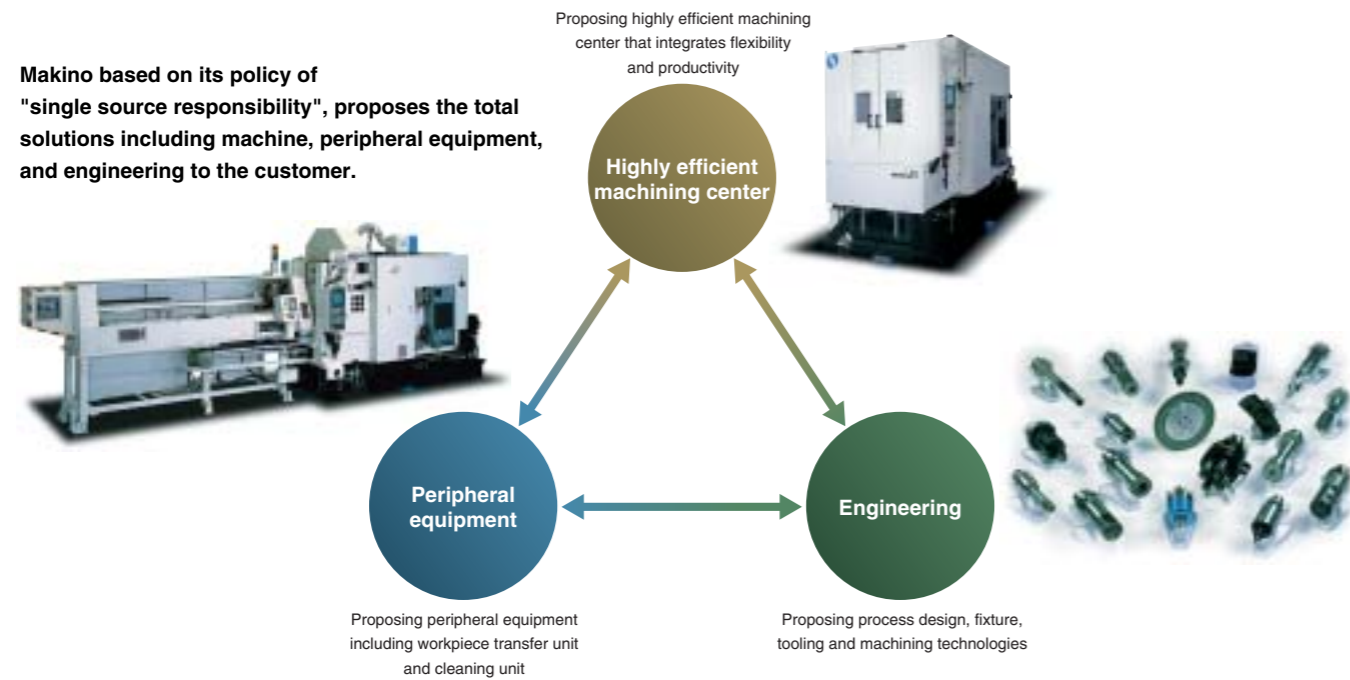


Makino based on its policy of "single source responsibility", proposes the total solutions including machine, peripheral equipment, and engineering to the customer.



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* The specifications in this catalogue are subject to change for improvement by uninterrupted R & D without notice.
* The photographs in this catalogue include optional accessories.
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Compact High Speed Machining Centers

J3
J3 FORMULA
J3 R
J3 i



High Machining Performance Overwhelming Competitive Machines

● HSK-A50 Spindle Excellent in Quick Motion and Cutting Performance

Quick motion

Items	Former machines (BT40 spindle)	J3
Spindle startup time	1.2 sec (16000 min ⁻¹)	0.6 sec (16000 min ⁻¹)
Spindle stop time	1.3 sec (16000 min ⁻¹)	0.7 sec (16000 min ⁻¹)

Cutting capability

Items	Competitors machines (BT30 spindle)	J3
Metal removal rate	1200 cm ³ /min	2400 cm ³ /min

(Example of aluminum machining with a face mill)

Optimum spindle selection based on the material and machining condition

Type of spindle	Max. speed	Max. power	Max. torque	Main material
Standard	16000 min ⁻¹	15 kW	29 N·m	Aluminum
High power	12000 min ⁻¹	22 kW	78 N·m	Aluminum / Cast iron
High torque*	8000 min ⁻¹	11 kW	81 N·m	Cast iron / Steel

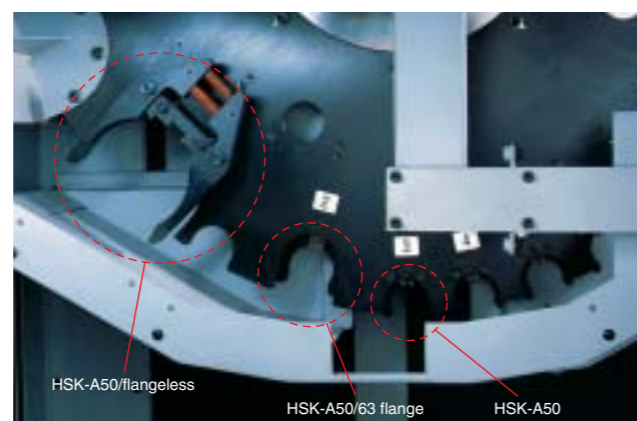
*Standard accessory for J3R having enhanced cast iron cutting capability



● Items Realizing Higher Cutting Performance

Use of HSK-A50/63 flange tool holder equivalent to HSK-A63

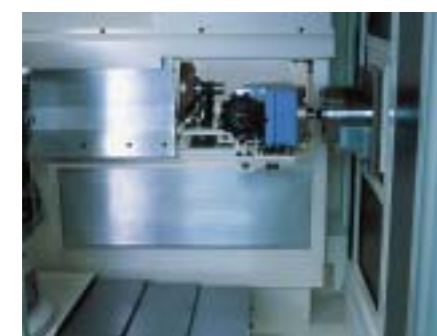
Using the HSK-A50/63 flange equivalent to the HSK-A63 tool holder realizes higher quality machining.



