Shibaura Machine

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ISO 9001

GOTEMBA plant

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* We reserve the right to change any of specifications in this catalog without notice in order to effect improvements.

URL : https://www.shibaura-machine.co.jp

SM19095-1100-SZ
Printed in Japan

MPF series

Shibaura Machine

MPF series

Double Column Type Machining Center

MPF00157-CED-04

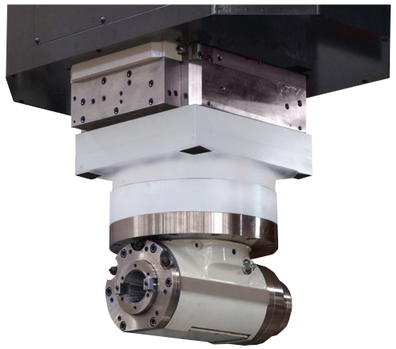
MPF-FSseries

Elevating crossrail type

There is a sister seires of MPF-F on which crossrail is fixed and has no elevation movement.

Angle Head (Option)

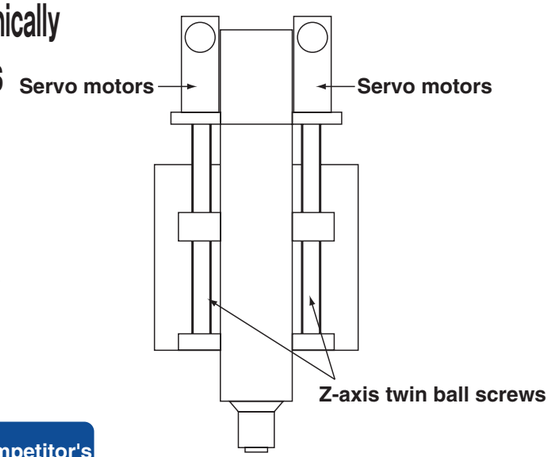
The optional angle head extend machining capability on the MPF series machine to five-side on a workpiece in order to increase machining efficiency on her.
The machine is able to work on four-side of workpiece with the optional angle head, in addition to work on top face with the standard snout, in single set-up.



Maximum power : 3kW at 100 min^{-1}
Maximum torque : 286N·m(29kgf·m)
Maximum speed : 2 000min^{-1}
Tool change : AATC
(An optional special tool changer with AATC feature is required)
Allow AAI : at every 90 positions

Double column type machining center best suited for high-speed and high efficiency machining operations.

Development and design to be integrated both mechanically and electrically for diversified machining technologies



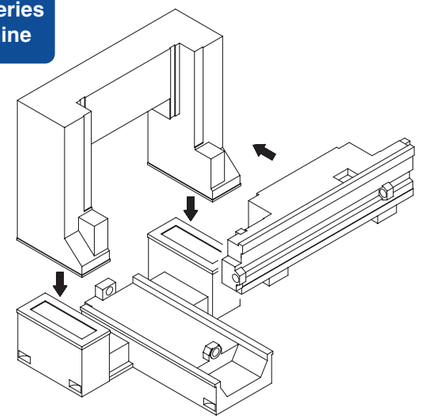
Most sophisticated energy-saving machine, fully considering resources and environment.

Sharp cut in air consumption.
Complete elimination of oil mist scattering into the air.
Energy-saving Z-axis twin ball screws, not requiring any balancing unit.

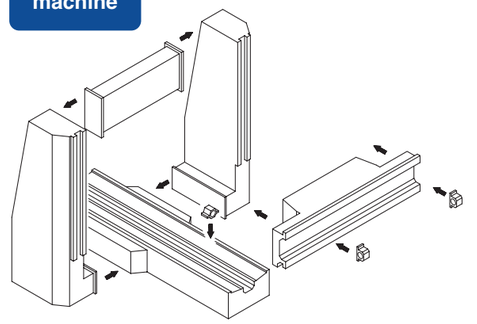
Realization of high productivity due to high speed and high rigidity.

Rapid traverse rate: 30 m/min (X-, Y-axes)
Spindle speed range: 40 ~10,000 min^{-1}
Cartridge spindle, considering easy maintenance.
190 mm-diameter long nose satisfying both easy access and heavy-duty cutting.

MPF series machine



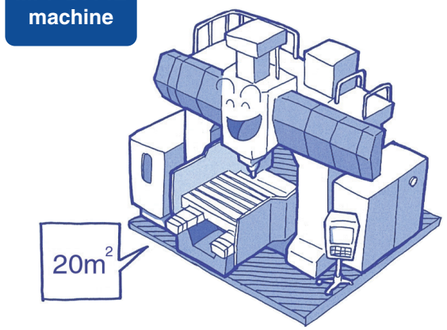
Competitor's machine



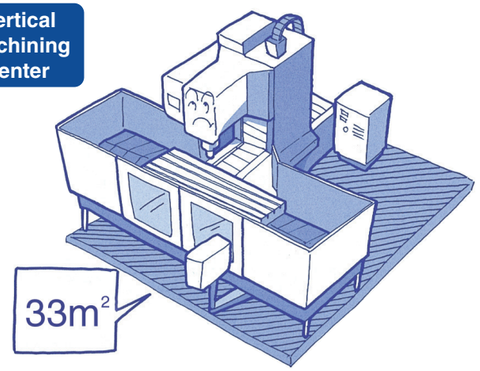
Wide machining range and small installation space.

In spite of the machine whose distance between columns is 2,100 mm, the installation space is as small as 20 m^2, which is smaller than the vertical machining center having equivalent machining range.

MPF-2114E machine



Vertical machining center



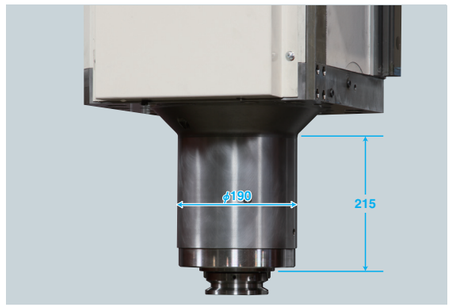
Double column type machining center having extensive cutting ability ranging from low-speed heavy-duty cutting to high-speed cutting.

π Frame

A basis for machine rigidity is provided by integrally cast columns and crossrail characterized by high rigidity.

Spindle (snout)

The snout has long nose of 190 mm diameter to achieve high rigidity on the spindle and better accessibility to a workpiece.

