

a500Z

5-Axis
Horizontal
Machining Center



www.makino.co.jp



Atsugi and Fuji Katsuyama works are certified for ISO14001 and ISO9001.

*The specifications, figures, and overviews of products, peripheral devices and accessories in this catalogue may be changed without prior notice to incorporate improvements resulting from ongoing R&D programs.

*The all products in this catalogue include the optional specifications and equipment.

*The products, including technical data and software, may be subject to the Foreign Exchange and Foreign Trade Control Law in Japan. Prior to any re-sale, re-transfer or re-export, please contact Makino to obtain any required authorization and approval.

M492Ea 1710 (V-T-D)



Quest for speed

Machine body and axis-feed mechanism are designed based on ROI design concept. The spindle moves quickly. Not only cutting time, but also non-cutting time* such as positioning, tool changing, etc. can be shortened drastically.

* In the part machining field, non-cutting time is a problem to be solved. For example, it takes up about half of total machining time of aluminum part. Makino addresses it by a500Z. Shortening this time contributes to improvement in productivity.

Intelligent
ROI
Reduction of Inertia



It is a new reliable 5-axis control machining center developed from Makino's renowned a1nx series horizontal machining centers. Makino's unique tilting table is embedded.

Specifications		
Axis travels	(X×Y×Z)	: 730×750×500 mm
	(B / C)	: 360 deg. (cont.) / 180 deg.
Pallet size		: 500×500 mm
Maximum workpiece size (diameter × height)		: 630×500 mm
Maximum payload		: 400 kg
Machine size (width × depth × height)		: 2804×6100×2776 mm

14000 min⁻¹ spindle Torque 303 N·m

The direct-drive spindle is agile and reaches its maximum speed in 1.6 seconds. Time for start-up/stop in tool changing operation is shortened. Time for tap machining is also shortened (Rigid tap 2800min⁻¹).

High performance 20000 min⁻¹ spindle is available as optional specification. It is suitable for machining aluminum.

Heavy-duty cutting

- 14000 min⁻¹ / HSK-A63
- 125 mm diameter face mill
- Material: Ductile cast iron (FCD450)
- Metal removal rate: 646 cm³/min



Tilting table of ROI design concept

Thanks to the slant structure of C-axis which supports B-axis with inclined surface, its inertia is small. Together with DD-motor for driving, high response motion is realized.

- Feed rate B axis: 45000 deg./min
- C axis: 27000 deg./min

When angle plate is used on a conventional horizontal machining center, machining in upper part position of angle plate is not stable. Machining conditions should be adjusted to avoid chattering. As for a500Z, that is not a problem, because the double-slant structure of the table unit and the bed brings stability. Three sides are open around the pallet. There are no interferences above the table. Operator can get the clear picture of interference at the time of programming or designing fixtures.



Tilting pallet: 0 deg.

Tilting pallet: 45 deg.

Tilting pallet: 90 deg.

1 Advanced axis cooling system

Heat generation in the axes during high speed machining can affect accuracy and performance of the machine.

The a500Z machine has the cooling technology of ball screw core and ball screw support bearing. Cooling oil, whose temperature is controlled to follow that of the bed casting, is circulated through to the ball screws and end support bearings.

2 Roller linear guides

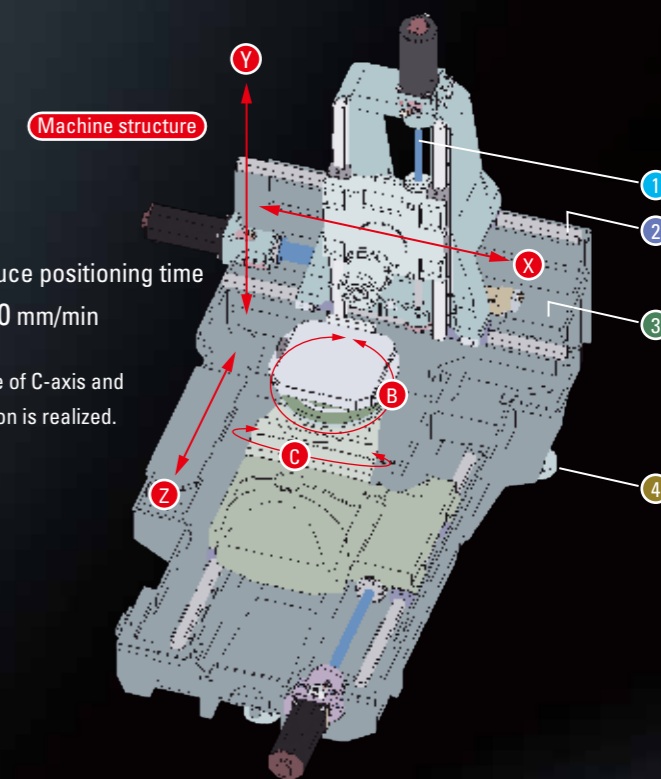
Cylindrical roller guides are used in the X-, Y- and Z-axis.

