallet changer system for the VARIAXIS i-600 / i-700 / i-700T / i-800T / i-1050 / i-1050T provides excellent operator working space inside the 2 pallet changer.

VARIAXIS i-700 (2-pallet changer)

VARIAXIS i-800T (2-pallet changer)

VARIAXIS i-1050 (2-pallet changer)

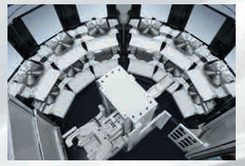
	VARIAXIS i-600 (2-pallet changer)	VARIAXIS i-700 (2-pallet changer)	VARIAXIS i-700T (2-pallet changer)
Pallet size	□400 mm	□500 mm	Φ610 mm
Max. workpiece size	Φ600 mm × 425 mm	Φ730 mm × 500 mm	Φ730 mm × 500 mm
Max. load	300 kg	600 kg	600 kg

	VARIAXIS i-800T (2-pallet changer)	VARIAXIS i-1050 (2-pallet changer)	VARIAXIS i-1050T (2-pallet changer)
Pallet size	Φ610 mm	□800 mm	Φ1000 mm
Max. workpiece size	Φ730 mm × 500 mm	Φ1250 mm × 700 mm	Φ1250 mm × 700 mm
Max. load	600 kg	1500 kg	1500 kg

MPP (MULTI PALLET POOL)

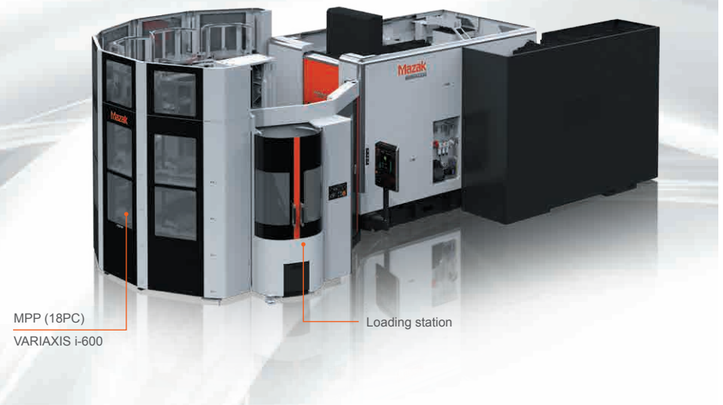
OPTION

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.



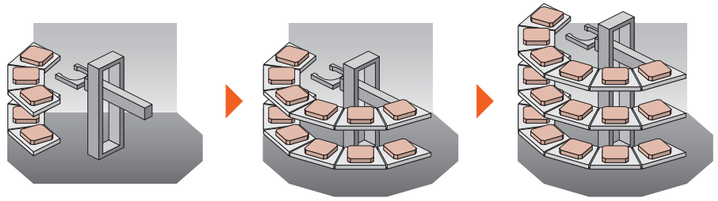
Pallet loader and workpiece stocker

Loading station



Flexible pallet stocker capacity

6, 12 and 18 pallet storage capacities are available after initial installation.



3 pallets × 2 levels
6 PC

6 pallets × 2 levels
12 PC

6 pallets × 3 levels
18 PC

Workpiece specifications

Model	Pallet size	Max. load (without pallet)	Max. workpiece size (without pallet)
VARIAXIS i-600	□400 mm	300 kg	Φ600 mm × 425 mm
VARIAXIS i-700	□500 mm	600 kg	Φ730 mm × 500 mm
VARIAXIS i-700T	Φ610 mm	600 kg	Φ730 mm × 500 mm

SMOOTH MPP

MPP control / management software

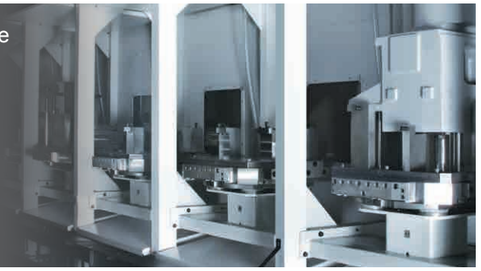
Once the production schedule is input, operation will be performed automatically. Production results, system utilization and other data can be checked on the MAZATROL SmoothAi CNC. If connected to a network (prepared by user), system date are accessible on office PCs, tablets and smartphones.

Automation

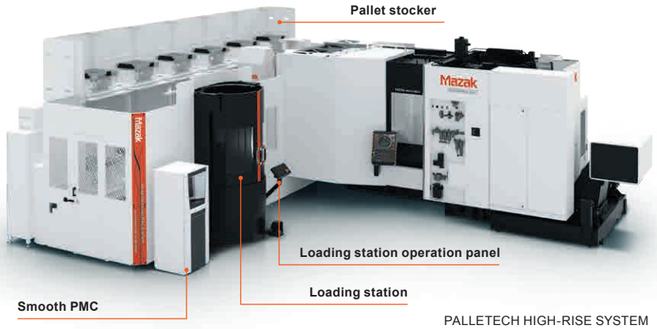
PALLETECH SYSTEM — OPTION

With minimum investment, PALLETECH system can utilize machines and fixtures for improved operation rate

- Automatic pallet transfer with fixtures and workpieces for multi-product machining
- Shortens the idle time of machine and fixtures by simulation function, optimizing the machining schedule
- Highly reliable machine and systems, which enable improvement of the system operation rate



PALLETECH HIGH-RISE SYSTEM
(2 level)



PALLETECH HIGH-RISE SYSTEM
with horizontal machining center

- PALLETECH can be expanded flexibly in response to increased production volume
- VARIAXIS i series can be integrated to other machines such as horizontal machining centers using PALLETECH SYSTEM
- Flexible connection to peripheral system and devices that increase automatic operation time

Pallet size

VARIAXIS i-600	VARIAXIS i-700	VARIAXIS i-700T / i-800T
□400 mm	□500 mm	Φ610 mm

PALLETECH MANUFACTURING SYSTEM
(1 level)

PALLETECH MANUFACTURING CELL
with horizontal machining center

SMOOTH PMC

FMS control / management software

- Easy and prompt optimization of system operation schedule by simulation based on actual machine data
- Support to setup workpieces and tools required for system operation
- Monitor operational status from a PC in an office and tablets

System monitoring screen

Simulation

Preparation for hydraulic fixtures — OPTION

Hydraulic fixtures continuously supply hydraulic power to the table for loading and unloading workpiece.

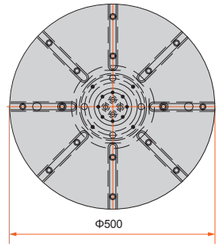
Single table

Note : available for 2-pallet changer specification

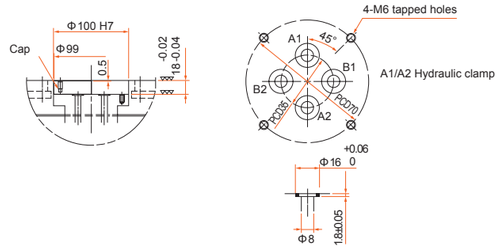
Unit : mm

VARIAXIS i-600
VARIAXIS i-700

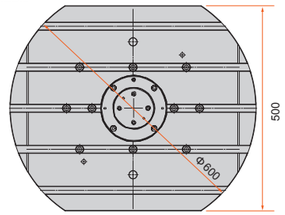
Φ500 mm table



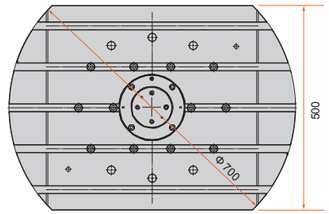
Details



VARIAXIS i-600
Φ600 mm × 500 mm table



VARIAXIS i-700
Φ700 mm × 500 mm table



Compact tool magazine with large tool storage capacity — OPTION

VARIAXIS i-600, 700

The compact multiple drum tool magazine has a large tool storage capacity to meet the machining requirements of a wide variety of workpieces in small size lots. Tools are automatically loaded from the multiple drum tool magazine to the magazine next to the machining area. Select the tool magazine size that best meets your production requirements.

