



# BM series

## Horizontal Machining Center

# Shibaura Machine

View the Future with You



### ISO 9001



GOTEMBA plant

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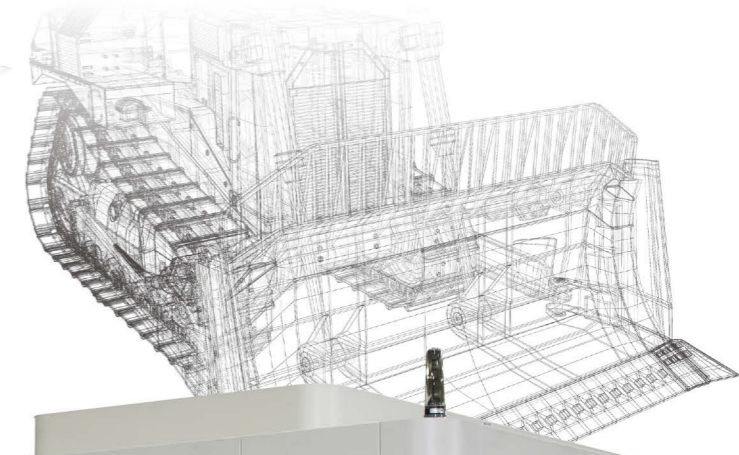
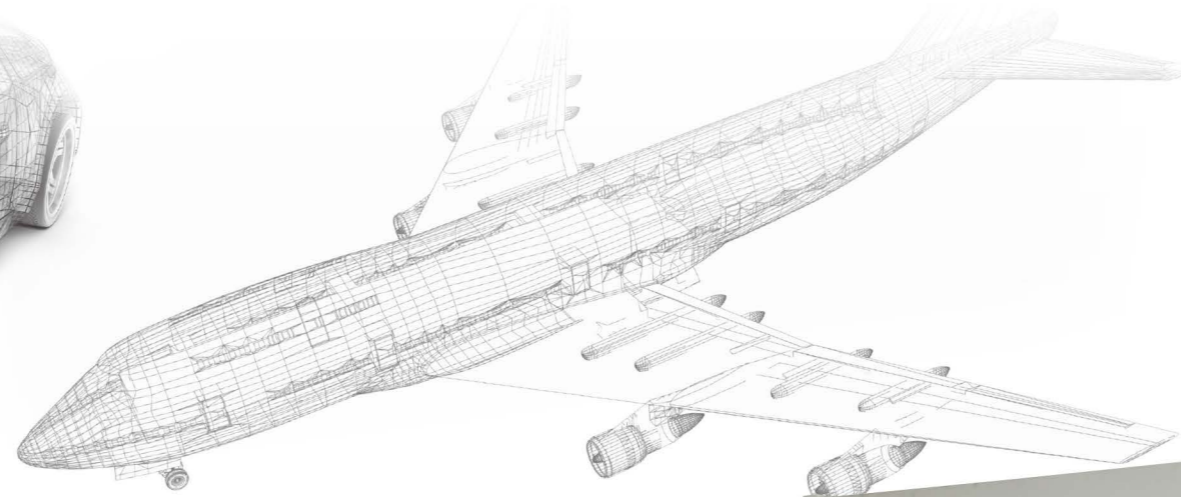
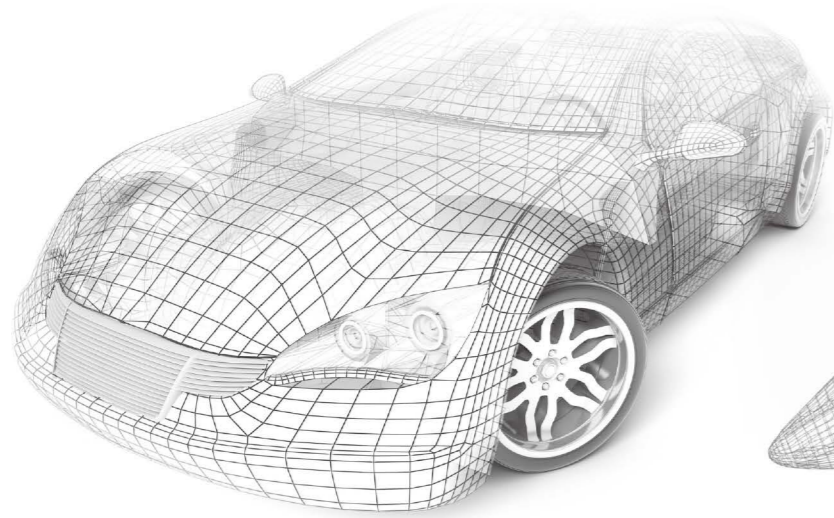
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\* We reserve the right to change any of specifications in this catalog without notice in order to effect improvements.