Rollers provide line contact area, which enhances rigidity and load capacity of machine.

3 Stepped column

The two X-axis guides under the column are at different heights.

This stepped design supports the machine to move at high speed and high acceleration modes by reducing the weight of column without compromising rigidity of the machine in Z-axis direction.



Feed mechanism to reduce positioning time
Feed rate (X, Y, Z) 60000 mm/min

Thanks to the slant structure of C-axis and the bed, high response motion is realized.

4 Three-point support

The machine body is designed to sit on the shop floor with only three-point support. [Advantages of three-point support]

- ⊙ A machine is hard to be affected by aged deterioration of foundation.
- ⊙ Periodic level maintenance is not required.
- ⊙ Cost of foundation is reduced.



Horizontal setup

The horizontal setup of workpiece is possible, due to the table design. The pallet loading station is widely opened for easy loading/unloading of workpieces and fixtures with crane.

Excellent spindle accessibility

L-shape operator door is excellent for access to the spindle and the table. Checking and measuring can be done easily.



Control unit that maximizes machine performance

Professional 6

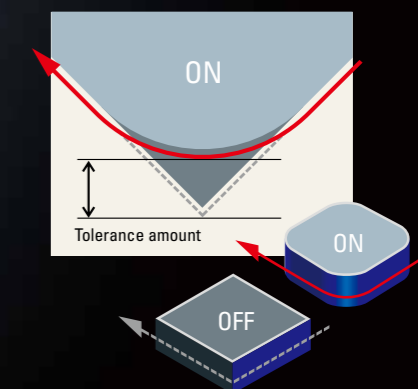
Professional 6 optimizes machine motion, according to machining conditions. Even in machining with high-speed and high-acceleration, machining surface quality and shape accuracy can be kept. Machining efficiency is totally enhanced. A variety of machining modes are preset. Operator can easily choose suitable one for its purpose.

Advanced control technology

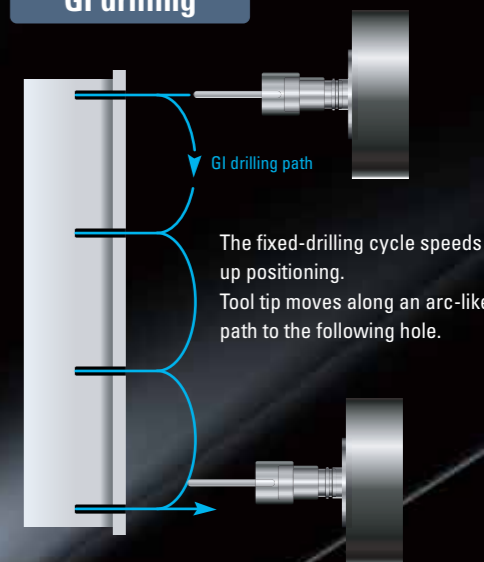
(Shortening non-cutting times)

GI milling

Tolerance amount at the corner section of the tool path can be set. Accordingly, smooth motion can be made by reducing deceleration of federate.



GI drilling



Chips are evacuated quickly and effectively

To ensure efficient and reliable chip removal in continuous operation, the chamber of machine is composed almost entirely of vertical panels. Coolant from the spindle head and the ceiling flush chips directly into the center trough under the table. Large volume base coolant washes chips towards the lift up chip conveyor.

8-nozzle coolant

Overhead shower coolant

Terrace washing coolant

Spindle head washing nozzle coolant

Two fixed nozzles are equipped to wash away chips from the top of spindle. Chips don't enter the spindle taper in tool changing operation.

Lift up chip conveyor

Main filter

Durable stainless steel wire mesh filter prevents clogging of hoses and pipes. Nylon filter is also selectable.

Cyclone type secondary filter

Fine sludge, which cannot be filtrated by the main filter, is completely separated from coolant.

