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

YASDA developed the 5-axis PX30i machine to supply customers with a top quality, highly reliable machine tool for the machine shop market and OEM users. The PX30i is outstanding in versatile 5-axis applications, precision in parts, drilling, face milling, boring, milling from and also excellent for hardened steel, tough materials like titanium and inconel. The PX30i has an excellent design for automation, usability and productivity

YASDA

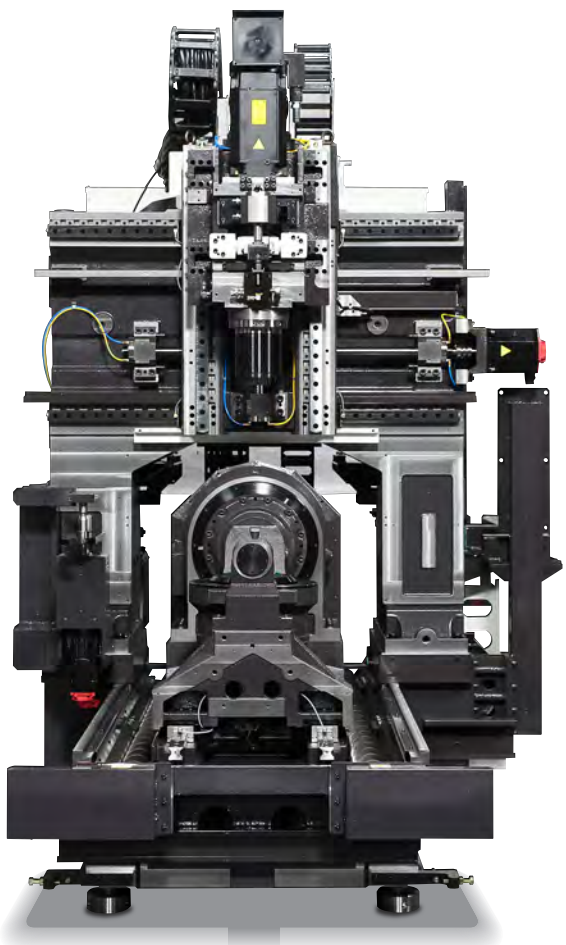
PX30i

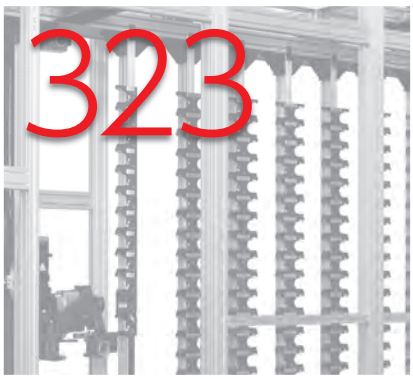
Market is demanding both high speed machining and high production capacity
The new 5-axis machining center is integrating highly efficient
and high quality machining performance of YASDA
into those features at a higher dimension

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 stocker capable of storing 33 pallets

