



Higher accuracy produces greater profitability

YASDA CNC JIGBORER

YBMvi40 Ver.Ⅲ

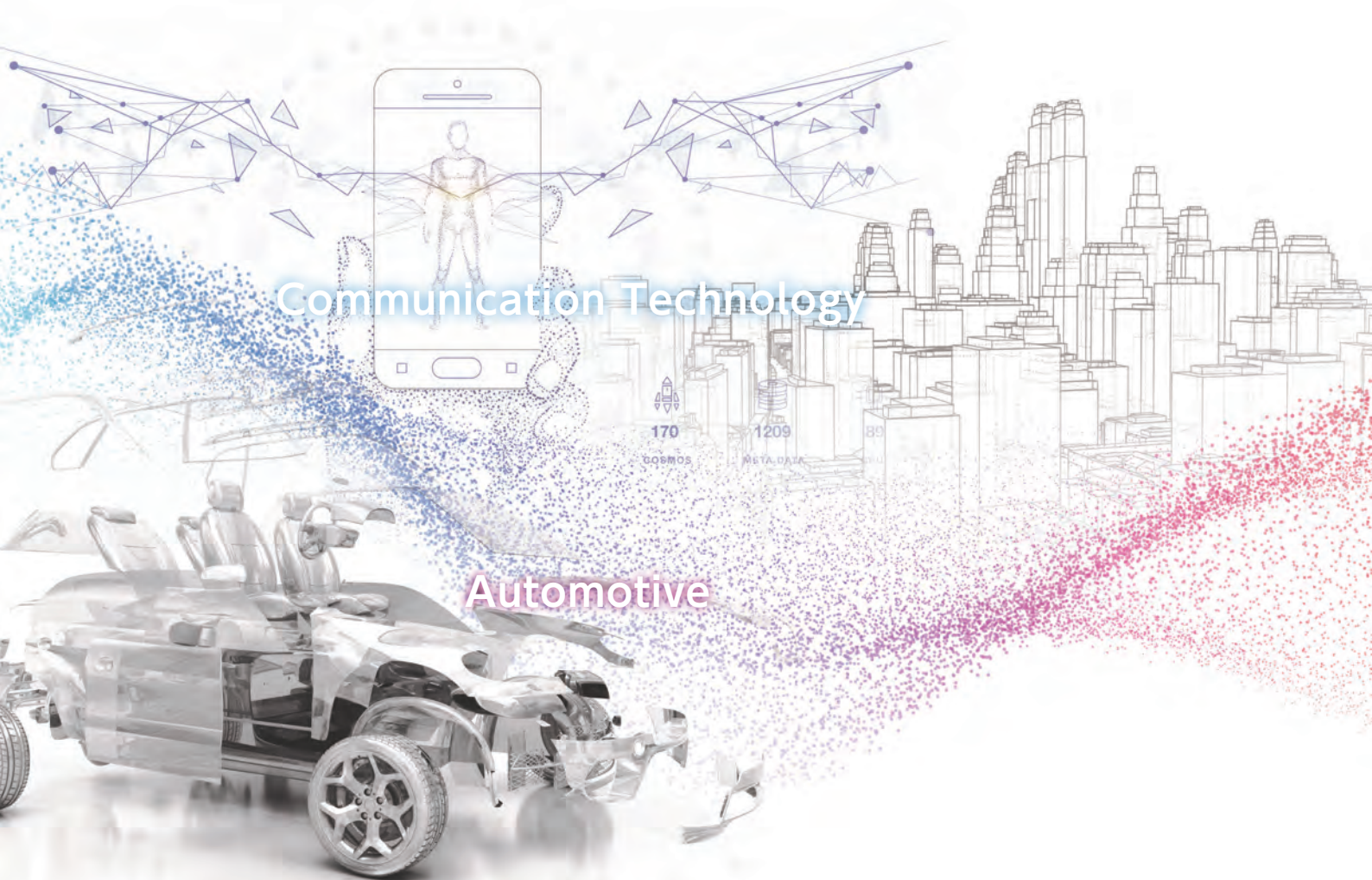


MOLD & DIE MILLER

Thermal Distortion Stabilizing System
High-performance Spindle with Preload Self-adjusting System



The YBM Vi40 fulfills the growing needs for high-precision 5-axis milling machines due to the increasing complexity of parts, dies and molds, the increasing hardness of materials, and the increasing quality of the machined surface.



The Highest Accuracy

YASDA's 5Axis CNC JIGBORER



YBMvi40 Ver.Ⅲ

The "YBM Vi40" is the flagship of YASDA's vertical 5-axis machine, leading the 5-axis milling technology of highly hardened materials in highest precision.