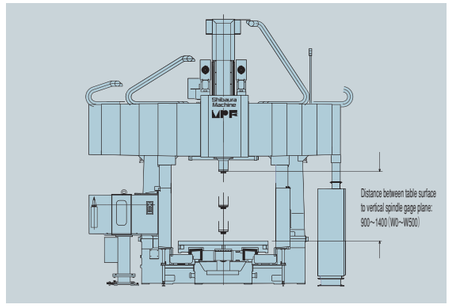


Z-axis twin ball screw drive

The Z-axis is driven by the twin ball screws, which eliminates the need of any balancing unit. Energy-saving and quick response features are particularly effective in profile machining such as machining of dies and molds.

Crossrail elevation (MPF-ES)

The crossrail can be elevated 500 mm at 250 pitches at three positions by means of a hydraulic cylinder. Thus, the machining range is extended and machining is possible at the optimal extended position of ram.



Examples of cutting data

■Face milling

Workpiece material	Cutter diameter mm	Spindle speed min^{-1}	Cutting speed m/min	Width of cut mm	Depth of cut mm	Feedrate mm/flute	Feedrate mm/min	Removal rate cm^3/min	Required power kW	Ram extension mm
AISI 1055	ϕ100	598	188	70	8	0.43	1 316	737	24	705

■End milling (side-face milling)

Workpiece material	cutter diameter mm	Spindle speed min^{-1}	Cutting speed m/min	Width of cut mm	Depth of cut mm	Feedrate mm/flute	Feedrate mm/min	Removal rate cm^3/min	Required power kW	Ram extension mm
AISI 1055	ϕ63	606	120	30	50	0.22	524	786	26	514

■Boring

Workpiece material	Cutter diameter mm	Spindle speed min^{-1}	Cutting speed m/min	Prepared hole dia. mm	Feedrate mm/flute	Feedrate mm/min	Required power kW	Ram extension mm
AISI 1055	ϕ141	225	100	115	0.14	32	5.9	551

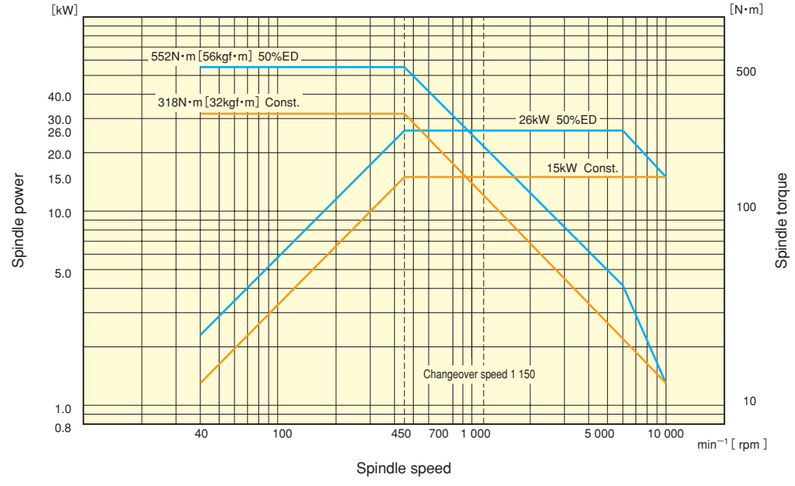
■Drilling

Workpiece material	Cutter diameter mm	Spindle speed min^{-1}	Cutting speed m/min	Depth of hole mm	Feedrate mm/rev	Feedrate mm/min	Required power kW	Ram extension mm
AISI 1055	ϕ69.5	110	24	60	0.3	33	5.1	383

■Tapping

Workpiece material	Cutter diameter mm	Spindle speed min^{-1}	Cutting speed m/min	Prepared hole dia. mm	Required power kW	Ram extension mm
AISI 1055	M52×5	61	10	47	3.3	325
AISI 1055	M3×0.5	1 000	9.4	2.5	—	584

Spindle capacity diagram



TOSNUC PX100 STATE OF THE ART CNC CONTROLLER DEVELOPED TO MAXIMIZE MACHINE PERFORMANCE & PROFITS.

TOSNUC PX100

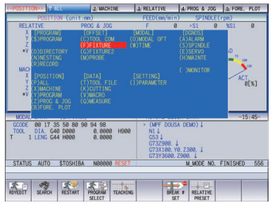
TOSNUC PX100, A personal computer architecture. Integrated into our TOSNUC controller developed specifically to enhance our CNC controller with higher performance functions and even more versatility. Our goal to create more innovative features that support easier operation thus contributing to an increase in productivity and machine performance.

Housed USB port for avoiding obstruction to work

Versatility in operation based on our vast experience

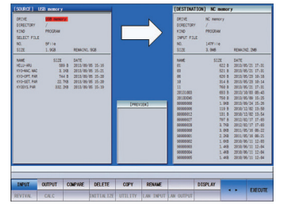
Based on our extensive experience integration between mechanical and electronic technology. Our new CNC controller was developed with an emphasis on easy operation, easy to understand and easy to remember. This perfect combination is the Key to achieving higher machining accuracy in high speed machining.

Pop-up menu



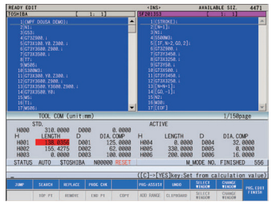
By pressing a soft key on the selected screen a menu will appear showing the desired function on a sub display window.
Having a pop up display menu type system avoids complicated hierarchy in software and shortening the scan time to process a desired function.

File editing screen



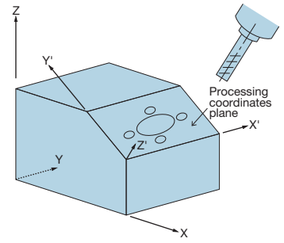
Multi-task and multi-window is a feature that enables you to open a window file from any current screen to perform program input/output deleting or copy a program to execute a calculator screen clipboard.
Program list and memory are connected to a user media and displayed on the screen allowing the program to be checked in a preview window within the same screen during input or output of programs from a user media.

Multi screen background edit



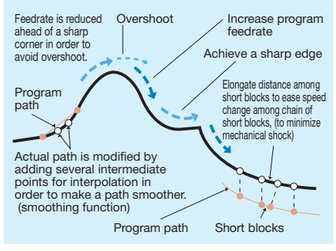
The screen can be divided into three sections to display two program screens and the third shown MODAL OFFSET DATA compensation information which is required upon machining.
These three screens run independently during automatic operation and during editing.
A new program can be generated and created utilizing a clipboard feature and or background split screen edit two programs simultaneously as compared to a personal computer.

Program support functions



A general program running on G17 plane when programmed on X-Y plane and machining a depth on inclined surface as shown does not require a program modification. This very important feature convenient and executable with G command and canned cycle simplify machining of an inclined surface without effort.