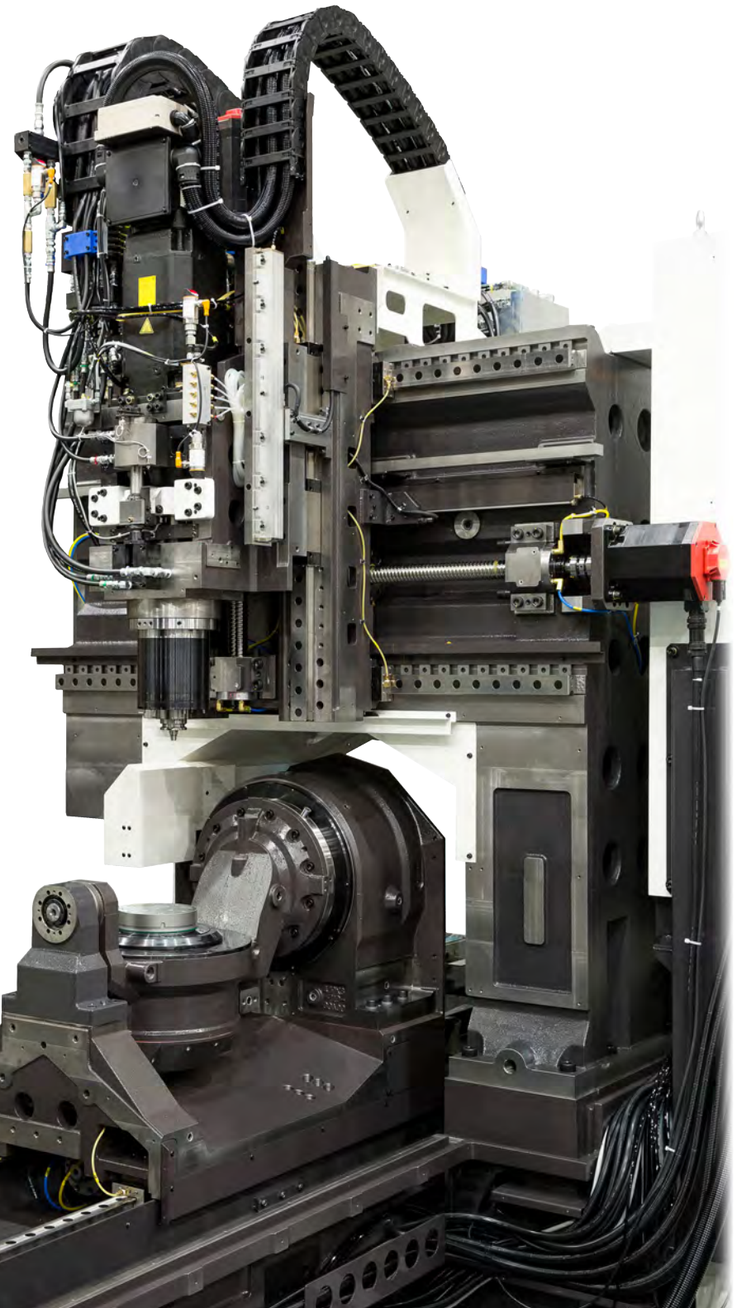
Operating system

YASDA's unique operating system connecting operator and machine

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)

	X	Y	Z
Accuracy : A	0.0026	0.0021	0.0027

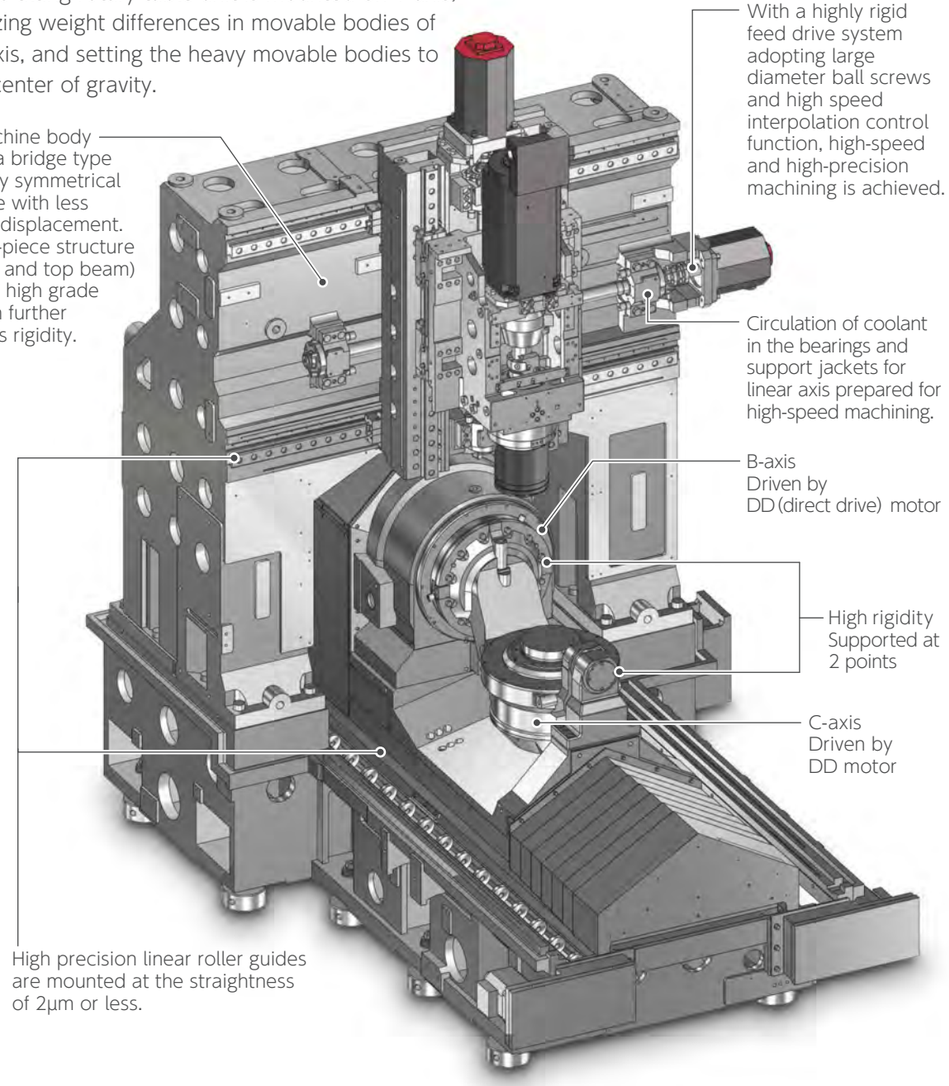
ISO 230-2(2014) unit(mm)

