

PRECISION TSUGAMI

CNC Precision Automatic Lathe

BH20 / BH20Z BH38

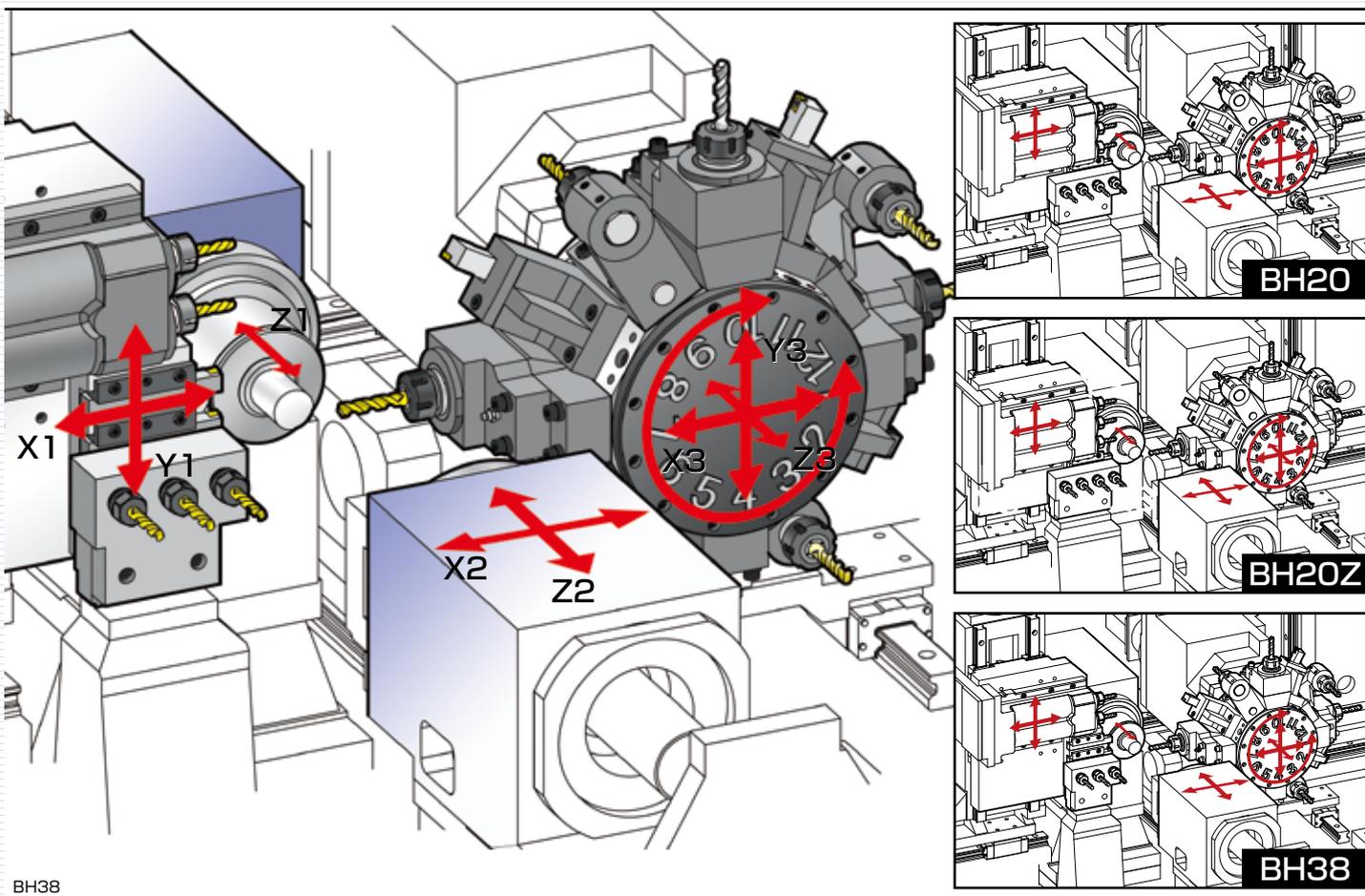


Sliding headstock type automatic lathe that encompasses the entire process
12-station turret + Gang type tool post + Back spindle