Advanced functions for high speed machining and higher machining accuracy



Preview control

Generally, a profile to be machined requires a true shape and shape error decrease as servo gain increase. However high gain causes over shoot and increases machine vibration from large acceleration to mechanical system, which causes a bad surface finish in machining.
Preview control based on optimum control theory is developed to prevent such affect on machined surface and minimize shape error without setting high gain.

Completed long stroke series

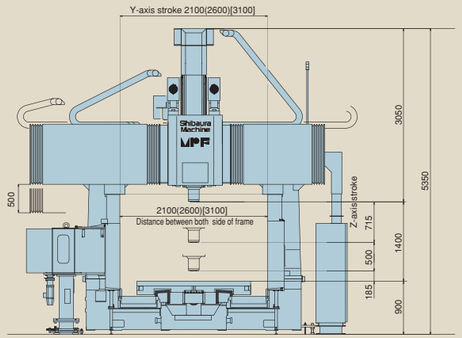
Machine specifications

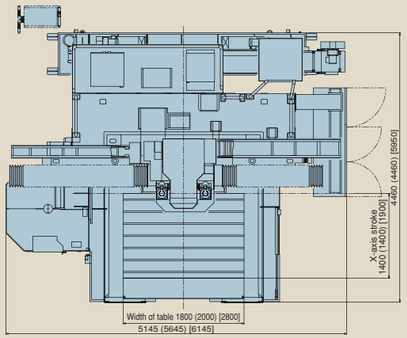
Machine specifications			MPF-2114		MPF-2614		MPF-3116		MPF-2130		MPF-2140		MPF-2150		MPF-2630		MPF-2640		MPF-2650		MPF-3130		MPF-3140		MPF-3150	
			F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS	F	FS
Travel	X-axis travel (Longitudinal movement of table)	mm	1 400				1 900		3 500		4 500		5 500		3 500		4 500		5 500		3 500		4 500		5 500	
	Y-axis travel (Cross movement of spindle head)	mm	2 100		2 600		3 100		2 100						2 600						3 100					
	Z-axis travel (Vertical movement of ram)	mm	715						715																	
	W-axis travel (Elevation of crossrail), 250 pitches at 3 positions	mm	—	500	—	500	—	500	—	500	—	500	—	500	—	500	—	500	—	500	—	500	—	500	—	500
	Height (distance from table surface to vertical spindle gage plane)	mm	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400	1 050	1 400
	Distance between columns, through which maximum workpiece can pass	mm	2 100		2 600		3 100		2 100						2 600						3 100					
Table	Table working surface	mm	1 800×1 400		2 000×1 400		2 800×1 600		1 800×3 000		1 800×4 000		1 800×5 000		2 000×3 000		2 000×4 000		2 000×5 000		2 500×3 000		2 500×4 000		2 500×5 000	
	Table loading capacity	kg	10 000						20 000																	
	Table T-slot size	mm	24 mm-wide; Arranged at 200 mm pitches in longitudinal direction of table.						24 mm-wide; Arranged at 200 mm pitches in longitudinal direction of table.																	
Spindle	Spindle speed (continuous)	min^{-1}	40～10 000						40～10 000																	
	Spindle taper hole		7/24 taper No.50						7/24 taper No.50																	
	Maximum spindle torque	N·m{kgf·m}	552 {56}						552 {56}																	
	Spindle bearing inner diameter	mm	100						100																	
Spindle ram	Type		Open ram type						Open ram type																	
	Guideway		Roller guide						Roller guide																	
	Cross section size	mm	380×380						380×380																	
Feedrate	Rapid traverse rate (X, Y, Z)	m/min	30(X, Y) 20(Z)						20(X, Z) 30(Y)																	
	Feedrate (X, Y, Z)	mm/min	1～10 000						1～10 000																	
	Crossrail feedrate (W)	m/min	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)	—	(1)
Tool	Type of tool shank		MAS BT50						MAS BT50																	
	Type of retention knob		MAS P50T-1 (45°)						MAS P50T-1 (45°)																	
Motor	Spindle drive motor (50 %ED/cont. rating)	kW	AC26/15						AC26/15																	
	Feed motors X-axis	kW	AC5.5						AC7.5																	
	Feed motors Y-axis	kW	AC5.5						AC5.5																	
	Feed motors Z-axis	kW	AC5.1×2						AC5.1×2																	
Power sources	Power supply		AC200/220V±10%, 50/60Hz±1Hz						AC200/220V±10%, 50/60Hz±1Hz																	
	Power capacity (excluding options)	kVA	76						76																	
	Compressed air source	MPa	0.5～0.8MPa						0.5～0.8MPa																	
Tank capacity	Tank capacity of hydraulic unit (for 24-tool ATC)	ℓ	10	37	10	37	10	37	10	37	10	37	10	37	10	37	10	37	10	37	10	37	10	37	10	37
	Tank capacity of spindle cooling unit	ℓ	60						60																	
CNC system			TOSNUC PX100						TOSNUC PX100																	
Accuracy	Positioning accuracy	mm	X-, Y-axis±0.007/1 000 Z-axis±0.007/715						X-, Y-axis±0.007/1 000 Z-axis±0.007/715																	
	Repeatablity	mm	±0.003						±0.003																	
Painting color	Machine exterior		A25-85A (Munsell 5Y8.4/0.5) and N2.5 [Two-toned color]						A25-85A (Munsell 5Y8.4/0.5) and N2.5 [Two-toned color]																	
	Machine interior		Munsell 10YR8/4						Munsell 10YR8/4																	

			MPF-2114FS	MPF-2614FS	MPF-3116FS
Machine size	Machine height	mm	5 350	5 350	5 350
	Floor space	mm	5 150×4 420	5 750×4 420	6 250×5 700
	Mass of machine	kg	21 200	23 500	30 200

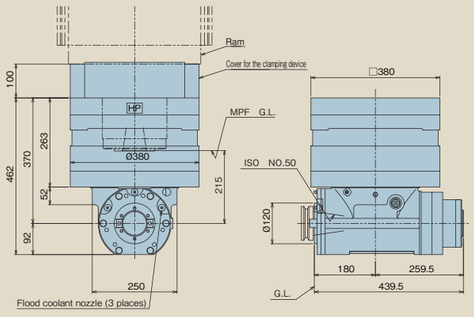
External View

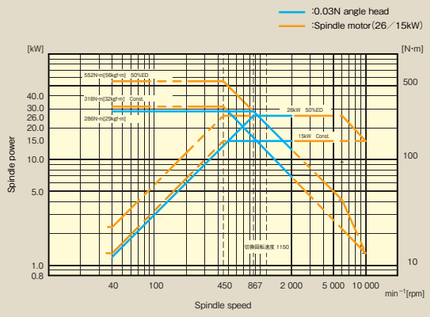
MPF-2114FS • (2614FS) • [3116FS]



