

Integration of high productivity and high quality machining



YASDA PRECISION CENTER

PX30i

5-Axis Machining Center

Reliability of machining at work shops, in-house built tilting rotary table
Yasda preload self-adjusting spindle, versatile machining capability

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PX30i

Market is demanding both high speed machining and high production capacity
The new 5-axis machining center is integrating highly efficient
and high quality machining performance of YASDA
into those features at a higher dimension



Symmetrical construction realizes high speed high efficiency and high quality machining

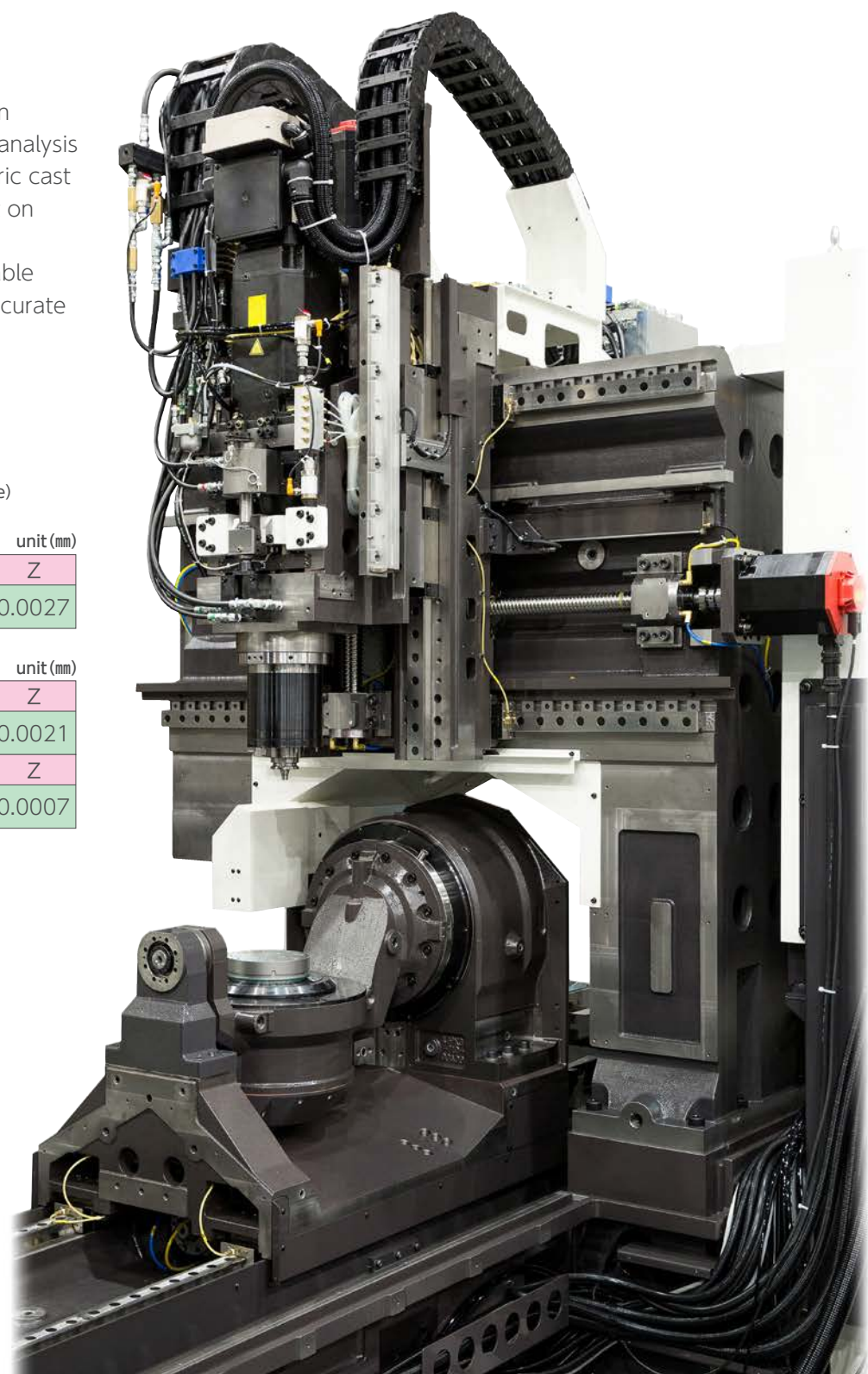
Symmetrical construction

Basic construction which has been designed through complete FEM analysis ensures high rigidity, and symmetric cast iron frame exerts maximum effect on minimizing thermal deformation. This achieves high reliability in stable precision-machining and highly accurate positioning machining.