	X	Y	Z
Accuracy : A	0.0023	0.0014	0.0021
Repeatability : R	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.



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.

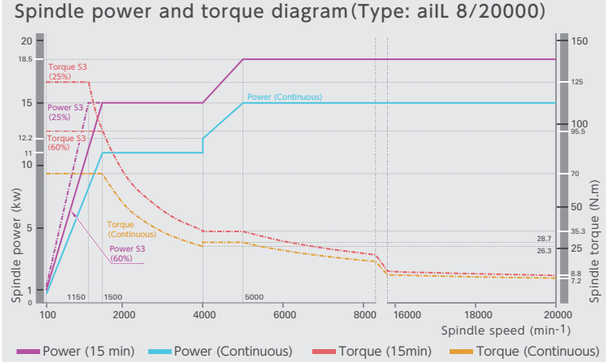
Spindle motor

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)

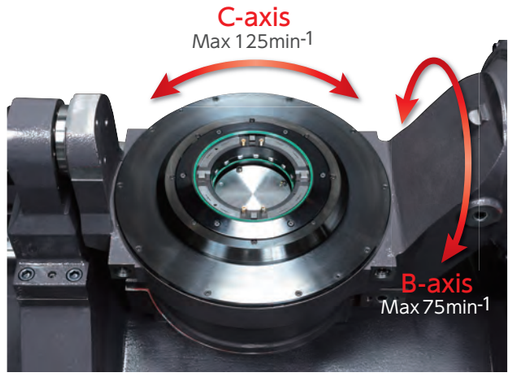


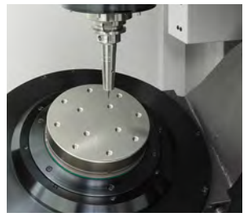
Newly designed combination table with higher reliability

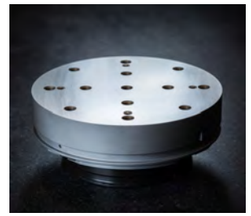
B/C-axis direct drive table

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.



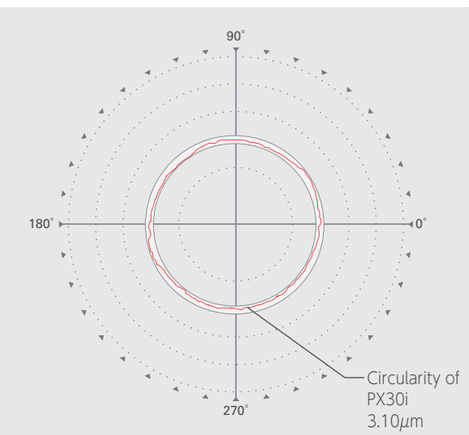




System 3R Matrix185

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.