It has been renewed as Ver.Ⅲ.

By employing the DD (Direct Drive) motors in the B and C axes, the simultaneous 5-axis machining capability has been improved.

In addition, the rigidity and mechanical stability have been further improved by reviewing the mechanical structure.



YBM Vi40 is upgraded to Ver.III

Improved motion performance by employing
DD motors on the B and C axes and reviewing the mechanical structure.

Equipped with a high rigid and high-precision B/C-axis tilting rotary table unit which is mounted on Y-axis, setting the heavy movable bodies to a lower center of gravity.

In addition to conventional C-axis, newly B-axis also use of DD motor drive improves the simultaneous 5-axis machining capability without backlash.

Direct
Drive
MOTOR

Suppresses geometry change
due to B-axis rotation.

1/2

B-axis

C-axis

1/3

Additional B-axis shaft
cooling for reducing
thermal displacement
caused by B-axis motion.

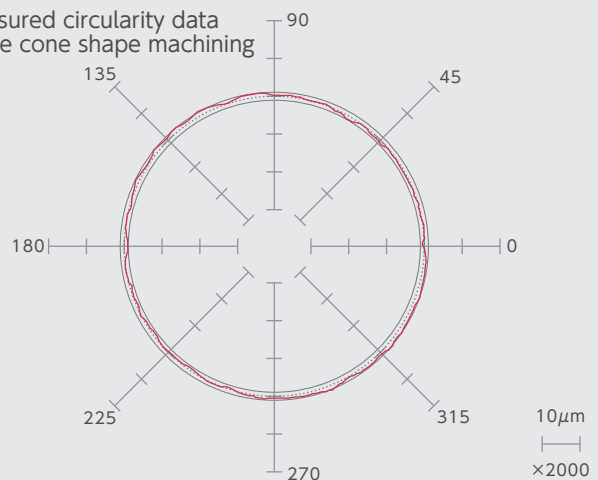
The table structure is
supported at three points to minimize
geometry changes
by different load.

Simultaneous 5-axis
machining accuracy (NAS979)

Circularity : $2.17\mu\text{m}$
(measured value)



Measured circularity data
of the cone shape machining

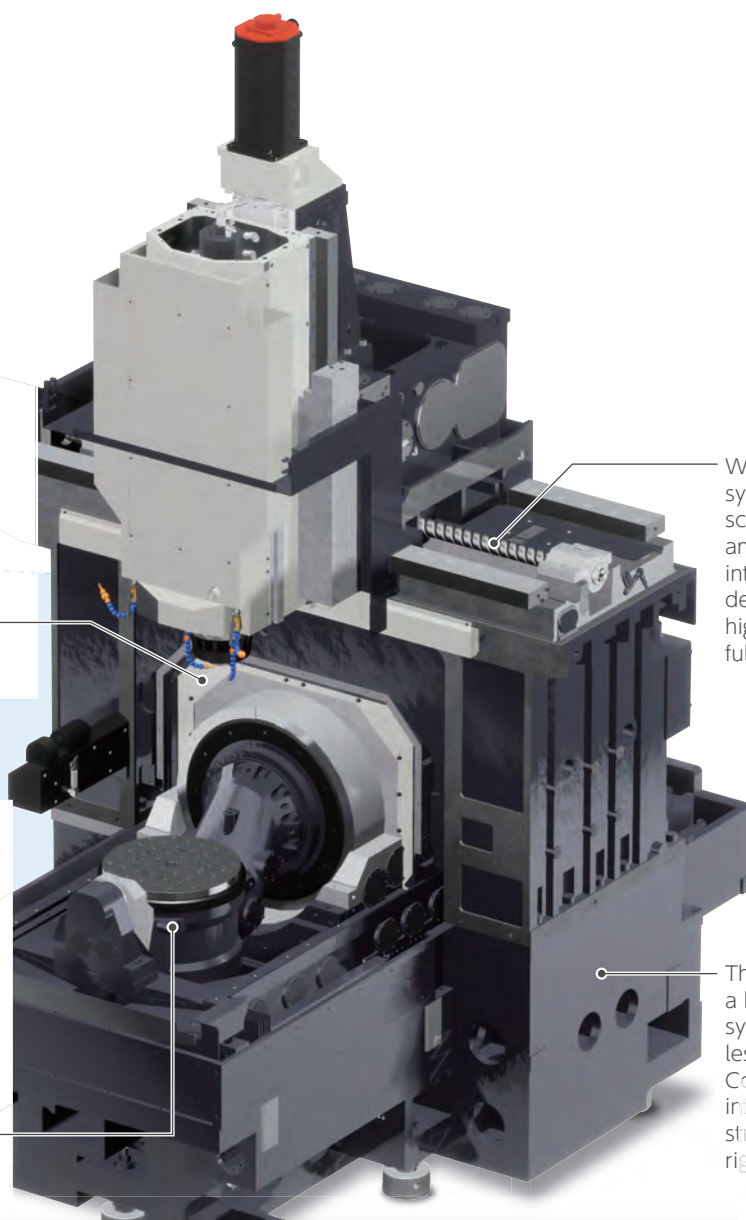


1/2

Reducing mechanical vibrations caused by saddle movement by redesigning the ribs.

