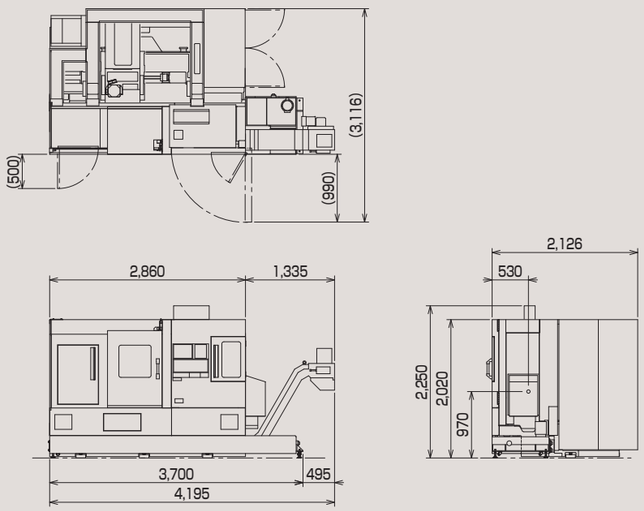
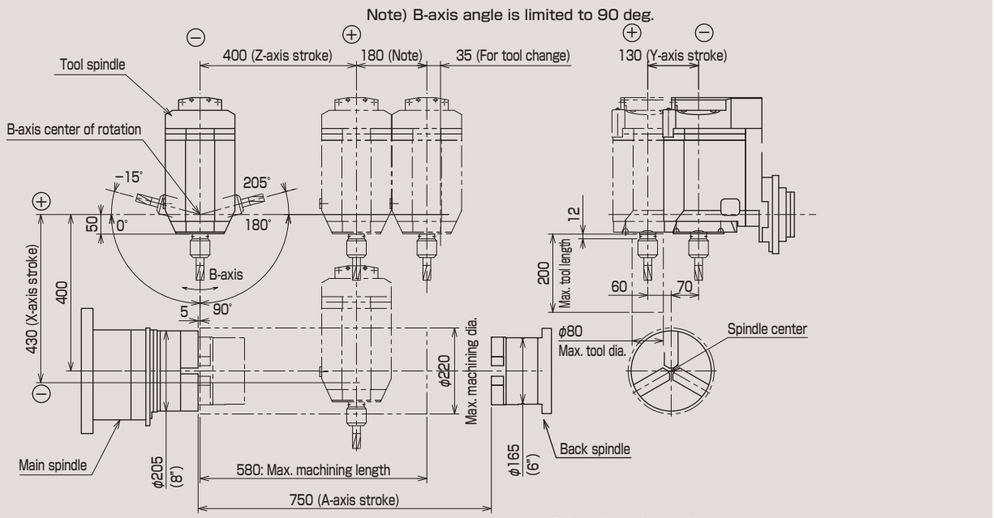
Appearance



Tooling zone



* 3-jaw chuck is optional.

Export permission by the Japanese Government may be required for exporting our products in accordance with the Foreign Exchange and Foreign Trade Law. Please contact our sales office before exporting our products.

The specifications of this catalogue are subject to change without prior notice.