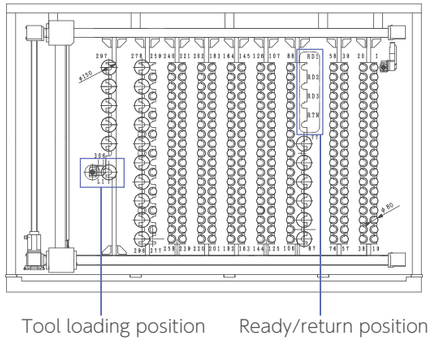


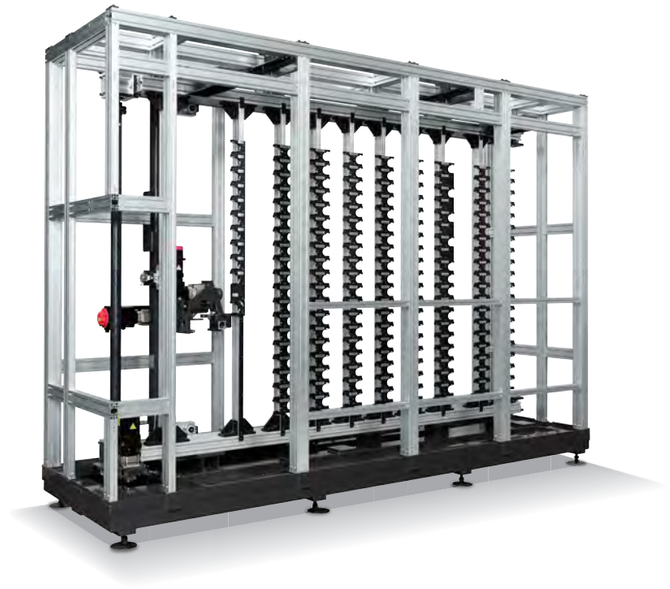
Automatic tool changer (ATC) promises reliable operability

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

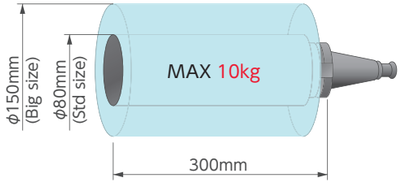
ATC

Designed for ø80mm standard tool and bigger tool up to ø150mm.



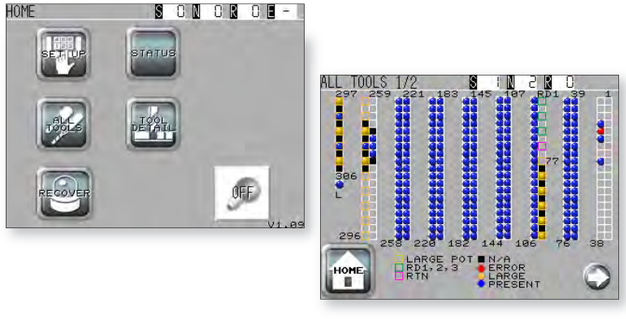


Tool dimensions



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.



Unprecedented long-time unmanned schedule operation is realized

Pallet stocker which can store 33 sets of work pieces

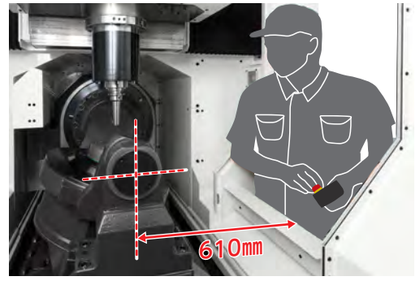
Pallets are automatically changed according to the machining schedule, thus long-time unmanned schedule operation is realized.
All axes in the handling system are driven by servo motors ensuring high speed and exact handling operations.

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.



Original operation system

The interface that connects man to machine "OpeNe" (Operator+Machine)

"YASDA OpeNe" is a YASDA's original system which widely supports operation of the machine such as machine status check, customization etc.