×2

Increased table rigidity in the Z-axis direction.



With a high rigid feed drive system adopting ball screws with large diameter and high speed interpolation control, demand for high-speed and high-precision machining fulfilled.

The machine body adopts a bridge type thermally symmetrical structure with less thermal displacement. Column and top beam are integrated into a single structure for increased rigidity.

※ Compared to our previous model

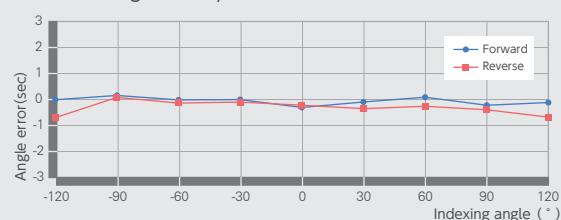
Positioning accuracy (measured value)

ISO 230-2(1988)			
	unit (mm)		
Accuracy : A	X	Y	Z
	0.0022	0.0009	0.0024

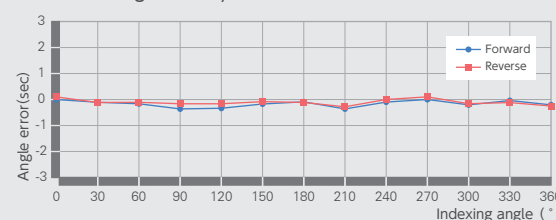
ISO 230-2(2014)			
	unit (mm)		
Accuracy : A	X	Y	Z
	0.0018	0.0009	0.0019
Repeatability : R	X	Y	Z
	0.0010	0.0004	0.0014

Indexing accuracy of B/C-axis

B-axis indexing accuracy : ±0.42sec (measured value) Tolerance: ±3sec



C-axis indexing accuracy : ±0.20sec (measured value) Tolerance: ±1.5sec



YASDA's original mechanism enabling stable high quality machining

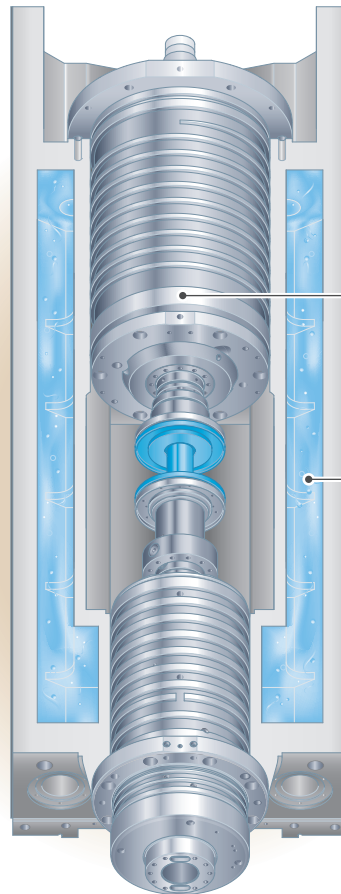
The preload self-adjusting spindle which machines at a high degree of accuracy throughout the whole range of speeds.

(MODEL:SAtype)

With a conventional fixed-position preload type spindle, as preload increases along with heat generation of the bearing by high speed spindle rotation, the initial preload is set very low. This method, however does not satisfy the requirement for spindle rigidity.

The "preload self-adjusting spindle" developed by YASDA is equipped with a mechanism that applies a large preload at low speed rotation, and the preload is adjusted in accordance with the amount of heat generation of the spindle bearing at high speed rotation. Accordingly compatibility during heavy-duty cutting within a low-speed range with low heat generation and high-precision rotation within a high-speed range can be achieved.

With 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 can be performed with high precision.



Direct Drive System

The preload self-adjusting 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.

Spindle motor

YASDA spindle motor employs a two coil changeover type winding, and helps high torque drive at both of high and low spindle speeds.

