Higher accuracy
produces
greater profitability

YBM 7 Ti

YASDA PRECISION CENTER

The DD motor adoption in B and C-axis
High-performance Spindle with Preload Self-adjusting System
Thermal Distortion Stabilizing System
Man-machine interface OpeNe

Saxis

YASDA

Bulletin No.7Ti0001-E

YASDA PRECISION CENTER

YBM 7Ti

YBM7Ti-2PLS

Outstanding machining capacity of difficult-to-cut materials in high precision/high efficiency

Table-on-table 5-axis machine employs high-power DD motors for its B- and C-axes

The “YBM7Ti” table unit employing high-power DD motors on B and C-axis is compact in comparison to the trunnion type but demonstrates superior follow-up performance in high speed and high precision machining achieving high productivity.

YBM7Ti

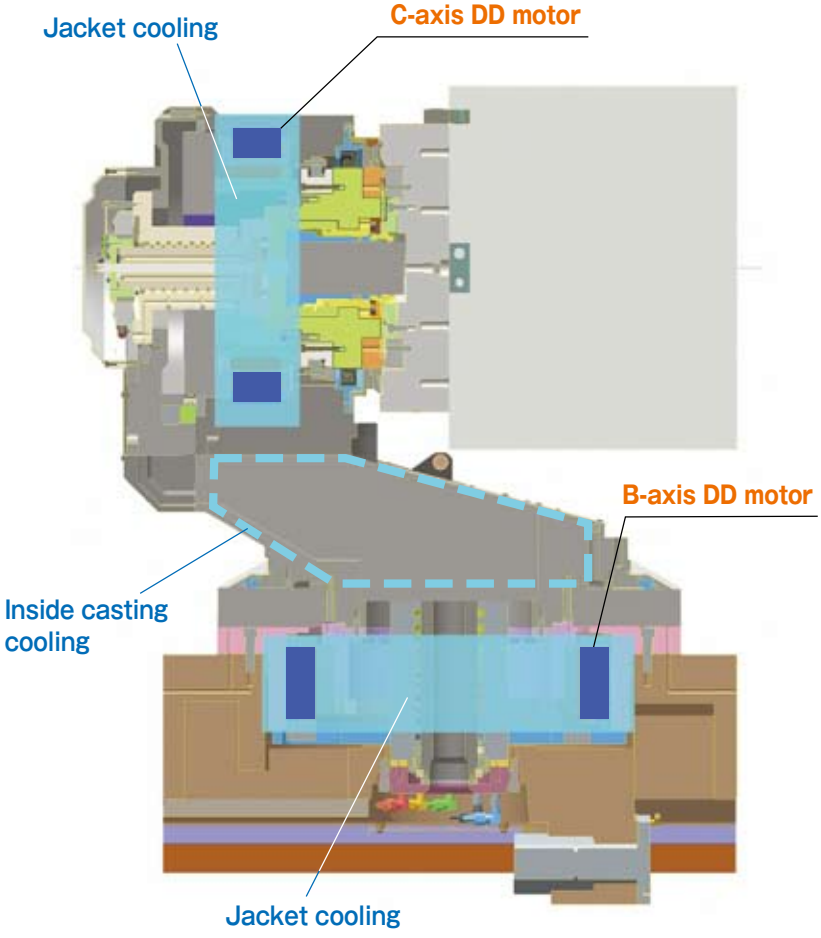
Newly developed table unit with high potentiality