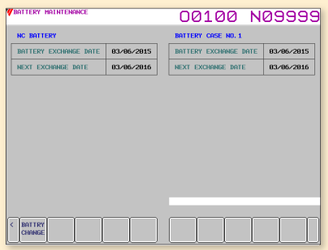
OpeNe

STANDARD version

This is a basic operation function containing total auxiliary screen, customization functions etc., to meet various customer's needs.

Enhanced work management function

This function enables detailed settings such as assignment of programs, pallets, machining order, etc.



Battery maintenance function

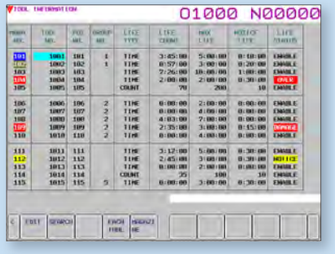
The battery change time is indicated with a message to prevent trouble due to end of battery life and to reduce maintenance work.

- Other: Customization function, total auxiliary screen etc.

OpeNe

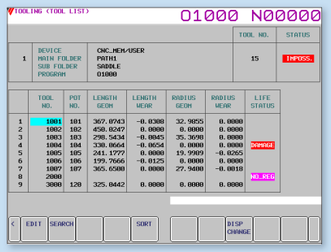
EXTENDED version

In addition to the STANDARD function, useful functions for assisting high productivity and automation are available as options.



Tool management function

Enhanced tool management function such as tool life and spare tool life is included.



Stored tool confirmation function

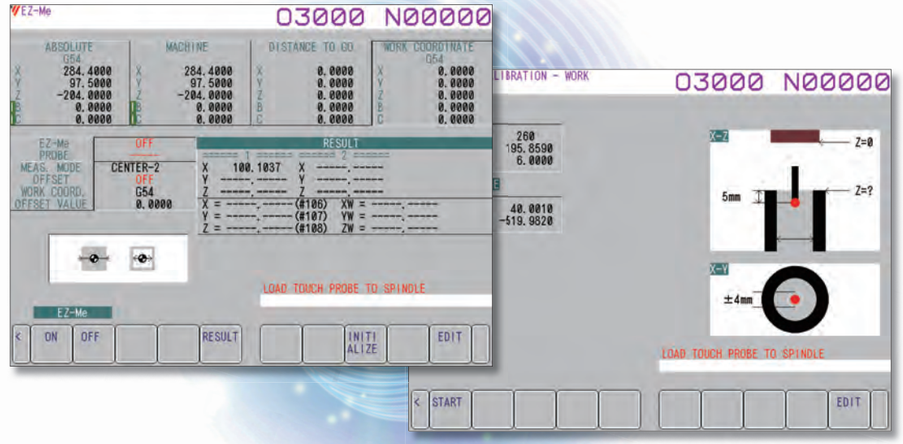
This function confirms status of all tools used before machining, and determines whether they can be used or not. This allows for flexible production by assigning priority to machinable pallets.

- Other: Production management function 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.

Machine calibration application

"Ez-CAL" & "i-CAL" (option)

Ez-CAL

This function measures the length of the automatic touch probe in the Z-axis direction and calibrates the displacement in distance between table and spindle due to room temperature change, etc., and significantly increases the reliability of measurement.

i-CAL

This function calibrates the center coordinate of the tilting axis (B-axis) and rotation axis (C-axis). For tool center point control (TCP) and index machining (TWP), this function is essential for high precision 5-axis machining as each axis of the machine moves according to this center coordinate.

One-touch calibration

This function allows one-touch operation on the OpeNe screen for Ez-CAL, i-CAL, normal automatic centering and calibration of tool measurement device.

Ez-Me, Ez-Me Pro: Subject to the machine with auto measuring probe Renishaw OMP400.
Ez-CAL: Subject to the machine with a non-contact type tool measurement device.
i-CAL: Subject to the machine with an auto measuring probe.