Filtration pore size: 20 μm



Spindle head washing nozzle coolant

Lift up chip conveyor



Shortening tool change time

Tool-to-tool: 0.9 sec

A servo type ATC shutter and a cam type ATC mechanism, which have been used long on Makino's machining centers, are equipped. In accordance with length of tool, they perform tool change operation in a short time by opening and closing the ATC shutter with the shortest width. Large flow air cleans the spindle taper hole to prevent chips from entering.

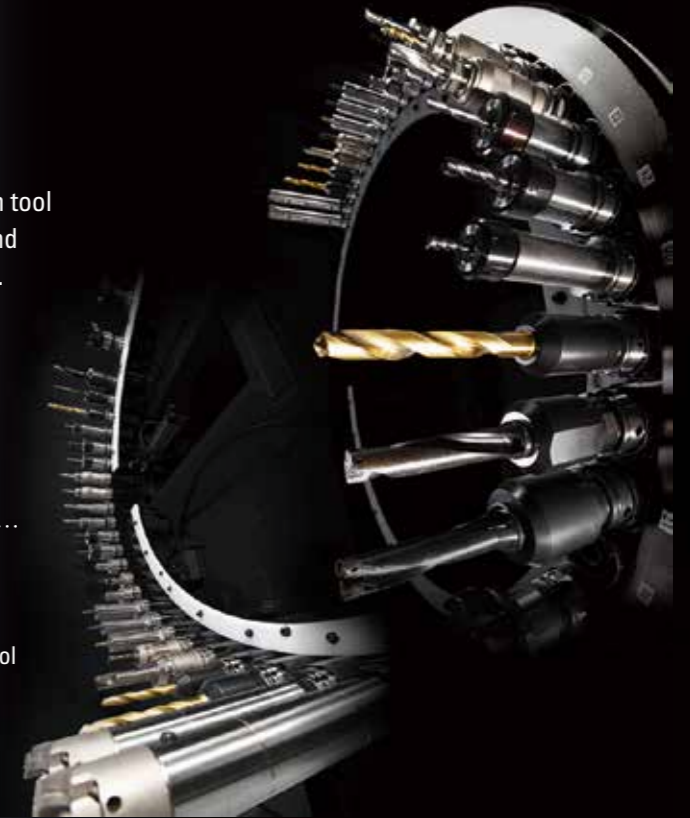
Maximum tool diameter : 70 / 155 mm
(without limitation / with limitation)

Maximum tool length : 510 mm

High speed ring type 60 tools magazine

Inertia active control technology is adopted to the tool magazine.

By automatically grasping total weight of tools in the magazine, acceleration / deceleration are optimized.



Broken Tool Sensor **Vision B.T.S.** (patented)



The broken tool sensor (BTS) is a device detecting tool breakage. A camera is in the tool magazine. By taking photos of tools at the standby position before and after machining, the BTS detects breakage. Compared with the conventional method of touch-type probe, detecting time is drastically shortened.



- Tool change speed optimized
Weight of each tool is automatically estimated, based on its silhouette. Tool change speed is optimized according to the information.
- ATC shutter opening width adjusted
Length of each tool is automatically measured. ATC shutter opening width is adjusted to the length.
- Z-axis retract minimized
Parameter of workpiece size is input by operator. Together with the information of tool length, necessary distance of Z-axis retract is calculated.