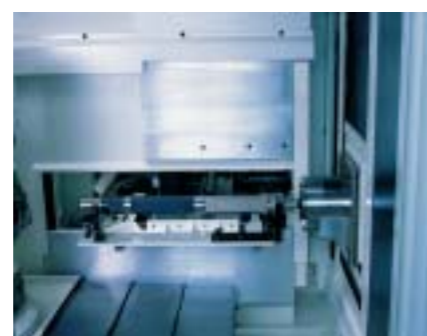
Combination ATC magazine

ATC magazine can store three different tool holders of HSK-A50 · HSK-A50/63 flange, and HSK-A50/flangeless*.

*Tool holder that holds other than flange (such as main body) with the gripper.



Large diameter tool



Long tool

Large-sized tool rack ATC

Supporting the ATC of large diameter tools and long tools that cannot be stored in the combination ATC magazine

*The above model includes special option specifications.

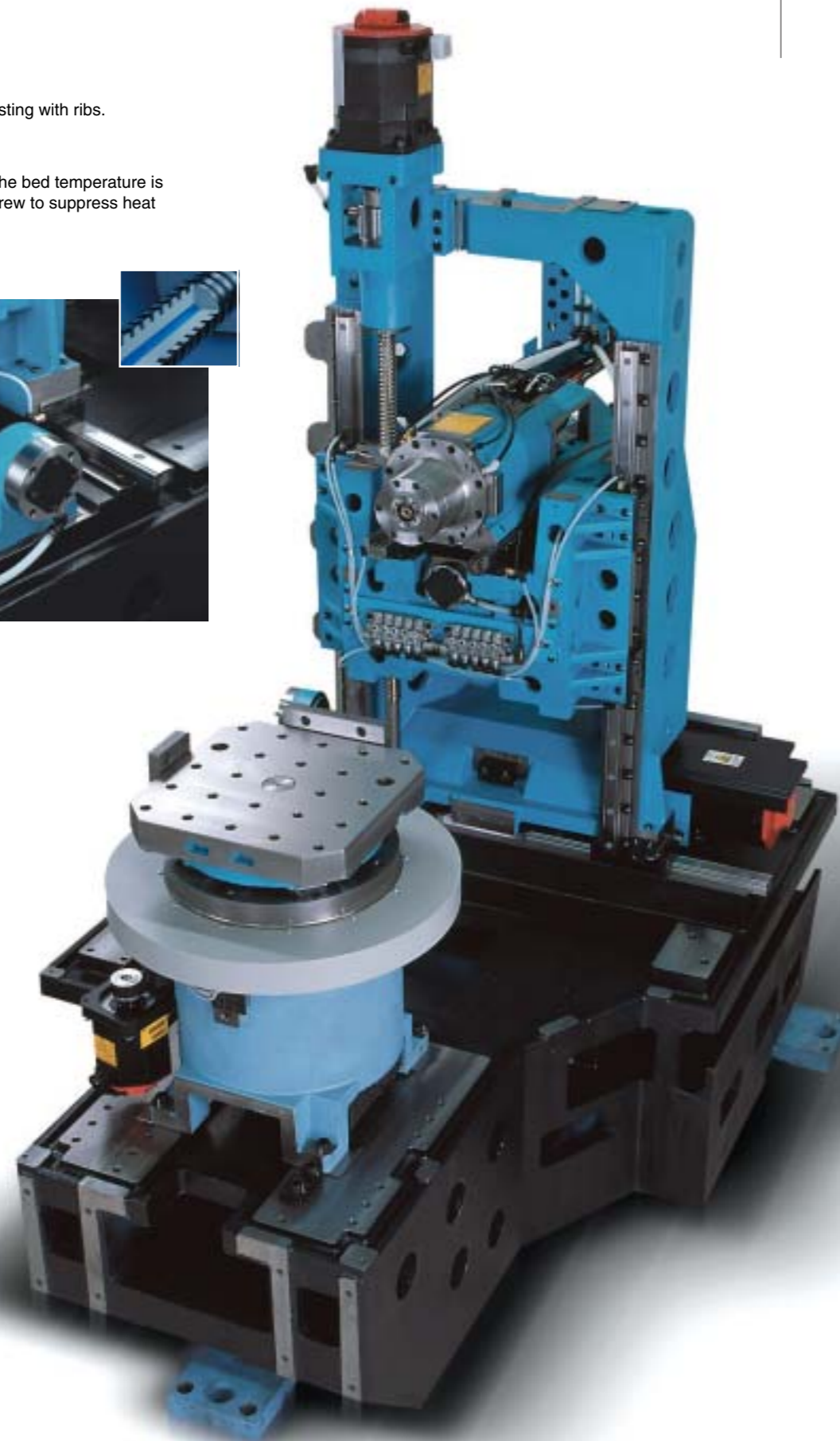
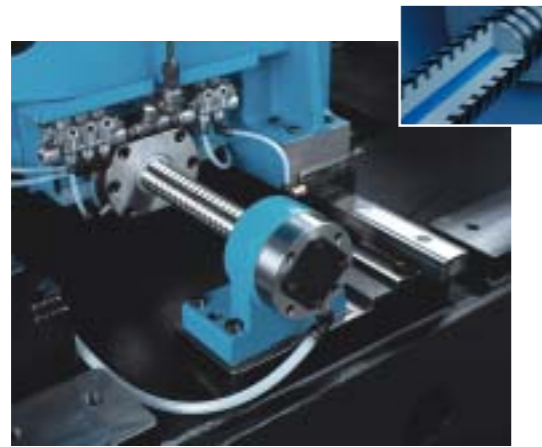
Machine structure for High Speed and High Acceleration

Bed

High rigidity with thick casting with ribs.

