

BSF-150C

Shibaura Machine



Shibaura Machine

View the Future with You

BSF-150C

Floor-Type Horizontal Milling and Boring Machine



ISO 9001



GOTEMBA plant

SHIBAURA MACHINE CO., LTD.

TOKYO MAIN BRANCH
2-2, Uchisaiwaicho 2-Chome, Chiyoda-ku, Tokyo 100-8503, Japan
TEL:+81-3-3509-0271 FAX:+81-3-3509-0335

SHIBAURA MACHINE CO., AMERICA
Chicago Head Office
755 Greenleaf Avenue, Elk Grove Village, IL 60007, U.S.A.
TEL:847-709-7199 FAX:847-593-9741

Canada Branch
6 Shields Court, Suite 101, Markham, Ontario L3R 4S1, CANADA
TEL:905-479-9111 FAX:905-479-8339

SHIBAURA MACHINE UK LTD.
66 Burners Lane, Kiln Farm, Milton Keynes MK11 3HD
UNITED KINGDOM
TEL:+44-(0)1908-562327 FAX:+44-(0)1908-562348

SHIBAURA MACHINE SINGAPORE PTE. LTD.
Head Office
123 Pioneer Road, Singapore 639596, SINGAPORE
TEL:68611455 FAX:68612023

TOSHIBA MACHINE [THAILAND] CO., LTD.
127/28 Panjathanee Tower, 23rd Floor, Nonthree Road, Khwaeng Chong
Nonthree, Khet Yannawa, Bangkok 10120, THAILAND
TEL:02-681-0158 FAX:02-681-0162

TOSHIBA MACHINE [VIETNAM] CO., LTD.
2nd, VIT Tower, No.519, Kim Ma Street,
Ba Dinh District, Hanoi, VIETNAM
TEL:024-2220-8700,8701 FAX:024-2220-8702

TOSHIBA MACHINE (CHENNAI) PRIVATE LIMITED
No. 65 (P.O. Box No. 5), Chennai-Bangalore Highway, Chembarambakkam,
Poonamallee Taluk, Thiruvallur, Chennai-600123, Tamil Nadu, INDIA
TEL:044-2681-2000 FAX:044-2681-0303

SHIBAURA MACHINE TAIWAN CO., LTD.
No.62, Lane 188, Jui-Kuang Road, Nei-Hu District, Taipei, TAIWAN
TEL:02-2659-6558 FAX:02-2659-6381

SHANGHAI TOSHIBA MACHINE CO., LTD.
Head Office
4788, Jin Du Road, Xinzhuang Industry Zone, Shanghai, 201108
PEOPLE'S REPUBLIC OF CHINA
TEL:021-5442-0606 FAX:021-5866-2450

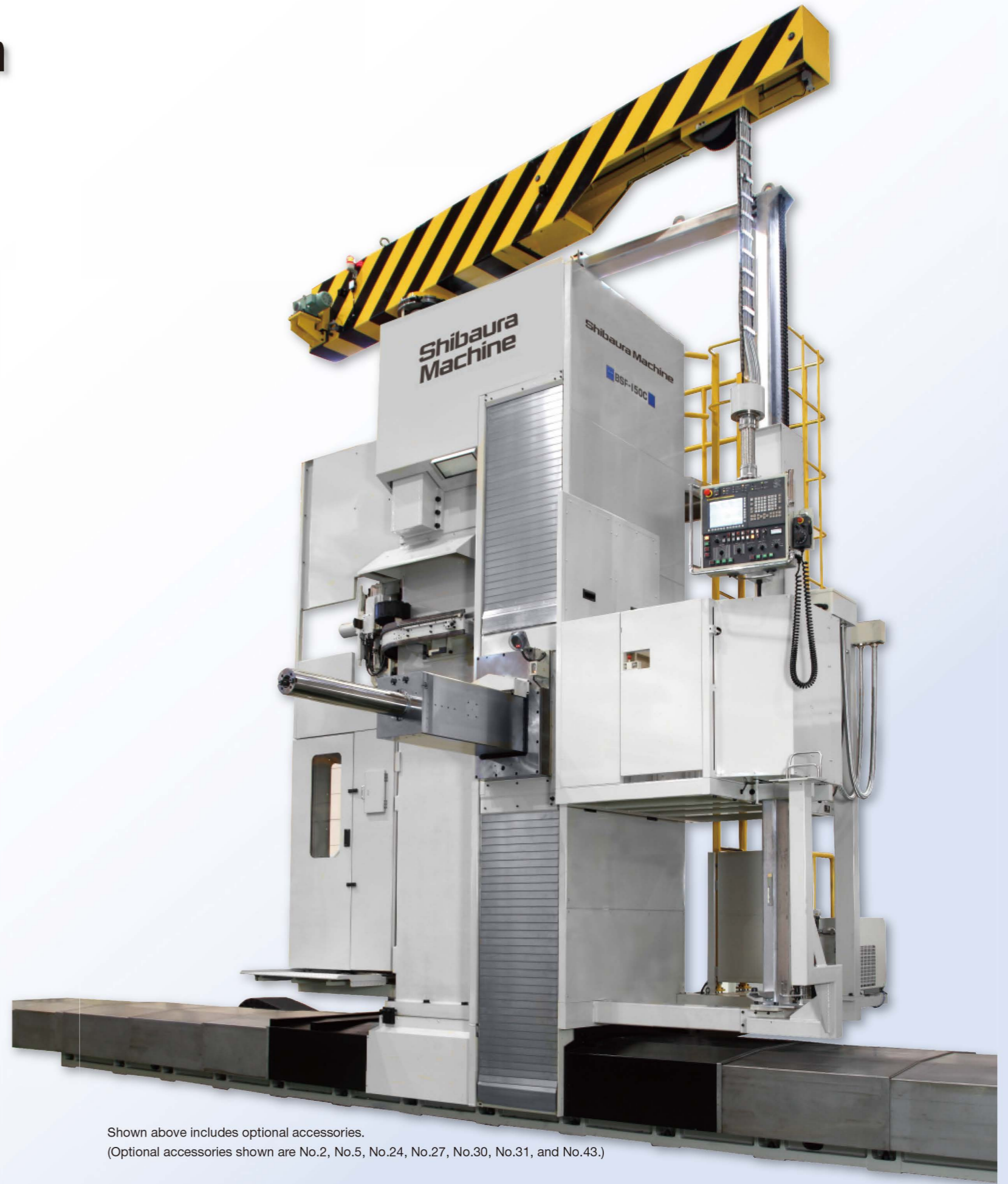
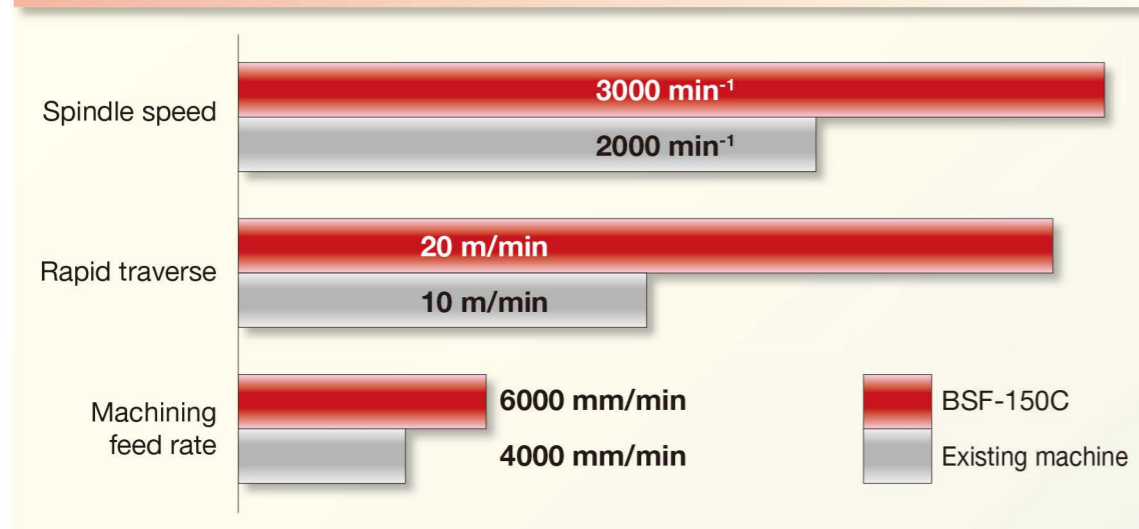
* We reserve the right to change any of specifications in this catalog without notice in order to effect improvements.