Complex-shaped parts can be made from bar stocks

- 12-station turret with independent drive mechanism
 - Cycle time drastically shortened using three-path control
 - Complete machining from bar stock
- BH20, BH20Z: Max. 35 tools BH38: Max. 34 tools
- Powerful main spindle and back-spindle motors
 - Many NC features are provided as standard.
 - Automatic programming system for BH (optional)



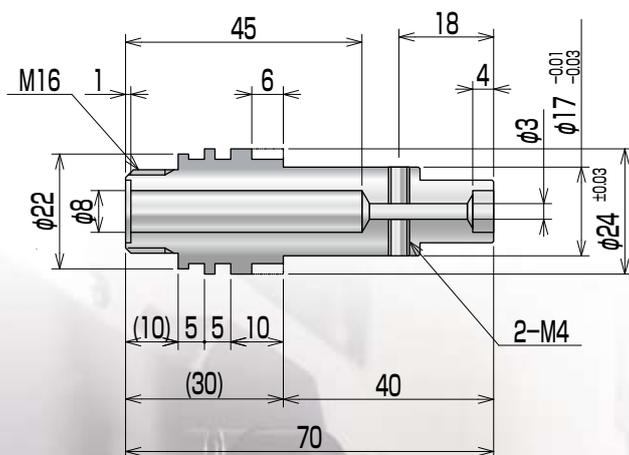
machined



Photo: BH20/BH20Z

Machining example

Material ——— SUS303
 Bar stock diameter — $\phi 25$



Conventional model

Simultaneous machining time

Main spindle

230sec.

Back spindle

BH38

Simultaneous machining time

Main spindle

160sec.

Back spindle

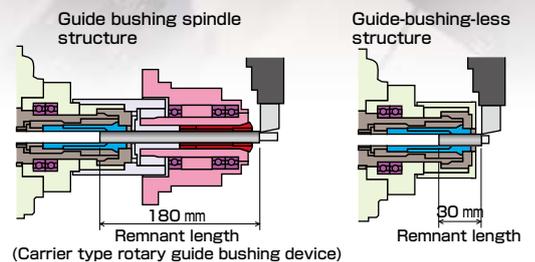


The direct-drive rotary guide bushing enables higher spindle speed. **BH20/BH20Z**

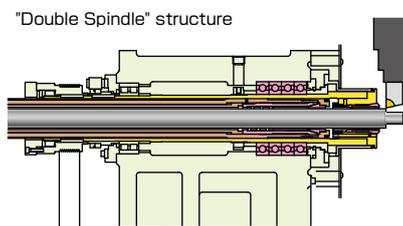
- Maximum spindle speed: 10,000min⁻¹ ■ Machining stroke: 170mm
- Improved geometric accuracy, dimensional accuracy, and surface roughness with high speed and quiet operation

Guide bushing type or guide-bushing-less type selectable according to the workpiece (Option) **BH20/BH20Z**

- Stationary guide bushing ■ Guide-bushing-less unit
- Direct-drive rotary guide bushing device
- Possible to switch between the guide bushing type and guide-bushing-less type so the most suitable operation for the workpiece length can be chosen.
- The spindle without a guide bushing does not require ground bars, enabling high speed and high precision when machining cold drawn bars. The shortest possible remnant length is 30 mm.



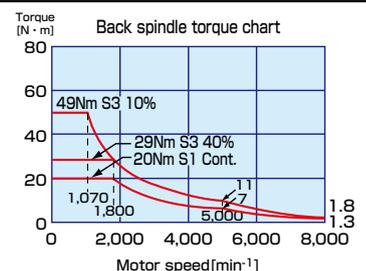
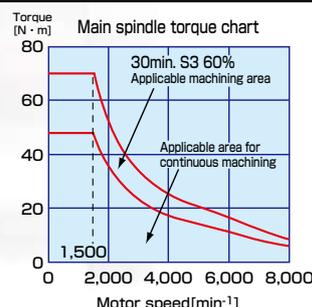
"Double Spindle" structure enables powerful machining that produces blue chips. **BH38**