Ball screw

Cooling oil controlled to the bed temperature is circulated into the ball screw to suppress heat generation.



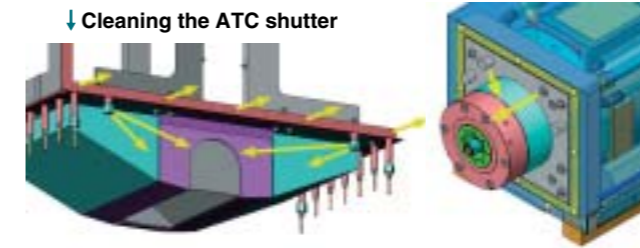
Chip Disposal that Maintains High Quality

Spindle protection from chip entry

Before ATC operation

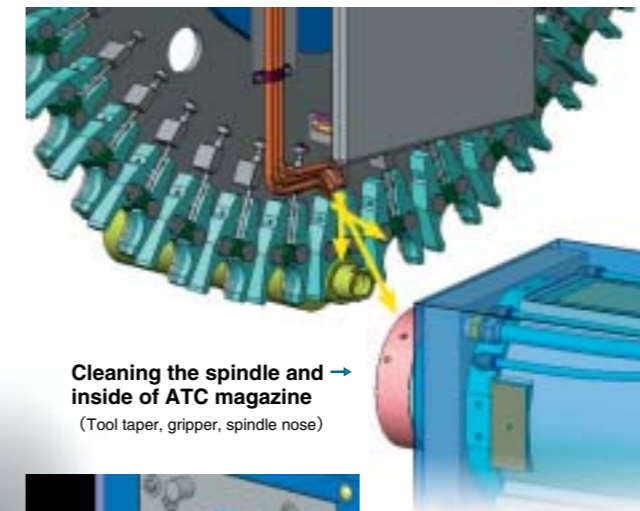
No chips remain at the top of spindle head.

↓ Cleaning the top of spindle head

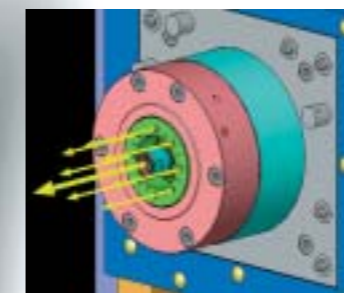


During ATC operation

No chips remain on the face spindle and tool holder.



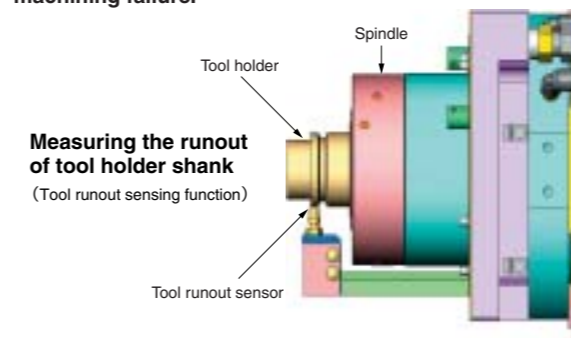
Cleaning the spindle and inside of ATC magazine
(Tool taper, gripper, spindle nose)



← Blowing the tool holder taper part with air
(Spindle taper cleaning air)

After ATC operation

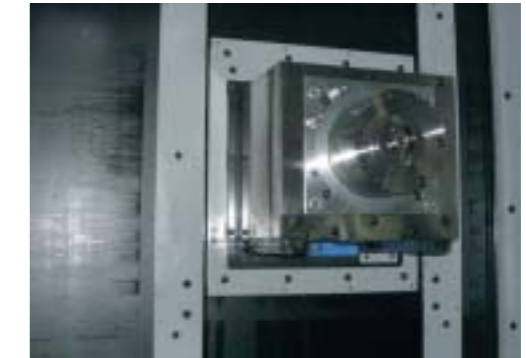
If chips entered, the machine stops by alarm to avoid a machining failure.



Measuring the runout of tool holder shank
(Tool runout sensing function)

Structure to discharge chips easily

Machining chamber slide cover
Cover selection is available based on the type of chips and material.



Winding type

Aluminum / Wet machining (standard accessory for J3)



Telescopic type

Cast iron/Steel machining (standard accessory for J3R)

Center trough design



Various types of coolants (spindle nozzle, overhead shower, trough, oil pan shower) immediately dispose of much chips generated in the machining chamber.

Max. tilt angle 52 degrees



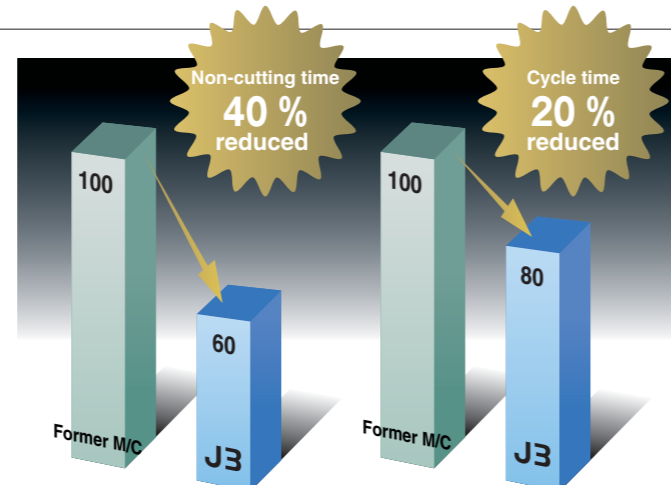
※The above model includes special option specifications.