TSUGAMI CORPORATION

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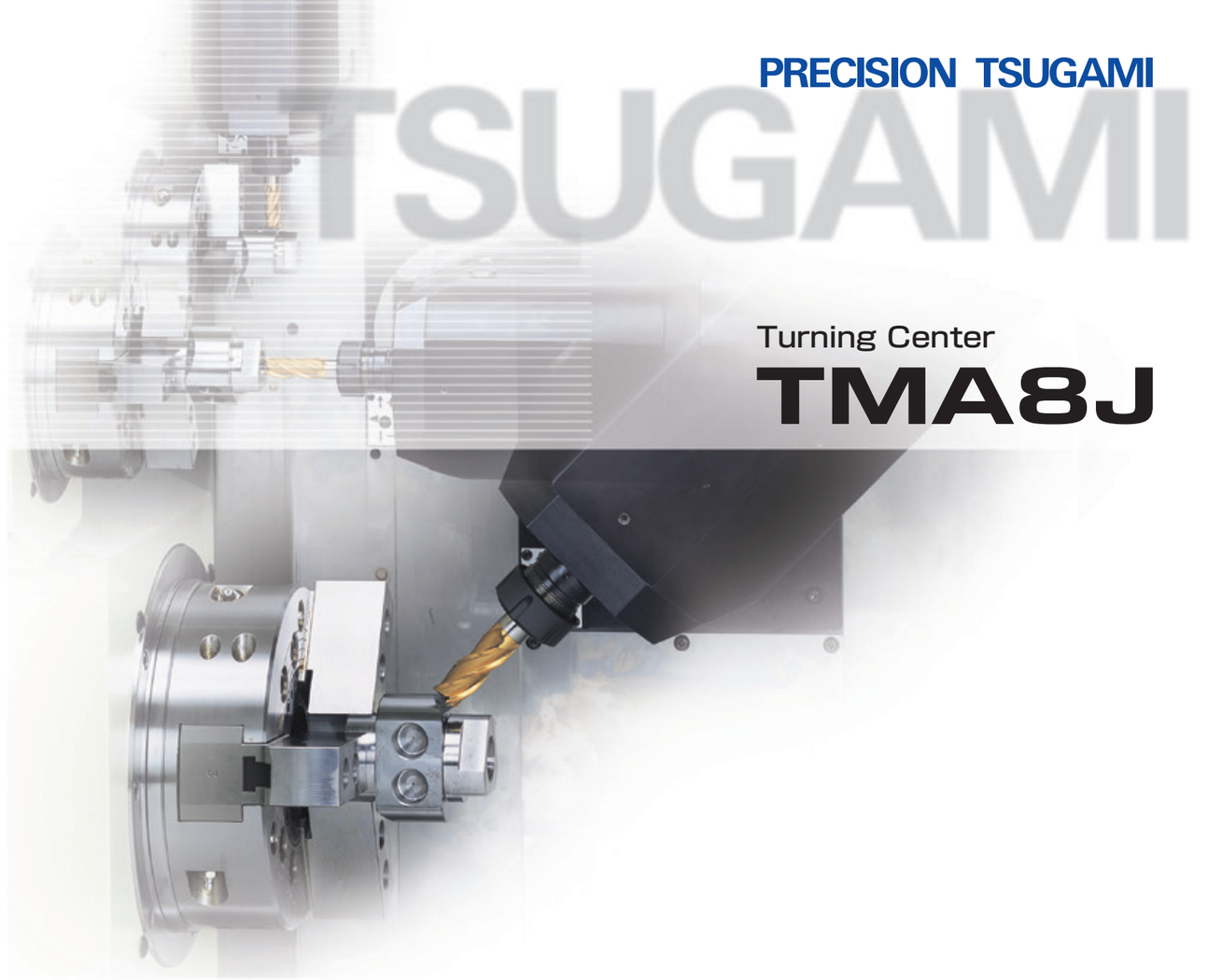
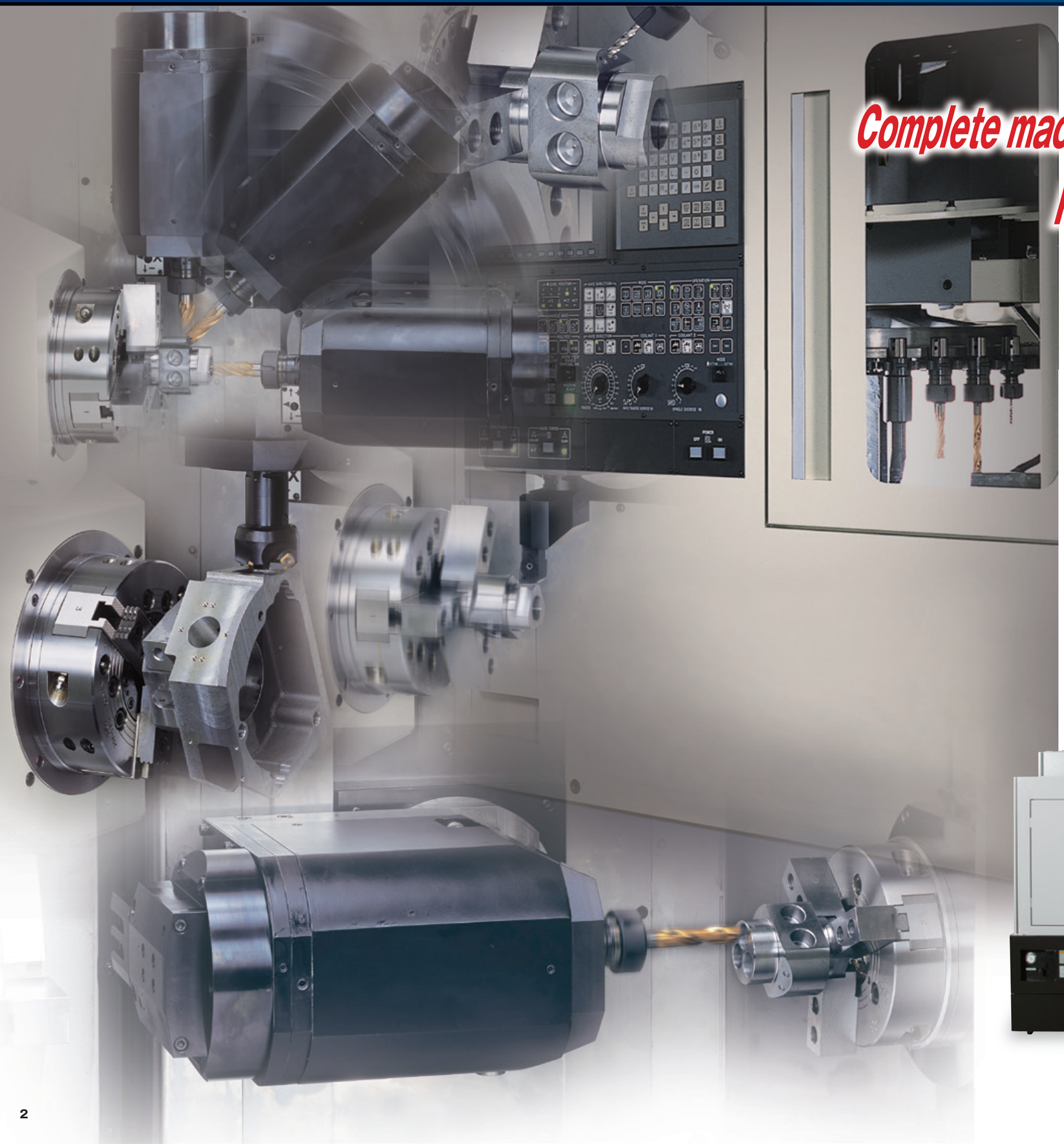
PRECISION TSUGAMI