VARIAXIS i-600
Shown with optional equipment

265 tools drum tool magazine

Tool storage capacity

#40	205,265, 325, 385,445,505 tools

■ Magazine operation panel

Loading / unloading tools as well as editing tool data can be performed to reduce the time required for tool setup.

Innovation for Higher Productivity

MAZATROL SMOOTH Ai

New MAZATROL SmoothCNC system

Designed to provide unsurpassed productivity through even faster and higher precision control while elevating your production to the next level with AI and digital twin technology

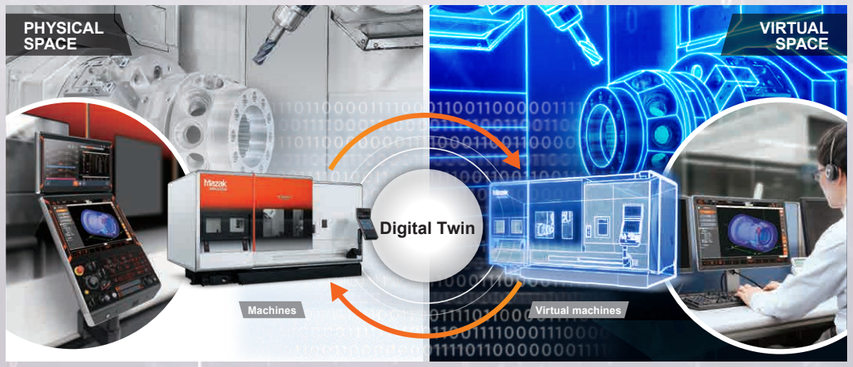
- Touch screen operation — similar to using your smartphone / tablet
- MAZATROL Smooth graphical user interface for unsurpassed ease of operation
- CNC System integrates with your Windows® PC
- Latest hardware and software for unprecedented speed and precision
- Higher machining speed for high accuracy 5-axis machining
- Fine tuning function - easy machining parameter setting for various workpieces
- MAZATROL TWINS - software that enables real-time sharing and centralized management of various data for increase productivity

AI

Increase your productivity with AI technology

Digital Twin

Create a virtual machine on your office PC for efficient setup and improved productivity



Automation

Advanced automation utilizing robot and software

Shown with optional MAZATROL SmoothAi dual monitor

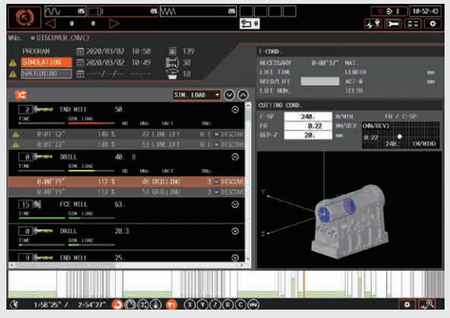
Innovative functions for higher productivity

Innovative functions to improve productivity from programming to machining

Simulation, Test cutting (machining analysis, optimization)

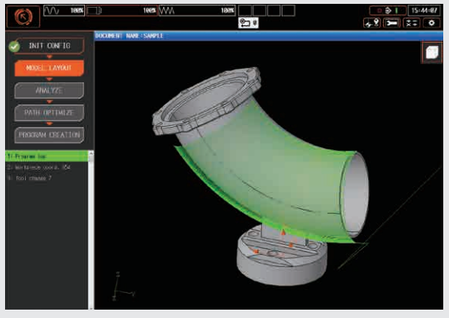
Cutting Adviser

Cutting adviser optimizes machining conditions by machining simulation and visualization of machining process from accumulated machining results.



SMC PLUS OPTION

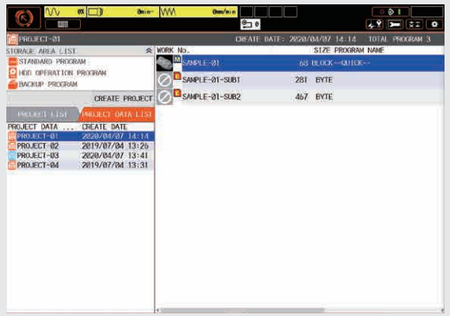
Compares the cutting point of the EIA program with the 3D model so the correct command point can be changed to ensure the correct tool path and high accuracy finished surfaces.



Set up

Project function

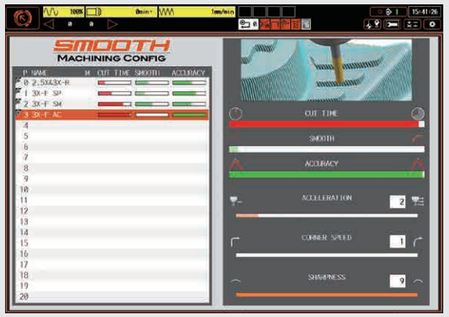
Data required to execute machining is managed as project data. Project data can be exported to the machine, drastically reducing time for inputting data. Additionally, project data of entire factory can be managed with Smooth Project Manager (optional software).



Tuning machining features

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. Additionally, the rotary axis acceleration tuning parameter can now be adjusted by a slider switch as well as selecting speed priority or accuracy priority for simultaneous 5-axis machining.



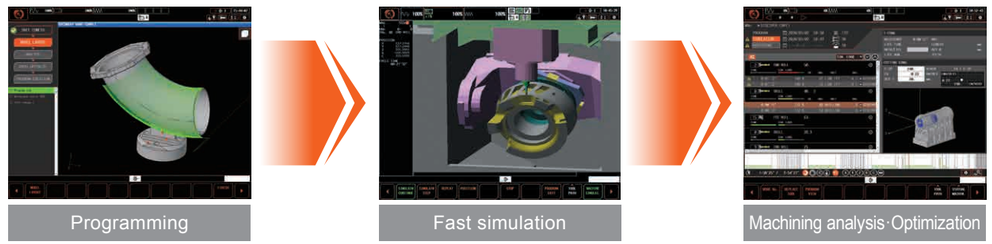
Advanced digital technology for manufacturing

MAZATROL TWINS (software) for high productivity OPTION

Virtual machines in your office accurately duplicate the operation of machines on your factory floor. Available software can be used together with machines equipped with the MAZATROL SmoothAi CNC to substantially increase the efficiency of your production.

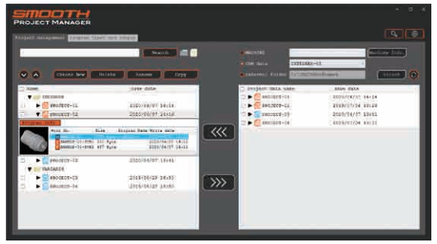
Smooth CAM Ai

Programs can be made and edited, as well as performing simulation and analysis on the Smooth CAM Ai for multiple machines.