Positioning accuracy (measured value)

ISO 230-2(1988)	unit (mm)		
Accuracy: A	X	Y	Z
	0.0026	0.0021	0.0027

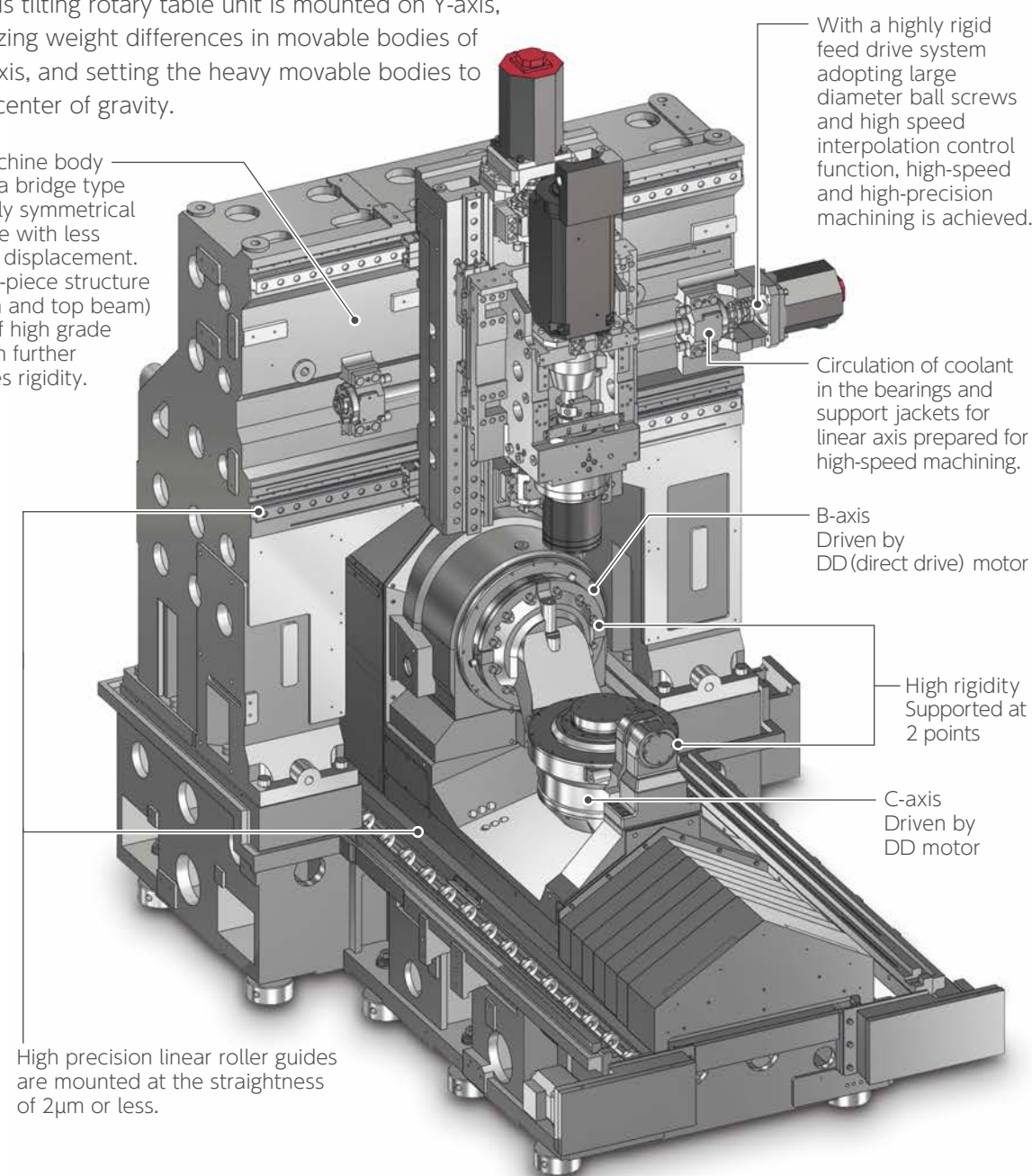
ISO 230-2(2014)	unit (mm)		
Accuracy: A	X	Y	Z
	0.0023	0.0014	0.0021
Repeatability: R	X	Y	Z
	0.0008	0.0006	0.0007