- The double spindle structure that integrates the guide bushing and the spindle (in perfect synchronization) enables high accuracy and powerful machining.
- Since water-soluble coolant can be used, there is no danger of fire or greasy fumes even when heavy duty machining is performed.
- Short remnant length (150 mm + workpiece length)
- 3 times faster feed rate, 3 times greater productivity

Equipped with more powerful main-spindle and back-spindle motors that increase machining capability. **BH38**

Main spindle motor: 7.5/11kW
Back spindle motor: 3.7/5.5kW





Overrapped machining with the back spindle (built-in motor drive)

- Improved rotation and phase synchronization accuracy with the main spindle
- The main/back spindle follow-up function enables rounding cut-off.



BH20/BH20Z back spindle

Shortened indexing time

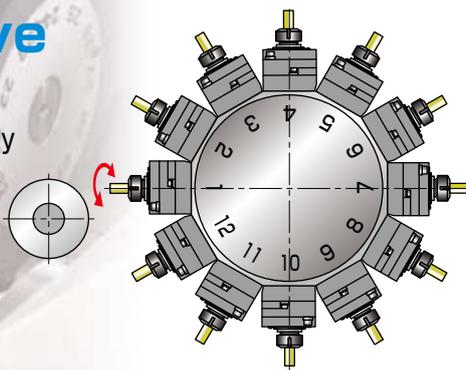
- Turret indexing time by the servo motor: 0.3 sec
- Chip-to-chip time: 2 sec (4 sec on the conventional model)
- Non-lift indexing turret reduces mechanical shocks.

Higher rigidity of rotary tools

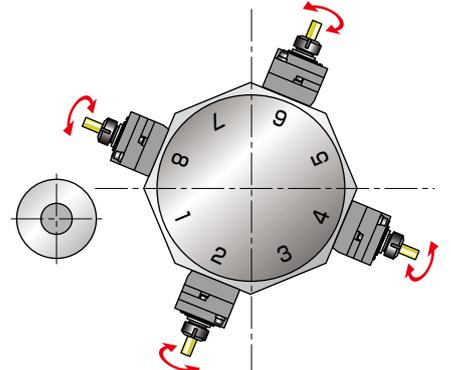
- 20% increase in productivity thanks to enlarged drive shaft and bearing.
- Bore diameter on turret: 40 mm (32 mm on conventional models)

Independent drive

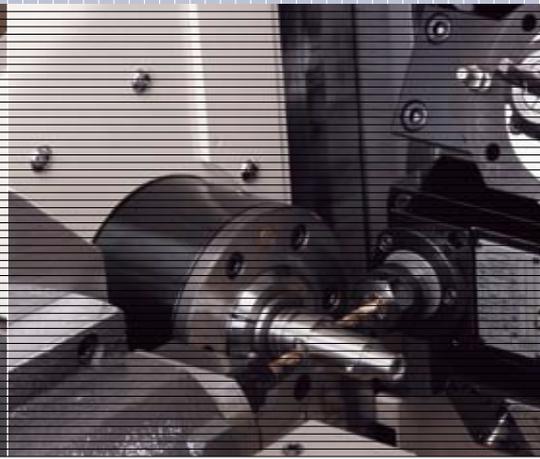
- Quiet operation, energy saving and improved machining accuracy by less influence from thermal distortion on turret.
- Rotary tools can be mounted on all 12 stations.



BH20/BH20Z/BH38

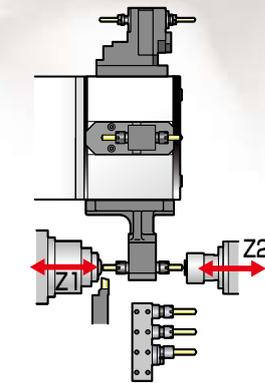
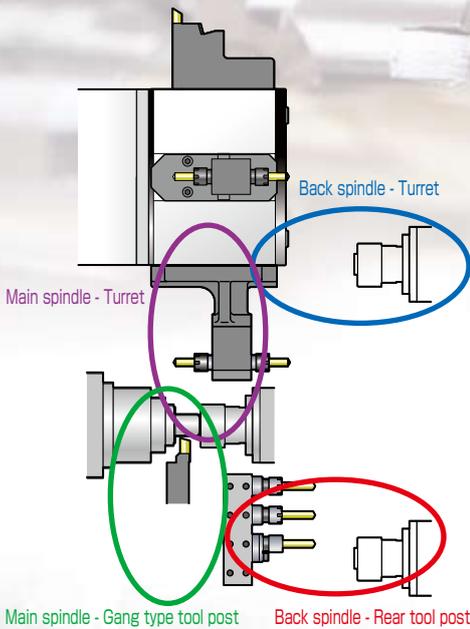