**Horizontal machining centers with the highest level of technical capabilities of Shibaura Machine, and**

**of precision in a class created by bringing together achieving a further evolution of machining technology**



Horizontal Machining Center

# BM series

## BM-Q Standard Spindle (Quill Spindle)

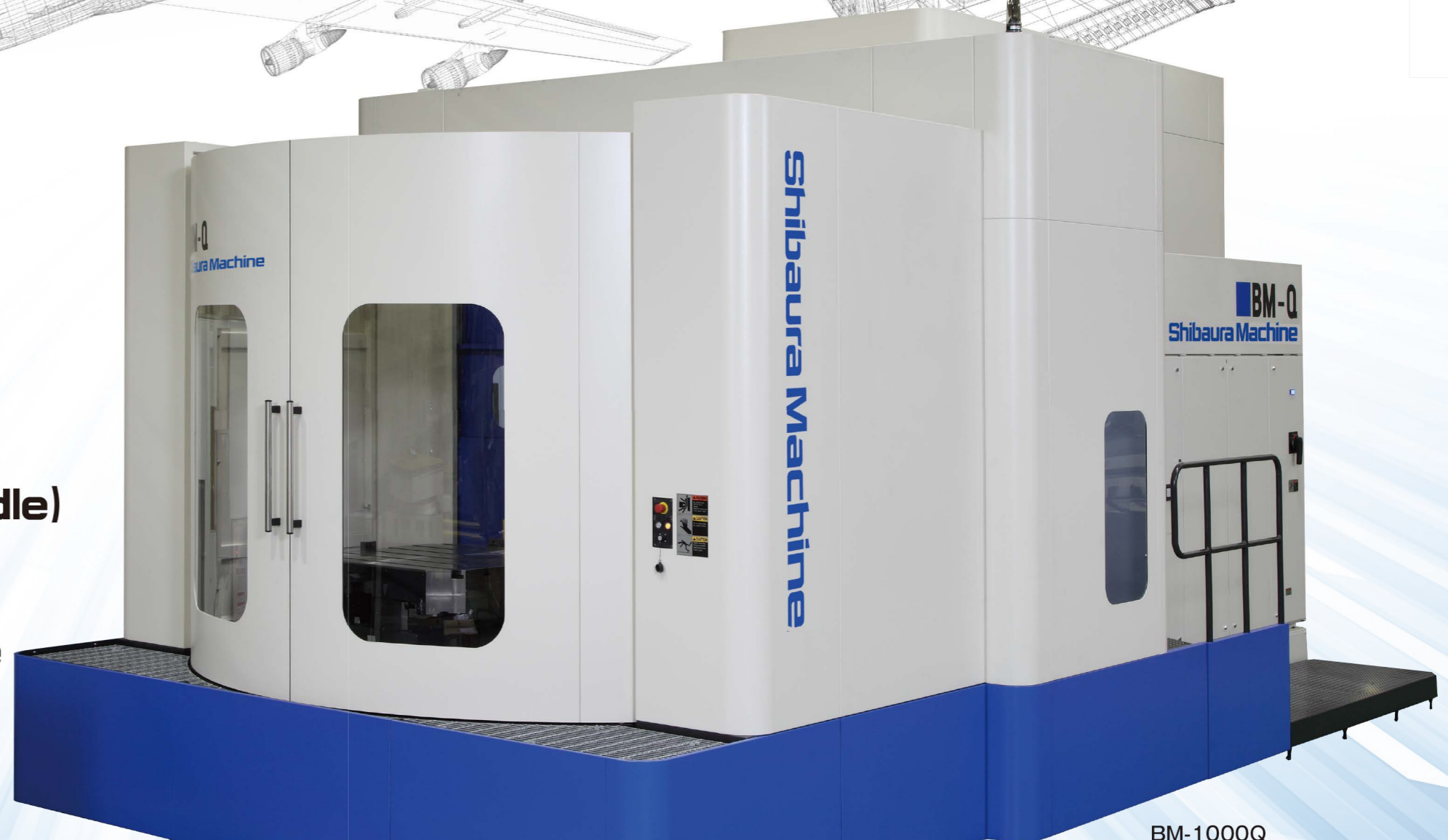
Improved accessibility to workpieces by quill feeding  
High output motor mountable

## BM-U Universal Head Spindle

Complex shapes can be machined in one setup by swiveling the A-axis head.

## BM-H High Speed Spindle

20,000 min<sup>-1</sup> high speed spindle with a built-in motor



BM-1000Q

Note: The picture of the machine above includes special accessories

# Spindle Lineup

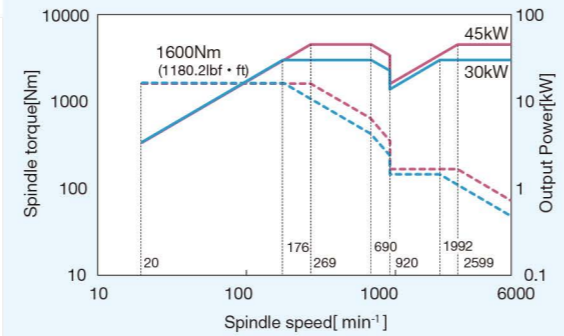
A wide variety of spindles support diversified workpieces

## BM-Q Standard Spindle (Quill Spindle)



Spindle rotational speed	6 000min <sup>-1</sup>
Spindle motor (50% ED/continuous)	AC30/22 kW
Maximum spindle torque	1 600 Nm

Improved accessibility of the spindle to workpieces by strong  $\phi 200$  mm quill feeding. Achieved heavy duty cutting with high torque of the best in class.