Quick Motion Reduces the machining Time and Increases Productivity

High speed and high acceleration

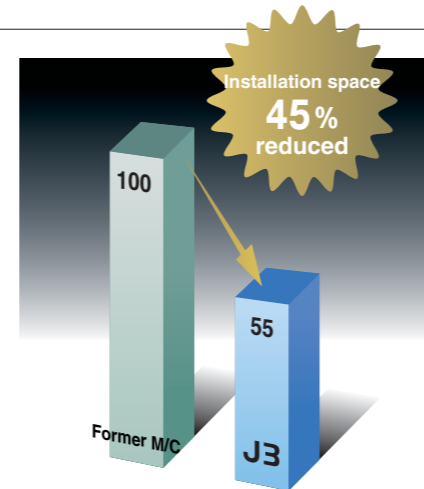
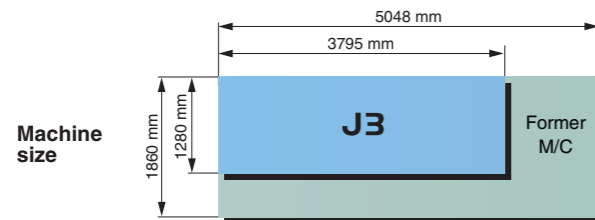
Remarkable improvement in response reduces the time.

Rapid traverse acceleration	X axis : 10.8 m/s ² (1.1 G) Y axis : 12.7 m/s ² (1.3 G) Z axis : 19.6 m/s ² (2.0 G)
Rapid traverse rate	60 m/min
Cutting feed rate	50 m/min
Tool change time	2.5 sec (chip-to-chip)

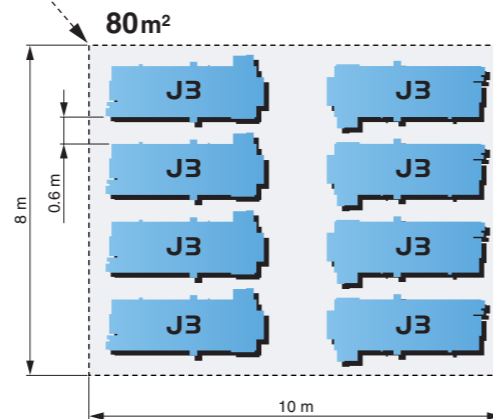
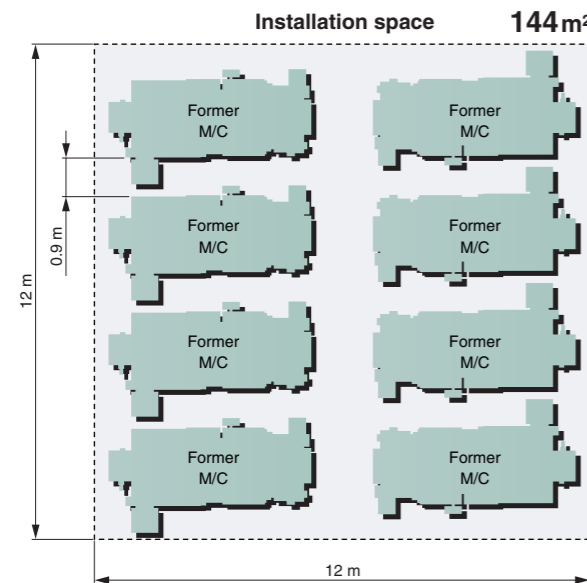


※Example of ABS valve body machining

Space saving



※Example of ABS valve body machining



Productivity

Production capacity doubled without expanding the installation space

Items	Former M/C (8 units)	J3 (8 units)	Effect
Production capacity (pieces/year)	102000 (100%)	122000 (120%)	Time reduction ⇒ Capacity 20% UP
Required installation space (m ²)	149 (100%)	82 (55%)	Compact machine ⇒ Installation space 45% reduced
Space productivity* (capacity/m ²)	685 (100%)	1488 (217%)	Time reduction + Compact machine ⇒ Space productivity 2.2 times

Space productivity **2.2 times**

※Production capacity per unit area

Environment and Operator Friendly Design

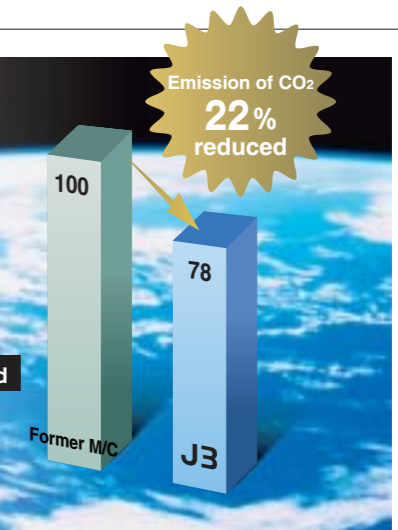
Reduction of CO₂

Reduction of machining time by high speed and high acceleration unit

Central pump system for coolant (nozzle, overhead shower, base coolant)

Lift-up chip conveyor starts when the spindle rotates and the coolant is used

Automatic power shutoff function



Operator-Friendly



Easy for operation

A swing type operation panel is useful for operator to access from the machine front easily.