This new model has been re-engineered for performance and design in response to the market's need for higher speed and accuracy
Floor Type Horizontal Milling and Boring Machine
with Extendable Rigid Square Ram.

BSF-150C

- Higher maximum rapid and feed traverse with higher spindle speed provide faster machine time and better cutting performance.
- Higher rigidity, higher accuracy and higher spindle speed results in high machine performance.
- Optional automated accessories such as ATC, AATC, AAC, AAI, etc. eliminates unnecessary set-up changes and minimizes man-power.
- Optional long extension 380 mm square ram provides high rigidity and excellent work piece accessibility. (Optional accessories)

Evolution of BSF



Shown above includes optional accessories.
 (Optional accessories shown are No.2, No.5, No.24, No.27, No.30, No.31, and No.43.)

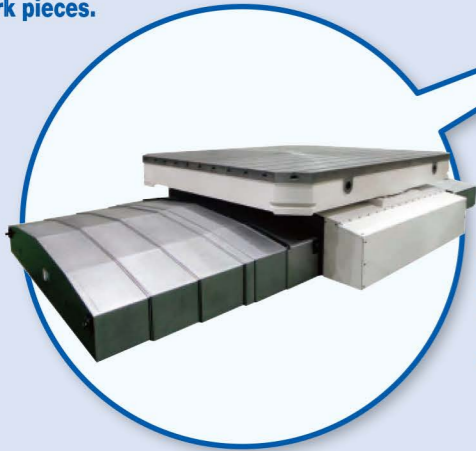
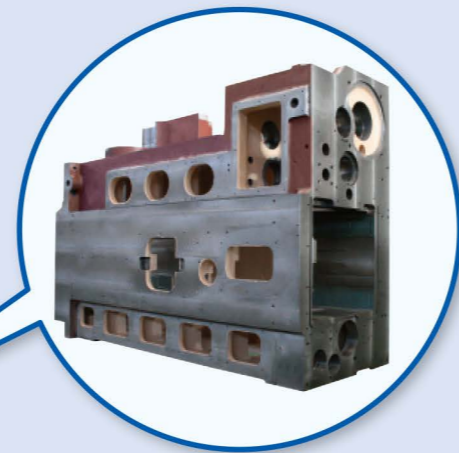
Features of BSF-150C



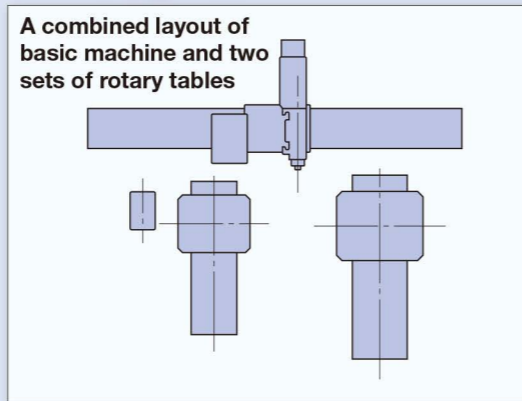
Maximum optional specification for a total extension of W and Z axis is 1 800 mm, 380 mm x 380 mm square gives the optimum accessibility to the most difficult work pieces.



The spindle head is mono-block type cast iron to create a rigid ram support guide for long extension.



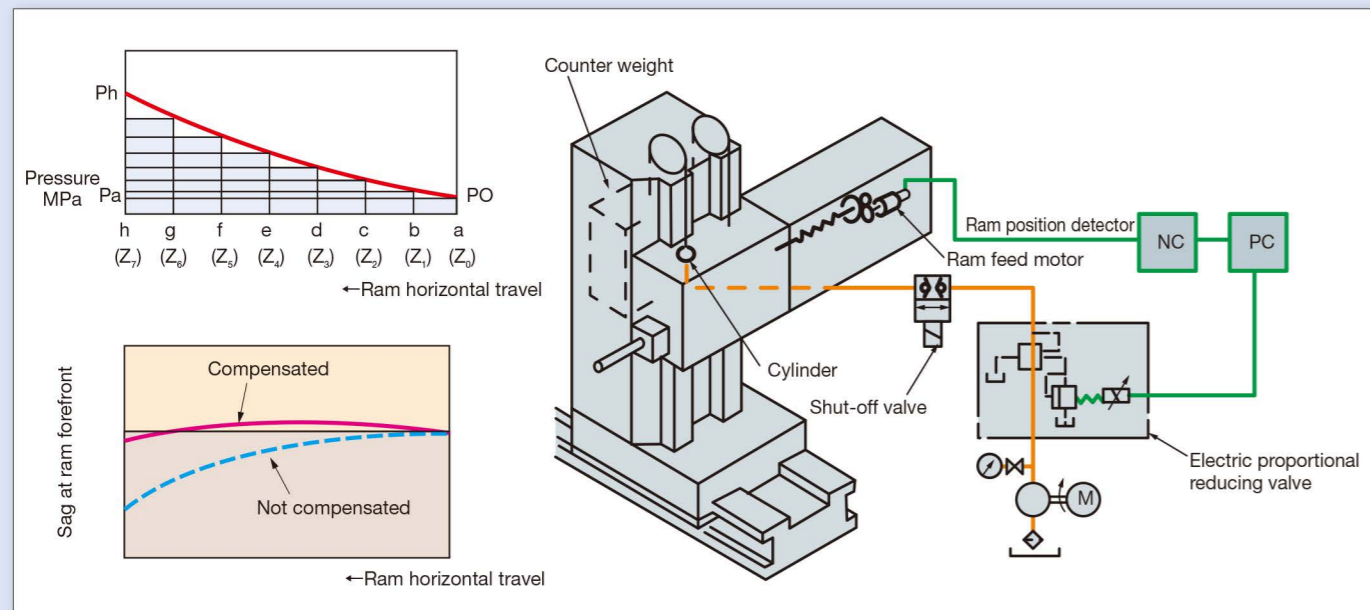
Improve production flexibility and efficiency when combined with an optional Rotary Table.