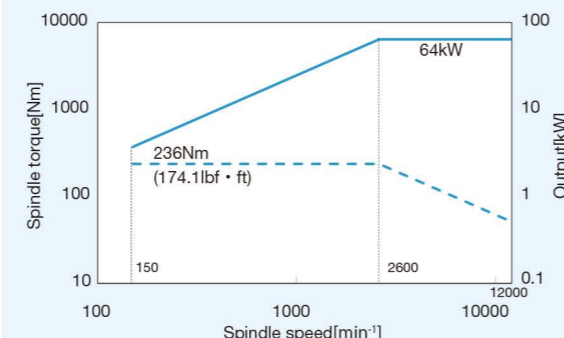


## BM-U Universal Head Spindle

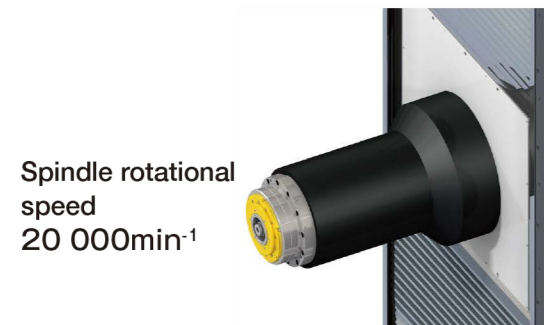


Spindle rotational speed	12 000min <sup>-1</sup>
Spindle motor (40% ED/continuous)	AC64/53.4 kW
Maximum spindle torque	236 Nm

By five-axis machining, it is possible to consolidate processes for complicated shapes in one setup and improve the operating ratio.

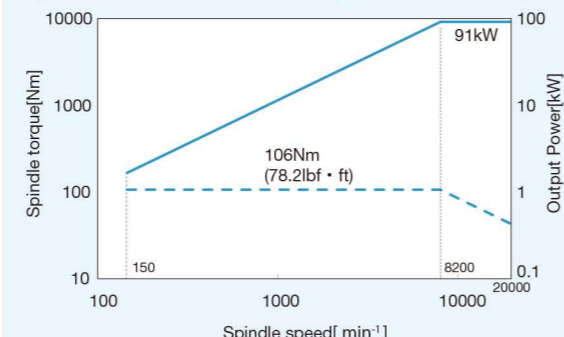


## BM-H High Speed Spindle



Spindle rotational speed	20 000min <sup>-1</sup>
Spindle motor (40% ED/continuous)	AC91/85 kW
Maximum spindle torque	106 Nm

High speed machining is possible with a built-in motor. Work effectively for high speed finishing of metal molds with a small diameter tool and high speed finish machining of aluminum parts.

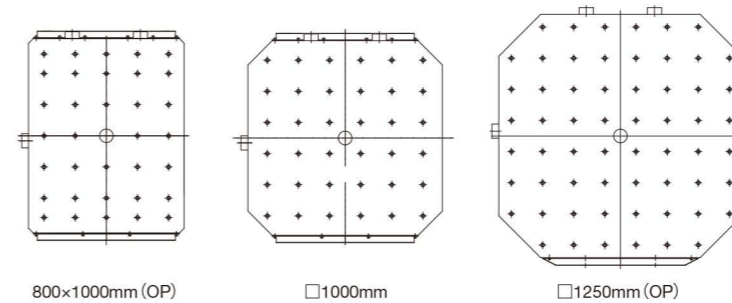


# Mechanical Structure

Further optimization with inherited high rigidity and by FEM analysis. Speed increased to fast forward speed of 40 m/min and cutting feed speed of 25 m/min.

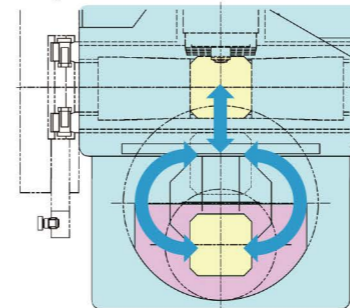
**High efficiency machining of large workpieces is realized, promising productivity improvement.**

High precision machining is realized with a unique worm mechanism which enables a minimum pallet indexing angle of 0.0001°. Supporting a maximum load mass of 4.5 t (option).



By using a common pallet base structure, a pallet that meets the machining needs can be selected.

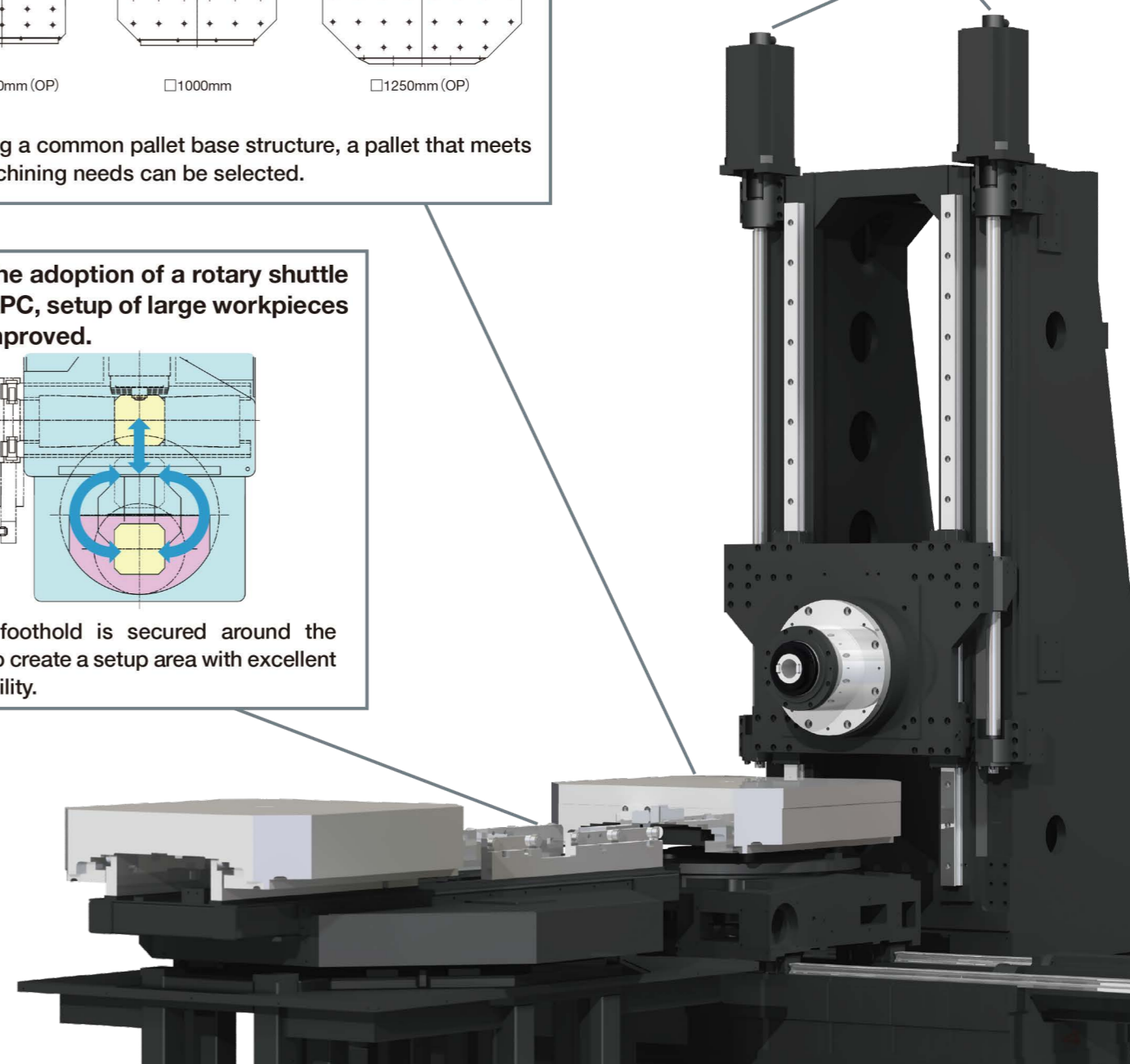
With the adoption of a rotary shuttle type APC, setup of large workpieces has improved.