1. Specifications of base machine

1) Travel	X-axis travel	680mm
	Y-axis travel	400mm
	Z-axis travel	500mm
	B-axis travel	−125.0°～ +65.0°
	Distance from table surface to spindle nose face (B=0°)	120～620mm
	Distance from C-axis center to spindle nose face (B=90°)	90～590mm
	Least input increment	0.0001mm
2) Rotary table (B / C axis)	Table working surface	ϕ185mm
	Table loading capacity/moment	80N.m
	Table surface configuration	13-M10 tap
	Maximum pivot diameter of work	ϕ400mm (with limitation)
	Maximum work height	315mm (with limitation)
	Least input increment	0.0001°
3) Spindle	Spindle type	SA40-20000-18.5 (Preload self-adjusting spindle)
	Spindle speed range	100～20,000min^{-1}
	Spindle drive motor	AC15 / 18.5kW (Continuous/30min)
	Spindle taper hole	7 / 24 Taper No.40(HSK-A63 option)
4) Feed rate	Rapid traverse rate	(X-,Y-,Z- axis) 60,000mm/min (B-axis) 75min^{-1} (C-axis) 125min^{-1}
	Cutting feed rate	(X-,Y-,Z- axis) 20,000mm/min (B-axis) Max50min^{-1} (C-axis) Max50min^{-1}
	Least input increment	0.0001mm (deg)
5) Automatic tool changer		323 tools (Max)
6) Maximum tool diameter / length / mass		ϕ150mm / 300mm / 10kg
7) Automatic pallet changer		Pallet number 33 faces
8) Pallet chucking device		System 3R: Matrix 185 With pallet seating check function
9) Mass of base machine		Approx. 19,000kg
10) Electric power capacity		60kVA
11) NC unit		FANUC 31i-B5 15 inch monitor

2. Optional equipment

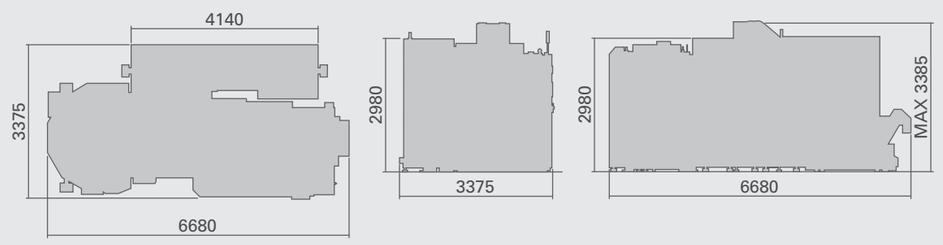
1) Signal tower (Multilayer signal lamp)	7) Tool length / radius compensation and tool breakage sensor
2) Spindle center through air coolant	8) Automatic measuring system
3) Spindle center through flood coolant	9) High-speed machining function (YASDA HAS-3 system)
4) Cutting fluid temperature control unit	10) Weekly timer
5) Mist collector	11) Thermal displacement compensation for spindle
6) Automatic tool length compensation and tool breakage sensor	

3. CNC Options

1) Part program storage	Total:512KB·1MB·2MB·4MB·8MB
2) Extensional number of registerable programs	Total:250·500·1,000·2,000·4,000
3) Background editing	
4) Helical interpolation	G02·G03
5) Conical / spiral interpolation	G02·G03 (Helical interpolation is required)
6) Inch / Metric conversion	G20·G21
7) Scaling	G50·G51
8) Coordinate system rotation	G68·G69
9) Programmable mirror image	G50.1·G51.1
10) Rigid tap	M29 (G84·G74)
11) Optional block skip	Total : 9
12) Tool offset pairs	499sets・999sets
13) Custom macro common variable	Total : 600
14) Addition of workpiece coordinate	48sets・300sets
15) Tool management	
16) Normal direction control	
17) Cs contouring control	
18) Three-dimensional coordinate conversion	G68・G69
19) Inverse time feed	G93
20) Ethernet function	FOCAS2 / Ethernet function
21) Data server function	Fast data server, Capacity 1GB,2GB,4GB

OUTLINE

unit:mm



DIMENSION