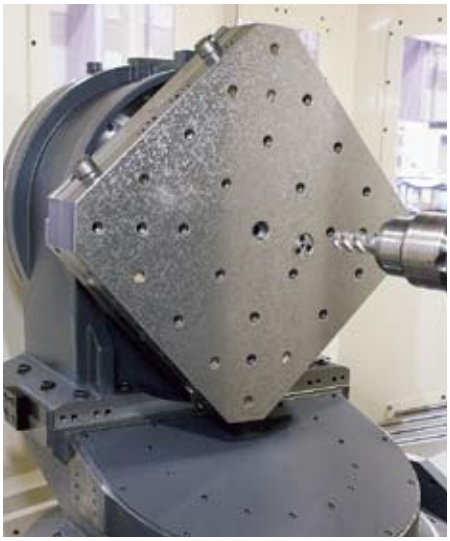
The newly developed table unit, employing DD motors
and highly rigid bearings, demonstrates superior capacity
for high speed and high precision machining,
cutting difficult-to-cut materials and heavy cutting with a powerful driving force.
In addition, due to highly precise rotational axis control,
it realizes backlash-less operation and quick-response machining.

◆Since it is designed based on a horizontal machining center, it is possible to select bigger ATC and APC.
◆The newly developed table unit is four times as rigid as the former model, resulting in a 60% significant reduction in deformation when loaded is realized.

Full-scale measures against thermal displacement for the rotary table

The B- and C-axes rotary table employing the high-power DD motors maintains its high accuracy by cooling the jacket and casting inside. Moreover, the YASDA thermal distortion stabilizing system which minimizes the influence from the factory environment on the machine body is employed. Circulation of temperature controlled liquid allows stable high precision machining during the continuous long operation.





Pallet chucking mechanism

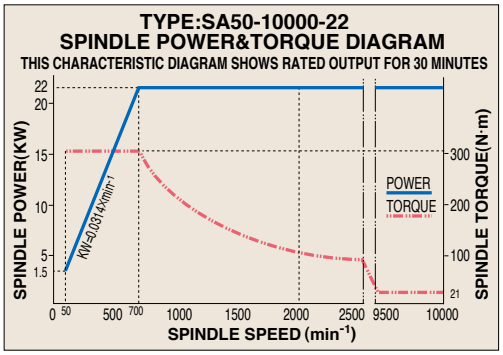
Special clamp mechanism against gravity direction moments

YASDA' s traditional large-diameter curvic coupling is employed for the pallet-chucking mechanism. A special clamp mechanism demonstrates high positioning accuracy of pallet change and chucking rigidity against gravity direction moments. The 120mm thick pallet is made of highly rigid cast iron, which has a top surface that is precisely hand scraped, and maintains high precision for a long period. The bottom side of the pallet is flat, which can be used in various pallet changing systems such as multiple pallet changer, FMS etc.

Realizing both heavy cutting in the low-speed range and highly precise rotation with low heat generation in the high-speed range

The preload self-adjusting spindle developed by YASDA differs from the conventional fixed-position preload method. It has a mechanism that applies a large preload at low-speed rotation, and the preload decreases in accordance with the amount of heat generation of the spindle bearing at high-speed rotation. Thus both heavy-duty cutting in a low-speed range and low heat generation and high-precision rotation in a high-speed range can be achieved.

The spindle and the spindle drive motor are connected co-axially by a diaphragm coupling, in order to achieve high precision rotation of the spindle throughout the full speed range of the spindle. By this function, heavy-duty cutting, high-speed cutting of highly hardened steel and machining by a helical end mill that generates a thrust-reversing force, heavy cutting of difficult-to-cut materials such as inconel, titanium, etc. can be realized.



Preload self-adjusting spindle

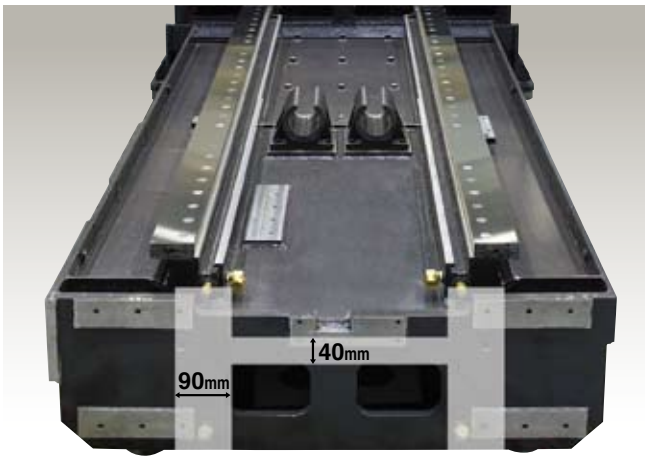
Spindle assembly room (clean room)