A flat foothold is secured around the pallet to create a setup area with excellent workability.

Powerfully supporting high speed, high precision, responsiveness and high rigidity machining with a twin drive mechanism.

Ball screw axial center cooling (option) can suppress thermal displacement and maintain high accuracy.



# Simple & Smart CNC TOSNUC PX200

- 1 Electro-mechanical integrated CNC for professional use (field) made by a machinery manufacturer.
- 2 CNC that supports operation with a simple & smart operation.
- 3 CNC that responds to a wide range of applications from manual machining to automatic machining in a production control system.
- 4 CNC to quickly detect abnormalities in the machine with an enhanced diagnostic function to improve the operating ratio.



## Features of the Operation Panel

### Flush Surface

Simple and timeless design



### HMI

- Adopted 19-inch vertical touch panel type
- Smartphone-like intuitive operation
- Enabling input while wearing gloves

### Keyboard

- Adopted mechanical keys with a sense of luxury
- Adopted QWERTY keyboard layout to improve operability

### Operation Switches

- Easy-to-see operation is realized with HMI and mechanical switches.

# New Machining Assist Functions

## Operator Support



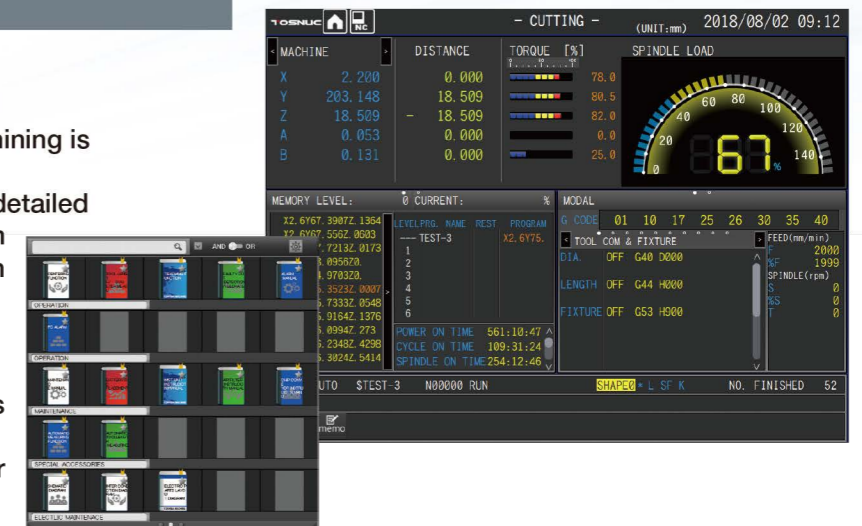
### Machining Screen

Information necessary for machining is consolidated on one screen. Expanded coordinates and detailed factors at the time of alarm occurrence are displayed with one touch.



### Manual Viewer

Browsing of manuals for machines and NCs. Keyword search is possible for all manuals.



## Machining Support



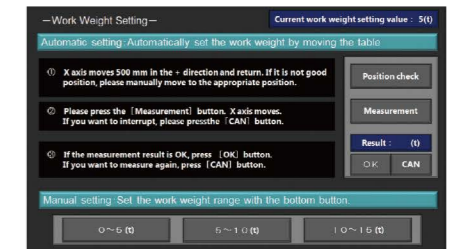
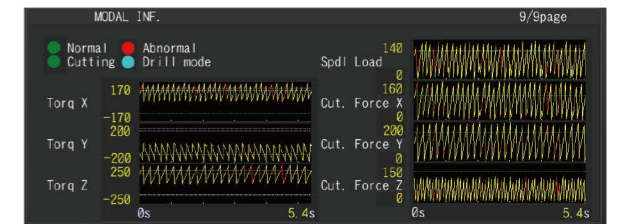
### Sensorless Cutting Force Detection

Real time monitoring of cutting forces during machining. Detection of machining abnormalities and protection of workpieces and tools.