Smooth Project Manager

Smooth Project Manager is used to manage the project data of the entire factory. The data can be synchronized between the machine in the factory and the PC in the office.



Smooth Tool Management

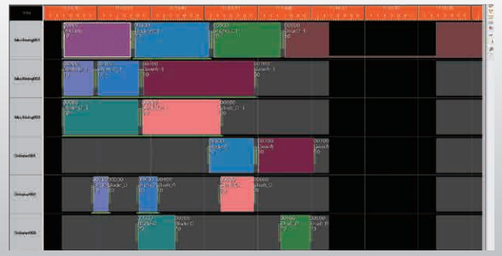
The Smooth Tool Management software manages data of the large number of tools in use by a factory for higher productivity.

Smooth Monitor AX·Smooth Link

Machine status information is collected from the whole plant and is accumulated for production results, as well as production analysis.

Smooth Scheduler

Smooth Scheduler is software to create effective machining schedules utilizing production data. Schedules are displayed for convenient monitoring of production progress.



Environmentally Friendly

Designed with environmental considerations

The environment and our impact on natural surroundings have always been important concerns of Yamazaki Mazak. This is shown by the fact that all factories in Japan where Mazak machine tools are produced are ISO 14001 certified, an international standard confirming that the operation of our production facilities does not adversely affect air, water or land.

Extended coolant service life

Reduction of lubrication consumption

Reduction of electrical power consumption

Auto-power off

When the machine is not operated for a pre-registered period of time, the machine worklights and the CNC backlight are turned off automatically. They are automatically turned on when the motion sensor detects the return of the operator.

Chip conveyor stop

After the passing of a pre-registered period of time after automatic machine operation stops, the chip conveyor automatically stops to reduce electrical power consumption. (Chip conveyor is optional equipment)

Grease lubrication

The linear roller guides and ball screws are lubricated by grease which eliminates tramp oil in the coolant resulting in a much longer service life for the coolant.

Energy Dashboard OPTION

The Energy Dashboard provides a convenient visual monitoring of energy consumption and analysis. (Optional electrical power monitor required)

Process screen display

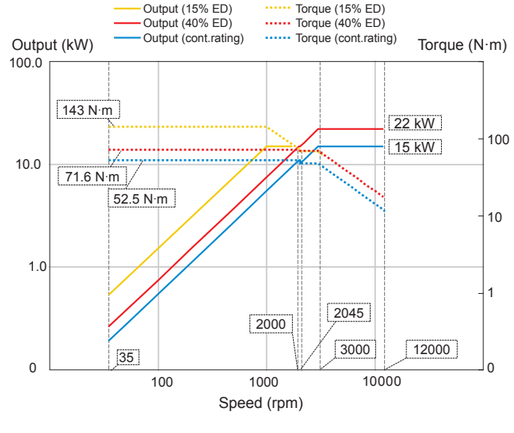
· Total energy consumption (of workpiece in operation)
· Current energy consumption

Spindle Output / Torque Diagram

VARIAXIS i-600, i-700

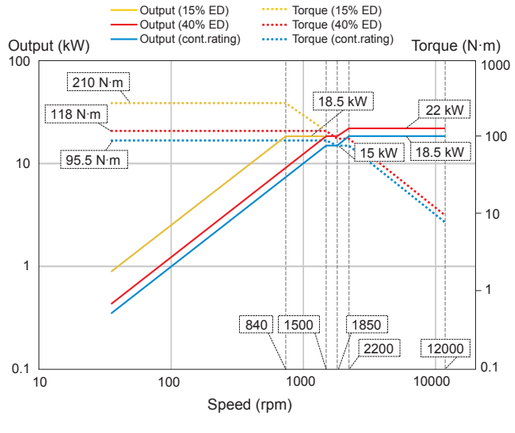
12000 rpm spindle

Output	Torque
AC 22 kW (30 HP) (40% ED)	71.6 N·m (40% ED)
	52.5 N·m (cont. rating)



12000 rpm high torque spindle OPTION

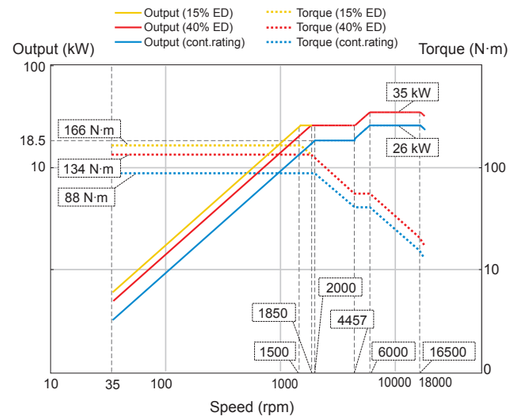
Output	Torque
AC 22 kW (30 HP) (40% ED)	118 N·m (40% ED)
	95.5 N·m (cont. rating)



VARIAXIS i-600, i-700, i-1050(HSK-A63)

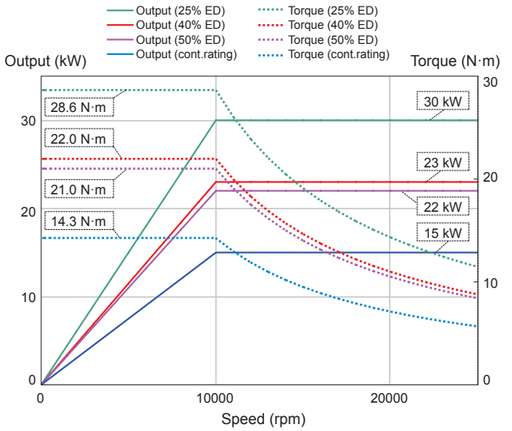
18000 rpm spindle OPTION

Output	Torque
AC 35 kW (47 HP) (40% ED)	134 N·m (40% ED)
	88 N·m (cont. rating)



25000 rpm spindle OPTION

Output	Torque
AC 23 kW (31 HP) (40% ED)	22 N·m (40% ED)
	14.3 N·m (cont. rating)

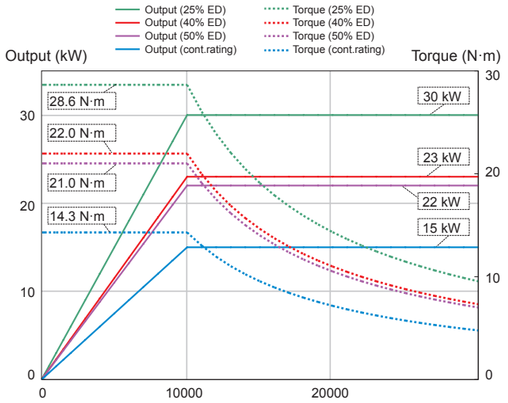


■ Spindle Output / Torque Diagram

VARIAXIS i-600, i-700

30000 rpm spindle **OPTION**

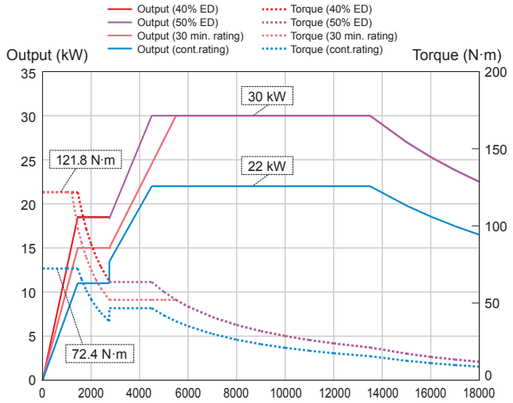
Output	Torque
AC 23 kW (31 HP) (40% ED)	22 N·m (40% ED)
	14.3 N·m (cont. rating)