Guide mechanism demonstrating high rigidity and rotational accuracy

The guide mechanism for the B- and C-axes employs three roller bearings, achieving both high rigidity and rotational accuracy at high speed/high revolution. The high resolution rotary encoder is provided as standard equipment for detecting indexing angles. These items enable high-precision machining of diverse range of work from difficult-to-cut materials to 3D forms. Moreover, twin ball screws are employed in X- and Y-axes and also large ball screws in driving axes for realizing the high speed and precision feeding crucial for high productivity and high precision machining. The guide mechanism is very reliable in conjunction with the carefully finished traditional highly-rigid YASDA construction.

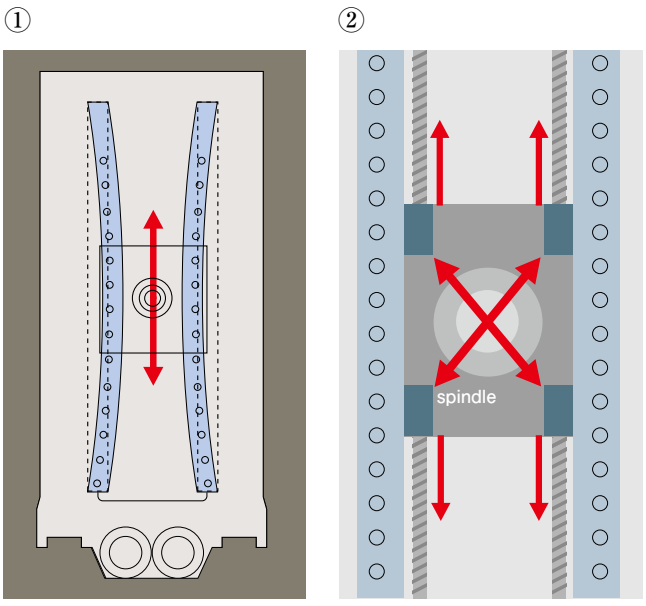
No distortion highly rigid H-shaped bed

The steel bed of simple “H-shape” consisting of two 90mm thick longitudinal frames and 40mm thick flat surface frame realized outstanding rigidity. Solid steel plates evenly distribute thermal capacity all over, maintaining highly stable machine accuracy while avoiding deformation due to room temperature fluctuations. Moreover, the box guide ways are 60HRC through-hardened steel. After high-precision grinding work and laborious hand-wrapping, the guideways are carefully fastened to the mounting surface of the hand-scraped bed. For sliding method, YASDA’s original hybrid sliding is employed. It removes small vibrations coming from the roller guide method and prevents the deterioration of machining accuracy due to vibration to cutting tools. High speed/high precision positioning and high quality machining are realized.



Large column with superior thermal stability

The double-walled, symmetrically constructed box column is highly rigid, with ribs inside both walls maintaining superior thermal stability, realizing stable high-precision machining.
The spindle unit is arranged in the center on the twin ball screw driving the Y-axis, and the Y-axis guideway enabling more precise up-and-down movements of the spindle (Figure 1).
The Y-axis guideways are not completely parallel but they are attached a few micrometers concave in order for the preload for the roller way bearings on both sides of the spindle becomes constant in all positions (Figure 2).
Because of this, there is a little change in the position of the spindle head, enabling extremely high straightness and accurate positioning.