Turning Center

TMA8J

Complete machining performed by single machine
Turning center with excellent cost performance

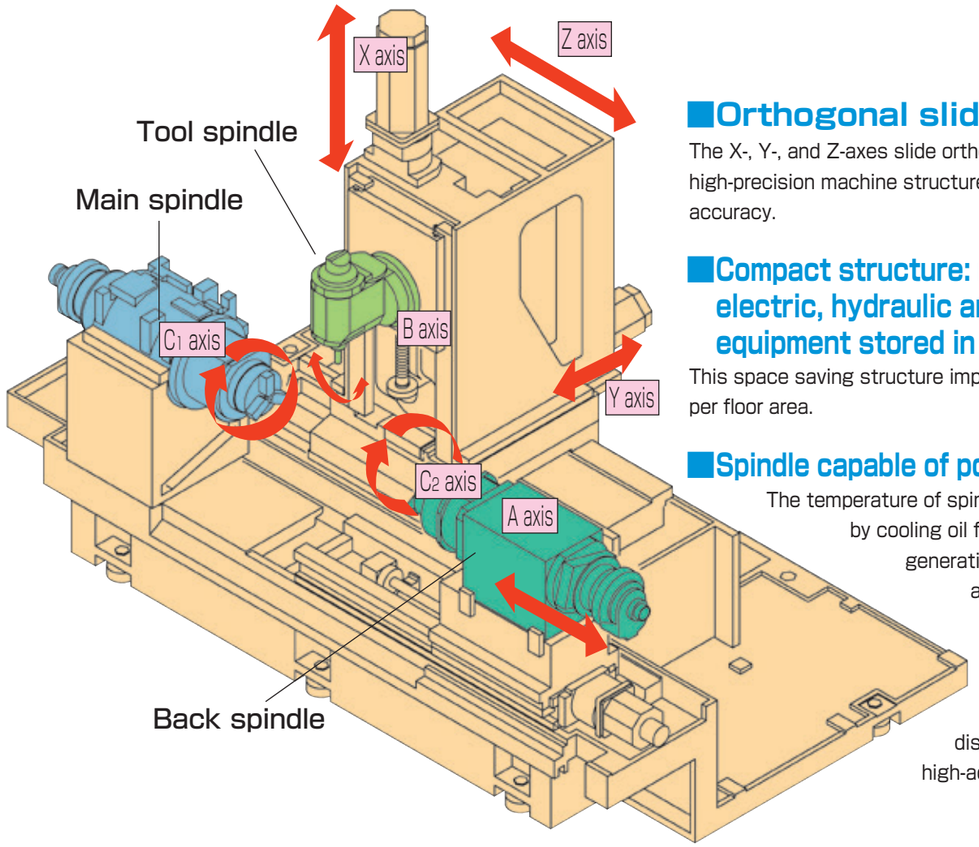


Complete machining performed by single machine Realizes high-performance milling at overwhelming cost performance.

Specifications

Max. spindle speed	5,000 min^{-1}
Max. main spindle torque	210 Nm
Max. back spindle torque	131 Nm
Rapid traverse rate	X axis: 30 m/min, Y axis: 24 m/min, Z axis: 40 m/min
ATC	0.8 sec (tool to tool)

Basic structure enables complex machining



■Orthogonal slide structure

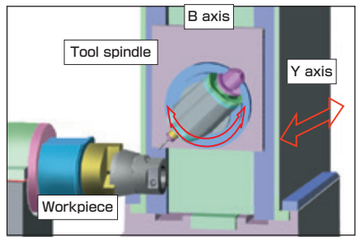
The X-, Y-, and Z-axes slide orthogonally to reflect high-precision machine structure into machining accuracy.

■Compact structure: mechanical, electric, hydraulic and pneumatic equipment stored in the main body

This space saving structure improves productivity per floor area.

■Spindle capable of powerful cutting

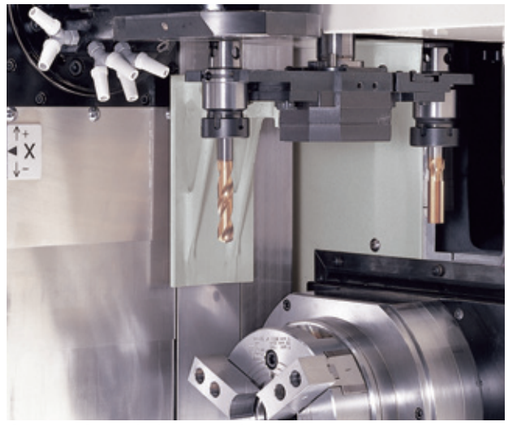
The temperature of spindle unit is controlled by cooling oil for prevention of heat generation from the bearings and the built-in motor. The thermally symmetrical structure also minimizes thermal displacement to ensure high-accuracy machining in long term.



◇ The B axis can index in 0.001 deg step in the range of +/-105 deg and is capable of angular machining.
◇ B-axis indexing realize high-precision and rigid indexing by adopting 3-piece coupling. (When indexing in every 5 deg only)
◇ Off-center milling is realized by the Y-axis control with 130 mm stroke.

■Tool spindle with standard Y-axis control and B-axis index

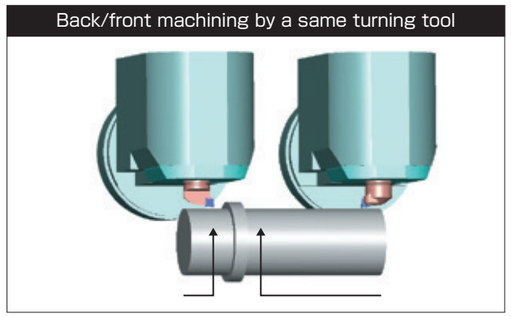
Single tool spindle structure that allows turning tools and milling tools to fit in the same tool spindle bore achieves powerful cutting without any tool interference.
In addition, not only horizontal front face machining but also angular machining can be performed by the Y-axis control and B-axis index that can implement the swivel positioning in 0.001 deg step in the range of +/- 105 deg.
The dual contact tool holder held by bore taper and end face of the tool spindle can perform powerful high-accuracy turning.
Employment of a 5.5-kW powerful built-in motor performs milling as powerful as a machining center from low speed to high speed.