Conventional model

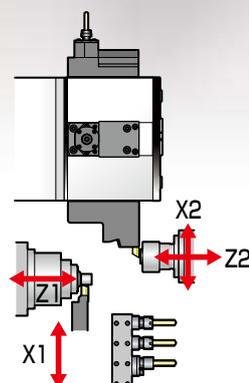


Shorter cycle time under three-path control

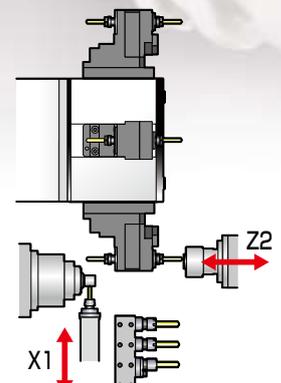
■ A variety of simultaneous machining styles available



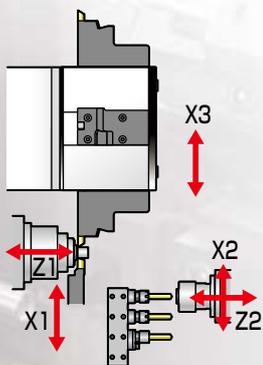
(1) Simultaneous drilling (front, back) BH20/BH20Z/BH38



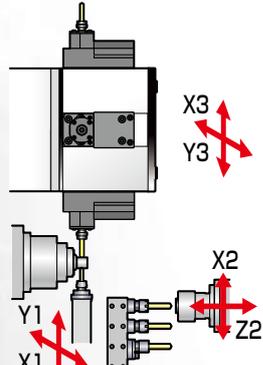
(2) Simultaneous turning (front, back) BH20/BH20Z/BH38



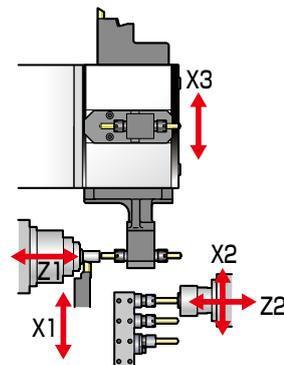
(3) Simultaneous drilling (cross, back) BH20/BH20Z/BH38



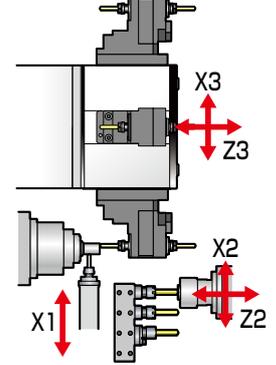
(4) Balance turning + Back spindle machining BH20/BH20Z/BH38



(5) Simultaneous cross drilling/end milling + Back spindle machining BH20/BH20Z/BH38



(6) Simultaneous turning/drilling + Back spindle machining BH20/BH20Z/BH38



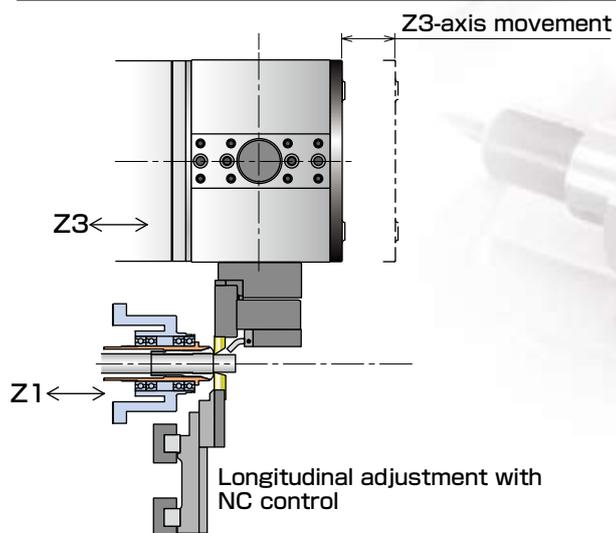
(7) Front off-center drilling + cross drilling + Back spindle machining BH20Z/BH38