Spindle head

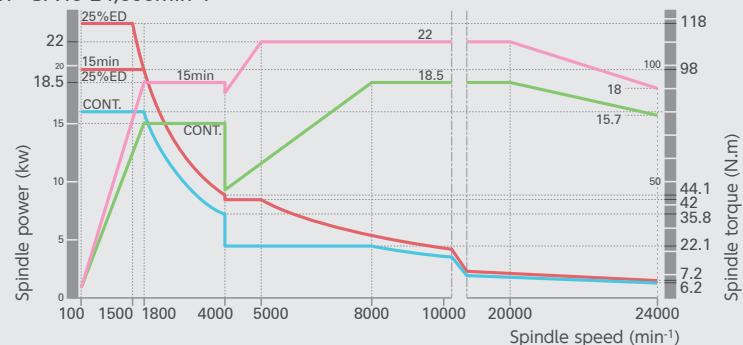
Thermal distortion stabilizing system

The spindle head and saddle of the machine contain the largest heat generating parts such as spindle, spindle motor and feed motor.

This is why machining centers suffer from thermal distortion which can easily result in inconsistent machining accuracy. YASDA's design prevents such distortion by circulating heat exchange fluid throughout the spindle head, controlling the temperature of spindle head following the sensor for reference room temperature.

Spindle power and torque diagram SA40-24,000min-1

- Power (short time)
- Power (Continuous)
- Torque (short time)
- Torque (Continuous)



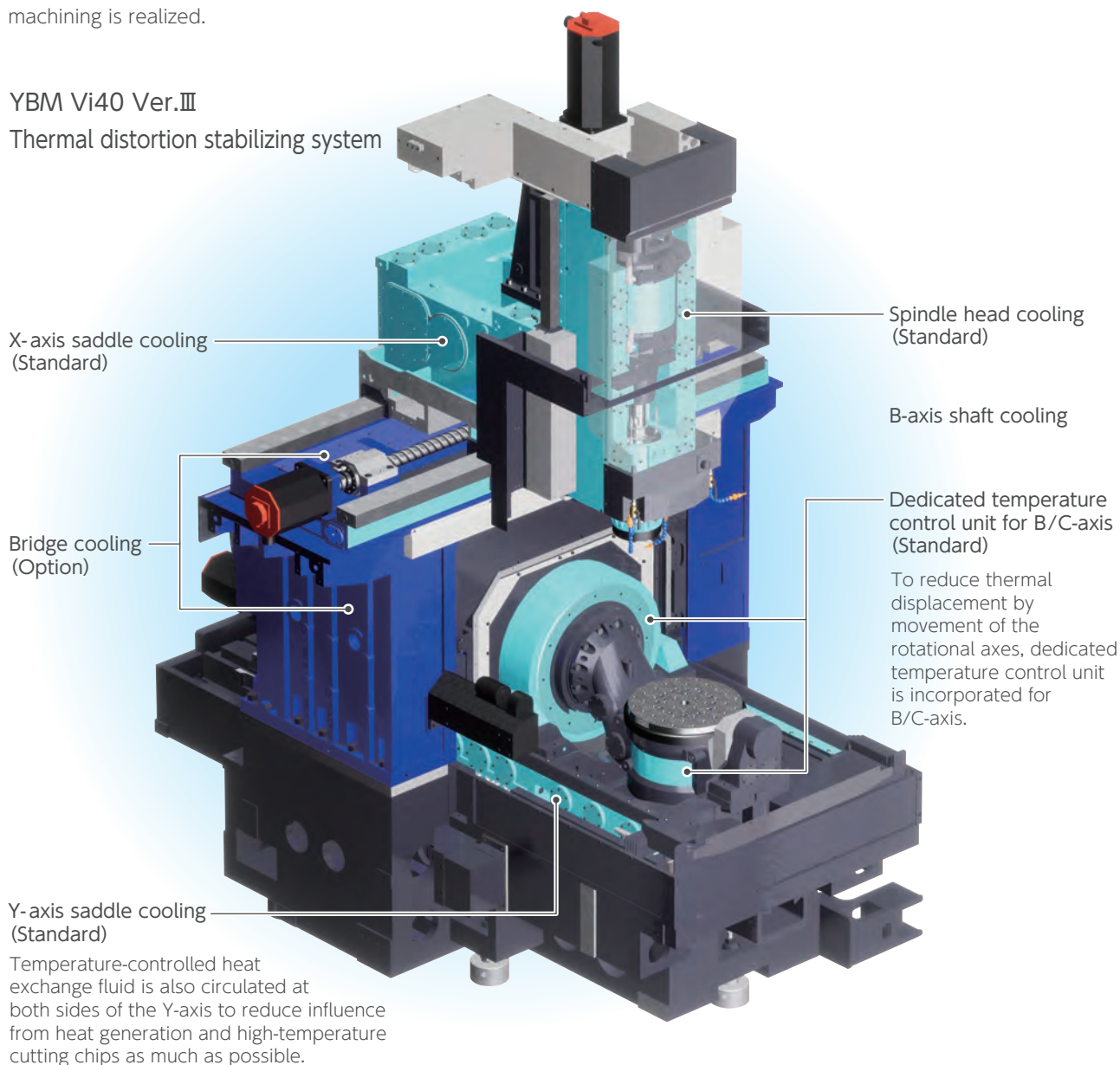
Thorough measures to control thermal distortion