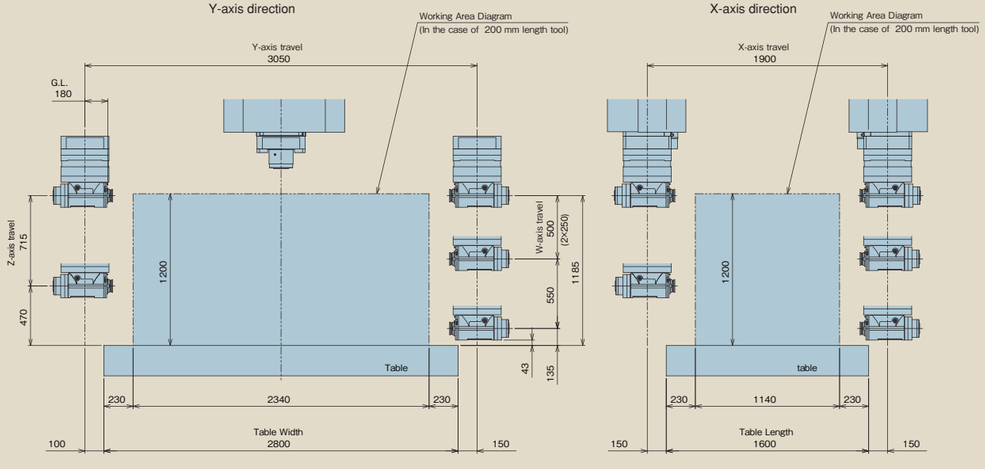


Angle Head





Working Area Diagram (In the case of MPF-3116FS with 200 mm length tool)



Standard accessories / Optional accessories

Machine standard accessories

1. Automatic tool clamping/unclamping device
2. Z-axis full closed loop control
3. NC operation box with stanchion
4. Hydraulic unit
5. Ram cooling oil temperature regulator
6. Oil-mist lubrication unit (1 set)
7. Telescopic steel cover for bed
8. Telescopic steel cover for crossrail
9. Special tools for maintenance and operation
10. Coolant through the spindle
11. Spindle designed for "BIG PLUS" tool

Optional accessories (Items marked ☆ are included in the pack specifications.)

☆ 1 Auto power OFF device
When M02 or M30 is executed while the AUTO POWER OFF lamp on the machine control unit (MCU) is illuminated, the primary main power is turned off after the NC power has been turned off.

☆ 2 Work light
Two (2) waterproof LED lamps of 13 W are attached under the crossrail.

☆ 3 Operator call lamp
This lamp is mounted on the right column cover as viewed from the machine front side.
Green: Illuminated during automatic operation.
Yellow: Illuminated when M00, M01, M02, M30 or M52 has been read in.
Red: Illuminated in any alarm state.

4 Chip gutter
Consists of two (2) chip gutter located along both sides of the bed, which serve as the coolant recovery trough also.
Note: A chip bucket shall be provided by customer

5 Automatic tool changer (ATC)
- Tool storage capacity: 24 tools (36 or 60 tools)
- Maximum tool diameter: 125 mm [4.9"]
- Maximum tool length: 450 mm [17.7"]
- Maximum tool mass: 25 kg [55 lbs]
- Type of magazine: Turret disc type
- Maximum allowable moment around gage plane: 29 N•m [21.7 ft.lbs]
- Method of tool selection: Pot address, random and short-cut indexing

6 MAS 2 type retention knob: MAS P50T-2 (30˚)

7 Automatic workpiece changer (AWC)
- Direct table changing system (DTC system)
- Number of tables: 2 tables
- Direction of table change: In longitudinal direction of the machine.

8 External program number search function
An NC program number (4-digit integer) is searched automatically by input from external device and cycle start are executed automatically in AWC operation.

9 Installation parts: Leveling blocks and clamping plates

10 Chip conveyor: Motorized B type
Located along both sides of the bed. A hinge plate type for full length of the bed.

11 Coolant unit B
A short hinge plate type chip conveyor is integrated on a coolant tank.

	2114FS	2614FS	3116FS
Coolant tank volume	500L	570L	660L
effective coolant capacity	280L	320L	380L

- Coolant pump motor: AC 2 P, 1.1 kW
- Conveyor drive motor: AC 4 P, 0.2 kW

Coolant is delivered to the workpiece from external nozzles by means of the M08 command.
Note 1: Use a fire-resistant water-soluble coolant.
Note 2: A splash cover is not included.
Note 3: Installed at the rear side of the machine.

12 Chip bucket
This is a portable and swing type designed for coolant unit B above.
Bucket capacity: 0.18m³

13 Locating block for the special tool holder from Daishowa
Distance between the locate pin of a block and spindle centerline is 80 mm [3.1inch].
Note1: This block is designed for the tool holder made by Daishowa Seiki
Note2: When 0.03N angle head is going to be used on the machine, please remove the block attached on the snout.

14 Air blower function
Air is blown out of the coolant delivery port of Item 11 above by means of M51.
- Flow rate: Approx. 400 normal liters/min (max.) [Approx. 25 gal/min]

Note: This flow rate is included in flow rate of 500 normal liters/min (Compressed air specifications) stated in the item 2.1.

15 Mist coolant unit
Mist coolant is delivered from the coolant delivery port of Item 11 above by means of M07.

16 Automatic measuring system
This unit consists of a radio touch probe (Renishaw), a standard measuring software designed by Shibaura Machine and a calibration block for check of compensation values of touch probe.
A printer is not included and must be prepared by customer.
Note: When the radio touch probe is already being used on any nearby existing machine in the customer's plant, the frequency must be adjusted before delivery of the machine from manufacturer.
In this case, advise us beforehand.

17 Full-closed position feedback system
X-axis Y-axis

18 Center through cooling system of ball screws
X-axis Y-axis Z-axis
Note: This option make continuation operation at the feedrate 10,000 mm/min possible.

19 Air compressor (~~6~~ ①5.5 kW; screw type)
Note: Electric power and a controller for the air compressor shall be provided by customer.

20 Air dryer
Note: Be sure to select the air dryer. When provided by the customer, it is not required.

21 Customer's designated machine exterior painting color
Colors shall be specified by the customer as per the Munsell notation system and color sample of it shall b supplied to the manufacturer of the machine.
Note: For the pendant operation box, company nameplate, parts purchased from sub-suppliers and machine interior, each maker's standard shall govern their color.