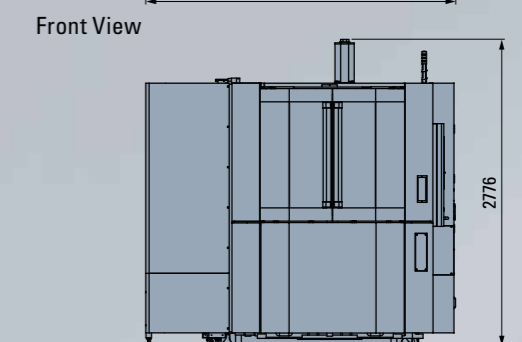
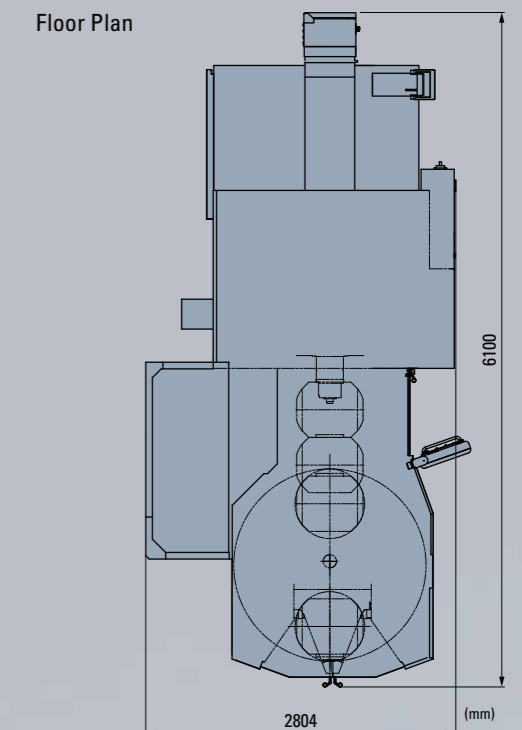
Specifications		
Axis travels	X × Y × Z	730 × 750 × 500 mm
	B (rotating table)	360 deg.
	C (tilting table)	180 deg.
Pallet table	Size	500 × 500 mm
	Maximum workpiece size (diameter × height)	630 × 500 mm
	Maximum payload	400 kg (excluding pallet weight)
	Surface configuration	Tapped hole M16 × 24 hole (pitch 100 mm)
Spindle	Speed range	50 - 14000 min ⁻¹
	Interface	BT40 (7/24 taper #40)
	Torque	303 / 119 N·m (10%ED / cont.)
Feedrates	Rapid traverse (X, Y, Z)	60000 mm/min
	Cutting feedrate (X, Y, Z)	1 - 50000 mm/min
	Rapid traverse (B, C)	45000 / 27000 deg./min
	Cutting feedrate (B, C)	1 - 45000 / 1 - 27000 deg./min
Automatic tool changer	Tool storage capacity	60 tools
	Maximum tool diameter (without limitation / with limitation)	70 / 155 mm
	Maximum tool length	510 mm
	Maximum tool weight	12 kg
Machine size (standard specification)	Width × Depth × Height	2804 × 6100 × 2776 mm
	Weight	15000 kg
Floor space	Width × Depth	4540 × 8500 mm

Standard specifications

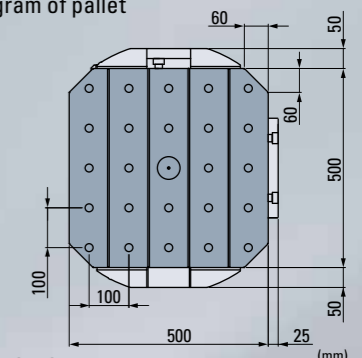
- 14000 min⁻¹ spindle
- Spindle temperature controller
- 60 tools magazine
- Broken Tool Sensor Vision B.T.S.
- Tapped holes (2 pallets)
- Pallet changer
- Pallet changer safety guard
- Pallet clamp confirmation function
- Operator door lock (operation mode)
- Nozzle coolant
- Shower coolant
- Terrace washing coolant
- Through spindle coolant and air (1.5 / 2.2 MPa)
- Lift up chip conveyor
- Automatic grease supply device
- Air dryer
- Signal light 3- layer
- Portable manual pulse generator with the handle enable button
- Rigid tap
- Professional 6
- GI control
- Super GI.5 control
- ECO mode functions
- Automatic power-off

Optional specifications (⊙) / Optional equipment (★)

- ⊙ 20000 min⁻¹ spindle *Only HSK-A63
- ⊙ HSK-A63
- ⊙ Scale feedback (X, Y, Z axes 0.05 μm)
- ⊙ 133 tools magazine
- ⊙ 218 tools magazine
- ★ Additional pallet (tapped hole)
- ⊙ 14-pallet double layer pallet magazine (1 WSS)
- ⊙ Through spindle coolant and air (3 / 7 MPa)
- ★ Workpiece washing gun
- ★ Oil skimmer
- ★ Coolant temperature controller
- ⊙ Lift up chip conveyor (rear discharge, double layer)
- ⊙ Lift up chip conveyor (rear discharge, for cast iron)
- ★ Casting processing magnet
- ★ Mist collector
- ★ Automatic tool length measuring device (retractable)
- ★ Automatic workpiece measuring device
- ⊙ Portable manual plus generator with tool position display (with coordinate origin function)
- ⊙ Customer specified machine color



Detailed diagram of pallet



Workpiece limitations