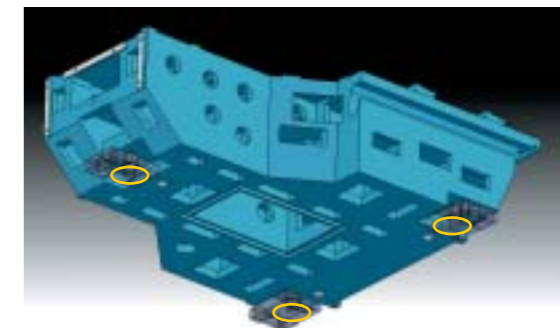
Quick spindle replacement

If the spindle replacement is required, it is easily pulled out with unique mechanism. It is minimizing machine downtime.



Good accessibility to the spindle

The spindle moves toward the operator, thus allowing the operator to check the tool and workpiece without entering the machining chamber.



Easy machine installation

Three-point support system does not require the level maintenance and enables the factory layout change easily.

※The above model includes special option specifications.

Highly Rigid machine structure Offers High Cutting Performance



Case 1

High power spindle
 Material ———— Aluminum (A5052)
 Tool used ———— 125 mm dia. face mill
 Spindle speed ——— 12000 min⁻¹
 Metal removal rate — 2400 cm³/min



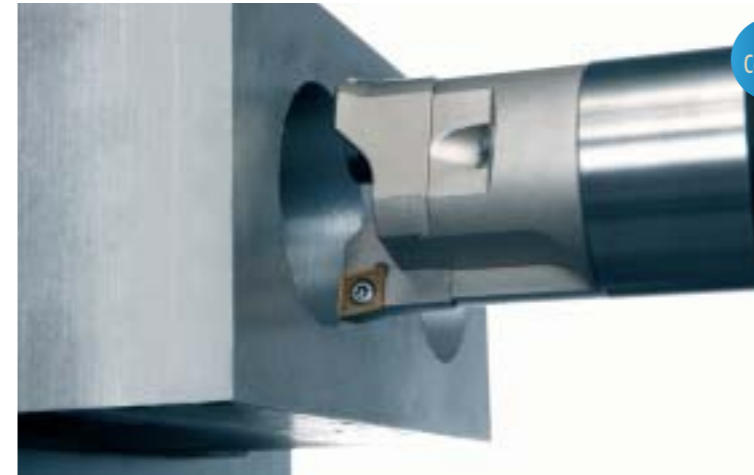
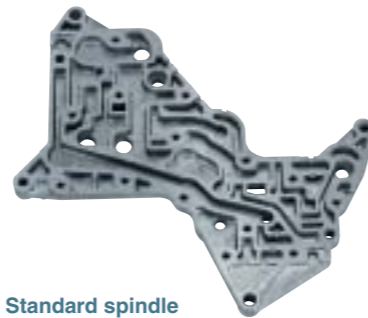
Case 5

High power spindle
 Material ———— Aluminum (A5052)
 Tool used ———— 51 mm dia. insert drill
 Spindle speed ——— 2700 min⁻¹
 Metal removal rate — 662 cm³/min



Case 2

High power spindle
 Material ———— Cast iron (FC250)
 Tool used ———— 80 mm dia. face mill
 Spindle speed ——— 7960 min⁻¹
 Metal removal rate — 645 cm³/min



Case 6

High torque spindle
 Material ———— Cast iron (FC250)
 Tool used ———— 80 mm dia. counter boring
 Spindle speed ——— 597 min⁻¹
 Prepared hole ——— 68 mm Dia.

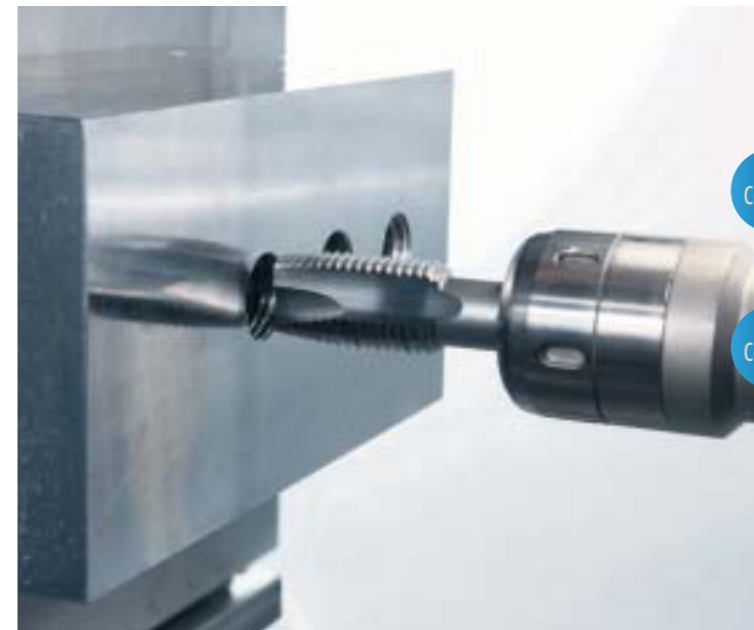


Case 3

Standard spindle
 Material ———— Aluminum (A5052)
 Tool used ———— 16 mm dia. endmill
 Spindle speed ——— 16000 min⁻¹
 Metal removal rate — 1400 cm³/min

Case 4

High torque spindle
 Material ———— Ductile cast iron (FCD500)
 Tool used ———— 20 mm dia. endmill
 Spindle speed ——— 1600 min⁻¹
 Metal removal rate — 230 cm³/min



Case 7

High power spindle
 Material ———— Aluminum (A5052)
 Tool used ———— M36-4 tap
 Spindle speed ——— 221 min⁻¹

Case 8

High torque spindle
 Material ———— Steel (S45C)
 Tool used ———— M27-3 tap
 Spindle speed ——— 118 min⁻¹