22 Machining of reference grooves on table
Note: Two reference grooves are machined at 200 mm from both ends of the table.
Width: 24 mm [0.94 inch]
Depth: 10 mm [0.39 inch]

23 Automatic tool length measuring function
It is integrated in the ATC 24 and in column mounted ATC when ATC specification was other than ATC24.
Calibration tool shall be prepared by customer.
Note:
- When the Cross-rail is at its highest position, a tool shorter than 250mm cannot be measured.
- Be careful of interference of measuring equipment and workpiece.
- This is not designed for Item No.40 (0.03N Angle Head).①

24 Chip cover (half cover)
- ATC side covers in front of the left column (fixed covers including automatic door)
- Right and left covers along the bed (fixed covers including manual door)

25 Table end covers
- They are fixed at both ends of the table.

26 Balance bar type pendant hanger

27 Axis address replacement (X to Y / Y to X)

28 Preheat timer Type A or B

29 Additional retention knobs
Number of pieces should be specified.

30 Pit type machine foundation
The entire machine is installed on the level below 600 mm [23.6"] from shop floor.

31 Machine inspection in the presence of customer personnel
The following points shall be checked in the presence of customer personnel.
- Appearance
- ATC, AAC function
- Spindle taper hole runout

32 Spindle thermal displacement compensation by mean of the gap sensor

33 Outlet for an external device
An outlet, with specifications of AC100 V and 5 A, is provided on front door of the machine control unit (NC panel) for an external device.

34 Vector drill
Including followings:

Flex drill	1 set
Side lock holder	1 set
Retention knob	1 set
Collet	1 set (5 pcs.)
(ϕ4～5, ϕ6～7, ϕ8～9, ϕ10～11, and ϕ12～13)	
Case	1 set
Machining software	1 set
3-dimensional coordinate conversion	1 set

35 Power-Flex
Including followings

1) Model:	BT50-EK7-240
2) Type of spindle taper hole:	7/24 taper No.50
3) Spindle speed ratio:	10 times
4) Maximum speed:	30,000min⁻¹
5) Tool shank:	ϕ3,4,5,6
6) Index range:	
Vertical plane	0～90deg
Horizontal plane	0～360deg

Note: Item No.36 is required for this option.

36 Simultaneous air blow
Air is blown out from external nozzles and through spindle center simultaneously. This simultaneous blow is not available in usual operation.
Air flow rate is increased 200 Nl/min. Total flow rate for the machine increase to 700 Nl/min.

37 Expanded automatic tool length measuring function
Length of such tools that it is difficult to specify tool edge position as boring tools, milling cutters is able to be measured in this function.
A: Manual positioning of tooth edge
B: Automatic positioning of tooth edge
Note: Item No.23 is required for this option.

38 Spindle load-ratio pre-setting function
Allowable upper load-ratio could be pre-set by M-code in memory.
Spindle rotation and axes feed stop when actual load ratio exceed the preset limit and show alarm message on the screen.

39 Transformer for different line voltage
The transformer box will be installed separately. Advise us of the voltage on primary line in the installing factory beforehand.

40 0.03N Angle Head (designed for AAC・AAI)
Following two NC functions are required.
- Spindle C-axis control
- Programmable parameter input

Note 1. Mount the angle head after removed the location block.
Note 2. Set the angle head support base at the specified position on the table before executing AAC
Note 3. Clamping unit for AAC must be kept on the snout.
Note 4. Snout length will be reduced 150 mm for the clamping unit.
Note 5. External coolant nozzle will be one port when machining by snout on AAC specification machine.
Note 6. Select ATC with 36 tools or more for ATC on the angle head..
In the case of 24 ATC, tool must be changed on the angle head by manual.
Note 7. Coolant through spindle is not available on the angle head

41 Automatic attachment indexing in 5 degree increment
Following one NC functions are required.
- 3-dimensional coordinate conversion

42 Angle head support base
Automatic attachment change (AAC) will be executed on the support base located at special position on the table near ATC.

CNC System Specifications TOSNUC PX100

Standard and pack specifications

(Items marked ☆ are included in the pack specifications.)

A. Controlled axes

Controlled axes — 3 axes (X, Y, Z)

Simultaneously controlled axes
3 axes for positioning (G00) and linear interpolation (G01)
2 axes (X-Y, Y-Z or Z-X) for circular interpolation (G02, G03)

B. Programmable Methods

Programming resolution — Linear axis: 0.001 mm

Maximum programmable dimension
Linear axis: ±99999.999 mm

Data code — Automatic recognition of ISO/EIA code
JIS B6311 ISO 6983/1
EIA RS-358-B EIA RS-244-B

Data format — Variable block with a decimal point word address format

Absolute/incremental programming — G90/G91

Decimal point input
Calculator type/Programming resolution type

C. Interpolation

Positioning — G00 - Positioning at rapid traverse

Linear interpolation — G01

Circular interpolation — G02 (CW)/G03 (CCW)

D. Feed

Rapid traverse rate

Feedrate — F5-digit direct programming in mm/min

Dwell: G04
Dwell time can be specified in the range of 0 to 999.99 seconds following address F (or P).

Continuous jog feed
A selected axis is continuously moved at rapid traverse or feedrate by manual operation.

Rapid traverse rate override
Rapid traverse rate can be overridden in the range of 0 to100 % in 10 % increments.

Feedrate override
Feedrate can be overridden steplessly in the range of 0 to 200 %.

Automatic acceleration/deceleration
Linear acceleration or deceleration is effected on rapid traverse rate and jog feedrate.

Automatic acceleration/deceleration for feed
Linear acceleration or deceleration is effected on feedrate by commanding G08/G09 and G50/G51.

S-type acceleration/deceleration for rapid traverse
S-type acceleration or deceleration is effected on rapid traverse rate.

☆ Thread-cutting
Thread-cutting synchronized with spindle revolution can be executed by means of G33.

☆ Feed per revolution
Feed per minute or feed per revolution can be selected for feedrate as specified by F code, using G94/G95.

☆ Dwell per revolution
Dwell per revolution can be effected by means of G05.

☆ Handwheel feed (portable)
0.001/0.01/0.1 mm (per division)

Stroke limit dwell function (only for Z-axis)
Even if a program resulting in axis overtravel is commanded in the G00 mode, it is not processed as the alarm, but the Z-axis moves to the stroke limit at rapid traverse and stays there until it returns to the stroke range by another G00 command.