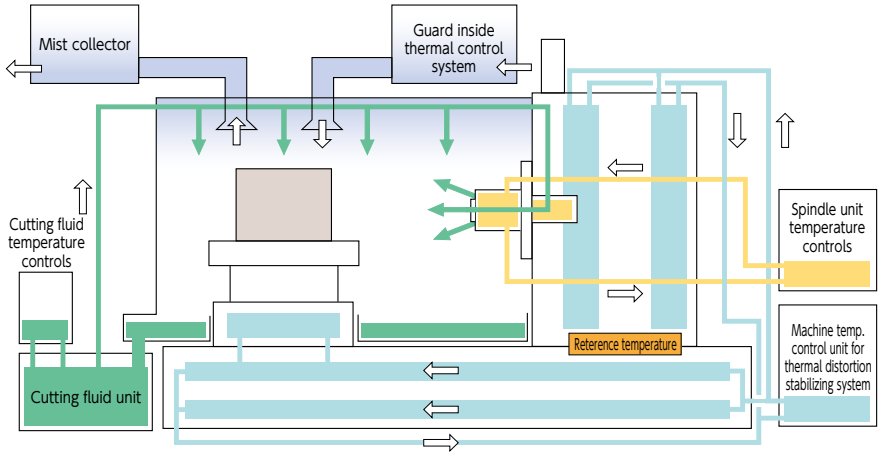


Advanced cooling technology to suppress thermal deformation

Machining center is subject to constant thermal deformation by the environment in which it is installed; for instance, rapid changes in room temperature, difference in temperature between the top and bottom of the room, and radiant heat from the ceiling or walls. YASDA has an advanced optional system to protect the machine from thermal deformation being caused by the factory environment allowing stable and high-precision machining.

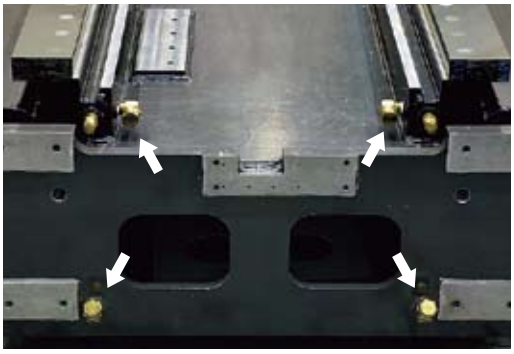
● Thermal distortion stabilizing system (Option)

YASDA's thermal distortion stabilizing system measures the datum temperature from a single location and circulates the temperature controlled oil within ±0.2°C of the datum temperature through the main components. This avoids any rapid thermal deformation that would greatly affect the machining accuracy and stability, thus allowing constantly precise and stable machining.



● Spindle motor cooling

The spindle motor generates the most heat to the machine body. This heat not only thermally deforms the spindle but also the machine body and causes machining errors.
YASDA circulates special cooling oil in the spindle unit to avoid thermal deformation by heat generation thereby allowing stable and highly precise machining through highly accurate rotation of the spindle.