Standalone System

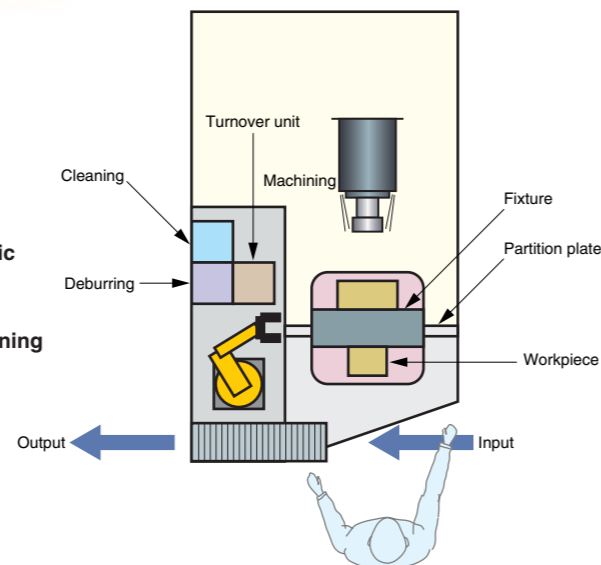
● Example of built-in robot (standard accessory for J3i)



J3i with built-in robot

**Space-saving
Clean
Low cost**

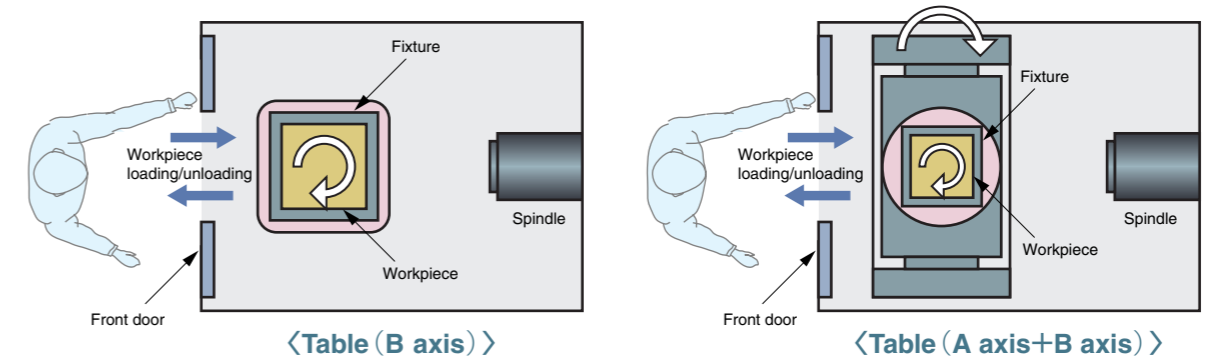
ALL-IN-ONE system including automatic loading/unloading of workpiece between processes and processes other than machining such as a deburring and a cleaning



Workpiece Loading/Unloading Variations

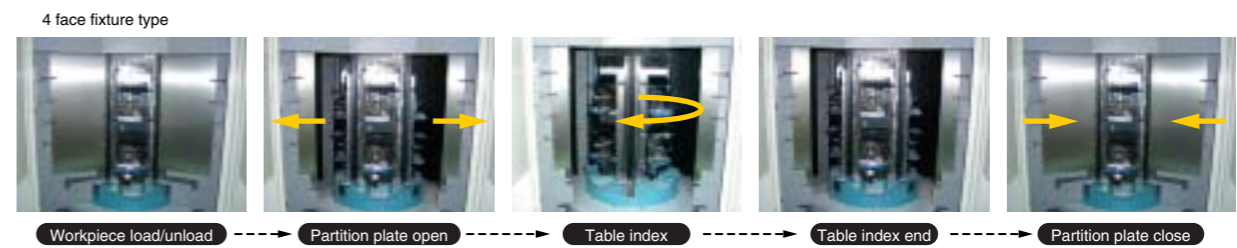
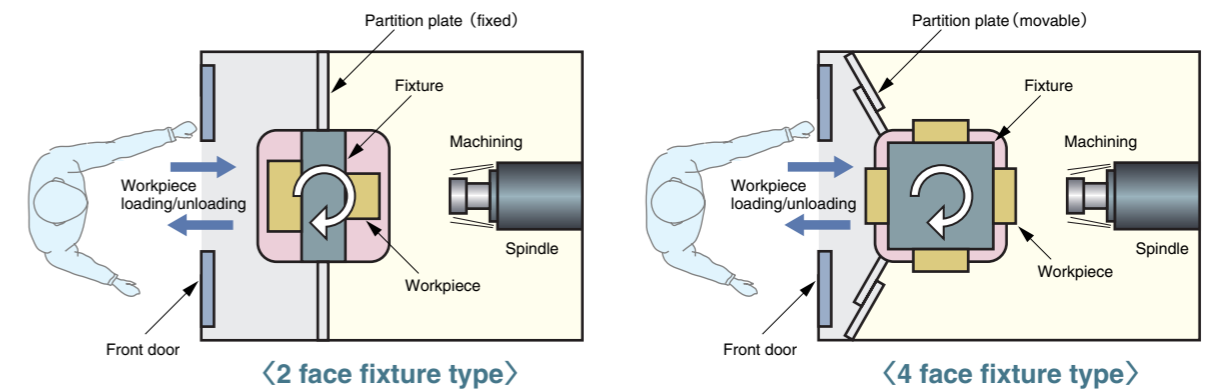
● Single table