VARIAXIS i-700T

18000 rpm spindle

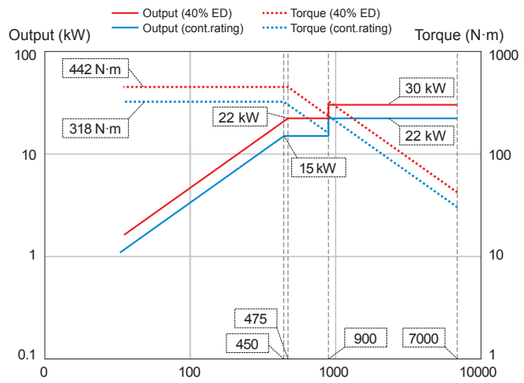
Output	Torque
AC 30 kW (40 HP) (40% ED)	122 N·m (40% ED)
	72.4 N·m (cont. rating)



VARIAXIS i-1050

7000 rpm high torque spindle **OPTION**

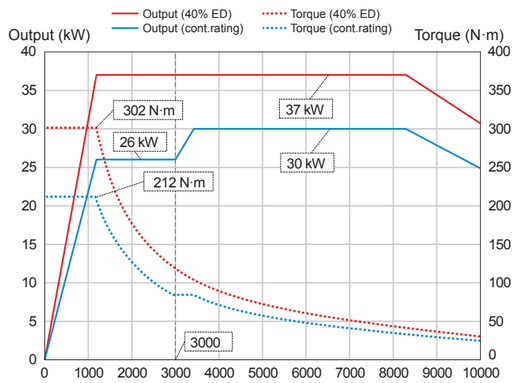
Output	Torque
AC 30 kW (40 HP) (40% ED)	442 N·m (40% ED)
	318 N·m (cont. rating)



VARIAXIS i-800T, i-1050T

10000 rpm spindle

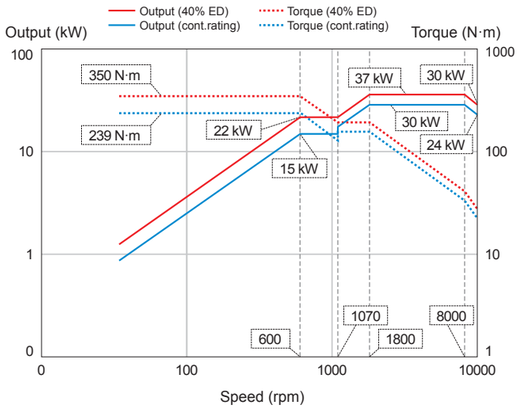
Output	Torque
AC 37 kW (50 HP) (40% ED)	302 N·m (40% ED)
	212 N·m (cont. rating)



VARIAXIS i-1050

10000 rpm spindle

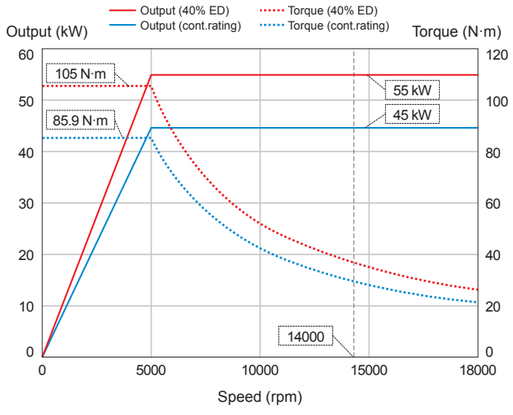
Output	Torque
AC 37 kW (50 HP) (40% ED)	350 N·m (40% ED)
	239 N·m (cont. rating)



VARIAXIS i-1050

18000 rpm spindle (HSK-A100) **OPTION**

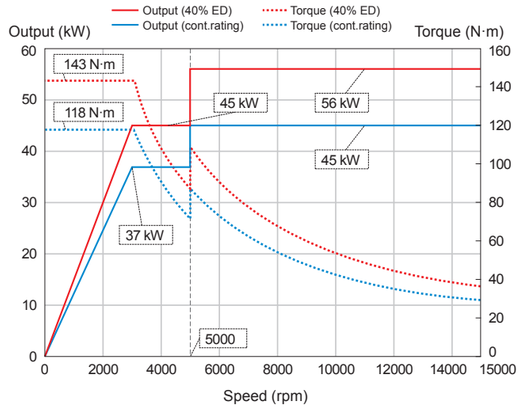
Output	Torque
AC 55 kW (74 HP) (40% ED)	105 N·m (40% ED)
	85.9 N·m (cont. rating)



VARIAXIS i-800T, i-1050T

15000 rpm spindle **OPTION**

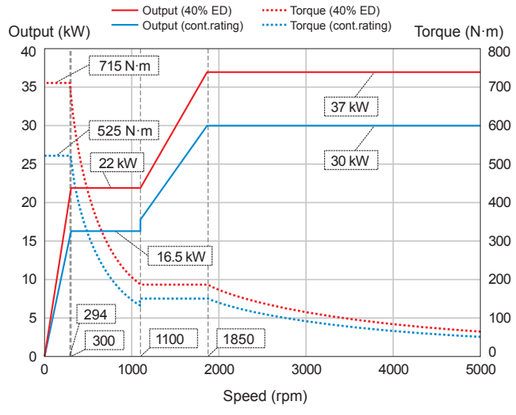
Output	Torque
AC 56 kW (75 HP) (40% ED)	143 N·m (40% ED)
	118 N·m (cont. rating)



VARIAXIS i-800T, i-1050T

5000 rpm high torque spindle (HSK-T100) **OPTION**

Output	Torque
AC 37 kW (50 HP) (40% ED)	715 N·m (40% ED)
	525 N·m (cont. rating)



■ Standard and Optional Equipment

Automation

TOOL HIVE — OPTION

The TOOL HIVE can store more than 160 tools in a small space. Operation and tool data editing can be performed on the TOOL HIVE TERMINAL control panel to reduce the time required for tool setup.

● TOOL HIVE specifications

Tool storage	#40	160, 200, 240, 280, 320, 360 tools
	#50	180, 216, 252, 288, 324, 360, 396, 432 tools
Magazine	Rack type	
Tool selection method	Random selection, shortest path (fixed pocket assignment)	

Tool storage other than the above is available. Please contact us.

240 tool TOOL HIVE magazine

Scale feedback system — OPTION

Detects absolute machine position - especially suitable for high speed operation over extended periods.
(A-,C-axis scale feedback system is standard equipment for i-1050, i-1050T)

Remote manual pulse generator — OPTION

Manual pulse generator, axis selecting switch and emergency stop button are on remote operation panel for more convenient machine setup.

Automatic tool length measurement & tool breakage detection

Tool length is automatically measured and registered in the CNC system. Tool breakage can be detected during automatic operation.