Automatic tool change unit

Tool magazine

Back/front machining by a same turning tool



Multi turning holder to index in 4 positions

The tool can be indexed at fixed positions in 90 deg steps (4 positions) and tools can be used efficiently.

■High-speed tool change unit as standard

The cam driven tool change unit performs the tool-to-tool change at 0.8 sec.

■Tool magazine settable from the machine front

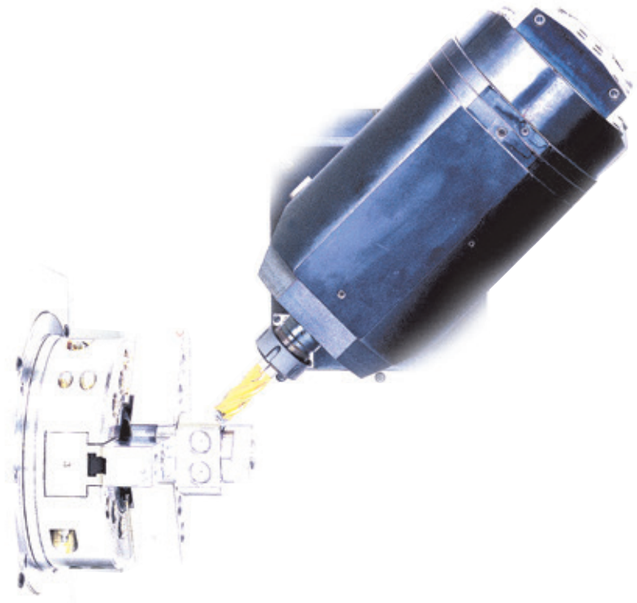
The standard 30-tool (optional 60-tool) magazine is on the machine front so that operator can easily change and monitor tools.

■Tool spindle indexing function

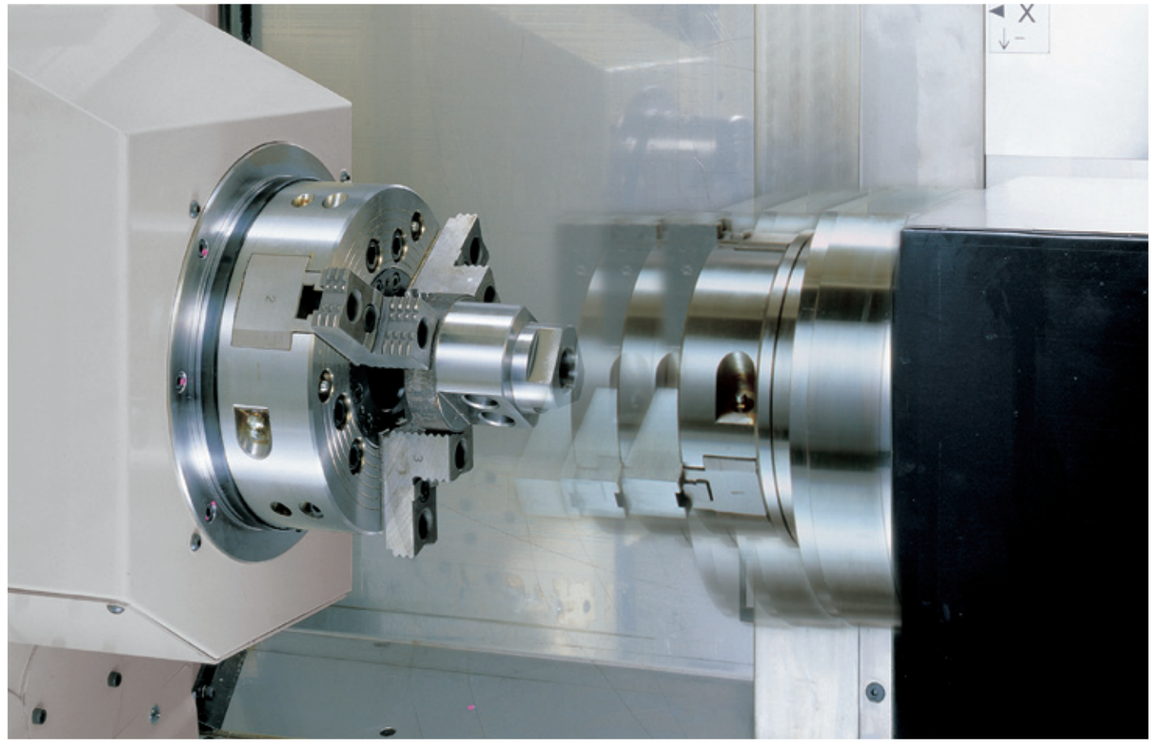
The unique 90° indexable tool spindle can reduce the number of tools and shorten the tool change time by using a multi turning holder with four turning tools or can turn back and front faces by a same tool.