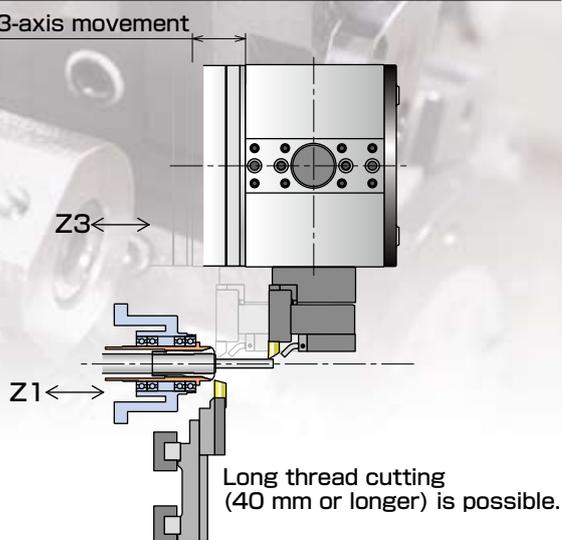
X/Y/Z-axis movement of turret

■ Z-axis added turret increases machining capability

Balance turning **BH20Z/BH38**



Long thread cutting **BH20Z/BH38**



Generously opening rear door is provided as standard

■ Heavy components such as rotary tools can be mounted and dismantled at the rear of the machine.

■ The index selector switch for the turret is located on the rear side of the machine to ensure easy operation.



Optimized tooling with the help of a BH automatic programming system (optional)

Even with multi-path control, multi-axis control, or complex-shaped parts, a program with the optimal tooling and the shortest cycle time can be created. Tsugami's machining know-how (machining processes, machining conditions, etc.) and the highest priority allocated to the matching of the machine hardware and software results in a system that enables novice programmers to create standardized, high quality programs, even for complex products that demand accurate results.

■ Create NC programs in a short period of time. No complicated entry is required.

Create processes and NC programs automatically by simply inputting geometrical data and tool data. The interactive system helps you create programs easily and quickly.

■ Simple operations

Geometrical data can be configured using a building block method (no acquisition of CAD skills required), and in addition, only minimal tool data entry is required.

■ Automatic calculation of cycle time

The cutting time and idle time are calculated automatically, which are helpful for the user to further shorten the cycle time.

*The calculated cycle time is a reference value.

■ 3D simulation for operation checks

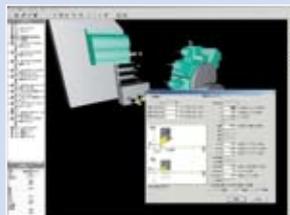
The 3D simulation function enables the user to check the operations from any angle.

■ Interference check function

It is possible to check the created/edited NC program for interference.

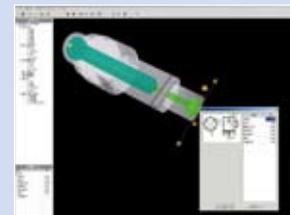
Name	Specifications
Applicable models	BH20/BH20Z/BH38
OS	Windows® 2000 Windows® XP (with Internet Explorer 4.0 or above and OpenGL library installed)
Computer	PC/AT compatibles (DOS/V machines)
CPU	Intel Celeron® 2.0 GHz or more

Step 1: Tool definition



Tool definition as like an actual mechanical setting, inputting tool type, tool width, drill dia., setting position, etc. for each tool.

Step 2: Work shape definition



No CAD operation required for work shape definition.

By building up simple shapes (building block method), geometry can be created with ease in a drastically shortened time.

Even a novice can quickly learn the input method.