Laser type tool length measurement — OPTION

Tool length measurement can be performed on extremely small tools which can not be measured with touch type tool length measurement. Thanks to noncontact measurement by laser beam, tool length and diameter can be measured with the tool rotating to provide stable accuracy.

Automatic power ON / OFF + warm-up operation

The setting of a self-timer is used to automatically turn on and turn off the machine.

Status light (3 colors, square) — OPTION

Indicates operational status.
Red : alarm
Yellow : operation end
Green : in automatic operation

Tool ID — OPTION

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 and tool data input, reducing setup time.
(requires retention bolt with tool ID and tool presetter)

Coolant

Workpiece washing coolant — OPTION

By discharging a large volume of coolant from nozzles, machined chips are efficiently removed from the workpiece and fixture. This option is effective for machines equipped with the pallet changer or robot to minimize the accumulation of machined chips during automatic operation.

Flood coolant

Coolant is discharged from nozzles on the spindle housing to cool the workpiece and remove chips.
(Optionally available for i-1050, i-1050T)

Coolant through spindle — OPTION

Coolant is fed to the tool tip by passages through the tool for lower tool tip temperatures, improved chip-control and lubrication. 3 pump pressure specifications are available : 0.5 MPa , 1.5 MPa and 7.0 MPa (5 kgf/cm^2, 15 kgf/cm^2, 70 kgf/cm^2).

SUPERFLOW coolant system — OPTION

The SUPERFLOW coolant system features improved chip-control and lubrication, lower tool tip temperatures.
· High performance cyclone filter with minimum maintenance requirements
· Coolant pressure easily set by M-code (pressure range from 0 to 7 MPa (0 to 70 kgf/cm^2))

Coolant temperature control — OPTION

Maintains the coolant temperature to be the same as the room temperature to prevent thermal displacement which can affect machining accuracy.

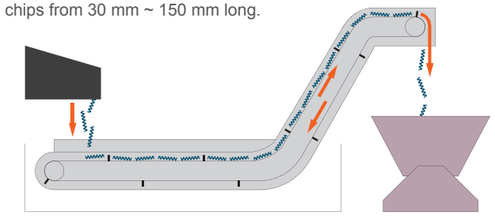
Mist collector — OPTION

Coolant mist generated by machining is removed from the machining area in order to maintain a safe and clean working environment.

Chip disposal

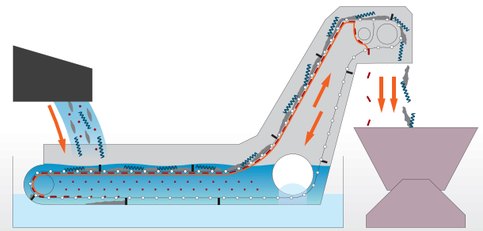
Chip conveyor (hinge) — OPTION

Chips are removed by a hinge-plate belt and discharged from the rear or side of machine. Very suitable for curly shaped steel chips from 30 mm ~ 150 mm long.



Chip conveyor (ConSep 2000II WS) — OPTION

Chip conveyor with internal coolant filtration that is effective for removing small chips as well as long, curly chips.



	ConSep 2000II WS	Hinge
Sludge-like chips (0.25 mm ~ 1 mm)	○	×
Needle-like chips (~ 0.5 mm)	○	×
1 ~ 5 mm	○	×
5 ~ 30 mm (MAX.30 mm)	○	×
30 ~ 70 mm (MAX.70 mm)	○	○
70 mm -	○	○

Standard and Optional Equipment

● : Standard ○ : Option - : N / A

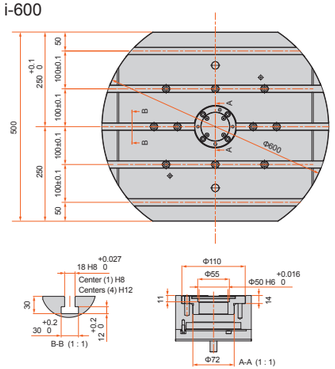
		VARIAXIS i-600	VARIAXIS i-700	VARIAXIS i-700T	VARIAXIS i-800T	VARIAXIS i-1050	VARIAXIS i-1050T
Table	Φ600 mm × 500 mm T-slot table	●	-	-	-	-	-
	Φ700 mm × 500 mm T-slot table	-	●	-	-	-	-
	Φ630 mm table	-	-	●	-	-	-
	Φ800 mm tapped table	-	-	-	●	-	-
	Φ1050 mm × 800 mm T-slot table	-	-	-	-	●	-
	Φ1050 mm tapped table	-	-	-	-	-	●
Machine	Work light	●	●	●	●	●	●
	Ai THERMAL SHIELD	●	●	●	●	●	●
	5000 rpm high torque spindle	-	-	-	○	-	○
	7000 rpm high torque spindle	-	-	-	-	○	-
	10000 rpm	-	-	-	●	●	●
	12000 rpm	●	●	-	-	-	-
	12000 rpm high torque spindle	○	○	-	-	-	-
	15000 rpm (HSK-T100)	-	-	-	○	-	○
	18000 rpm	○	○	●*4	-	-	-
	18000 rpm (HSK-A100)	-	-	-	-	○	-
	18000 rpm (HSK-A63)	-	-	-	-	○	-
	25000 rpm (HSK-A63)	○	○	-	-	○	-
	30000 rpm (HSK-F63)*1	○	○	-	-	-	-
Automation	Automatic tool length measurement & tool breakage detection	●	●	-	-	●	-
	Laser type tool length measurement	○	○	○	○	○	○
	30 tool magazine	●	●	●	●	●	●
	40 tool magazine	○	○	○	○	○	○
	80 tool magazine	○	○	○	○	○	○
	120 tool magazine	○	○	○	○	○	○
	Workpiece measurement printout (printer not included)	○	○	○	○	○	○
	Absolute positioning system	●	●	●	●	●	●
	Remote manual pulse generator	○	○	○	○	○	○
	Automatic front door	○	○	○	○	○	○
	Automatic power ON / OFF + warm-up operation	●	●	●	●	●	●
	Operation end buzzer	○	○	○	○	○	○
	Status light (3 colors)	○	○	○	○	○	○
	2-pallet changer	○	○	○	○	○	○
	Wireless touch probe RMP600	○	○	○	○	○	○
	Tool eye (manual)	-	-	●	●	-	●
	Preparation for hydraulic fixtures	○	○	○	○	○	○
Safety Equipment	Operator door interlock	●	●	●	●	●	●
High Accuracy	MAZA-CHECK (software, reference sphere)*2	●	●	●	●	●	●
	Ball screw core cooling (X-, Y-, Z-axis)	●	●	●	●	●	●
	Scale feedback (X-, Y-, Z-axis)	○	○	○	○	○	○
	Scale feedback (A-, C-axis)	○	○	○*5	○*5	●	●
	Coolant temperature control	○	○	○	○	○	○
Coolant / Chip disposal	Coolant system	●	●	●	●	●	●
	Workpiece air blast	○	○	○	○	○	○
	Oil skimmer (RB-200)	○	○	○	○	○	○
	Mist collector	○	○	○	○	○	○
	Hand held coolant nozzle*3	○	○	○	○	○	○
	Coolant through spindle system 0.5 MPa (5 kgf/cm²)	○	○	○	○	○	○
	Workpiece washing coolant	○	○	○	○	○	○
	High pressure coolant through spindle 1.5 MPa (15 kgf/cm²)	○	○	○	○	○	○
	High pressure coolant through spindle 7.0 MPa (70 kgf/cm²)	○	○	○	○	○	○
	SUPERFLOW coolant system 0 ~ 7.0 MPa (0 ~ 70 kgf/cm²)	○	○	○	○	○	○
	Flood coolant 0.44 MPa (4.5 kgf/cm²) 30 L/min	●	●	●	●	○	○
	Coolant through spindle pressure switch	○	○	○	○	○	○
	Top cover	●	●	●	●	●	●
	Chip conveyor (hinge) rear discharge	○	○	○	-	-	-
	Chip conveyor (ConSep II WS) rear discharge	○	○	○	-	-	-
	Chip conveyor (hinge) right side discharge	-	-	-	○	○	○
	Chip conveyor (ConSep II WS) right side discharge	-	-	-	○	○	○
	Chip bucket (swing type)	○	○	○	○	○	○
	Chip bucket (fixed type)	○	○	○	○	○	○
Tooling	Pull stud bolt	○	○	○	○	○	○
Others	Manual	●	●	●	●	●	●
	Additional manuals	○	○	○	○	○	○
	MAZATROL SmoothAi dual monitor	○	○	○	○	○	○