■Interference prevention function

Interference prevention function prevents the interference between the back spindle and the tool spindle.



Flexible response to systematization



■Back spindle achieves 6-face machining.

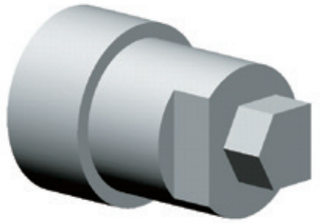
C-axis function is provided as standard to the back spindle, and workpiece external surface and end face of the back spindle side can be machined in every 0.001 deg.
Workpiece transfer from the main spindle to the back spindle during rotation is accurately performed by the synchronous spindle control.

■Connection of bar feeder for long unmanned operation

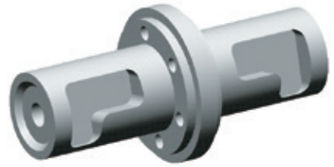
Up to ϕ65 mm of bar stock is available. Optional collet chuck realize accurate clamping and correspond to the machining of non-round workpieces.

Process integration by various operations

■ Machining models



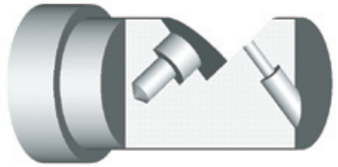
End milling & vertical traverse milling



Peripheral milling

Cylindrical grooving & cam machining

Off-center drilling

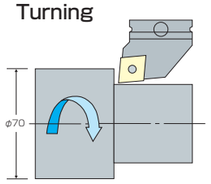


Angular milling & angular drilling

Hobbing & cam machining

■ Machining capability

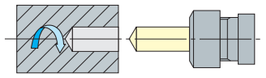
Turning



	Cutting section area (mm²)
Main spindle	3.0
Back spindle	1.5

Workpiece material: S45C

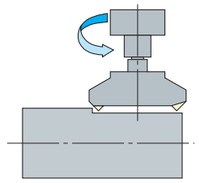
Drilling



	Drilling dia. (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
Main spindle	ϕ30	0.25	1,060
Back spindle	ϕ20	0.25	1,600

Workpiece material: S45C

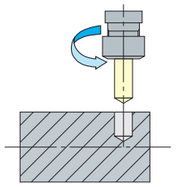
Milling (tool spindle)



Cutter dia. (mm)	Width of cut (mm)	Depth of cut (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
ϕ50 (4-blade cutter)	40	3	0.6	800

Workpiece material: S45C

Drilling (tool spindle)

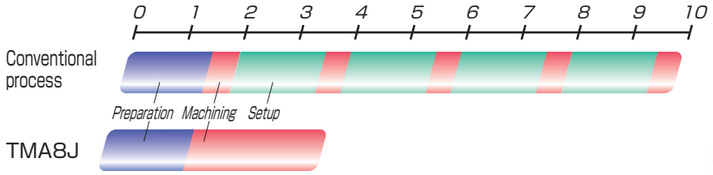


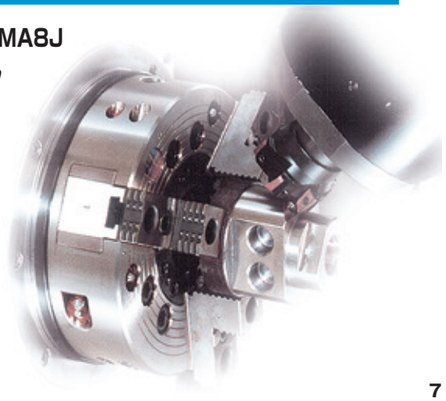
Drilling dia. (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
ϕ20	0.2	1,600