### Work Weight Setting

Simply follow the instructions on the screen and set the weight of the workpiece. Machining suitable for workpiece weight is realized.

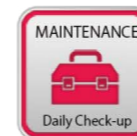


## Preventive Maintenance and Monitoring



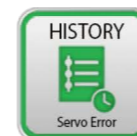
### Operation Status List

The machine operation status and the operating ratio are displayed in graphs and with numerical values. The list can be displayed on a weekly or monthly basis.



### Daily Inspection

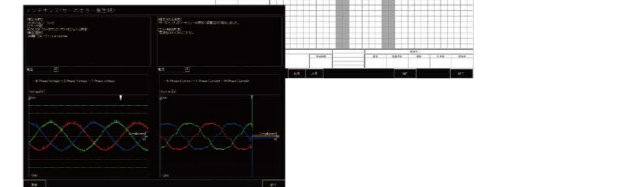
Daily inspection can be performed on the screen. Results can be saved in pdf format by easy operation.



### Maintenance

Detailed data when some malfunction occurs in the mechanical system is saved. Factor analysis is possible with graphs and other data at a later time.

DATE	OPERATION TIME	OPERATION RATIO	UPPER %	LOWER TIME (S)
18/07/26	[Graph]	[Graph]	58	13 17 5
18/07/23	[Graph]	[Graph]	34	25 9 21 5
18/07/22	[Graph]	[Graph]	38	25 9 25 5
18/07/21	[Graph]	[Graph]	42	25 9 30 5
18/07/20	[Graph]	[Graph]	45	25 9 34 5
18/07/19	[Graph]	[Graph]	50	25 9 38 5
18/07/18	[Graph]	[Graph]	55	25 9 42 5
18/07/17	[Graph]	[Graph]	59	25 9 46 5
18/07/16	[Graph]	[Graph]	63	25 9 50 5
18/07/15	[Graph]	[Graph]	67	25 9 55 5
18/07/14	[Graph]	[Graph]	71	25 9 59 5



# New Design Pursuing Workability

## Operation Panel and Diagonal Door



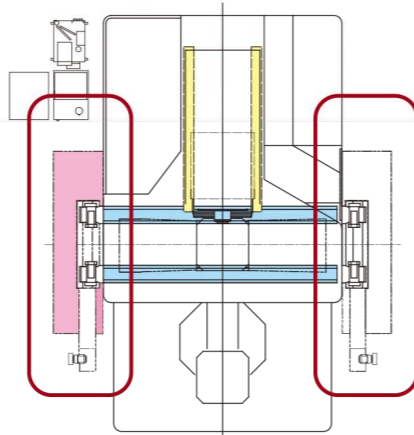
Improved operability and visibility achieved with the operation panel that can rotate from 0 to 90 degrees and the diagonal door.

## Daily Inspection Devices



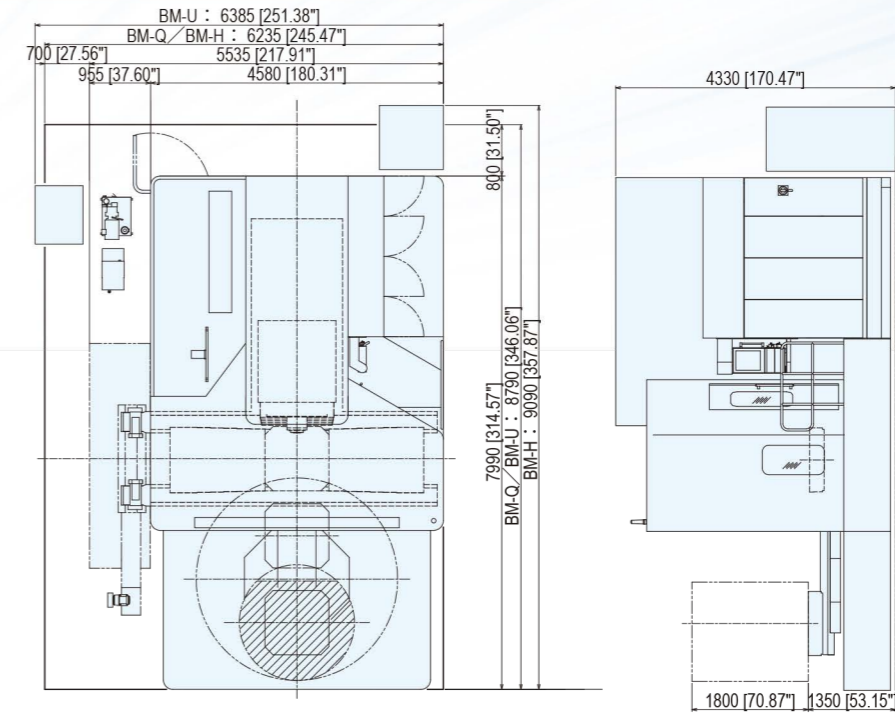
Easy maintenance achieved by placing the devices that require daily inspection together on the back panel of the machine.