The highly rigid integrated portal structure dominates the field of high precision and heavy-duty cutting

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

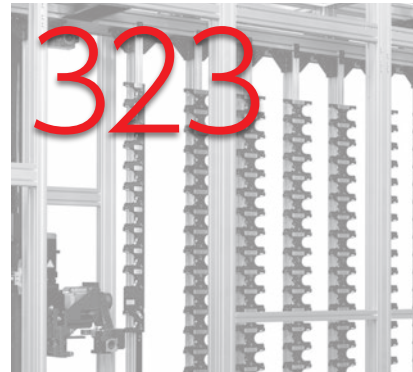
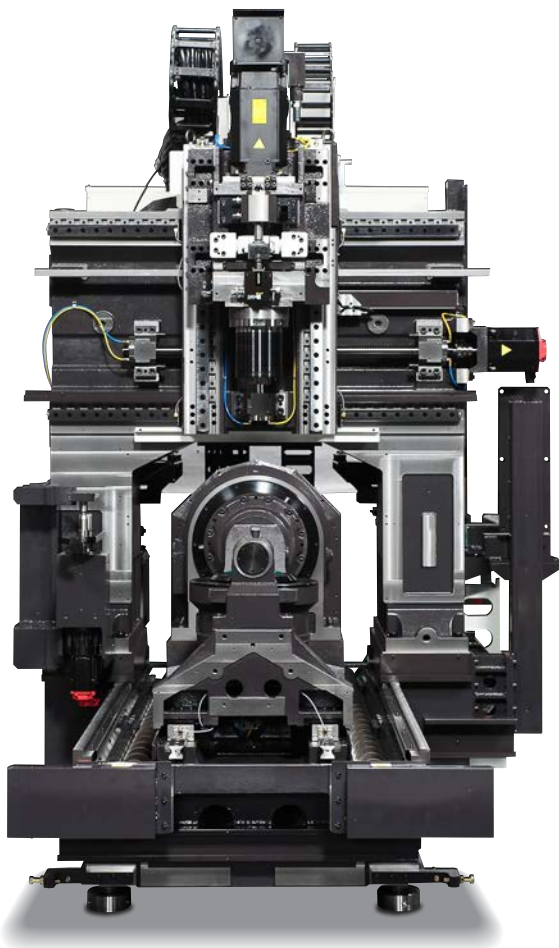
The machine body adopts a bridge type thermally symmetrical structure with less thermal displacement. A single-piece structure (column and top beam) made of high grade cast-iron further improves rigidity.



5-axis

Integration of unprecedented high productivity and stable machining accuracy

PX30i is capable of high volume and high-mix production inheriting the DNA of the YBM series which demonstrate high performance in 5-axis machining of complicated shape components.



ATC tool capacity Max 323

Large capacity automatic tool changer (ATC) prepared for long-time continuous machining and large volume production



Number of pallets 33 sets

Equipped with a stoker capable of storing 33 pallets



Operating system

YASDA's unique operating system connecting operator and machine

YASDA's classic preload self-adjusting spindle

Both heavy-duty cutting in a low-speed range and high-precision rotation in a high-speed range with low heat generation are realized

By the unique mechanism of the preload self-adjusting spindle that applies a large preload at low-speed rotation while preload decreases in accordance with the amount of heat generation of the spindle bearing at high-speed rotation, heavy-duty cutting, high-speed machining of highly hardened steel and high precision machining with helix end mill that generates a thrust-reversing force are realized.