Two different size rotary tables are placed in front of a basic machine.

Spindle head gravity center compensating device

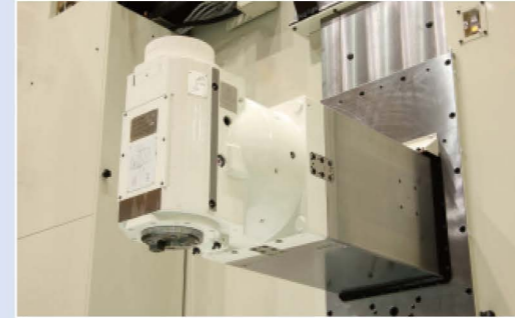
The Spindle head-center of gravity compensating device counteracts the primary cause of ram sag which occurs when changing center of gravity as the ram moves out. Tension on two balancing cables, front and rear, are automatically adjusted based on ram position to achieve optimum straightness when extending the ram.



Extensive Attachments (Optional accessories)

Other attachments can be supplied based on customer requirements.

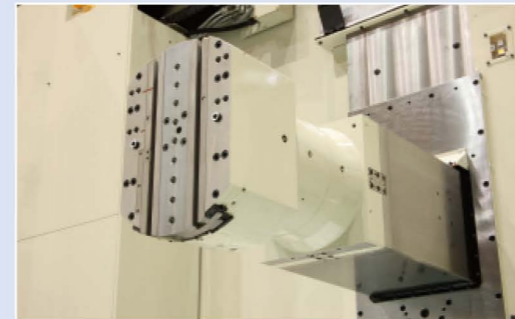
Angle Head L370



Angle Head L700



Facing Head

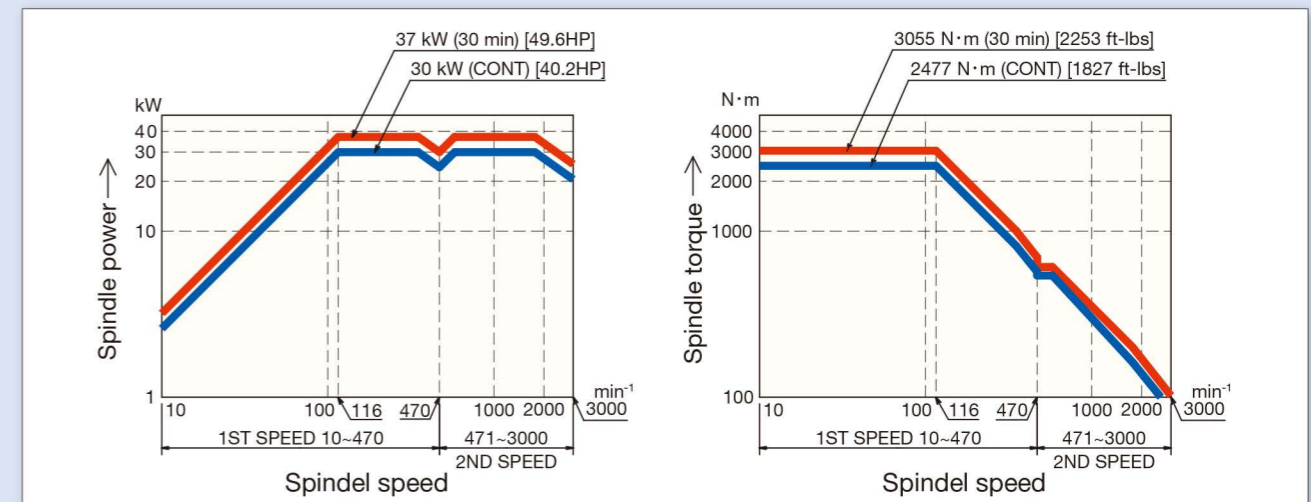


Universal Head



Contact us for attachments not shown above.

Spindle capacity diagram



Machining data example

	Facemill	Endmill
Material	S55C	S55C
Cutter diameter	∅ 200 mm	∅ 80 mm
Spindle speed	190 min ⁻¹	352 min ⁻¹
Depth of cut	6 mm	50 mm
Machining width	180 mm	30 mm
Feedrate	1110 mm/min	562 mm/min
Chip volume	1190 cc/min	848 cc/min
Ram extension	640 mm	316 mm



* Above data might be different on each machine, according to setup jig, machining position, cutting edge and tool holder.

Standard accessory

1 SET

- (1) Electrical cabinet
- (2) CNC unit including standard specifications
- (3) Automatic tool clamp/unclamp device in the spindle MAS P50T-1(45°)
- (4) Spindle oriented stop
- (5) Spindle air blowing at tool change (for ATC)
- (6) Spindle head gravity center compensating device
- (7) Mist lubrication unit (for spindle bearing)
- (8) Lubrication unit (for column/column base)

- (9) Hydraulic unit
- (10) Column slideway cover
- (11) Telescopic steel cover for bed slideways
- (12) Cable drag chain for electrical wiring and pipings
- (13) Wiring : inside of machine and between machine/control cabinet
- (14) Piping : inside of machine and between machine/power unit
- (15) Special maintenance tools