Cooling system of the bed

● Ball screw bracket cooling

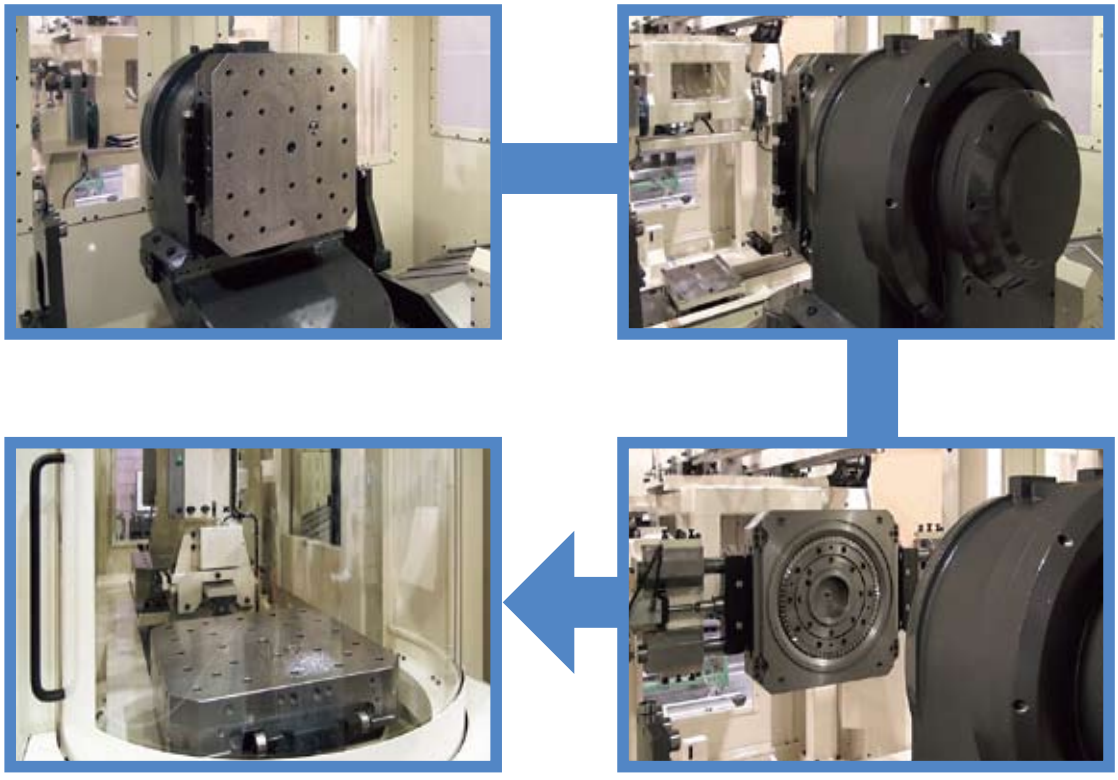
Deformation of the machine body through heat transmission hinders high positioning accuracy. YASDA circulates cooling oil through the oil jacket affixed with a ball screw bracket to avoid thermal deformation of the machine body due to the heat generated by the bearings, resulting in more accurate and reliable positioning.

Cooling system of the ball screw bracket

PC/ATC tailored to the production system

Pallet changer (PC) considering easy preparatory work

The pallet set vertical in the machine is placed horizontally in the loading/unloading station for easy preparation.



High-performance tool changer

YASDA's high-performance automatic tool changer (ATC) is selectable from 60 tools up to 450 tools, enabling long hours of high efficient machining of a diverse range of workpieces by FMC and FMS.

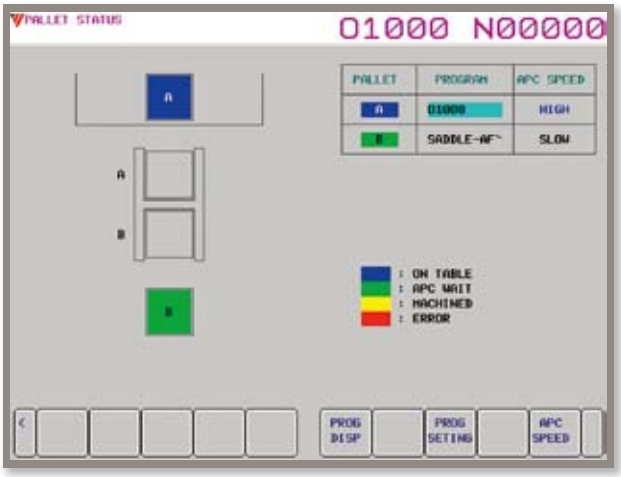
※Number of tools can be selected by the combination of magazines.

Connecting operator and machine via a man-machine interface

OpeNe | Operator + Machine

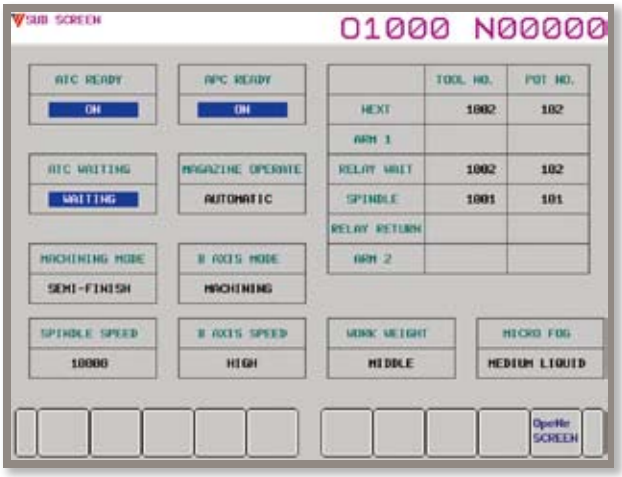
The original operating system “YASDA OpeNe” simplifies machine operation and enables user-defined settings.