E. Part Program Storage and Edit

Program storage
600 m (No. of registrable programs: 512)
(About 50 m is reduced to keep it as the maker's area according to the optional functions selected.)

Part program edit (Background edit)
Various editing operations are possible for programs memorized. Program clear, program copy, program rename, search, jump, cancel, deletion and copy for specified range, replace, program insertion, register in abbreviation, line mark designation, sequence number change, space insertion between words, program input in S.F auto mode, simultaneous opening of two programs, editing of various data during program editing, undo of deleted program, English comment

Program name
A program name is specified by a maximum of eight alphanumeric characters following address $ or O. Up to 32-character program comment can be included.

Sequence number
A sequence number is specified by a 5-digit number following address N.

Sequence number search
A block containing specified sequence number can be searched.

Program nesting list
A list of program nesting is displayed.

Program offset list
Lists of blocks containing the following data are displayed after search from the head of program.
Fixture offset list, T code list

Program check
Program format check is executed.

F. Operation and Display

☆ Operation panel — 15 inch color TFT liquid crystal display
Keyboard with membrane switches (80 keys)

Customizing key
When a series of key input operation used very often is registered in a key beforehand, it can be executed quickly, thus improving efficiency of operation.

Tool file
A combination of tool length, cutter diameter, tool offset and other tool data can be displayed and edited.

Operation
Automatic operation, MDI operation and manual numerical command are possible.

S.F manual setting
S and F codes can be set in the manual mode.

S.F auto setting
S and F codes can be set automatically in the manual mode.

Spindle motor load display
Load exerted on the spindle drive motor is displayed.

Run hour display — The NC working time is displayed.

Calendar timer
Management of program creation date, and time display.

Machining record
Machining start time, actual machining time, etc. of a program executed in the AUTO mode are displayed.

User's name registration
A user's name is displayed at system startup.

Jog feedrate switch

Display of manual interruptive amount and exit from interruption
A jog shift amount of an axis made during automatic operation can be displayed on the screen next to the current position display, using the automatic interruption display and interruption function.

G. I/O Function and Devices

RS232C interface port A
Input and output of NC programs and tool offset data are possible via the EIA RS232C interface.

USB memory
A machine could be operated and part program, tool data, etc. are input/output, from USB memory.
connected onto personal computer HMI

☆ Remote buffer operation
Automatic operation is executed by means of a NC program sent from the host computer according to the transmission protocol.
・Protocol A (Hand-shake system)
・Protocol B (DC control code system)

H. S, T and M Functions

Spindle speed function (S-function)
Spindle speed can be specified by a five-digit integer following address S.

Spindle speed override — 50～200 % in 10 % increments

Tool function (T-function)
Tool number can be specified by a six-digit integer following address T.

Miscellaneous function (M-function)
Miscellaneous function can be specified by a four-digit integer following address M.

I. Tool Offset

Tool length offset
Tool length offset can be set on an axis perpendicular to selected plane by means of G43, G44 or G49.

Tool offset
Tool offset expansion or reduction is effected on an axis in selected plane by means of G45, G46, G47 or G48.

Cutter diameter compensation C
Cutter compensation is effected on an axis in selected plane by commanding G40, G41 or G42.

No. of tool offsets
No. of tool length offset: 60 sets
No. of cutter compensation: 60 sets

J. Coordinate System

Automatic reference point return
G28: Automatic return to reference point
G29: Return from reference point
G20: Reference point check

Coordinate system setting
A coordinate system can be set by means of G92 so that current axis position can be the commanded coordinate.

Fixture offset
Fixture offset is effected by means of G53 or G57.

Fixture offset 2
Fixture offset is effected by means of G54, G55 or G56.

2nd to 4th reference point return
Axes are returned to the 2nd to 4th reference point automatically.

K. Operation Support Function

Control in/out
Information flanked by the control in and control out codes can be neglected.

Single block
A program can be executed block by block during automatic or MDI operation.

Optional stop — M01

Optional block skip
A block containing a slash (/) code at the top can be ignored. (One pc.)

Dry run
Axes move at a feedrate specified by parameter in lieu of programmed feedrate.

Machine lock
Output of axis command pulses to the machine side is stopped.

Auxiliary function lock
M, S or T command is not output to the machine side.

Z-axis feed cancel
Output of Z-axis command pulses to the machine side is stopped.

Manual absolute ON/OFF
A jog travel distance can be added to the current coordinate value according to the status of the absolute ON/OFF switch.

Override cancel
Override on feedrate and spindle speed can be ignored and clamped at 100 %, by commanding M48 or M49.

All clear
The CNC internal memory can be initialized by pressing the ALL CLEAR pushbutton switch.

Reset — A command currently executed can be reset.

Feed hold
Axis feed can be stopped temporarily by pressing the FEED HOLD pushbutton switch during automatic or MDI operation.

Cycle stop
Axis feed and spindle revolution can be stopped temporarily by pressing the CYCLE STOP pushbutton switch during automatic or MDI operation.

Restart
When machining was interrupted during automatic operation for tool exchange, etc., the operation can be resumed from the specified block after taking necessary steps.

Sequence number collation and stop
Operation can be stopped after the block preceding a block bearing specified sequence number has been executed.

Manual numerical command
Data can be input and executed in the manual mode.
Data that can be input: G00/G01, F, M, S, T, axis data (incremental)

Single block suppression
Single block ON or OFF in the single operation mode can be selected by means of G990 or G991.

Feed hold suppression
Feed hold ON or OFF can be selected by means of G992 or G993.

Override suppression
Feedrate override ON or OFF can be selected by means of G994 or G995.

Handwheel feed interruption suppression
Handwheel feed interruption ON or OFF can be selected by means of G996 or G997.

☆ Handwheel feed interruption
Interruption by means of the MPG handwheel can be permitted during cutting feed.

☆ Manual tool length and tool diameter measurement
An offset value from the master tool is measured and memorized under specified offset number.

L. Programming Support Function

Plane selection
A machined plane can be selected by means of G17, G18 or G19.

Circular interpolation by radius programming
Radius of an arc can be specified directly by R command.

Circle cutting — G12, G22: Inner circle cutting CW
G13, G23: Inner circle cutting CCW
G222: Outer circle cutting CW
G223: Outer circle cutting CCW

Machine coordinate system positioning command
Axes can be moved to the coordinates characteristic of the machine by means of G73.

Subprogram call
A subprogram stored in the memory can be called and executed by means of G72. The subprogram name should be specified by eight alphanumeric characters following address $ or O.

Arbitrary angle chamfering/corner R
Arbitrary angle chamfering or corner R can be inserted between cutting feed commands of consecutive two blocks.