Optional accessory

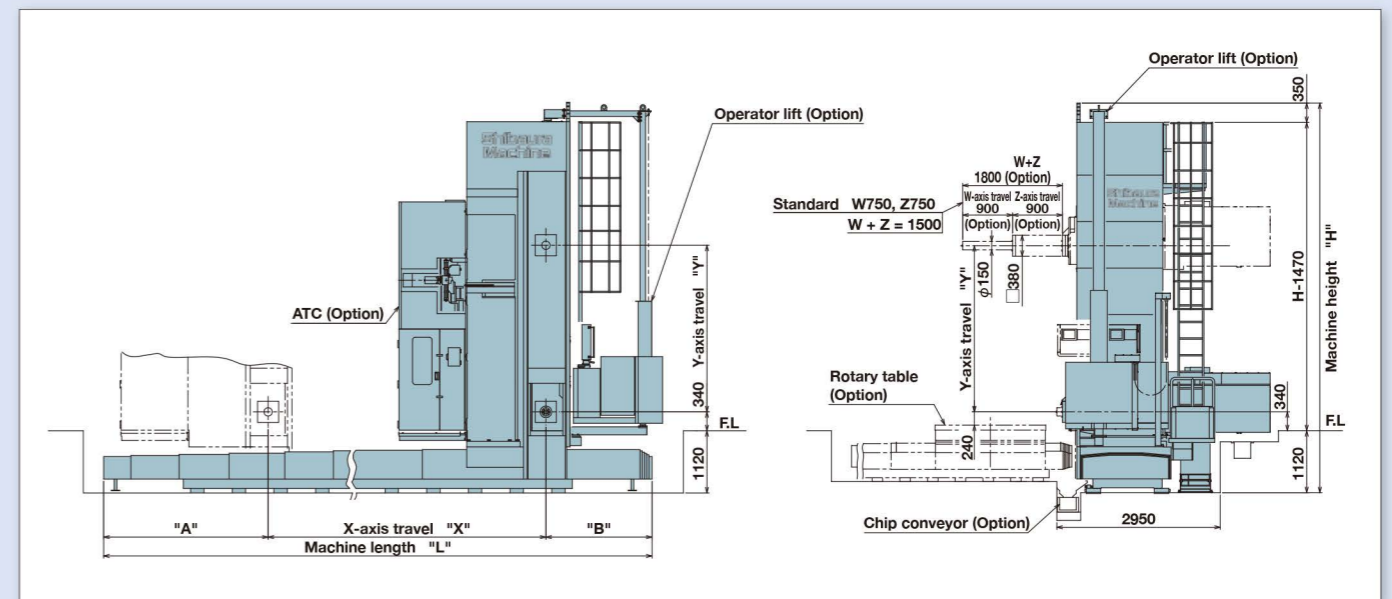
Item	Remarks
1	Installing parts leveling blocks, anchor bolts and plates
2	Long extension version on Z and W axes Z 900 mm, W 900 mm Z + W = 1800 mm
3	Pull-stud MAS P50T-2 (30°) type pull-stud
4	Big PLUS Spindle nose
5	Automatic tool changer (ATC) 60 or 90 or 120 tools Tool dimensions $\phi 125 \times 500$ mm Max. tool diameter $\phi 320$ mm Max. L-shaped boring tool with $\phi 400$ mm Max. mass of tool 30 kg
6	Automatic attachment changer (AAC)
7	Automatic attachment indexer (AAI) At every 90 degree
8	Operator-call lamp (LED) Three color of red, yellow and green
9	Flood coolant system Coolant tank capacity 1000 Liter (X-axis under 9 m) 2000 Liter (X-axis over 10.5 m) Pump delivery pressure 1 MPa Water-soluble type coolant A splash guard cover is not included
10	Through-spindle coolant delivery Coolant delivery quantity 10 litre/min
11	Spindle air blow function Air through spindle by push button or M-code
12	Linear scale feedback on X and Y axes
13	Linear scale feedback on Z-axis
14	Angle head L370 AAC, AAI (at 90 deg. Position) and AATC are available Spindle power : 20 kW/200 min ⁻¹ Maximum spindle speed is 2 500 min ⁻¹
15	Angle head L700 AAC and AAI (at 90 deg. Position) are available Tool must be changed manually Spindle power : 6 kW/200 min ⁻¹ Maximum spindle speed is 2 000 min ⁻¹
16	Angle head L800 R AAC and AAI (at 90 deg. position) are available Tool must be changed manually Spindle power : 10 kW/200 min ⁻¹ Maximum spindle speed is 2 000 min ⁻¹ Head is indexed manually at any angle.
17	Snout L1000 AAC and AAI are available Spindle power : 20 kW/200 min ⁻¹ Maximum spindle speed is 2 000 min ⁻¹ An additional tool rack is required to change tool automatically.
18	Universal head AAC is available Head is indexed manually at any angle. Tool must be changed manually Spindle power : 20 kW/200 min ⁻¹ Maximum spindle speed is 500 min ⁻¹

Item	Remarks
19	5-dere. index head AAC and AAI (at 5 deg. position) are available Tool must be changed manually Spindle power : 15 kW/200 min ⁻¹ Maximum spindle speed is 2 000 min ⁻¹
20	Facing head CS AAC is available Tool must be changed manually Maximum spindle speed is 200 min ⁻¹ One set of tool holder is included.
21	Attachment stocker rack All attachments can be stored in the rack, including protection door and attachment ID. About 700 mm of X-axis travel would be occupied for the unit.
22	Attachment stocker pallet Each attachment is stored on the machine, in its own pallet. One of attachments on pallet is placed on the pallet base by crane. About 700 mm of X-axis travel would be occupied for the unit.
23	Automatic origin compensation
24	Automatic measurement of workpiece Radio touch probe Including measuring software and calibration block
25	Automatic tool length measurement
26	W axis thermal expansion compensation
27	Operator's lift Loading capacity : 200 kg Lifting speed : 4 000 mm/min
28	Power outlet socket on electrical control box One piece for 100 volt 10 ampere
29	Air connection port on operator's lift For maintenance
30	Motorized arm for pendant control box
31	Work light (LED) At upper portion of the column
32	Automatic main power shutdown Including NC power
33	Rotary Table To be discussed
34	B-axis rotary scale feedback For rotary table listed above
35	V-axis linear scale feedback For rotary table listed above
36	Step on the bedcover
37	Chip conveyor along the Basic Machine Lift-up above floor with emergency switch
38	Chip conveyor besides Rotary Table Lift-up above floor
39	Floor plate with its leveling device 1600 x 2400 x 300 mm
40	Floor plate with its leveling device 2000 x 4000 x 300 mm
41	Hydraulic unit
42	Air compressor 22 kW Including automatic water draining, filter and dryer
43	Custom painting color To be discussed in detail.
44	Transformer

Machine Specifications

Travel	X-axis travel	mm [in]	4 500~18 000 [177.2~708.7] (1 500 [59.1] increment)
	Y-axis travel	mm [in]	2 500 [98.4], 3 000 [118.1], 3 500 [137.8], 4 000 [157.5]
	Z-axis travel	mm [in]	750 [29.5] (OP 900 [35.4])
	W-axis travel	mm [in]	750 [29.5] (OP 900 [35.4])
	Total extension of ram and spindle (Z and W axis)	mm [in]	1 500 [59.1] (OP 1 800 [70.9])
Spindle	Spindle diameter	mm [in]	150 [5.9]
	Spindle speed	min ⁻¹ (rpm)	10~3 000
	Taper on the spindle		7/24 taper No.50
	Ram dimensions	mm [in]	380 x 380 [14.96 x 14.96]
	Maximum spindle torque	N · m [ft · lbf]	3 055 [2 253] (OP 3 656 [2 697])
Feedrate	Rapid traverse (X, Y, Z, W)	m/min [ipm]	20 [787.4] (X and Y axis) 15 [590.5] (Z axis) 10 [393.7] (W axis)
	Feedrate (X, Y, Z, W)	mm/min [ipm]	1~6 000 [0.04~236]
Tool	Tool Shank		MAS BT50
	Pull stud		MAS P50T-1 (45°)
Motor	Spindle motor (30-min.rating/cont.rating)	kW [HP]	AC 37/30 [49.6/40.2]
CNC Controller			FANUC Series 31i-MODEL B
Accuracy	Positioning accuracy	mm [in]	X, Y axis $\pm 0.007/1 000$ [$\pm 0.0003/40$] Z axis $\pm 0.007/500$ [$\pm 0.0003/20$]
	Repeatability	mm [in]	± 0.005 [± 0.0002] X, Y, and Z axis
Painting Color	External color		Munsell 5Y8.4/0.5 (R4-383)
	Internal color		Munsell 10YR8/4

General View



X-axis travel	X	mm [in]	4 500 [177.2]	6 000 [236.2]	7 500 [295.3]	9 000 [354.3]	10 500 [413.4]	12 000 [472.4]	13 500 [531.5]	15 000 [590.6]	18 000 [708.7]
Machine length	L	mm [in]	9 370 [368.9]	10 870 [428]	12 370 [487]	13 870 [546.1]	15 770 [620.9]	17 270 [679.9]	18 770 [739]	20 270 [798]	23 420 [922]
Dimension "A"	A	mm [in]	2 960 [116.5]	2 960 [116.5]	2 960 [116.5]	2 960 [116.5]	3 160 [124.4]	3 160 [124.4]	3 160 [124.4]	3 160 [124.4]	3 235 [127.4]
Dimension "B"	B	mm [in]	192 [75.6]	1 920 [75.6]	1 920 [75.6]	1 920 [75.6]	2 110 [83.1]	2 110 [83.1]	2 110 [83.1]	2 110 [83.1]	2 185 [86]