## Placement Layout



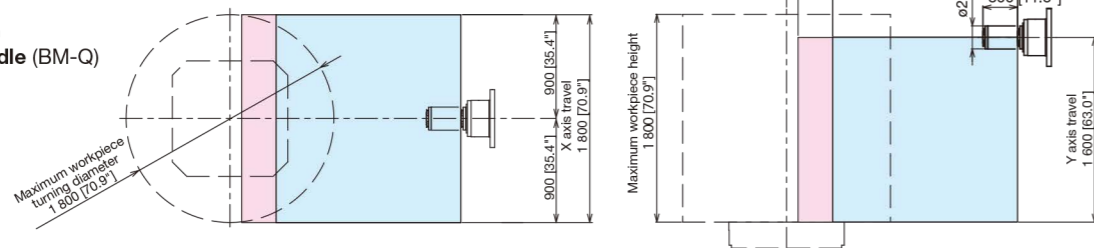
The chip conveyor and the coolant unit can be installed on either the left or the right depending on the layout. (Supported as an option)

## Machine general view

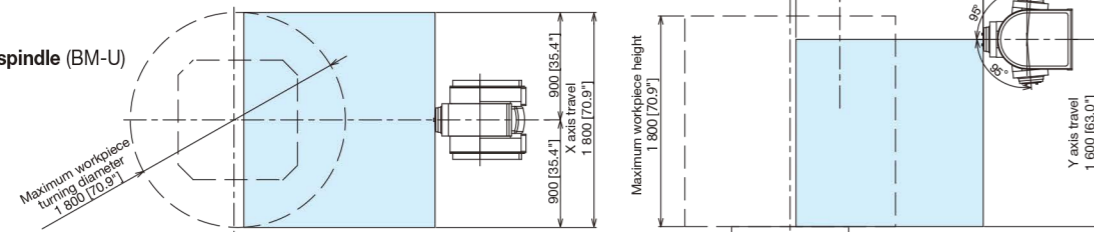


## Axis travel

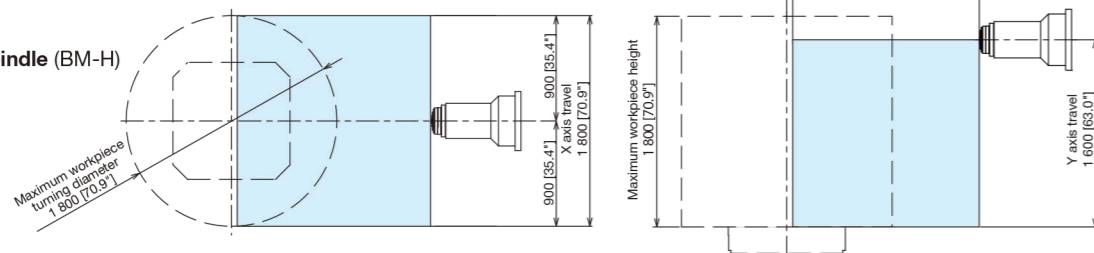
### BM-Q Standard spindle (BM-Q)



### BM-U Universal head spindle (BM-U)



### BM-H High speed spindle (BM-H)



Machine specifications			BM-Q Standard Spindle	BM-U Universal Head Spindle	BM-H High Speed Spindle	
Travel	X-axis travel (Cross movement of pallet)	mm [in]	1 800 [70.9]			
	Y-axis travel (Vertical movement of spindle head)	mm [in]	1 600 [63.0]			
	Z-axis travel (Longitudinal movement of column)	mm [in]	1 600 [63.0]			
	W-axis travel (Quill extension)	mm [in]	300 [11.8]			
	A-axis travel (Spindle rotation)	deg		±95		
Pallet	Pallet working surface	mm [in]	1 000×1 000 [39.4×39.4] [1 250×1 250] [49.2×49.2] [800×1 000] [31.5×39.4]			
	Pallet loading capacity	kg [lb]	3 000 [6 615.0] [4 500] [9 920.8]			
	Pallet table surface		1 000×1 000: 36×M20 [T slot 22 mm [0.9"] 6 pieces] 1 250×1 250: [60×M20] [T slot 22 mm [0.9"] 8 pieces] 800×1 000: [34×M16] [T slot 18 mm [0.7"] 5 pieces]			
	Minimum indexing angle	deg	0.0001			
Spindle	Spindle speed range	min <sup>-1</sup>	20~6 000	150~12 000	150~20 000	
	Maximum spindle torque	N·m [lbf·ft]	1 600 [1 180.2]	236 [174.1]	106 [78.2]	
Feedrate	Rapid traverse rate	X, Y, Z	40 [1574.8]			
		B	1 600			
		W	6			
	Feedrate	A	3 600			
		X, Y, Z	1~25 000			
Jogging feed	A	3 600				
Automatic tool changer	Type of tool shank		MAS BT50	MAS BT50	HSK A100	
	Type of retention knob		MAS P50T-1 (45°)	MAS P50T-1 (45°)		
	Tool storage capacity		60 [90, 120] tools			
	Maximum tool diameter	When pots are full:	mm [in]	ø125 [4.9]		
		When adjacent pots are empty:	mm [in]	ø240 [9.8]		
	Maximum tool length		mm [in]	550 [21.7]		
	Maximum tool mass		kg [lb]	25 [55.1]		
Method of tool selection			Pot address random short-cut			
Power sources	Electric power supply		AC 200/220V ±10%, 50/60Hz ±1Hz			
	Power capacity	kVA	130	175	260	
	Compressed air source		0.5~0.8MPa (5~8kgf/cm <sup>2</sup> ), 550Nℓ/min			
Machine size	Machine height	mm [in]	4 330 [170.5]			
	Floor space (Including maintenance area)	mm [in]	6 235×8 790 [245.5×346.0]	6 385×8 790 [251.4×346.0]	6 235×9 090 [245.5×357.9]	
	Mass of machine	kg [lb]	35 000 [77 161.8]			