- Suitable for a multiple-face machining in one process



● Single table / Load/Unload during machining*

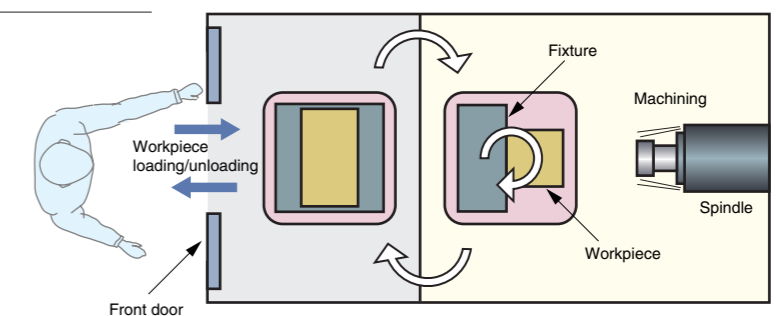
- The workpieces are changed by rotating the table (B axis) in a short time to realize the productivity equivalent to the pallet changer.
- Suitable for a production line in process dispersion



*Setup method that allows the workpiece to be loaded/unloaded during machining by installing the partition plate in the machining chamber.

● 2-pallet / Pallet changer

- Suitable for a production line in process integration

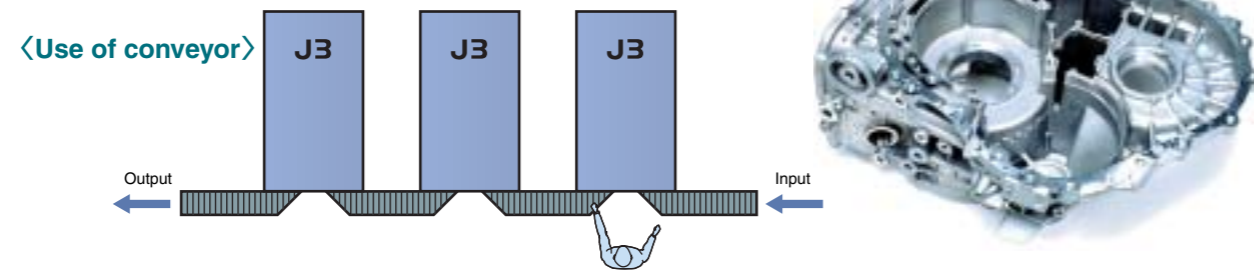


*The above model includes special option specifications.

Workpiece Transfer System Variations

Manual transfer

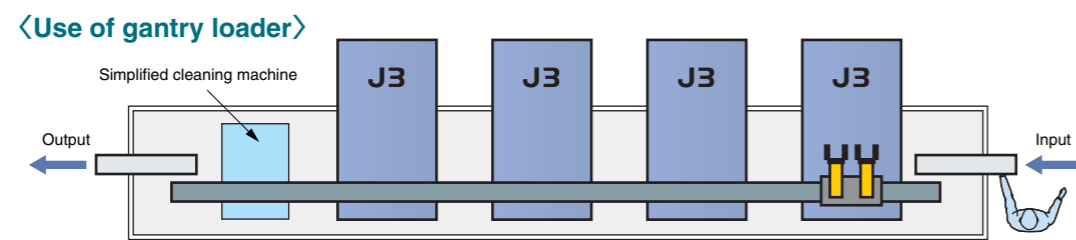
For rather light workpieces which will not burden the operator, they are transferred between machines using a conveyor.



Manual transfer (conveyor)

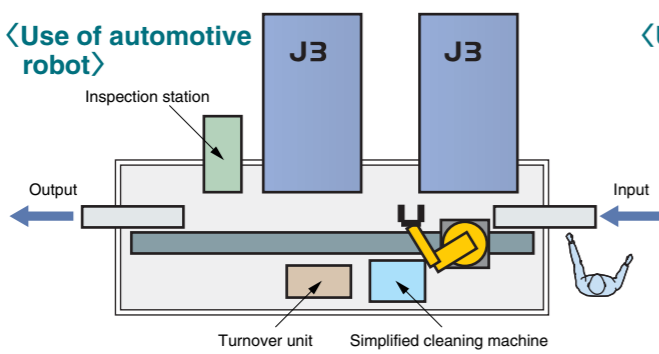
Automatic transfer

For large and heavy workpieces which will not be moved by the operator, or for an unmanned operation, they are automatically transferred between machines using a gantry loader or robot.

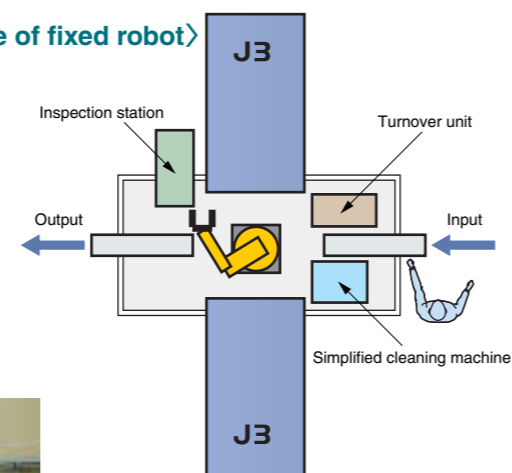


Automatic transfer (gantry loader)

<Use of automotive robot>



<Use of fixed robot>



Automatic transfer (automotive robot)



*The above model includes special option specifications.