*1 30000 rpm spindle not available with coolant through spindle and air through spindle system.
*2 MAZA-CHECK requires optional RMP600 wireless touch probe.
*3 Not available with the 2-pallet changer i-600, i-700 and i-700T.
*4 Different specification for 18000 rpm (option) spindle for VARIAXIS i-700T. See pages 10, 27 and 28 for details.
*5 Standard for C-axis

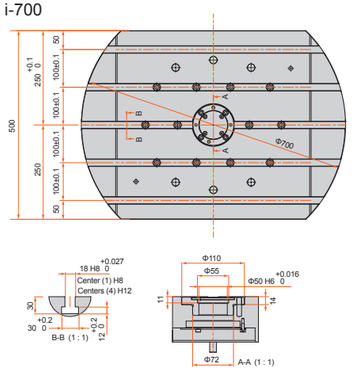
Table Dimensions

Unit : mm

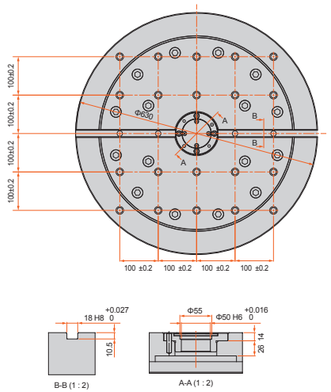
VARIAXIS i-600



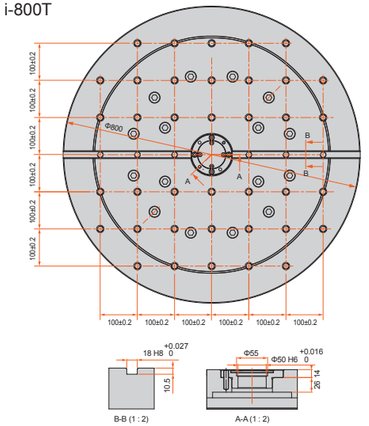
VARIAXIS i-700



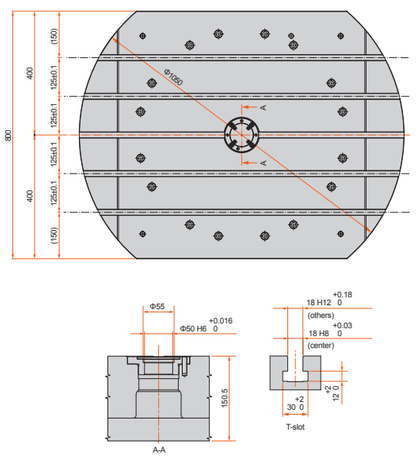
VARIAXIS i-700T



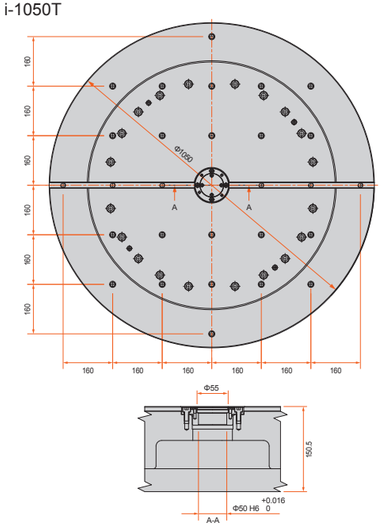
VARIAXIS i-800T



VARIAXIS i-1050



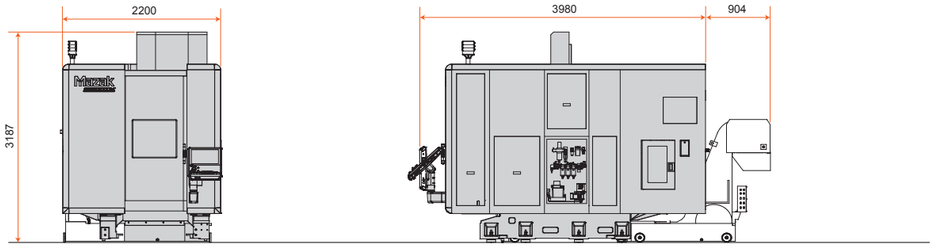
VARIAXIS i-1050T



■ Machine Dimensions

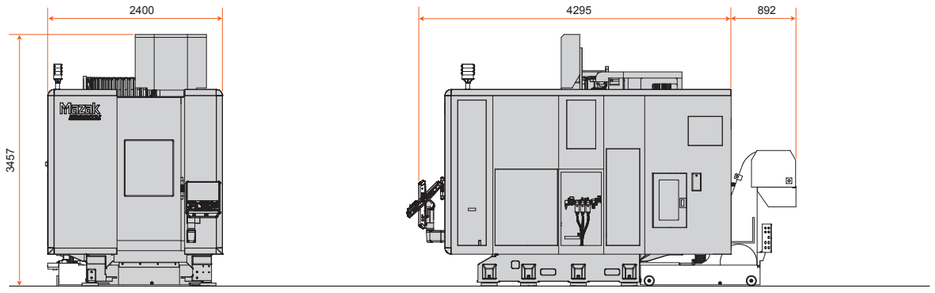
Unit : mm

VARIAXIS i-600



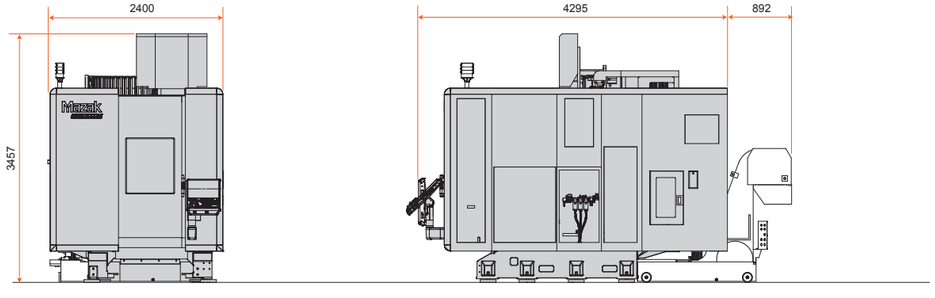
* Shown with optional ConSep II WS chip conveyor (rear discharge)