Y-axis travel	Y	mm [in]	2 500 [98.4]	3 000 [118.1]	3 500 [137.8]	4 000 [157.5]	When equipped with pendant arm				
Machine height	H	mm [in]	6 535 [257.3]	7 035 [277]	7 535 [296.7]	8 035 [316.3]	500 [19.7]				

CNC Controller FANUC Series 31i-MODEL B



Excellent operability

Manual Operation

Manual pendant allows for easy manual operation. Levers for Jog, spindle, override rotary switches, coolant/conveyor switches tool unclamp/clamp and more, allows for convenient operation in Manual mode and CNC mode. A portable handwheel unit allows fine movement in manual mode for set up and manual machining.

Automatic Operation

Essential optional functions for the Fanuc control are included in the standard machine specifications. They include canned cycles, custom macro, etc.

Standard and Package Specifications

Package specifications with "*" mark are included with the standard specification, even though specified as options from FANUC

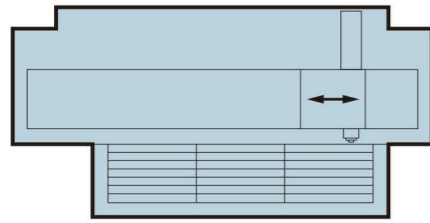
Functions	Remarks
A. Controlled Axis	
1 Controlled axes	X axis Column travel Y axis Spindle head travel Z axis Ram extension W axis Spindle extension 4 axes
2 Simultaneously controlled axes expansion	Linear Axis 0.001 mm or 0.0001 inch Rotary Axis (B) 0.0001 degree
3 Least input increment	
4 Interlock	
5 Machine lock	
6 Emergency stop	
7 Over travel	
8 Stored stroke check 1	
* 9 Stored stroke check 2, 3	
* 10 Mirror image	
B. Operation	
1 Automatic operation	
2 MDI operation	
3 Cycle start/feed hold	
4 Program number search	
5 Sequence number search	
* 6 Sequence number comparison and stop	
7 Buffer register	
8 Dry run	
9 Single block	
10 Manual continuous feed (JOG)	
11 Manual reference position return	
* 12 Manual handle feed (MPG)	1 unit
* 13 Manual handle feed rate	x1, x10, x100
* 14 Handle interruption	
* 15 Manual numerical command	
C. Interpolation function	
1 Positioning	G00
2 Single direction positioning	G60
3 Exact stop mode	G61
4 Tapping mode	G63
5 Cutting mode	G64
6 Exact stop	G09
7 Linear interpolation	G01
8 Circular interpolation	G02/G03
9 Dwell	G04 (in second)
* 10 Threading, synchronous cutting	
11 Skip	G31
12 Reference position return	G28 G29
13 Reference position return check	G27
14 2 nd reference position return	
D. Feed function	
1 Rapid traverse	
2 Rapid traverse override	0-100%, 10% step
3 Feed per minute	mm/min
* 4 Feed per revolution	For threading and synchronous cutting
5 Tangential speed constant control	
6 Cutting feedrate clamp	
7 Automatic acceleration/deceleration	Rapid traverse : linear Cutting feed : exponential or liner
8 Rapid traverse bell-shaped acceleration/deceleration	
9 Feed rate override	0-200%, in 10% step
10 Override cancel	
* 11 External deceleration	
12 Liner acceleration/deceleration after cutting feed interpolation	
E. Program input	
1 Label skip	
2 Control IN/OUT	
* 3 Optional block skip	3 kinds
4 Maximum programmable dimension	±9 digits
5 Program file name	32 characters
6 Sequence number	N8-digits
7 Absolute/incremental programming	G90, G91
8 Decimal point programming/pocket calculator type decimal point programming	
9 Diameter/Radius programming	
10 Plane selection	G17, G18, G19
11 coordinate system setting	
* 12 Workpiece coordinate system	G52-G59
13 Manual absolute ON/OFF	
14 Programmable data input	G10
15 Sub program call	Subprogram : 10 folds nested
* 16 Custom macro	
* 17 Addition of custom macro common variables	#100 to #199, #500 to #999 ※These variables are use for sequence macro too
* 18 Canned cycle	
19 Circular interpolation by R (Radius) programming	
* 20 Automatic corner override	

Functions	Remarks
F. Auxiliary/Spindle speed function	
1 Auxiliary function	M3
2 Auxiliary function lock	
3 High-speed M/S/T/B interface	
4 Spindle speed function	S4
5 Spindle override	0-150%, 10% step
G. Tool Function/Tool compensation	
1 Tool function	T4
* 2 Tool offset pairs	200-pairs
3 Tool length offset	G43, G44, G49
* 4 Tool offset	G45-G48
* 5 Tool radius, Tool nose radius compensation	G40-G42
6 Tool length measurement	Manual type
H. Accuracy compensation function	
1 Backlash compensation	
2 Backlash compensation for each rapid traverse and cutting feed	
3 Smooth backlash compensation	
* 4 Stored pitch error compensation	
* 5 Interpolation type pitch error compensation	
* 6 Bi-directional pitch error compensation	
* 7 Extended bi-directional pitch error compensation	
* 8 Inclination compensation	
* 9 Straightness compensation	
* 10 Interpolation type straightness compensation	128 points
I. Editing operation	
* 1 Part program storage size	512 Kbyte (1280 m)
* 2 Number of registerable programs expansion 1	Max. 1000 programs
3 Part program editing	
4 Program protect	
5 Extended part program editing	
* 6 Back ground editing	
* 7 Multi part program editing	
J. Setting and display	
1 Status display	
2 Clock function	
3 Current position display	
4 Program comment display	31 characters
5 Parameter setting and display	
6 Parameter check sum function	
7 Alarm display	
8 Alarm history display	
9 Operation history display	
10 Actual cutting feedrate display	
11 Display of spindle speed and T code at all screens	
12 Operating monitor screen	
13 Servo setting screen	
14 Servo waveform display	
15 Maintenance information screen	
* 16 Multi-language display	English/Japanese
17 Dater protection key	
18 Erase CRT screen display	
19 Parameter set supporting screen	
20 Help function	
21 Self-diagnosis function	
22 Periodic maintenance screen	
23 Display of hardware and software configuration	
24 Servo information screen	
K. Data input/output	
* 1 Reader / Puncher interface A	1 port of RS-232-C
2 Memory card input/output	
3 Automatic data backup	
L. Others	
1 Control unit incorporated type display unit	10.4" color LCD