NC program



The interference check function generates NC programs that have an optimal tool path free from interference.

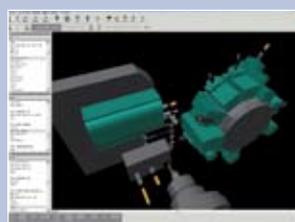
Cycle time



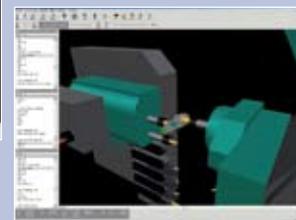
Process	Time
1	0.0000
2	0.0000
3	0.0000
4	0.0000
5	0.0000
6	0.0000
7	0.0000
8	0.0000
9	0.0000
10	0.0000
11	0.0000
12	0.0000
13	0.0000
14	0.0000
15	0.0000
16	0.0000
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92	0.0000
93	0.0000
94	0.0000
95	0.0000
96	0.0000
97	0.0000
98	0.0000
99	0.0000
100	0.0000

The cycle time is calculated automatically, and cutting time/idle time as well as process time for each path system can be displayed.

3D simulation



Using the 3D simulation function, main spindle and back spindle machining operations can be checked from any angle.

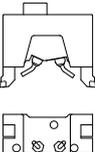
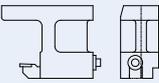
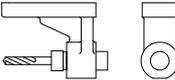
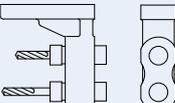
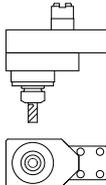
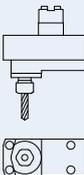
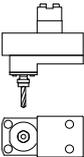
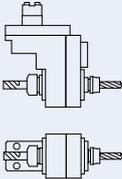


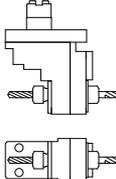
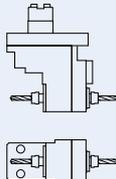
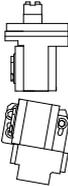
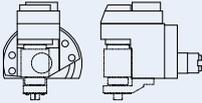
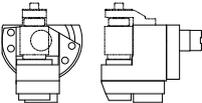
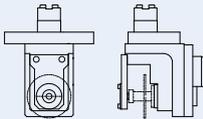
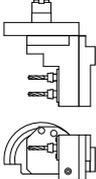
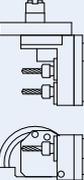
Many optional NC features on conventional model are provided as standard.

Name	BH20/BH38	Name	BH20/BH38
Chasing function	Standard	Multiple repetitive cycle	Standard
Continuous thread cutting	Standard	Expanded program editing	Standard
Manual pulse generator	Standard	Polar coordinate interpolation	Optional
Memory card input/output interface	Standard	Cylindrical interpolation	Optional
RS232C input/output interface	Optional	Direct drawing dimension input	Standard
Background editing	Standard	Inch/metric conversion	Standard
Run time/parts number display	Standard	Canned cycle for drilling	Standard
Custom macro	Standard	Rigid tap (main spindle, back spindle)	Standard
Constant surface speed control	Standard	Rotary tool rigid tap (for tool on the turret)	Optional
Spindle synchronous control	Standard	Rotary tool rigid tap (for cross drill on the tool post)	Optional
Tool geometry / wear offset	Standard	Cut-off detection (differential)	Standard
Programmable data input	Standard	Spindle speed fluctuation detection	Standard
Chamfering and corner R	Standard	Abnormal load detection	Optional

Machine Options
Work catcher (including work conveyor)
Work front discharge
Work rear discharge
Chip conveyor
Automatic fire extinguisher
Oil mist collector
High-pressure pump (750 W)
Drilling head
2-spindle cross drilling head (BH38 only)
Angular drilling head
Helical hobbing head (1)
Milling head