CNC System Specifications TOSNUC PX100

Canned cycle
A drilling canned cycle can be executed by commanding G77～G89.

Automatic corner override
Automatic override of inside corner
Change of inside arc cutting speed

Mirror image
Mirror image can be set on each axis by means of relevant pushbutton switch.

☆ Macro program
A macro program can be called and executed by commanding G72, G74, G75 or G76.

☆ Pattern cycle
Regular hole position pattern or milling pattern can be executed by commanding G109～G119 or G121～G132.

☆ Coordinate conversion
Parallel move and rotation of a coordinate system can be executed by commanding G10 or G11.

M. Mechanical Error Compensation

Backlash compensation
Backlash of the machine is compensated.

Pitch error compensation
Pitch error of the machine is compensated.

Unidirectional positioning
Final positioning of axes can always be performed from single direction by means of G60.

☆ Pitch error gradient compensation
Pitch error of each axis feed screw of machine system can be compensated by approximating with up to 30 straight lines.

N. Machine Control Support Function

Axis interlock
Each axis feed can be permitted or banned by means of external signal.

P. Safety and Maintenance

Emergency stop
Emergency stop can be effected on the machine by pressing the EMERGENCY STOP pushbutton switch. To reset, the EMG RESET pushbutton switch is used.

Overtravel check
Emergency stop is effected by means of external overtravel signal.

Stroke check
Axis feed overrunning a predetermined stroke is prohibited.

Interference check II
Axis entry into a predetermined off-limit area is prohibited by means of G26 or G27.

Self-diagnosis
An error in NC program, CNC system, servo and machine system can be monitored and an alarm is processed.

☆ Interference check I
Setting of axis interference area and axis interference check ON/OFF can be performed by means of G24 or G25.

☆ Door interlock
When the CNC system door is open, the primary power is turned off.

Q. Servo System

Servo motors — AC servo motors

Position detectors
Absolute encoders (absolute position detection)

Involute interpolation
Involute interpolation is executed with two orthogonal axes by commanding G105.

Archimedes interpolation
Archimedes interpolation (spiral interpolation) is executed with orthogonal two axes or with three axes including a vertical axis by commanding G102/G103.

D. Feed

☆ Synchronous tapping
Tapping operation is possible by synchronous control of the spindle and feed axis by commanding G843, G844 or G845.
Synchronous tapping speed range: 40～1,150 min^{-1}

Start of thread-cutting at selected angle
Thread-cutting can be started from a desired angle of the spindle.

Synchronous thread-cutting
Large-diameter thread-cutting is possible by synchronous control of spindle and feed axis.

E. Part Program Storage and Edit

Part program storage
1,200 m equivalent punched tape (No. of programs: 1,024)
3,000 m equivalent punched tape (No. of programs: 1,024)
5,400 m equivalent punched tape (No. of programs: 1,024)
7,800 m equivalent punched tape (No. of programs: 1,536)
10,200 m equivalent punched tape (No. of programs: 1,536)

* Mass memory (CF) — 2 GB

F. Operation and Display

English specification

External position display
Each axis position display can be equipped on the machine side.

G. I/O Function and Devices

RS232C interface port B
Input and output of NC programs, tool offset data, etc. are possible via the EIA RS232C interface.

** DNC interface
DNC interface pursuant to the EIA SP1292.

☆ Remote buffer operation
Automatic operation is executed as per an NC program sent from the host computer according to the transmission protocol.
Protocol A (Hand-shake system)
Protocol B (DC control code system)

Binary operation
Automatic operation is executed as per the binary data sent from the host computer according to the transmission protocol.

* High-speed LAN linkage
Host — FTP server
Protocol — TCP/IP
NC input cable — 100 base-T
Maximum capacity: 2 GB (including 30 MB for OS)

Note) The following items shall be provided by customer.
1) Network construction and setup
2) 10 base-T cable for connection with the machine

I. Tool Offset

☆ Additional number of tool offset
Tool length offset: 899 sets including the standard ones
Cutter compensation: 899 sets including the standard ones

☆ Wear offset memory
A wear offset memory can be added to the tool offset memory.

Three-dimensional tool compensation
Three-dimensional compensation of a tool path is possible by means of G30 or G31.

J. Coordinate System

☆ Additional number of fixture offset
Fixture offset: 99 sets including the standard ones (H901 ～ H999)

K. Operation Support Function

☆ Addition of optional block skip
A total of three including the standard one.

☆ Foreground plotting function
A tool path of an active NC program can be plotted on the display.

Manual alignment (or centering) function
An offset of the coordinate system is automatically calculated by macro program after workpiece measurement.

L. Programming Support Function

☆ Programmable mirror image
Mirror image can be set on each axis by means of G62 or G66.

☆ Teaching function
A program can be created automatically based on a block executed in the MDI mode, manual axis feed, etc.

☆ Programmable data input
The contents of the tool offset memory or fixture offset memory can be updated by means of G58 or G59.

☆ Fixture offset data input
When G158 is commanded, programmed each axis value can be added, taking the already registered offset value as the reference.

Programmable parameter input
Reading and writing of setting parameter and system parameter values are possible by means of G58 or G59.

☆ Scaling
A profile specified in an NC program can be reduced or expanded by means of G64 or G65.

☆ Figure copy function
Entire subprogram can be executed by effecting coordinate rotation or coordinate shift by means of G721 or G722.

☆ Circle cutting compensation

** Interruptive macro
A macro program can be called and executed by means of external signal.

Three-dimensional coordinate conversion
Three-dimensional parallel move and rotation of a coordinate system are possible by means of G14.

☆ Plane conversion
A program created based on the G17 plane can be converted into the one supposing other plane and executed by means of G35～G39.

Machining time estimate & NC plotting function
Program check, machining time estimate and tool path plotting for a non-active program can be executed in the background.

Interactive type automatic programming function
This function helps create NC programs for face milling, side face milling, pocket milling, contouring and drilling operations.

☆ Zone machining function
In die and mold machining, this function allows the following processing in a zone set beforehand in the CNC internal memory.
1) Change in depth of cut in Z-axis direction
2) Change of cutting conditions
3) Composite processing of 1) and 2) above

M. Machine Control Support Function

☆ Straightness compensation
Straightness of the machine system can be compensated by approximating with up to nine straight lines per each axis.

O. Automation Support Function

Skip function
When G61 is commanded, axis feed currently executed can be stopped by means of skip signal input from an external device.

Tool breakage and tool wear detection
Cutting load condition can be monitored to detect a tool breakage or tool wear.