Workpiece material: S45C

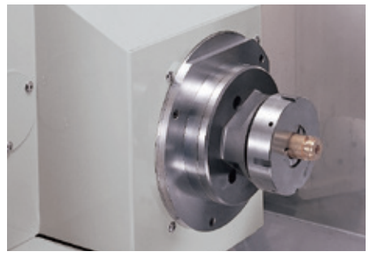
■ Process integration

Comparison of productivity between conventional process and TMA8J



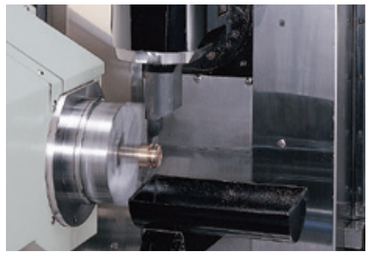


Convinced system built with abundant options



■Collet chuck units
Various collet chuck units appropriate for holding bar workpieces are prepared.

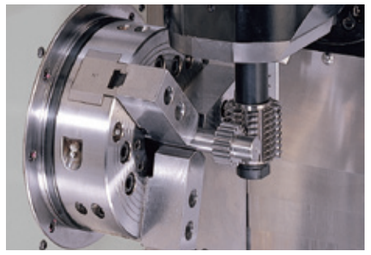
■60-tool magazine
Corresponding to long operation for multi kinds of workpieces



■Work catcher
Machined workpieces up to ϕ65 mm x 250 mm x 5 kg are discharged into a storage box in front of the machine body.

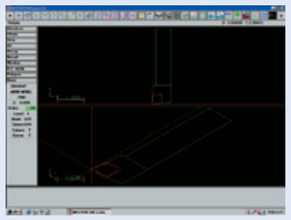
■Oil mist collector
The oil mist collector collects oil mist and prevent your factory environment from deteriorating. Central control is also possible.

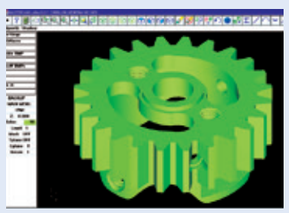
■Coolant through tool spindle
Maximum 7-MPa high-pressure coolant can be discharged to a tool nose from an optional high-pressure coolant system.



■Hobbing specifications
Gear cutting is ensured.

3D automatic programming (Option)





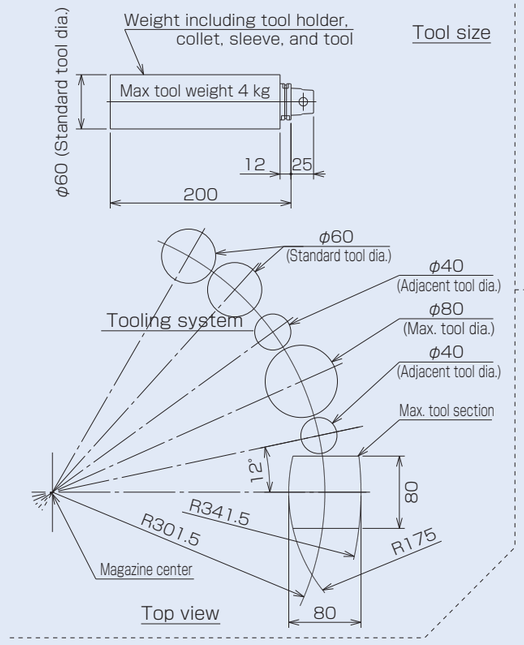
■Advanced complex functions including turning/drilling/milling

Turning: Contouring, roughing, grooving, & boring
Machining paths checkable on the workpiece shape display
Hole making: Drilling, tapping, reaming, boring & machining using C and Y axes
Milling: Pocketing, grooving, and 2D/3D contouring

■Visual worry-free function on 3D display
Capable of checking the machining area and tool interference on 3D display and zooming or rotating a hidden part to check figures in details.

■Easy CAM function to create NC programs from CAD
High-operability and high-performance are assured by comprehensive PC-based CAD/CAM (design, edit, & NC programming) to create NC programs from products drawings made by CAD.

Tooling system



These are dedicated holders for TMA8, TMA8-Ⅱ, TMA8-Ⅲ and TMA8J.
Be sure the other holders cannot be used.