Optional Accessories

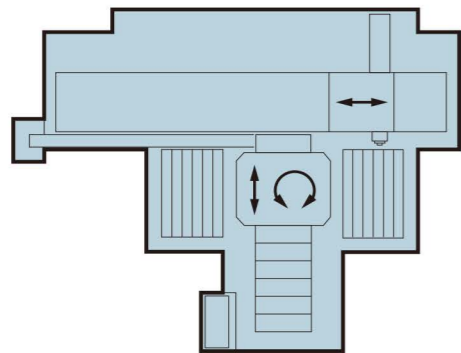
Functions	Remarks
A. Controlled Axis	
1 Controllable axes expansion	V and B axis
2 Parallel axis control	V2 and B2 axis
3 Inch/metric conversion	G20/G21
4 Liner scale I/F with absolute address reference mark	
C. Interpolation function	
1 Cylindrical Interpolation	
2 Helical interpolation	G02/G03
3 3 rd /4 th reference position return	
4 Conical/spiral interpolation	
E. Program input	
1 Polar coordinate command	
2 Additional of workpiece coordinate system	48 pairs
3 Optional chamfering/corner R	
4 Scaling	
5 Coordinate system rotation	G68/G69
6 3-dimensional coordinate system conversion	G68/G69
7 Programmable mirror image	
8 Figure copying	
9 Tape format for FS15	
F. Auxiliary/Spindle speed function	
1 Rigid tapping	
G. Tool Function/Tool compensation	
1 Tool offset pairs	400 items
2 Tool offset pairs	499 items
3 Tool offset pairs	999 items
4 Tool offset memory B	Geometry/wear memory
5 Tool offset memory C	Geometry/wear memory, Tool length/radius offset memory
6 Tool pair for tool management function	64 pairs 64 tools
7 Tool pair for tool management function	240 pairs 240 tools
8 Tool pair for tool management function	1000 pairs 1000 tools
9 Tool life management	
10 Addition of tool pairs for tool life management	Choice of the G9 is necessary Max 1024 pairs
I. Editing operation	
1 Part program storage size	1 Mbyte (2560 m)
2 Part program storage size	2 Mbyte (5120 m)
3 Part program storage size	4 Mbyte (10240 m)
4 Part program storage size	8 Mbyte (20480 m)
5 Number of registerable programs expansion 2	Max 4000 programs
6 Play back	
7 Machining time stamp	
J. Setting and display	
1 Run hour and parts count display	
2 Multi-language display	
3 Graphic function	
K. Data input/output	
1 Additional Reader/puncher interface	1 port of RS-232-C
2 Fast data server	
3 Data server buffer mode	
4 External data input	

Machine Layout



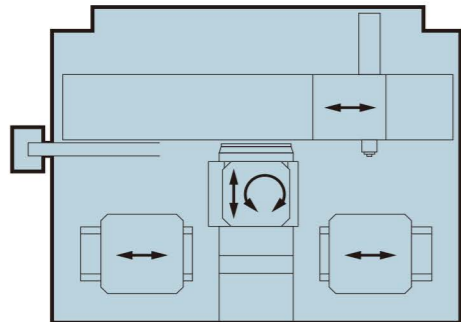
Versatile Layout with Floorplates

Floor plates provide minimum size and weight restrictions for work pieces and allow flexible work piece set-ups. The example sketch shows three floorplates arranged in length-wise, in a single row along X-axis travel. Multiple floorplate arrangements are restricted only by available floor space and can be in crosswise or double row depending on customer requirements.



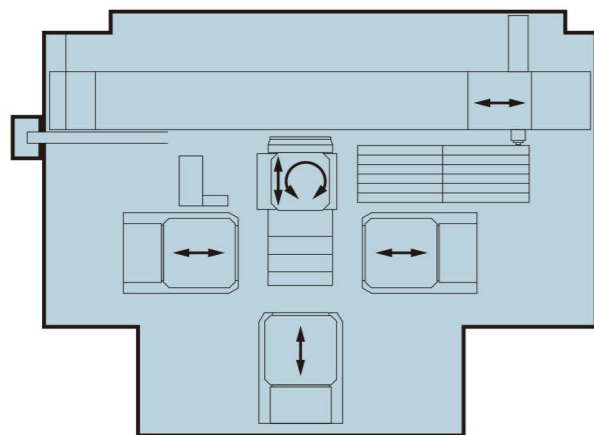
Flexible Layout with Floorplates and Rotary Table

A Rotary Table provides great flexibility allowing machining on multiple face workpieces, boring on inverted face and high precision rotary milling and drastically improves productivity. Combined with floor plates, this specification provides flexibility to machine a wide variety of work pieces. Multiple arrangements of this layout are available.



Unattended operation layout with Rotary Table equipped with pallet changer

A Rotary Table equipped with a pallet changer enhances performance and productivity by allowing unattended operation. 15 percent of production time for a workpiece is used for set-up on average. By utilizing the pallet changer, set-up for the next work piece can be completed while machining the current workpiece, reducing machine downtime to a few minutes to complete a pallet change, greatly increasing machine efficiency and multiple work piece flexibility.

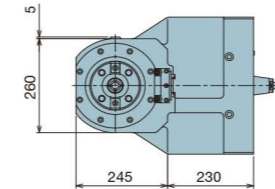
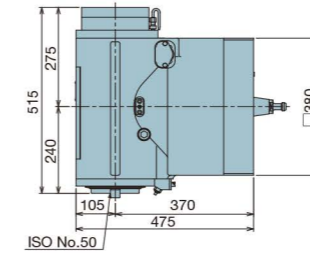


Labor saving layout with Floorplates, Rotary Table and pallet changer

The sketch shows two floor plates, a rotary table with a pallet changer. Combined with an attachment stocker, performance and productivity are drastically enhanced.

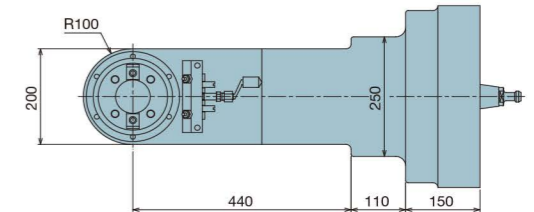
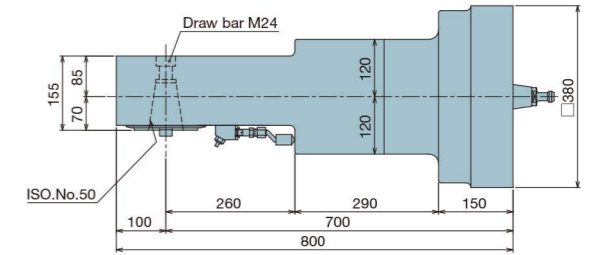
Attachment dimensions