VARIAXIS i-700



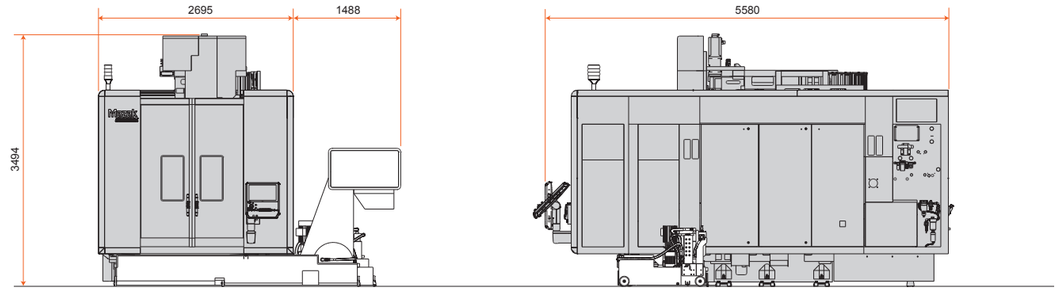
* Shown with optional ConSep II WS chip conveyor (rear discharge)

VARIAXIS i-700T



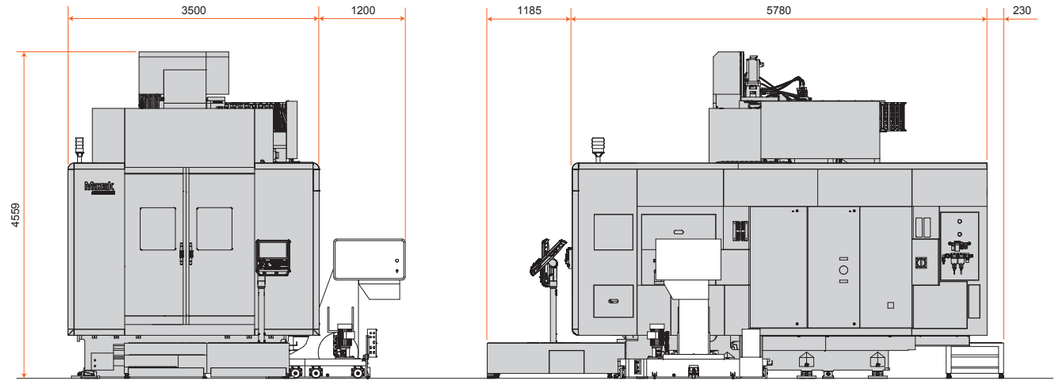
* Shown with optional ConSep II WS chip conveyor (rear discharge)

VARIAXIS i-800T



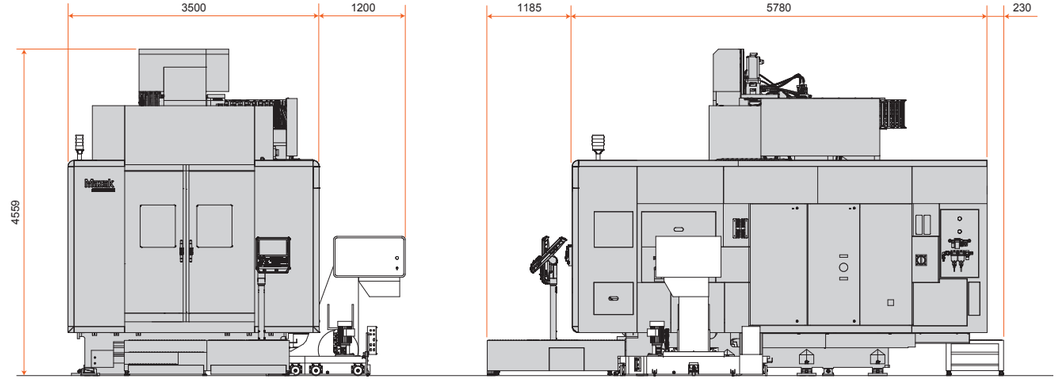
* Shown with optional ConSep II WS chip conveyor (right-side discharge)

VARIAXIS i-1050



* Shown with optional ConSep II WS chip conveyor (right-side discharge)

VARIAXIS i-1050T



* Shown with optional ConSep II WS chip conveyor (right-side discharge)

■ Standard Machine Specifications

		VARIAXIS i-600	VARIAXIS i-700
Stroke	X-axis travel (spindle head left / right)	510 mm	630 mm
	Y-axis travel (spindle head back / forth)	910 mm	1100 mm
	Z-axis travel (spindle head up / down)	510 mm	600 mm
	A-axis travel (table tilt)	-120° ~ +30°	
	C-axis travel (table rotation)	±360°	
Table	Distance from table top to spindle nose	70 mm ~ 580 mm (table horizontal)*1	100 mm ~ 700 mm (table horizontal)
	Table size	Φ600 mm × Width 500 mm	Φ700 mm × Width 500 mm
	Max. workpiece size	Φ700 mm × 450 mm	Φ850 mm × 500 mm
	Table load capacity (evenly distributed)	500 kg	700 kg
	Table surface configuration	18 mm T-slot × 5 100 mm pitch	18 mm T-slot × 5 100 mm pitch
Milling Spindle	Max. spindle speed	12000 rpm	
	Spindle taper	7/24 taper No. 40	
	Spindle bearing I.D.	Φ80 mm	
Feedrate	Rapid traverse rate (X-, Y-, Z-axis)	60 m/min, 60 m/min, 56 m/min	
	Rapid traverse rate (A-, C-axis)	18000°/min	18000°/min
	Cutting feedrate*2 (X-, Y-, Z-axis)	56 m/min	
	Cutting feedrate*2 (A-, C-axis)	18000°/min	18000°/min
	Simultaneously controlled axes	5	
	Min. indexing increment (A-, C-axis)	0.0001°	
	Indexing time (A-axis) (clamp / unclamp time not included)	0.55 sec. / 90°	
Automatic tool changer	Tool shank configuration	BT-40	
	Tool storage capacity	30	
	Max. tool diameter / length (from gauge line) / weight	Φ90 mm / 300 mm / 8 kg	Φ90 mm / 360 mm / 8 kg
	Max. tool diameter with adjacent tool pockets empty	Φ130 mm	
	Tool selection method	Random selection, shortest path (fixed pocket assignment)	
	Tool change time (chip-to-chip)	3.4 sec.	3.6 sec.
Motors	Spindle motor (40% ED / cont. rating)	22 kW (30 HP) / 15 kW (20 HP)	
	Electrical power requirement (40% ED / cont. rating)	57.66 kVA / 47.92 kVA	59.32 kVA / 49.57 kVA
	Air supply	360 NL/min	
Coolant	Coolant tank capacity	500 L	
Machine size	Height	3187 mm	3457 mm
	Width	2200 mm	2400 mm
	Length	3980 mm	4295 mm
	Machine weight	13000 kg	15000 kg
Sound	Equivalent continuous sound pressure level at operator position (dependant on equipment options)	Less than 80 db (A)	

*1 Specifications are different for 2-pallet changer
*2 Limited feedrate with continuous movement