Machine specifications

Item		TMA8J
Capability	Max machining diameter	220 mm
	Max. barstock diameter (Note 1)	65 mm
	Max machining length	580 mm
Stroke	X axis	430 mm
	Y axis	130 mm (+60/-70 mm)
	Z axis	580 mm + 35 mm (Note 2)
Main spindle	Max. spindle speed	5,000 min^{-1}
	Spindle end face	JIS A2-6
	C1-axis least index angle	0.001°
	Chuck size	8 inch
	Motor output	15/11 kW
Back spindle	Max. spindle speed	5,000 min^{-1}
	Spindle end face	ϕ140 mm flat
	C2-axis least index angle	0.001°
	Chuck size	6 inch
	Motor output	11/5.5 kW
	Stroke	750 mm
	Rapid traverse rate	30,000 mm/min
Tool spindle	Type of spindle	Single tool spindle with ATC
	Motor output	5.5/2.2 kW
	B-axis index angle	-15° to 195°
	B-axis least index angle	0.001° (positioning)
	B-axis index angle by coupling	5°
	Tool spindle indexing angle/position	90°/4 positions
	Max. tool spindle speed	10,000 min^{-1}
Automatic tool changer	Tool shank configuration	KM40XTS (KENNAMETAL for TSUGAMI)
	Tool storage capacity	30 tools
Rapid traverse rate	X axis	30,000 mm/min
	Y axis	24,000 mm/min
	Z axis	40,000 mm/min
	C axis	300 min^{-1}
Machine size	Machine height	2,250 mm
	Floor requirements	3,700 mm x 2,126 mm
	Machine weight	8,500 kg

Note 1) Bar stock operation capability may be limited depending on the chuck or the related devices.
Note 2) 35 mm is the stroke for changing tools. Among 580 mm of Z-axis stroke, the last 180 mm is limited with 90° of B-axis angle.

Options

■High-performance system	60-tool magazine	
■Automation & unmanned operation system	Tool checker	
	Bar feeder interface	
	Work catcher	
	Workpiece ejector	
■Chip disposal system	Chip conveyor	Selectable from two types (floor type and scraper type).
	Chip carrier	
■Coolant system	Coolant through tool spindle	
	High-pressure coolant system	
	Mist collector	
	Oil skimmer	
■Workpiece chucking	3-jaw chuck unit	For the main and back spindles
	Collet chuck unit	For the main and back spindles
	Chucking pressure change (two automatic shifts)	Available for the main and back spindles.
	Chuck foot switch	
■Safety	Automatic fire extinguisher	
	Automatic power shutdown	
■Others	Coromant Capt spec.	Tool spindle and tool magazine for Capt C4 holder
	Signal indicator	

NC specifications

Item	Specifications
NC unit	FANUC Oi-TF
Display unit	10.4" color LCD
Controllable axes	6 axes (Simultaneously controllable axes:4 axes)
Interpolation function	Linear interpolation, circular interpolation, polar coordinate interpolation, cylindrical interpolation, threading
Part program storage size	1 Mbyte
Number of registerable programs	800
Edit function	Background editing, programmable data input
Operation control	Run time & parts number display
Tape code	Automatic recognition of EIA/ISO
Command method	Standard: G code system A
Least input increment	0.001 mm 0.001°
Max. programmable value	±99999.999 mm/(±8 digits)
Program command	Workpiece coordinate system (G52 to G59), machine coordinate system, 3-dimensional coordinate conversion
Canned cycle	Canned cycle, multiple repetitive cycle, canned cycle for drilling
Spindle control	Direct command of S 5-digit, 0 - 120% override per 10%, constant surface speed control, main/back-spindle synchronization, Cs contour control, rigid tapping
Tool offset	Tool geometry offset and tool wear offset, cutter and tool nose radius compensation
Number of tool offsets	128
Tool function	T 5-digit (Upper 2 digits: Tool number, Lower 3 digits: Offset number), tool life management
Feed type	Rapid traverse, cutting feed (per revolution, per minute, cutting feedrate clamp), override (cutting feed, rapid feed)
Manual operation	JOG feed, handle feed, reference position return
Data input/output interface	Memory card, USB memory, RS232C
Operation function	Automatic operation, MDI operation, single block, feed hold, optional block skip, dry run
Safety function	Abnormal load detection, stored stroke limit

NC options

Part program storage size	2Mbyte
Number of tool offsets	200
Helical interpolation	Machining of a large-diameter thread and a solid cam is available by helically moving a tool.
Addition of optional block skip	The block with a code "/2 to /9" is neglected by a switch.
AI contour control	High-speed and accurate machining enabled by look-ahead function

Torque characteristics