- Equipped with user-defined work management functions
- For enabling even higher productivity and automation, it is equipped with various automation assist functions such as the tool life management function, product management function, and a tool storage confirmation function as options. In addition, it is also possible to meet a broader range of needs such as accuracy management of manufactured items, etc.



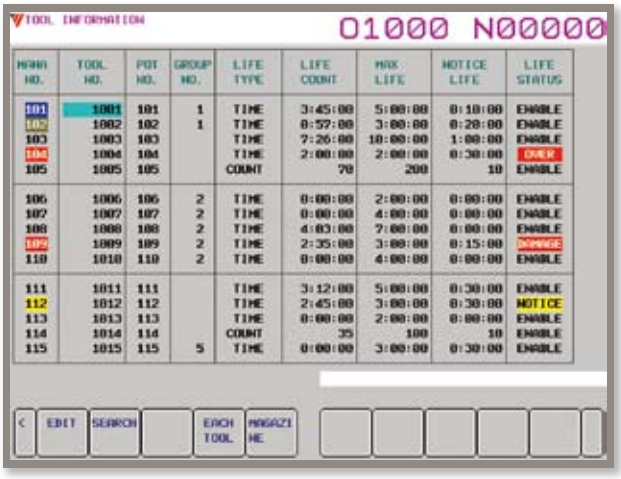
Work management function

The well-developed work management function allows fine settings such as programs for each pallet, pallet registrations, and processing order for multiple pallets.



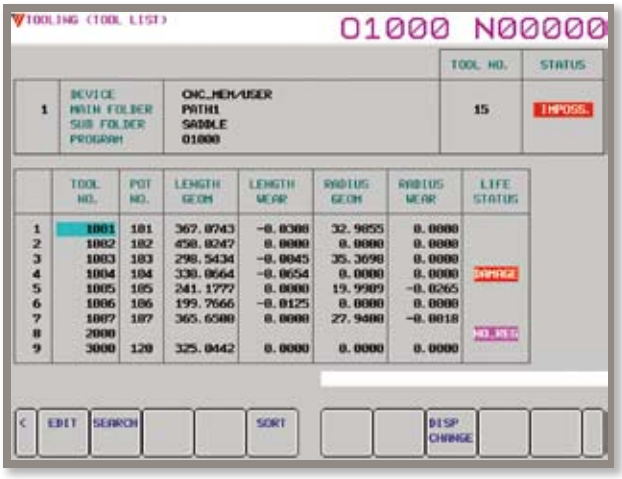
Comprehensive auxiliary screen

Viewing the state of the machine instantly and maintaining stable high productivity are possible.



Tool management function

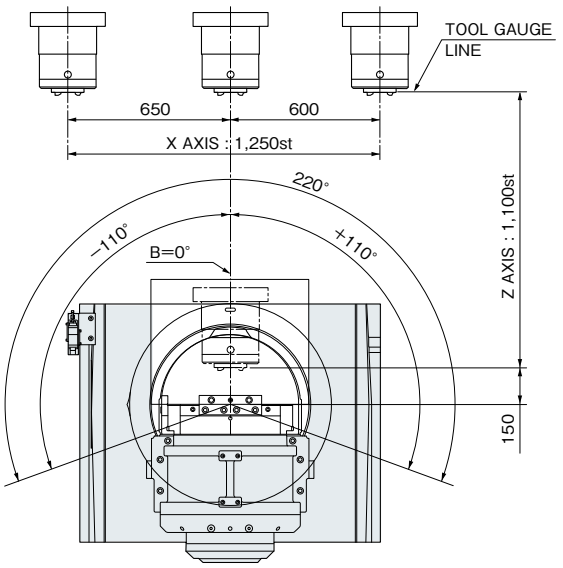
Well-developed tool management functions for tool life management, spare tool management, etc.