Cooling of spindle, spindle motor and bearings

Cooling oil is circulated in the spindle and spindle motor, which generate the most heat in the machine.



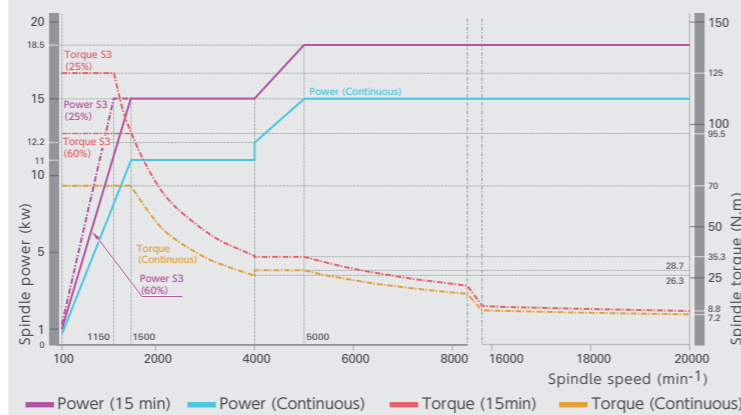
Spindle motor

A two coil type spindle motor is employed for realizing both high speed rotation and low speed rotation at high torque drive. In addition, the slim nose shape ensures good accessibility to work pieces.

Direct drive system

The spindle and the spindle drive motor are connected co-axially by a coupling in order to achieve high precision rotation of the spindle throughout the full speed range of the spindle.

Spindle power and torque diagram (Type: aiIL 8/20000)

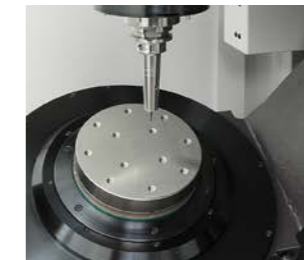
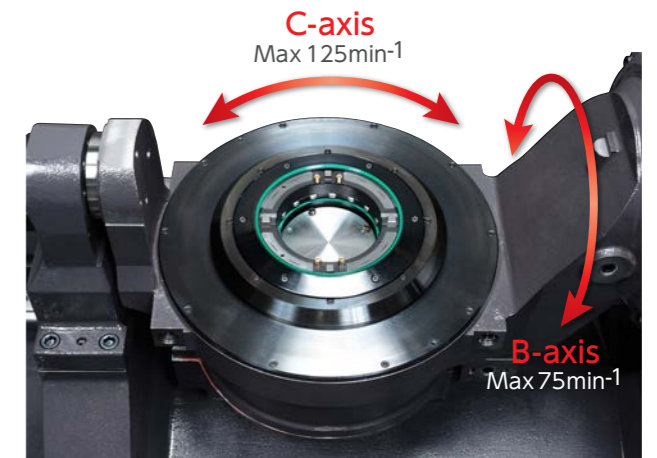


Newly designed combination table with higher reliability

B/C-axis direct drive table

The tilting rotary table has been newly developed to increase reliability and eliminate redundancy. It is driven by direct drive motors to achieve rapid and accurate positioning as well as smooth interpolation motion. The cradle where the pallet is mounted is supported by the large diameter rotor bearing on the motor side and by a high rigid bearing on the other side.

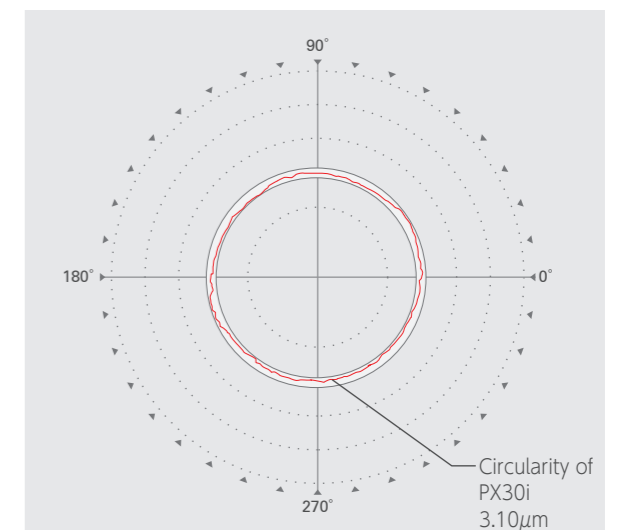
Coolant is circulated in the B/C-axis motors and bearings to minimize the impact of thermal displacement. The pallet clamp system employs a highly reliable air release method. Strong clamping force further increases cutting capacity.