Angle Head

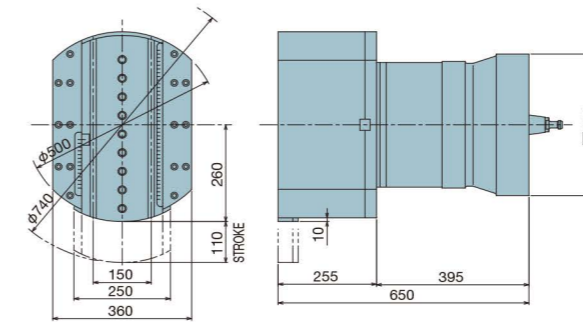


Angle Head L700

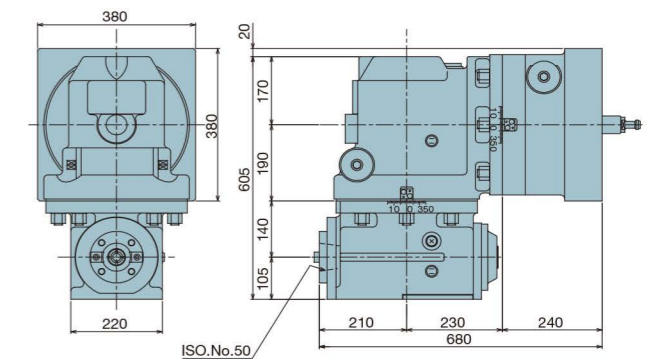
mm



Facing Head



Universal Head

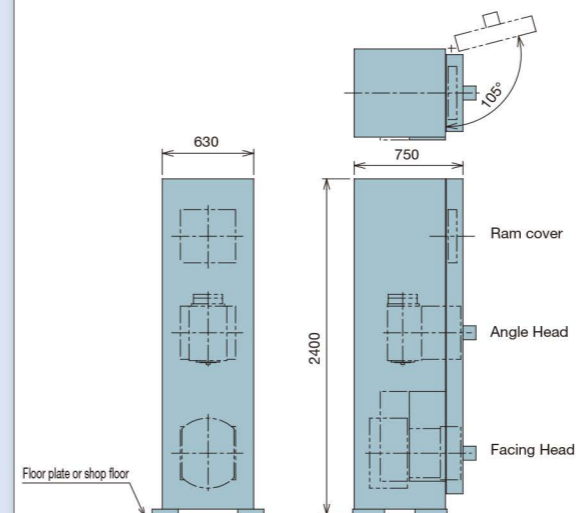


Attachment Stocker

Rack Type

Example ; Angle Head and Facing Head

mm

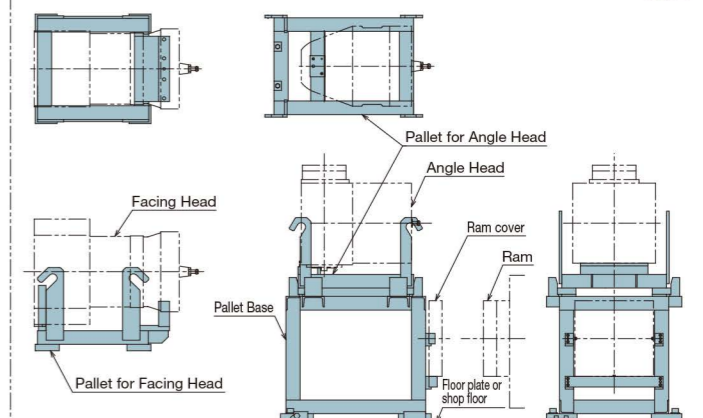


Pallet Type

Example ; Angle Head and Facing Head

- An attachment located on the pallet base will be picked up onto the ram.
- An attachment on the pallet base should be replaced by means of a crane, before mounting another attachment on the ram.

mm



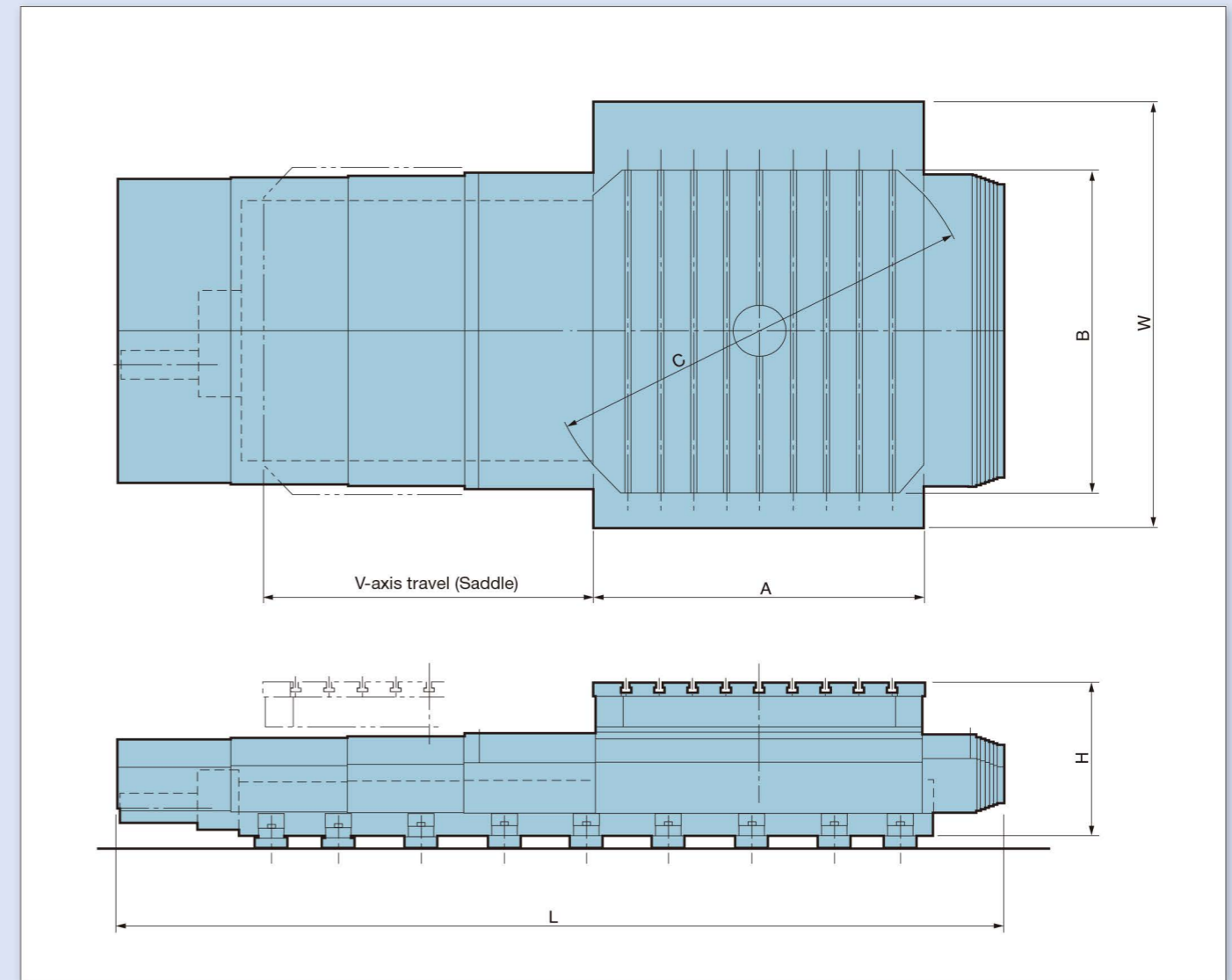
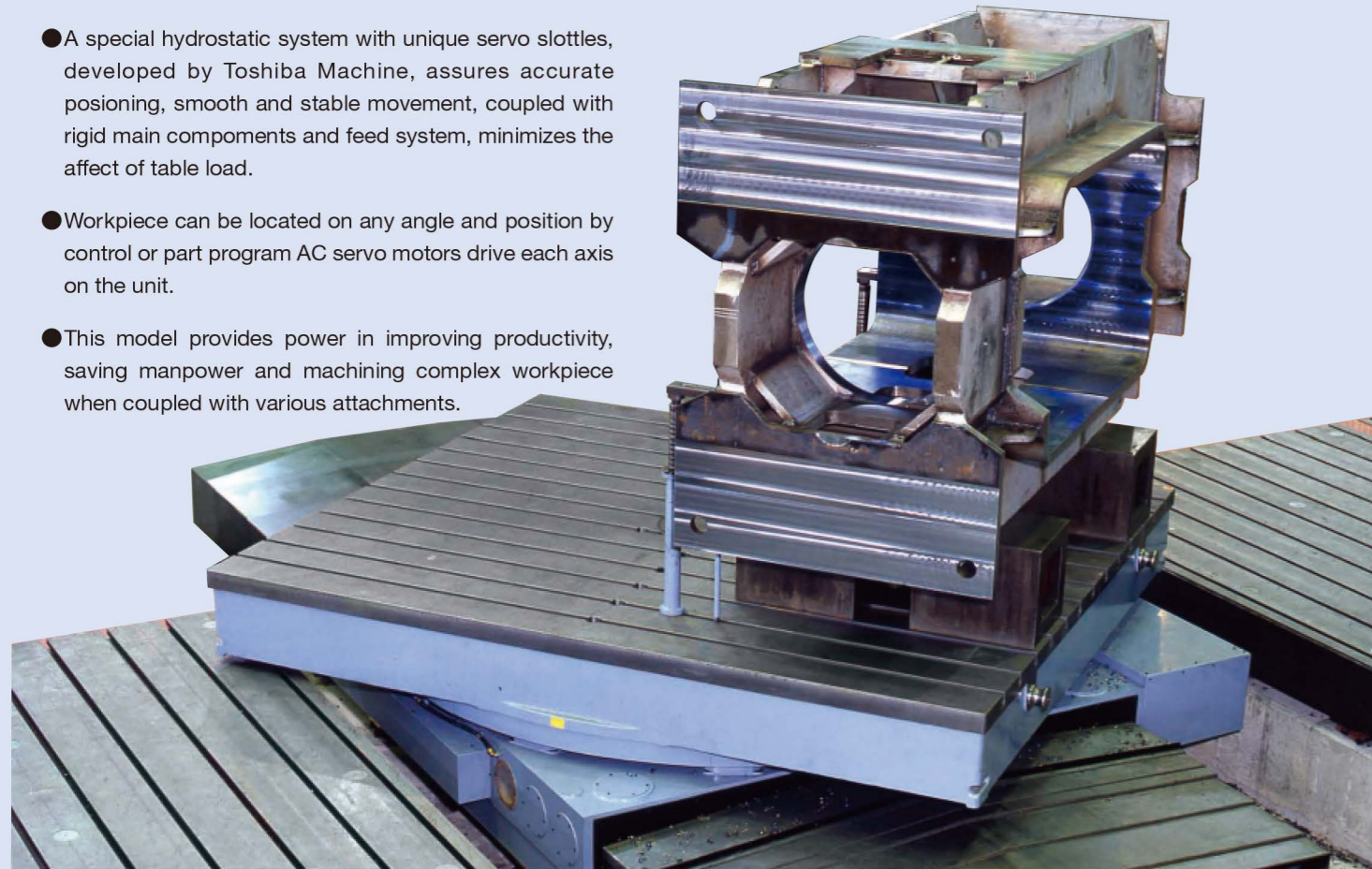
Note: It changes with combination of Attachments