		VARIAXIS i-700T	VARIAXIS i-800T
Stroke	X-axis travel (spindle head left / right)	630 mm	730 mm
	Y-axis travel (spindle head back / forth)	1100 mm	850 mm
	Z-axis travel (spindle head up / down)	600 mm	560 mm
	A-axis travel (table tilt)	-120° ~ +30°	-130° ~ +30°
	C-axis travel (table rotation)	±360°	
Table	Distance from table top to spindle nose	100 mm ~ 700 mm (table horizontal)	230 mm ~ 790 mm (table horizontal)
	Table size	Φ630 mm	Φ800 mm
	Max. workpiece size	Φ850 mm × 500 mm	Φ1000 mm × 375 mm (Φ800 mm × 500 mm)
	Table load capacity (evenly distributed)	700 kg	1000 kg
	Table surface configuration	M16 × P2 tapped holes	M16 × P2 tapped holes
Turning Spindle	Turning table speed	1100 rpm	800 rpm
Milling Spindle	Max. spindle speed	18000 rpm	10000 rpm
	Spindle taper	7/24 taper No. 40	7/24 taper No. 50
	Spindle bearing I.D.	Φ70 mm	Φ100 mm
Feedrate	Rapid traverse rate (X-, Y-, Z-axis)	60 m/min, 60 m/min, 56 m/min	42 m/min
	Rapid traverse rate (A-, C-axis)	18000°/min / 36000°/min	10800°/min / 36000°/min
	Cutting feedrate*1 (X-, Y-, Z-axis)	56 m/min	42 m/min
	Cutting feedrate*1 (A-, C-axis)	18000°/min / 36000°/min	10800°/ min
	Simultaneously controlled axes	5	
	Min. indexing increment (A-, C-axis)	0.0001°	
	Indexing time (A-axis) (clamp / unclamp time not included)	0.75 sec. / 90°	0.72 sec. / 90°
Automatic tool changer	Tool shank configuration	BT-40	BT-50
	Tool storage capacity	30	
	Max. tool diameter / length (from gauge line) / weight	Φ90 mm / 360 mm / 8 kg	Φ125 mm / 400 mm / 20 kg
	Max. tool diameter with adjacent tool pockets empty	Φ130 mm	Φ210 mm
	Tool selection method	Random selection, shortest path (fixed pocket assignment)	
	Tool change time (chip-to-chip)	4.1 sec.	5.1 sec.
Motors	Spindle motor (40% ED / cont. rating)	30 kW (40 HP) / 22 kW (30 HP)	37 kW (50 HP) / 30 kW (40 HP)
	Electrical power requirement (40% ED / cont. rating)	78.9 kVA / 67.6 kVA	106.80 kVA / 96.88 kVA
	Air supply	450 NL/min	500 NL/min
Coolant	Coolant tank capacity	500 L	400 L
Machine size	Height	3457 mm	3494 mm
	Width	2400 mm	2695 mm
	Length	4295 mm	5580 mm
	Machine weight	16000 kg	20000 kg
Sound	Equivalent continuous sound pressure level at operator position (dependant on equipment options)	Less than 80 db (A)	

*1 Limited feedrate with continuous movement

Standard Machine Specifications

		VARIAXIS i-1050	VARIAXIS i-1050T
Stroke	X-axis travel (spindle head left / right)	1200 mm	
	Y-axis travel (spindle head back / forth)	1385 mm	
	Z-axis travel (spindle head up / down)	900 mm	
	A-axis travel (table tilt)	-150° ~ +130°	
	C-axis travel (table rotation)	±360°	
Table	Distance from table top to spindle nose	180 mm ~ 1080 mm (table horizontal)	
	Table size	Φ1050 mm × Width 800 mm	Φ1050 mm
	Max. workpiece size*1	Φ1250 mm × 900 mm	
	Table load capacity (evenly distributed)	2000 kg	
	Table surface configuration	18 mm T-slot × 5 125 mm pitch	M16 × P2 tapped holes
Turning Spindle	Turning table speed	–	500 rpm
Milling Spindle	Max. spindle speed	10000 rpm	
	Spindle taper	7/24 taper No. 50	
	Spindle bearing I.D.	Φ100 mm	
Feedrate	Rapid traverse rate (X-, Y-, Z-axis)	40 m/min	
	Rapid traverse rate (A-, C-axis)	5400°/min / 10800°/min	
	Cutting feedrate*2 (X-, Y-, Z-axis)	40 m/min	
	Cutting feedrate*2 (A-, C-axis)	5400°/min	
	Simultaneously controlled axes	5	
	Min. indexing increment (A-, C-axis)	0.0001°	
	Indexing time (A-axis) (clamp / unclamp time not included)	1.09 sec. / 90°	
Automatic tool changer	Tool shank configuration	BT-50	
	Tool storage capacity	30	
	Max. tool diameter / length (from gauge line) / weight	Φ125 mm / 500 mm / 20 kg	
	Max. tool diameter with adjacent tool pockets empty	Φ210 mm	
	Tool selection method	Random selection, shortest path (fixed pocket assignment)	
	Tool change time (chip-to-chip)	7.0 sec.	
Motors	Spindle motor (40% ED / cont. rating)	37 kW (50 HP) / 30 kW (40 HP)	
	Electrical power requirement (40% ED / cont. rating)	101.13 kVA / 91.20 kVA	101.70 kVA / 91.78 kVA
	Air supply	480 NL/min	500 NL/min
Coolant	Coolant tank capacity	580 L	
Machine size	Height	4559 mm	
	Width	3500 mm	
	Length	7195 mm	
	Machine weight	31000 kg	
Sound	Equivalent continuous sound pressure level at operator position (dependant on equipment options)	Less than 80 db (A)	

*1 Limited by A-axis angle
*2 Limited feedrate with continuous movement

MAZATROL SmoothAi 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*, Path error suppression control*, Tool path optimization*
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 function	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)*1, Tool life monitoring (number of machined workpieces)*1	Number of tool offset : 4000, T code output for tool number, T code output for group number, Tool life monitoring (time)*1, Tool life monitoring (number of machined workpieces)*1
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, 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, Ai Thermal shield, Volumetric compensation*	
Protection functions	Emergency stop, Interlock, Pre-move stroke check, 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 function	Tool length teach, Touch sensor coordinates measurement, Workpiece offset measurement, WPC coordinate measurement, Measurement on machine, Tool eye measurement*1	Tool length teach, Tool offset teach, Touch sensor coordinates measurement, Workpiece offset measurement, Measurement on machine, Tool eye measurement*1
Automatic measuring function	WPC coordinate measurement, Automatic tool length measurement, Workpiece measurement*1, Sensor calibration, Tool eye auto tool measurement*1, Tool breakage detection, External tool breakage detection*	Automatic tool length measurement, Workpiece measurement*1, Sensor calibration, Tool eye auto tool measurement*1, Tool breakage detection, External tool breakage detection*
MDI measurement	Semi automatic tool length measurement, Full automatic tool length measurement, Coordinate measurement	
Peripheral network	PROFIBUS-DP*, EtherNet/IP*, CC-Link*, CC-Link IE Field Basic	
Memory	SD card interface, USB	
EtherNet	10 M / 100 M / 1 Gbps	

* Option
*1 Turning only

VARIAXIS i SERIES

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