System 3R Matrix185

Outstanding accuracy

This machine achieved 3.10μm of circularity (measured value) in a tilted cone machining test according to NAS979 standard, which is commonly used for simultaneous 5-axis machining accuracy.

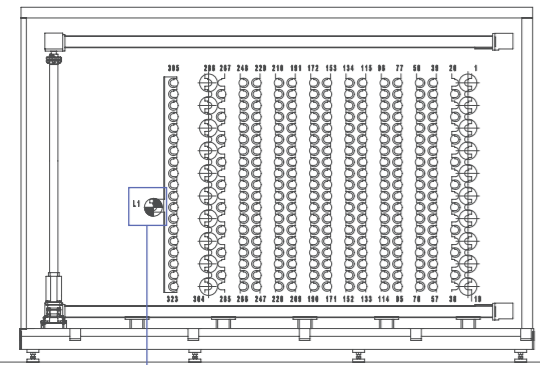


Automatic tool changer (ATC) promises reliable operability

Max 323 tools storage prepared for long-time continuous machining and large volume production

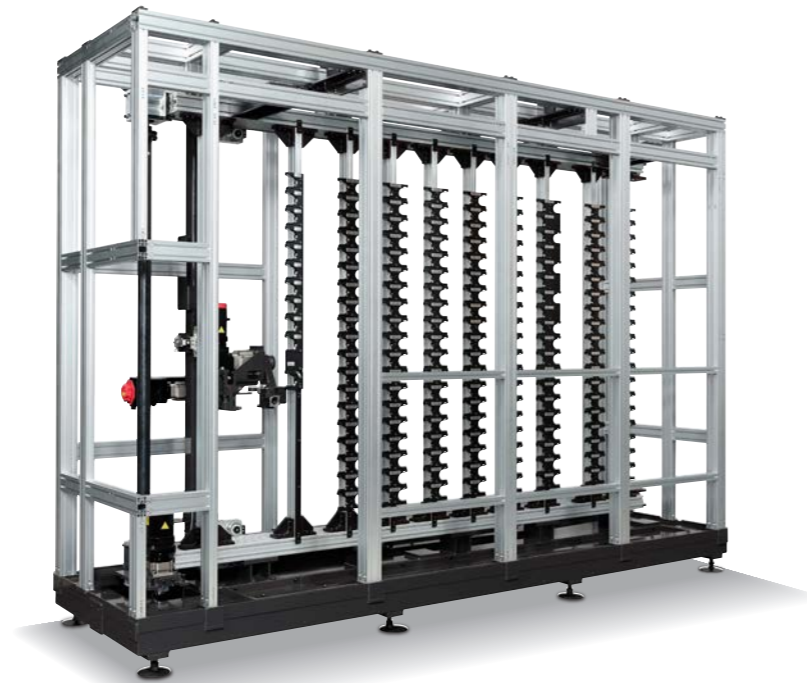
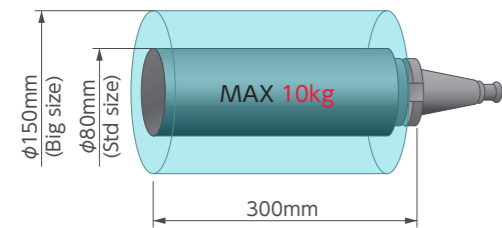
ATC

Designed for $\phi 80\text{mm}$ standard tool and bigger tool up to $\phi 150\text{mm}$.



Tool loading position

Tool dimensions



Unprecedented long-time unmanned schedule operation is realized

Pallet stoker which can store 33 sets of work pieces

Pallets are automatically changed according to the machining schedule, thus long-time unmanned schedule operation is realized.