Thermal distortion stabilizing system that helps assure highest accuracy during a long time running.

To achieve high-precision 5-axis machining, having center positions of two rotational axes constantly at a fixed position in air is very important. By circulating temperature-controlled oil through machine body, thermal displacement of each axis is minimized thus stable high-precision machining is realized.

YBM Vi40 Ver.Ⅲ

Thermal distortion stabilizing system



Navi-CAL

The application programs that assist "calibration" necessary for high precision machining.

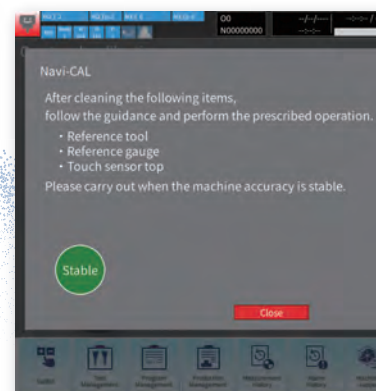


Periodic calibration of the equipment is necessary for high-precision machining.

However, it is surprisingly complex and time-consuming to determine the right condition of the machine for calibration and to learn the calibration procedure.

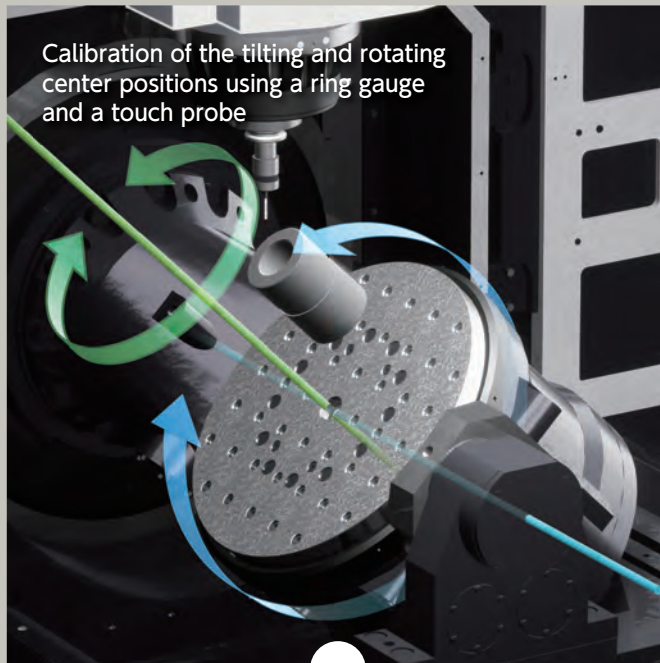
Navi-CAL assists the machine operator to perform this calibration easily.

You only need to follow the machine's instructions to complete the correct calibration, which helps to reduce variations in skills among operators.

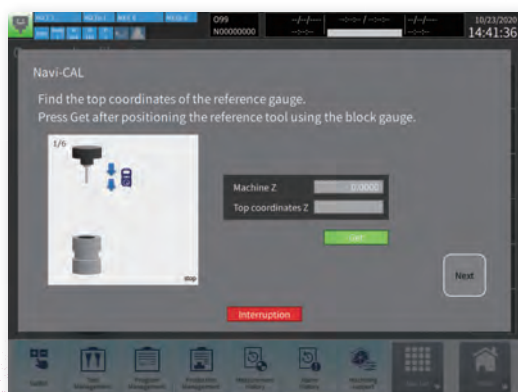




Checking distances in the Z direction using a reference tool and a block gauge



Calibration of the tilting and rotating center positions using a ring gauge and a touch probe



Easier User Interface

Easier and faster operations and functions utilizing FANUC iHMI.

Touch-panel type 15-inch display mounted with FANUC iHMI

A large-sized display with touch panel and the OpeNe Version 2.0 provides intuitive operation.

The manual viewer makes the FANUC instruction manual and machine user manual appear on the display.