Rotary Table (Optional accessory)

BR series Rotary Table can be supplied for our BSF series machine

In addition to above application, the unit can work together with your machine as a independent unit when equipped with an independent controller

- A special hydrostatic system with unique servo slottles, developed by Toshiba Machine, assures accurate positioning, smooth and stable movement, coupled with rigid main components and feed system, minimizes the affect of table load.
- Workpiece can be located on any angle and position by control or part program AC servo motors drive each axis on the unit.
- This model provides power in improving productivity, saving manpower and machining complex workpiece when coupled with various attachments.



Specifications of Rotary Table

BR series specifications		BR-16D Series		BR-20D Series			BR-25D Series		BR-40D Series		
		BR-16D	BR-16/20D	BR-20D	BR-20/25D	BR-25/32DS	BR-30/35D	BR-30/40D	BR-40D	BR-40/45D	
Table	Table dimensions (AxB)	mm [in]	1 600x1 600 [63x63]	1 600x2 000 [63x78.7]	2 000x2 000 [78.7x78.7]	2 000x2 500 [78.7x98.4]	2 500x3 200 [98.4x126]	3 000x3 500 [118.1x137.8]	3 000x4 000 [118.1x157.5]	4 000x4 000 [157.5x157.5]	4 000x4 500 [157.5x1 772]
	Swing diameter C	mm [in]	2 100 [82.7]	2 400 [94.5]	2 600 [102.4]	3 000 [118.1]	3 800 [149.6]	4 300 [169.3]	4 700 [185]	5 300 [208.7]	5 700 [224.4]
	Maximum load on table	kg [lbs]	16 000 [35 273]		30 000 [66 138]			60 000 [132 276]	50 000 [110 230]	150 000 [330 690]	130 000 [286 598]
	T-slot size	mm [in]	28 [1.1]		28 [1.1]			28 [1.1]		36 [1.4]	
	Minimum indexing increment	deg	0.0001		0.0001			0.0001		0.0001	
V-axis travel	mm/min [ipm]	1 500 (1 000 2 000) [59.1 (39.4 78.7)]		2 000 (1 500 2 500) [78.7 (59.1 98.4)]			2 500 (2 000 3 000) [98.4 (78.7 118.1)]		3 000 (2 500 4 000) [118.1 (98.4 157.5)]		
Feedrate	Rapid traverse on V-axis	m/min [ipm]	6 [236]		6 [236]			4 [157]		4 [157]	
	Rapid rotation on B-axis	deg/min	400		400			200		200	
	Feedrate on V-axis	mm/min [ipm]	1~4 000 [0.04~157.5]		1~4 000 [0.04~157.4]			1~4 000 [0.04~157.4]		1~4 000 [0.04~157.4]	
	Feedrate on B-axis	deg/min	1~300		1~300			0.1~150		0.1~150	
Machine height H	mm [in]	950 [37.4]		950 [37.4]		1 000 [39.4]	1 150 [45.3]		1 750 [68.9]		
Machine width W	mm [in]	2 175 [85.6]	2 190 [86.2]	2 630 [103.5]	2 665 [104.9]	3 200 [126]	4 065 [160]		4 425 [174.2]	4 595 [180.9]	
Machine length L	mm [in]	4 460 (3 960 4 960) [175.6 (155.9 195.3)]		5 370 (4 870 5 870) [211.4 (191.7 231.1)]			6 350 (5 850 6 850) [250 (230.3 269.7)]		8 385 (7 830 9 460) [330.1 (308.3 372.4)]		

Standard accessories

- 1 Table clamp
- 2 Bed slivay cover
- 3 Hydraulic unit

Optional accessories

- 1 Installation Parts
- 2 Rotary scale feedback for B-axis
Note 1) Travel in bracket shown in V-axis travel line are offered as an another standard specification.
Note 2) We will be pleased to offer a different table size or V-axis travel when required.