All axes in the handling system are driven by servo motors ensuring high speed and exact handling operations.



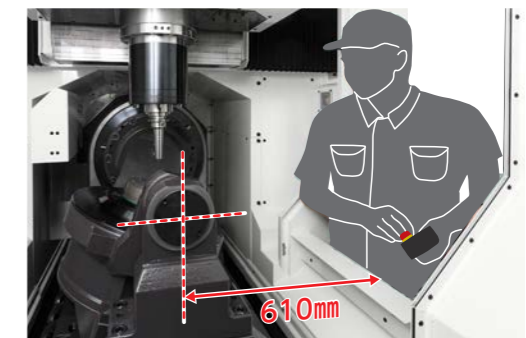
Improvement in workability

Machine and PLS operations, and work setup positions are arranged closely to each other to improve workability. Visibility is significantly improved by the 15-inch operation panel.



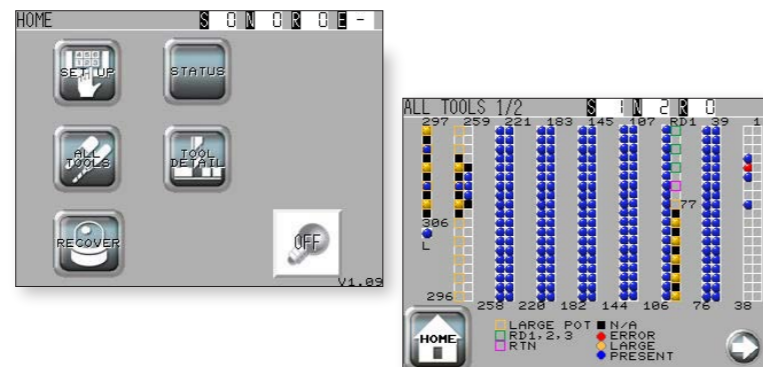
Operator-friendly design

The position of the upper surface of the pallet is set to 1,085mm from the machine floor. The center of pallet to the operator door is set to 610mm, allowing the operator an easy access to tools and the workpiece.



ATC operation touch panel

Intuitive and smart operation is realized by easy-to-understand icons, button arrangement and high visibility layout. This touch panel allows one-touch secure operation for tool storage, ATC manual operation, recovery function at the time of trouble, displaying tool information, etc., thus reducing stress on the operator.

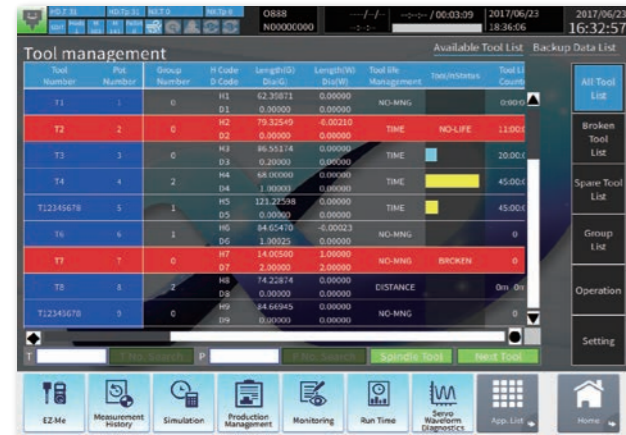


OpeNe serves as an intermediary between human and machine

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.

Work Management



The Work Management Function is an application for scheduling automated machining using AWC and APC. Cutting program can be registered to each workpiece and machining order can be flexibly scheduled on this application. This application helps increase production efficiency by the judgement function for judging whether each cutting program can be executed or not, machining time simulation function for calculating the total machining time of the whole process, etc.

High functionality and on-machine measurement options

Options to support sophisticated centering coordinate setting and calibration

Measurement and calibration application software to realize even more sophisticated and highly accurate 5-axis machining are available as options. The user-friendly interfaces are integrated in the OpeNe screen.