HAS-4 realizes higher speed and higher precision machining

YASDA's high-precision machining function HAS-4, essential for machining molds, has 5 basic modes (M300 to M304) including rough machining and finish machining.

It is possible to reduce machining time and improve machining accuracy by changing parameters such as acceleration/deceleration and tolerance according to machining purpose.

On the machining assist screen, it is possible to select from 5 basic machining modes and to finely adjust machining parameters for each mode according to machining conditions. It is also possible to select smoothing and other functions on the screen, thus allowing optimal conditions to be established according to each type of machining including 3D-shaped mold machining and 5-axis machining. For HAS-4, machining time is reduced by eliminating the stop time between blocks and surface quality is improved by more finely controlling servo-control feedback signals.



OpeNe serves as an intermediary between human and machine

Advanced functions of OpeNe Ver.2.0 provide the operator with complete details of the machine.



Tool Information Management



On this screen, not only basic tool information but also associated tool information such as machining load and measurement history are collectively managed. It is also possible to monitor spindle load in real time in comparison with past record data and check changes in same tool length and diameter. It is also possible to set a tool selected on the screen into the spindle (tool change) and tool measurement operation in interactive mode from the screen without program instructions.

Production Control



On this screen, not only machine running information but also mechanical information such as load on each axis while running, workpiece coordinates and tool compensation values are displayed. It is possible, in case of machining failure, to carry out a follow-up check because various types of mechanical information are displayed on the same time axis as that of program progress graph. It is also possible to graphically display actual machine running status on a daily, weekly and monthly basis. Machine running status data can be utilized in Excel format.

Maintenance Management



On this screen, various data such as number of operations and running status of peripherals are automatically acquired and saved. Use of acquired data allows for planned and efficient maintenance and predictive maintenance on equipment. A check if current machine status is appropriate or not is carried out automatically by acquiring servo wave data and comparing it with past data.

Program Management

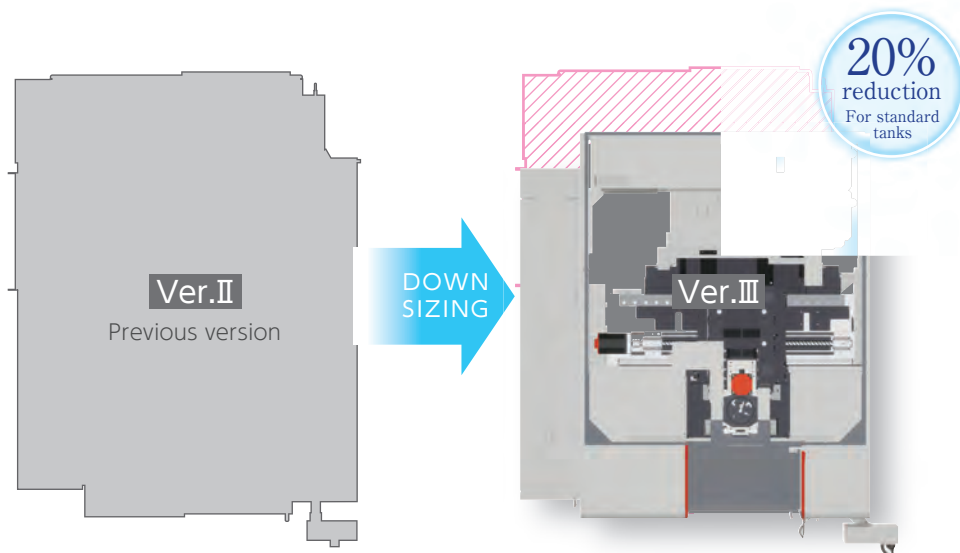


On this screen, machining time for any registered program can be easily calculated by simulation even while the machine is operating. Knowing machining end time with accuracy enables optimal utilization of equipment and smooth production.

Towards more user-friendly machines

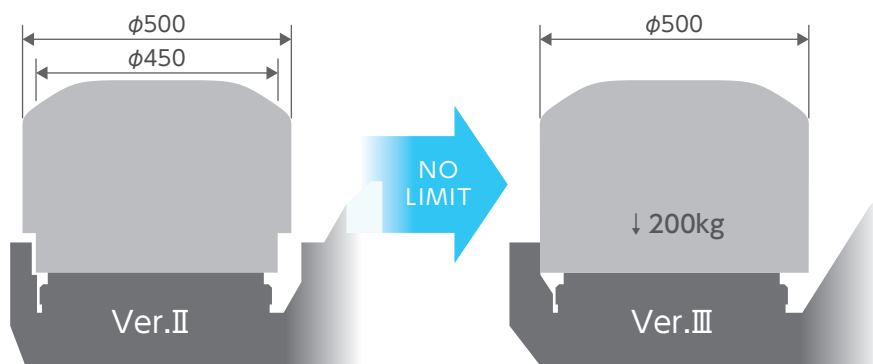
Reduction of footprint

By eliminating a maintenance platform ladder at the rear of the machine, the footprint has been reduced.