Machine Specifications (● : Standard, ○ : Optional, — : None)

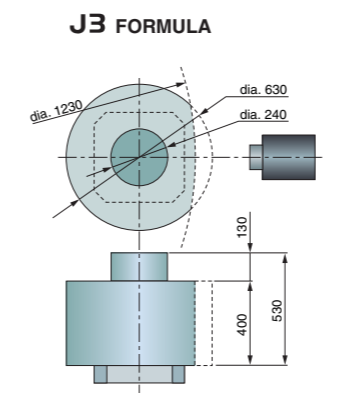
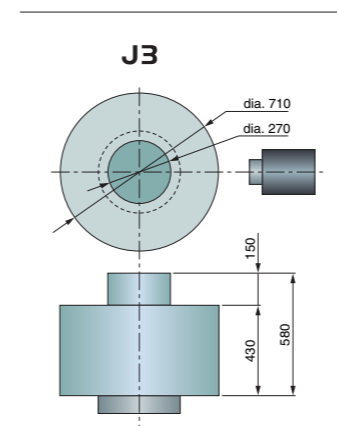
			J3	J3 FORMULA	J3R	J3i	
Spindle	Standard spindle	HSK-A50 16000 min ⁻¹	●	●	○	●	
	High power spindle	HSK-A50 12000 min ⁻¹	○	○	○	○	
	High torque spindle	HSK-A50 8000 min ⁻¹	○	○	●	○	
Feed axes	Travel (X×Y×Z axes)	400 × 400 × 400 mm	●	●	●	●	
		630 × 400 × 400 mm	○	○	—	—	
		630 × 500 × 400 mm ^{※1}	○	—	—	—	
		800 × 400 × 400 mm	○	—	—	—	
	Machining chamber slide cover (telescopic type)		—	—	●	—	
Grease supply	Manual		●	●	●	●	
	Automatic		○	○	○	○	
Table / Pallet	Table working surface size	dia. 400 mm / 400 mm x 400 mm	○	—	○	○	
	Pallet working surface size	400 mm x 400 mm	○	●	○	—	
	Minimum indexing angle	1°	○	●	○	○	
		0.001°	○	○	○	—	
Pallet changer		○	●	○	—		
Automatic tool change (ATC)	Tool storage capacity	Upper armless ATC 15 tools	●	○	●	○	
		Upper armless ATC 30 tools	○	●	○	●	
		Upper armless ATC 26 / 27 / 28 tools ^{※2}	○	○	○	○	
		Side armless ATC 40 tools	○	—	—	—	
	Rack ATC		○	—	—	—	
Coolant unit	Coolant unit	Tank capacity 600L for aluminum workpieces Lift-up chip conveyor Secondary filtration unit cyclone filter	○	●	○	○	
		Tank capacity 600L for cast iron and steel workpieces Lift-up chip conveyor Secondary filtration unit cyclone filter (with magnet)	○	○	○	○	
		Magnetic separator	○	○	○	○	
		Oil skimmer	○	○	○	○	
	Coolant supply	Through-spindle coolant & through-spindle air	1.5 MPa	○	●	○	○
			3.0 MPa	○	○	○	○
			7.0 MPa	○	○	○	○
		Spindle nozzle, overhead shower, trough, oil pan shower coolant		○	●	○	○
		Fixture washing coolant		○	○	○	○
		Workpiece washing gun		○	○	○	○
High pressure MQL supporting type		—	—	○	—		
Coolant mist collection	Mist collector		○	○	○	○	
Workpiece quality control	Temperature controller	Spindle cooling temperature controller	●	●	●	●	
		Coolant temperature controller	○	○	○	○	
	Measuring devices	Broken tool sensor (ATC side)	○	○	○	○	
		Tool runout sensor	○	○	○	○	
		Automatic workpiece measuring device	○	○	○	○	
Scale feedback (X, Y, Z axes)		○	○	○	○		
Splashguard	Totally-enclosed splashguard with front door & right door (manual)		○	●	○	—	
	Front door automatic open/close function		○	○	○	—	
	Setup during machining		○	—	○	○	
	Built-in robot supporting splashguard		—	—	—	●	
Hydraulic/air pressure supply to fixture	12-port rotary joint		○	—	○	○	
	CPH (9+9 ports)		○	○	—	—	
Others	Built-in robot system / Automated equipment area		—	—	—	●	
	Deburring unit / Cleaning unit / Workpiece turnover unit		—	—	—	○	

※1 : Only for the machine with side armless ATC ※2 : Combination magazine

Machine Technical Data

		J3	J3 FORMULA	J3R	J3i
Spindle	Spindle speed	Standard spindle 16000 min ⁻¹		High torque spindle 8000 min ⁻¹	Standard spindle 16000 min ⁻¹
	Spindle power or spindle torque	Max. power 15 kW		Max. torque 81 N·m	Max. power 15 kW
	Type of spindle nose	HSK-A50			
	Spindle startup time	0.6sec ±10% 16000 min ⁻¹		0.5sec ±10% 8000 min ⁻¹	0.6sec ±10% 16000 min ⁻¹
Feed axes	Travel (X×Y×Z axes)	400 × 400 × 400 mm			
	Rapid traverse rate	60000 mm/min			
	Cutting feed rate	50000 mm/min			
	Max. acceleration	Xaxis	10.8 m/s ² (1.1 G)		
		Yaxis	12.7 m/s ² (1.3 G)		
		Zaxis	19.6 m/s ² (2.0 G)		
Positioning accuracy	±0.004 mm (without scale)				
Automatic tool change (ATC)	Tool storage capacity	15 tools	30 tools	15 tools	30 tools
	Max. tool diameter	80 mm dia.			
	Max. tool length	310 mm			
	Max. tool mass	5 kg			
Tool change time (chip-to-chip)	2.5 sec (ATC 15-tool type)				
Machine size	Machine height	2300 mm	2700 mm	2300 mm	2700 mm
	Floor to table surface height	1020 mm			
	Required floor space (W×D)	1280 × 3795 mm	1280 × 4515 mm	1280 × 3795 mm	1545 × 4040 mm
	Level	3-point support			

Workpiece limitation (mm)



Front view / Side view / Floor plan (mm)