Measurement application

“Ez-Me” & “Ez-Me PRO” (option)

The measurement application software “Ez-Me” and “Ez-Me PRO”, using the manual pulse generator, are available as options. A wide variety of measurements from centering to confirmation after machining are done on the machine by intuitive operations. “Ez-Me PRO” offers a number of measurement patterns including angle measurement and calibration of rotation axis, calculation of peak from derived angle, etc. Thus it is very useful for sophisticated centering and measurement.



Touching workpiece by handle operation

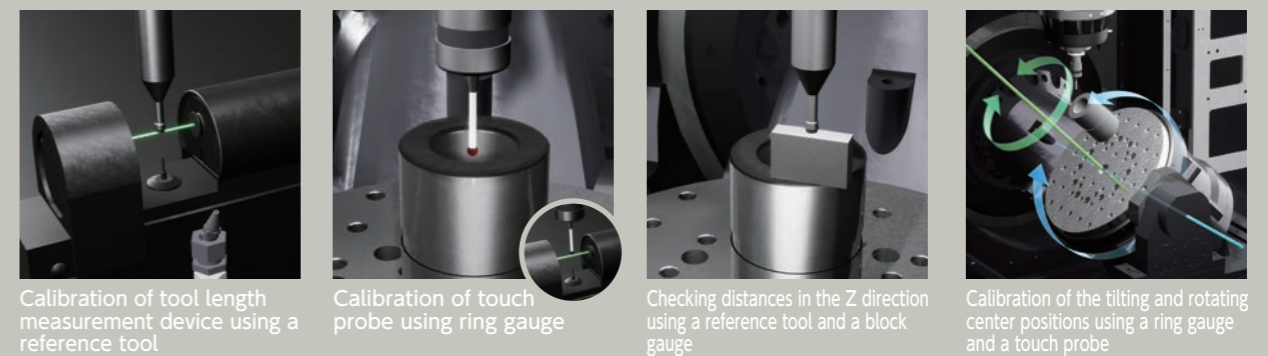
Machine calibration application

“Navi-CAL” (option)

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.

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



1. Base machine specifications

1) Travel	X-axis travel	680mm
	Y-axis travel	400mm
	Z-axis travel	500mm
	Table to spindle nose distance (B=0°)	120~620mm
2) Rotary table (B/C-axis)	Table working size	φ185mm
	Loading capacity	80kg
	Table surface configuration	13-M10Tap
	Table rotating axis travel (C-axis)	360deg.
	Table tilting axis travel (B-axis)	-125~+65deg.
	Distance between the center of rotating axis and spindle nose (B=90°)	90~590mm
3) Spindle	Spindle type	SA40-20000-18.5
	Spindle speed range	100~20,000min ⁻¹
	Spindle drive motor	AC15/18.5kW(Continuous/60%)
	Spindle taper hole	MAS BT40
	Spindle nose surface	BIG plus spindle
4) Feed rate	Rapid feed	(X-,Y-,Z-axis)60,000mm/min (C-axis)125min ⁻¹ (B-axis)75min ⁻¹
	Cutting feed	(X-,Y-,Z-axis)20,000mm/min (C-axis)50min ⁻¹ (B-axis)50min ⁻¹
	Min. input increment	0.0001mm(deg.)
5) ATC	Tool shank type	MAS BT40
	Pull stud type	JIS B6339-40P
	Tool storage capacity	323 tools
	Max. tool diameter/length/mass	φ80mm(φ150mm)/300mm/10kg
6) Automatic pallet changer (APC)	Number of pallets	33 pallets
		Set-up station with turn table
7) Pallet chucking device		System3R:Matrix 185 With pallet chucking confirmation function
8) Mass of machine		Approx.19,000kg
9) Electric power capacity		Max.58kVA
10) NC unit		FANUC 31i-B5 Plus