Elimination of restrictions at the bottom of the workpiece

Φ500mm workpiece can be mounted.



Two-way approach

The machining area can be approached from the front and right side.
The improved accessibility makes it easier to work.



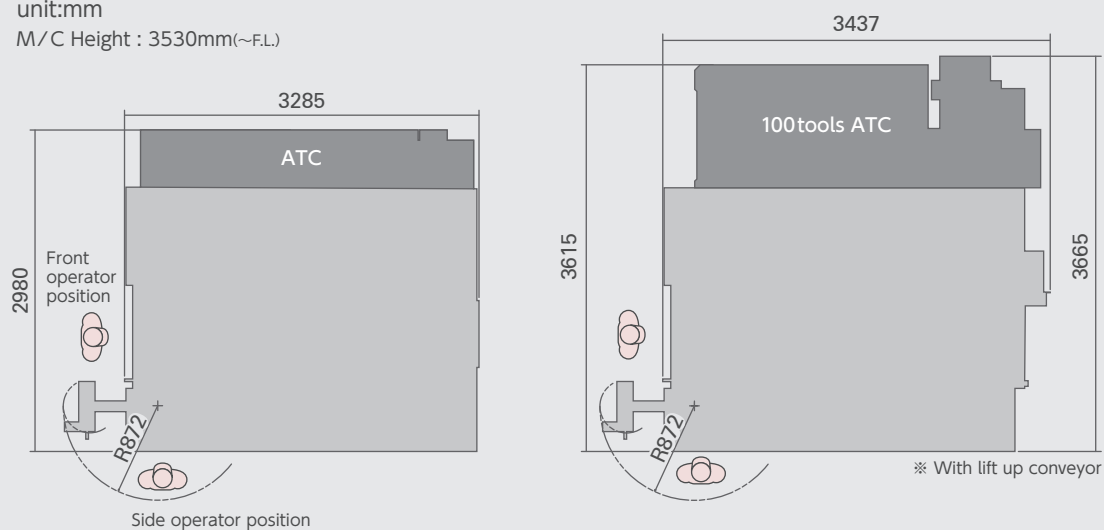
OUTLINE

YBM Vi40 Ver.Ⅲ

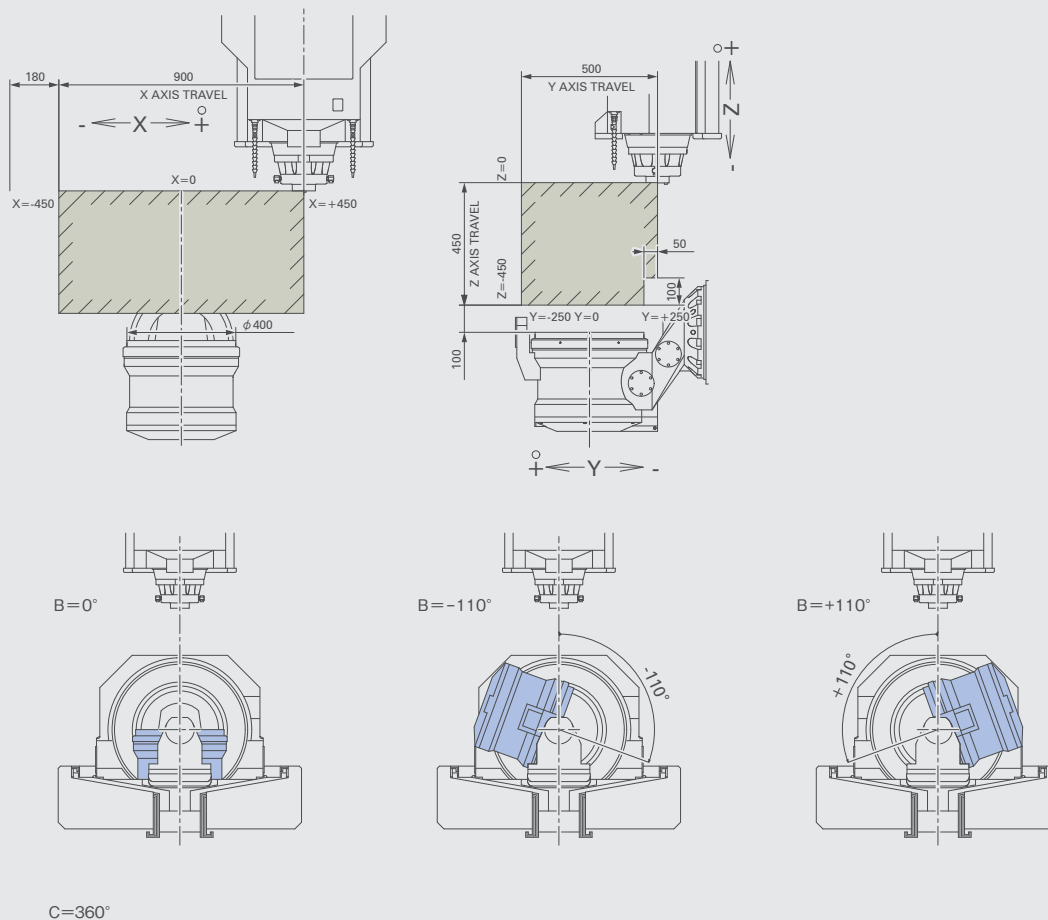
unit:mm

M/C Height : 3530mm(~F.L.)

100 tools ATC (Option)



STROKE DIMENSION



1. Base machine specifications

1) Travel	X-axis travel	900mm
	Y-axis travel	500mm (With limitation)
	Z-axis travel	450mm
	Table to spindle nose distance (B=0°)	100~550mm
2) Rotary table (B / C-axis)	Table working size	φ400mm
	Loading capacity	200kg
	Table surface configuration	44-M12Tap
	Table rotating axis travel (C-axis)	360deg.
	Table tilting axis travel (B-axis)	± 110deg.
	Distance between the center of tilting axis and table surface	0mm
3) Spindle	Spindle type	SA40-24000-18.5 (Preload self-adjusting spindle)
	Spindle speed range	100~24,000min ⁻¹
	Spindle drive motor	AC18.5 / 22kW (Continuous/15min)
	Spindle taper hole	MAS BT40
	Spindle nose surface	BIG plus spindle
4) Feed rate	Rapid Feed	(X-,Y-,Z-axis) 20,000mm/min (C-axis) Max.100min ⁻¹ (B-axis) Max.20min ⁻¹
	Cutting feed	(X-,Y-,Z-axis) 5,000mm/min (Standard) (C-axis) Max.100min ⁻¹ (B-axis) Max.20min ⁻¹
	Min. input increment	0.0001mm (deg)
5) ATC	Tool shank type	MAS BT40
	Pull stud type	JIS B6339-40P
	Tool storage capacity	60 tools
	Max. tool diameter/length/mass	φ70mm (φ100mm) / 250mm / 7kg
6) Mass of machine		Approx. 15,000kg
7) Electric power capacity		Max.40kVA
8) NC unit		FANUC 31i-B5 Plus

2. Standard equipments