☆ Counting of tool working time
The tool working time is totaled. When it has reached a specified tool life, an alarm will generate.

Feedrate regulation
Feedrate can be controlled so that cutting load (i.e., load imposed on the spindle drive motor) can be a predetermined value.

☆ Spare tool selection
When a tool that cannot be used any further due to end of life, breakage or wear, a spare tool set beforehand is selected.

☆ Tool wear coefficient function
When totaling the tool life and tool working time, they can be counted by multiplying a predetermined tool wear coefficient. (M code output only)

Two external M codes
M192, M193 (M code output only)

R. Servo System

☆ Shape recognition preview control function (including preview control)
When machining consecutive blocks of short line of tool path programmed at high speed, impact at a corner and error due to delayed response of servo system can be prevented to assure high-speed and high-precision machining.
CNC DASH
It is possible to setup acceleration and slowdown time separately for each axis X, Y, Z.
S.F function
When cutting a sculptured surface with a ball end mill, spindle speed can be controlled so that cutting speed can be made constant at ever-changing contact points. Also, feed per revolution can be controlled according to the spindle speed controlled.

S. Others

NURBS interpolation
Three-dimensional NURBS (Non-Uniform Rational B-Spline) interpolation is possible with defined data of NURBS curve.

Optional specifications

(Items marked ☆ are pack A specifications, which are included in the standard specifications.)

A. Controlled axes

Additional controlled axes
Select this function when controlling an NC rotary table through the TOSNUC PX100. Detailed specifications and the scope of work shall be discussed as necessary.

B. Programming Methods

Inch/metric selection
Programming in the inch system or metric system can be selected by means of G70 or G71.

C. Interpolation

☆ Helical interpolation
Helical interpolation can be executed by G02/G03 and a linear axis command.

Hypothetical axis interpolation
Setting and cancel of hypothetical axis can be commanded by "G07 α 0/1" (α: axis address). An axis specified as the hypothetical axis will not move.

Cylindrical interpolation
When G67 is commanded, cylindrical interpolation is possible by combining a straight axis with a rotary axis (additional axis) for operations such as grooving of a cylindrical cam.

Spindle normal direction control
When G140, G141 or G142 is commanded, grooving is performed, using a spring-necked turning tool mounted on the spindle.

Note) When selecting the functions marked **, consult with us beforehand.
Note) Marked with *, selectable between two options.

Lineup of double column type machining centers

MPH-B

MPH-B series

- Can satisfy diversified needs from industries by mounting on the ram various attachments for ranging from ultra heavy-duty cutting to complex curve machining.
- Crossrail elevation (500 mm, 250 mm pitch at 3 positions)
- A variety of attachments can be attached to the ram for a wide diversity of machining.
- Moving crossrail can be positioned at several locations. (500mm, 250pich, 3positions)

MPH-2140B～3150B

Effective distance between columns (Distance between columns) **2 100～3 100mm** (82.6～122.0in)
Axis travel **X·Y·Z**
4 500×2 100×800mm (177.2×82.7×31.5in)～
5 500×3 100×800mm (216.5×122.0×31.5in)
Table size **1 800×4 000mm** (70.9×157.5in)～
2 500×3 000mm (98.4～196.9in)
Spindle speeds **40～8 000min^{-1}**
Spindle drive motor **AC30/22kW** (AC41/30HP)
CNC system **TOSNUC 999**

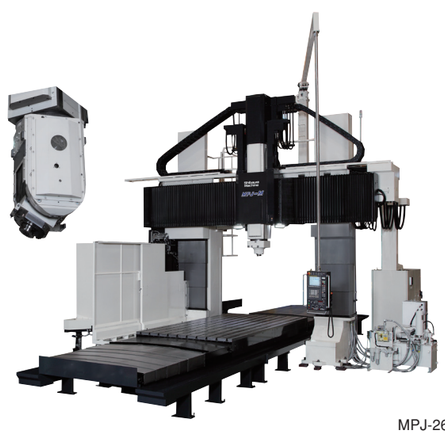
MPC-2650EⅡ

MPC-EⅡ series

- Many different attachments are available for various types of machining.
- High productivity can be achieved based on the High speed, High rigidity and High technology of the machine.
- Wide range of machine sizes. Distance between the columns from 2 100mm (82.7") to 3 600mm (141.7")

MPC-2140EⅡ～36100EⅡ

Distance between columns **2 100～3 600mm** (82.7～141.7in)
Axis travel **X·Y·Z**
4 500×2 900×900mm (177.1×114.1×35.4in)～
10 500×4 400×900mm (413.3×173.2×35.4in)
Table size **1 800×4 000mm** (70.8×157.5in)～
3 100×10 000mm (122×393.7in)
Spindle speeds **30～4 000min^{-1}** (OP : 6 000min^{-1})
Spindle drive motor **AC30/22kW** (AC41/30HP)
CNC system **TOSNUC 999**



MPJ-2640M

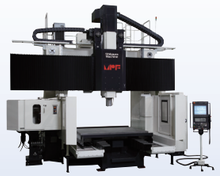
MPJ-M series

- Lead time reduction is realized by high acceleration
  1 degree indexing head (option) shows good surface for die and mold
- 10 000min^{-1} spindle speed, 15m/min in X-axis can be performed
- Aux time such as ATC, AAC are reduction

MPJ-2640M～3160M

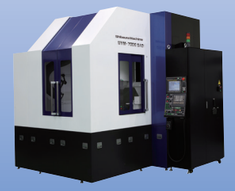
Distance between column **2 600～3 100mm** (102.36～122.05in)
Axis travel **X・Y・Z**
4 500×3 000×800mm (177.17×118.11×31.50in)～
6 500×3 500×800mm (255.91×137.80×31.50in)
Table size **2 000×4 000mm** (78.74×157.48in)～
2 500×6 000mm (98.43×236.22in)
Spindle Speed **40～10 000min^{-1}**
Spindle drive motor **AC45/37kw** (60/49.3HP)
CNC System **FANUC Series 31i-MODEL B5**
TOSNUC 999

From Die and Mold Machining to Forming Shibaura Machine Group Value-Chain

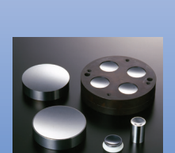


Die and Mold Machining Centers

High-Precision Machines



High Speed Milling Machines



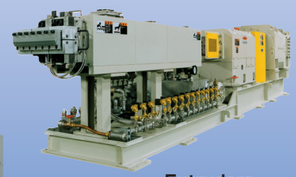
Precision Molds

System Robots

Optical-Glass-Molding-Press Machines

Injection Molding Machines

Die-Casting Machines



Extruders