Values in brackets [ ] are optional

# Specifications

## Spindle specifications (Please select the spindle specifications)

- 1 Standard spindle (BM-Q)
- 2 Universal head spindle (BM-U)
- 3 High speed spindle (BM-H)

## Standard spindle (BM-Q) Accessories

- 1 Mist unit for spindle gear

## Optional Accessories for standard spindle (BM-Q)

- 1 High-Power 45kW (60.3HP) spindle

## Universal head spindle (BM-U) accessories

- 1 A-axis rotary scale
- 2 Step-up transformer

## High speed spindle (BM-H) accessories

- 1 Step-up transformer

## Pallet Specifications

- |   |  |
|---|--|
| 1 1 000 x 1 000mm [39.4 x 39.4in] 36xM20 (Standard pallet specifications) | 4 1 000 x 1 000mm [39.4 x 39.4in] T slot 22mm [0.9in] (JIS3 Grade) 6 pieces (Optional pallet specifications) |
| 2 1 250 x 1 250mm [49.2 x 49.2in] 60xM20 (Optional pallet specifications) | 5 1 250 x 1 250mm [49.2 x 49.2in] T slot 22mm [0.9in] (JIS3 Grade) 8 pieces (Optional pallet specifications) |
| 3 800 x 1 000mm [31.5 x 39.4in] 34xM16 (Optional pallet specifications)   | 6 800 x 1 000mm [31.5 x 49.2in] T slot 18mm [0.7in] (JIS3 Grade) 5 pieces (Optional pallet specifications)   |

## Standard Accessories

- |   |  |
|---|--|
| 1 Numerical control system TOSNUC PX200                               | 11 Coil conveyor (Z-axis, 2 set)                 |
| 2 Auto power OFF unit   | 12 Splash cover                                  |
| 3 Plug socket for connecting an external device (AC 100 V, 5 A)       | 13 Automatic tool changer (60 tools)             |
| 4 Pallet edge locators (3 pieces / 1 pallet)                          | 14 Automatic pallet changer (2 pallets)          |
| 5 Table bed cover (X-axis cover, Telescopic steel cover, Horizontal)  | 15 APC stage for setup (Checkered plate)         |
| 6 Column cover (Y-axis cover, bellows cover, Longitudinal)            | 16 Hydraulic unit (*)                            |
| 7 Column bed cover (Z-axis cover, Telescopic steel cover, Horizontal) | 17 Oil cooler (*)                                |
| 8 Lubrication unit (for B-axis)                                       | 18 Installation parts                            |
| 9 Operator call lamp (3 colors: red, yellow and green)                | 19 Assembly and reassembly tools for maintenance |
| 10 Hinged plate conveyor (X-axis, 2 set)                              |  |
- \*: Specifications differ by the spindle specification.

## Optional accesories

- |   |   |
|---|---|
| 1 Flood coolant set   | 18 Test bar   |
| 2 Through-spindle coolant set                                 | •tool diameter: 60 mm [2.4 in]  |
| •Pump source pressure 1.0 MPa [145.0 psi]                     | •tool length: 310 mm [12.2 in]  |
| •Pump source pressure 2.0 MPa [290.1 psi]                     | 19 Earth leakage protection device  |
| 3 Through-tool coolant set (only BM-Q)                        | 20 Linear scale feedback: X, Y, Z-axis  |
| •Pump source pressure 1.0 MPa [145.0 psi]                     | 21 Rotary scale feedback: B-axis  |
| •Pump source pressure 2.0 MPa [290.1 psi]                     | 22 Chip bucket (C)  |
| 4 Chip blow air unit (only BM-Q)                              | Bucket capacity: Approx. 0.18 m <sup>3</sup> [180 L] [47.6 gal]   |
| 5 Mist coolant system   | 23 Customer's designated machine exterior painting color  |
| 6 Coolant / air blow unit (only BM-Q)                         | 24 External M-code output.  |
| 7 Shower coolant set  | 25 Multi-pallet magazine system   |
| 8 APC cover   | The number of pallets will be changed for your choice from basic 2 pallets. Choose one type from "6, 8, 10 pieces". |
| 9 APC fence   | 26 Collet MAS-II (BM-Q, BM-U)   |
| 10 X, Y, Z-axis Ball Screw Cooling System                     | Collet is changed from MAS-TYPE I to MAS-TYPE II.   |
| 11 The maximum loading 4 500 kg [9 920.8 lb]                  | 27 Through-spindle air blow   |
| 12 Automatic tool changer (ATC)                               | 28 Through-spindle coolant / air blow   |
| Tool storage capacity: Choose one type from "90, 120 tools".  | 29 Change scaffolding to grating for APC  |
| 13 Optional pull stud   | 30 APC step for APC cover   |
| 14 Automatic measuring function                               | 31 APC step for APC fence   |
| 15 Calibration block (for automatic measuring function )      | 32 Operator call lamp addition  |
| 16 Automatic tool length measuring function                   | 33 Safety specification conformity with CSA (CANADA).   |
| 17 Master tool (for automatic tool length measuring function) |   |