2. Standard equipments

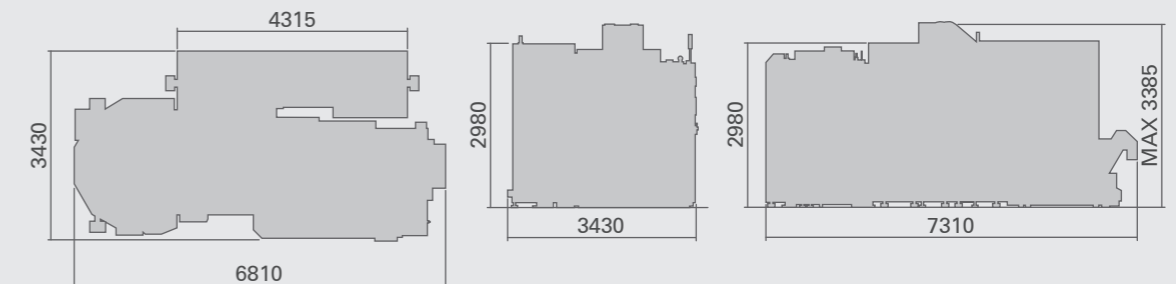
1) Optical scale feed back X-,Y-,Z-,B-and C-axis 0.0001mm(deg.) command available	7) Washing gun
2) Cutting oil unit (AA type) 6 Flood nozzles Standard tank capacity 780L	8) Tool measurement & Tool breakage detection system NT type (by BLUM)
3) Splash guard Manual slide door with ceiling cover,1 LED light	9) Automatic workpiece measuring system Touch probe OMP400 (by RENISHAW)
4) Chip conveyor Screw conveyor + scraper chip conveyor with separator	10) Signal tower (Multilayer signal lamp) Red, yellow, green (Flashing)
5) Spindle center through flood coolant 3.5MPa	11) Compensation for spindle thermal displacement Standard data
6) Coolant temperature controller	12) Automatic power breaker
	13) Automatic fire-extinguishing equipment interface

3. Optional equipments

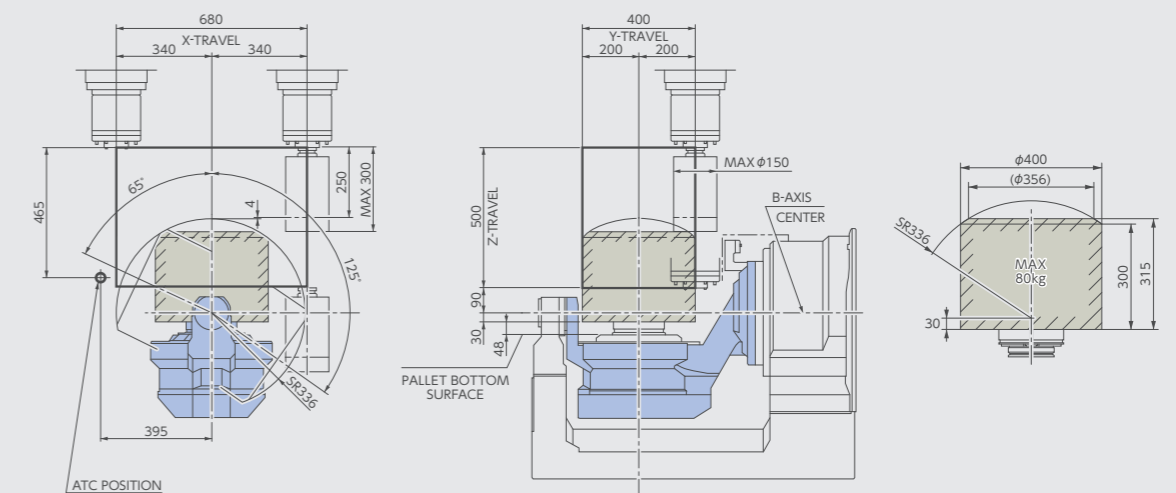
1) Spindle taper shape	HSK-A63
2) Number of additional stored tools	513 tools
3) External mist coolant	
4) Spindle center through air coolant	
5) Oil skimmer	
6) Mist collector	
7) Tool measurement & Tool breakage detection system	Z-nano (by BLUM)
8) Automatic workpiece measuring system	Touch probe OMP60 (by RENISHAW)
9) High-speed machining function (YASDA HAS-4 system)	Max. feed rate 12,000mm/min
10) Weekly timer	
11) Compensation for spindle thermal displacement	Individual data
12) Coolant unit level switch	

OUTLINE

unit:mm



DIMENSION





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