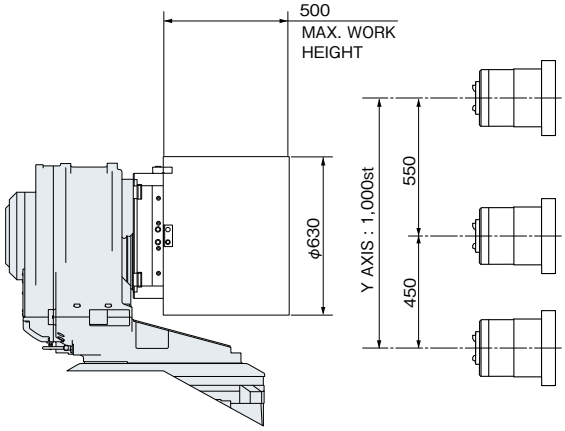


Stored tooling content confirmation function

Assist high-precision/high quality machining by examining the conditions of tools before machining and judging whether the tools are fit for use. For multiple pallets, mounted workpieces are sorted according to the available tools, allowing high productivity.

DIMENSIONS

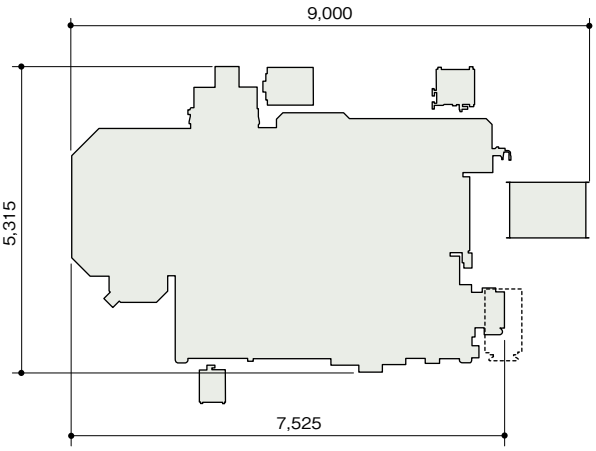




OUTLINE

UNIT: mm

M/C HEIGHT (F.L.) : 3,495mm



SPECIFICATIONS

1. Standard specifications		
1-1	Travel	
	X-axis travel (Longitudinal movement of table)	1,250mm
	Y-axis travel (Vertical movement of spindle head)	1,000mm
	Z-axis travel (Cross movement of column)	1,100mm
1-2	Rotary table (B,C-axis)	
	Table working surface	500×500mm
	Table loading capacity	500kg
	Max. size of workpiece	φ630×500mm
	Table rotational axis (B-axis)	+110～−110deg.
1-3	Spindle	
	Spindle speed range	10～10,000min^{-1}
	Spindle taper hole	7/24taper NT No.50
	Spindle drive motor	18.5/22.0kW(Continuous/15 min)

1-4	Feed rate	
	Rapid traverse rate (X,Y,Z-axis)	45,000·48,000·48,000mm/min
	Rapid traverse rate (B,C-axis)	70、100min^{-1}
	Cutting feed rate (X,Y,Z-axis)	10,000mm/min
	Cutting feed rate (B,C-axis)	25、60min^{-1}
	Least input increment	0.0001mm (deg.)
1-5	Automatic tool changer	
	Tool shank type	MAS BT50
	Tool storage capacity	60 tools
	Maximum tool diameter (with limitation)	φ360mm
	Maximum tool length	440mm
	Maximum tool mass	20kg
1-6	NC unit	FANUC 31i-B5

YASDA

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