## CNC system specifications TOSNUC PX200 standard specifications

- |  |  |  |
|--|--|--|
| 1 Controlled axes  | 5-9.Program check                              | 11-10.Mirror image   |
| 1-1.Controlled axes  | 6 Operation and display                        | 11-11.All clear  |
| X,Y,Z,B,W 5 axis (BM-Q)  | 6-1.Customized keys                            | 11-12.Command Reset  |
| X,Y,Z,B,A 5 axis (BM-U)  | 6-2.Parameter editing                          | 11-13.Feed hold  |
| X,Y,Z,B, 4 axis (BM-H)   | 6-3.Tool file                                  | 11-14.Cycle stop   |
| 1-2.Simultaneously controllable axes                               | 6-4.Display function                           | 11-15.Restart  |
| 5 axis (X,Y,Z,B,W) (BM-Q)  | 6-5.Display clear function                     | 11-16.Sequence number collation and stop                     |
| 5 axis (X,Y,Z,B,A) (BM-U)  | 6-6.S.F. manual setting                        | 11-17.Manual numerical command                               |
| 4 axis (X,Y,Z,B) (BM-H)  | 6-7.S.F. auto setting                          | 11-18.Single block control                                   |
| Positioning(G00),Linear interpolation (G01)                        | 6-8.Spindle drive motor load display           | 11-19.Feed hold control                                      |
| 2 axes for circular interpolation (G02,G03) X-Y,Z-Z-X              | 6-9.Working time display                       | 11-20.Override control                                       |
| 2 Programming methods  | 6-10.Counting of lot number                    | 11-21.Handwheel feed interruption control                    |
| 2-1.Programming resolution   | 6-11.Calendar timer                            | 11-22.Manual interruption and manual return                  |
| Linear axis: 0.001mm   | 6-12.Machining record                          | 11-23.Program command alarm detailed display                 |
| Rotary axis:B-axis:0.0001 deg                                      | 6-13.Register of users' names                  | 12 Programming support function                              |
| A-axis:0.0001 deg (BM-U)   | 6-14.Memory operation                          | 12-1.Plane selection   |
| 2-2.Maximum programmable dimension                                 | 6-15.MDI operation                             | 12-2.Circular interpolation by radius Programming            |
| Linear axis: ±99999.999mm  | 6-16.PC HMI                                    | 12-3.Circle cutting  |
| Rotary axis: ±99999.9999deg  | 6-17.Machining display                         | 12-4.Machine coordinate system positioning command           |
| 2-3.Data code  | 6-18.Home display                              | 12-5.Subprogram call   |
| Automatic recognition of ISO/EIA code                              | 6-19.Instruction manual viewer                 | 12-6.Random angle chamfering and corner R programming        |
| 2-4.Data format  | 7 I/O function and devices                     | 12-7.Canned cycle  |
| Variable blocks with Decimal point programming Word address format | 7-1.RS232C interface port A                    | 12-8.Automatic acceleration / deceleration for feed          |
| 2-5.Decimal point input  | 7-2.USB memory                                 | 12-9.Automatic corner override                               |
| Calculator type/Programming resolution type                        | 8 S,T and M functions                          | 13 Mechanical error compensation                             |
| 3 Interpolation  | 8-1.Spindle speed function (S-function)        | 13-1.Backlash compensation                                   |
| 3-1.Positioning  | 8-2.Spindle speed override                     | 13-2.Pitch error compensation                                |
| 3-2.Linear interpolation   | 8-3.Tool function (T-function)                 | 13-3.Zero point correction function                          |
| 3-3.Circular interpolation   | 8-4.Miscellaneous function (M-function)        | 13-4.Non-linear compensation control                         |
| 4 Feed   | 9 Tool offset                                  | 13-5.Preview positioning control + feed forward              |
| 4-1.Rapid traverse rate  | 9-1.Tool length offset                         | 13-6.Uni-directional positioning                             |
| 4-2.Feedrate   | 9-2.Tool offset                                | 14 Machine control support function                          |
| 4-3.Dwell  | 9-3.Cutter compensation C                      | 14-1.Integrated PLC  |
| 4-4.Manual continuous feed   | 9-4.Number of tool offsets                     | 14-2.Feed interlock  |
| 4-5.Rapid traverse rate override                                   | 10 Coordinate system                           | 15 Safety and maintenance                                    |
| 4-6.Feedrate override  | 10-1.Coordinate system setting                 | 15-1.Emergency stop  |
| 4-7.Automatic acceleration / deceleration                          | 10-2.Fixture offset                            | 15-2.Overtravel check  |
| 4-8.S type acceleration / deceleration for rapid traverse rate     | 10-3.Fixture offset 2                          | 15-3.Stored stroke check                                     |
| 4-9.High quality mode function                                     | 10-4.Return to 2nd, 3rd or 4th reference point | 15-4.Interference check II                                   |
| 4-10.Feedrate clamp  | 11 Operation support function                  | 15-5.Self-diagnosis  |
| 5 Part program storage and edit                                    | 11-1.Control in/out                            | 15-6.Software configuration display                          |
| 5-1.Part program storage 2GB                                       | 11-2.Single block                              | 15-7.Alarm display and alarm history                         |
| 5-2.Part program edit function                                     | 11-3.Optional block skip                       | 15-8.History of key operation, alarm and operating condition |
| 5-3.Background edit function                                       | 11-4.Dry run                                   | 15-9.Display copy  |
| 5-4.Program name   | 11-5.Machine lock                              | 15-10.Machine operating status                               |
| 5-5.Sequence number  | 11-6.Auxiliary function lock                   | 15-11.Dairy inspection                                       |
| 5-6.Sequence number search   | 11-7.Axis feed cancel                          | 15-12.Fault diagnosis  |
| 5-7.Program nesting list   | 11-8.Manual absolute ON/OFF                    | 15-13.Life management  |
| 5-8.Program offset list  | 11-9.Override cancel                           | 15-14.Motor load   |

## CNC system specifications TOSNUC PX200 pack specification

Q BM-Q \*Items marked are included in the pack specification U BM-U \*Items marked are included in the pack specification H BM-H \*Items marked are included in the pack specification

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