1) Optical scale feed back	X-,Y-,Z-,B-and C-axis 0.0001mm (deg.) command available
2) Cutting oil unit (AA type)	2 Flood nozzles standard tank capacity 300L
3) Splash guard	Manual slide door with ceiling cover, 1 LED light
4) Chip conveyor	Screw conveyor (inside the machine)
5) Washing gun	1 (Operator position)
6) Thermal distortion stabilizing system	Standard type
7) Compensation for spindle thermal displacement	Standard data
8) Automatic fire-extinguishing equipment interface	

4. Optional equipments	
1) Spindle taper shape	HSK-A63
2) Number of additional stored tools	100 tools
3) Signal tower (Multilayer signal lamp)	Red, yellow, green (Flashing)
4) Spindle center through air coolant	Micro fog coolant unit
5) Spindle center through flood coolant	3.5/6MPa (With cutting fluid temperature control unit)
6) External lift-up chip conveyor	
7) Coolant temperature controller	
8) External mist coolant	Manufactured by Bluebe / 2 nozzles
9) Oil skimmer	Oil Pure or belt type
10) Mist collector	Mistresa
11) Tool measurement & Tool breakage detection system	NT-H (by BLUM)
12) Tool measurement & Tool breakage detection system	Dyna Vision Pro (by BIG Daishowa)
13) Tool measurement & Tool breakage detection system	Dyna Line (by BIG Daishowa)
14) Automatic workpiece measuring system	
15) High-speed machining function (YASDA HAS-4 system)	Max. feed rate 12000 mm/min
16) Thermal distortion stabilizing system	With weekly timer
17) Weekly timer	
18) Compensation for spindle thermal displacement	Individual data
19) AWC door	
20) Robot interface	Compatible with System 3R and EROWA
21) Coolant unit level switch	



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