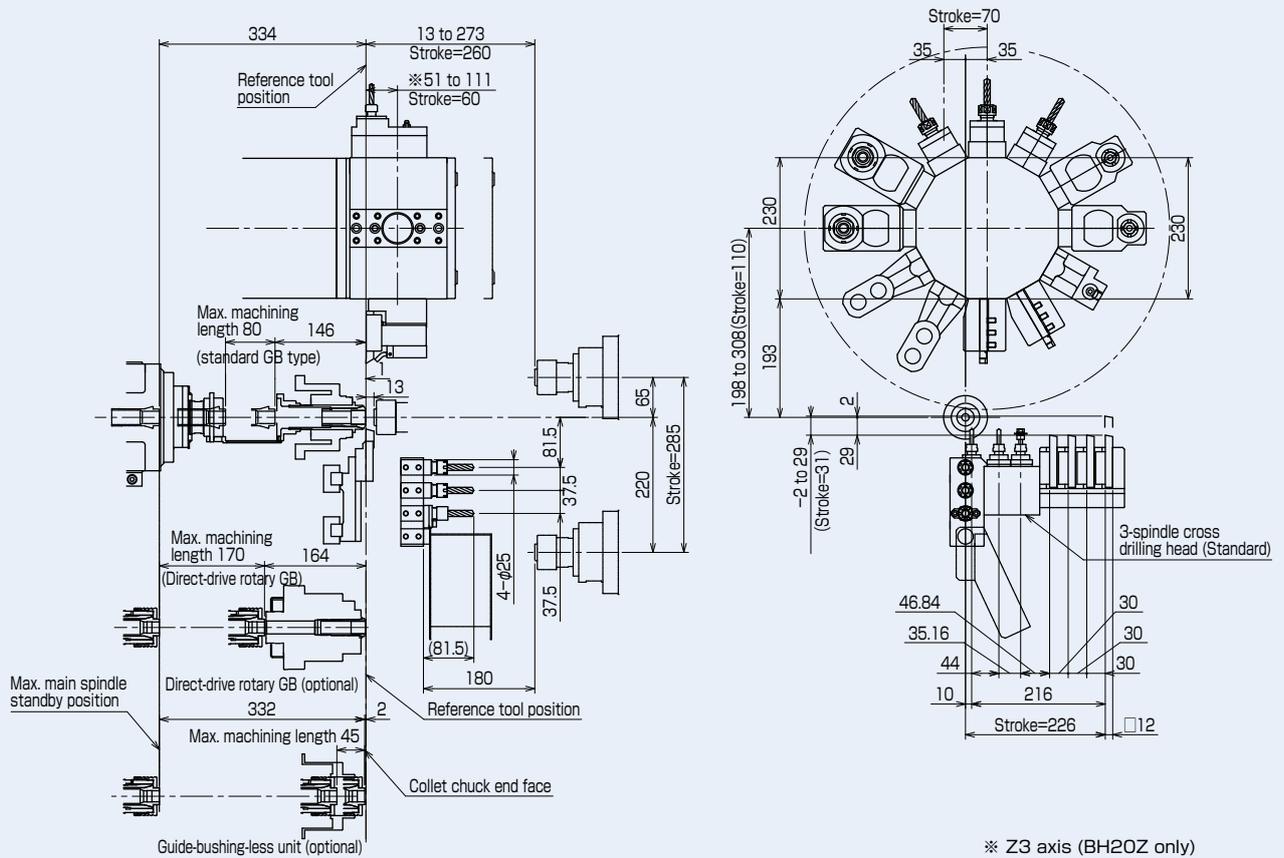
Turret Tooling System

Item	External View	Function															
Turning holder		<ul style="list-style-type: none"> ●Cutting tools Shank (square) □20×125 (BH38) Shank (square) □16×105 (BH20) Shank (square) □12×85 (BH20) Position Rear turret 															
Double-turning holder		<ul style="list-style-type: none"> ●Cutting tools Shank (square) □20×125 (BH38) Shank (square) □16×105 (BH20) Shank (square) □12×85 (BH20) Position Rear turret 															
Front holder	 (Reverse mounting is prohibited.)	<ul style="list-style-type: none"> ●Cutting tools Shank (square) □20×125 (BH38) Shank (square) □12×85 (BH20) Position Rear turret 															
Drill holder	 (Reverse mounting is prohibited.)	<ul style="list-style-type: none"> ●Cutting tools Shank dia. ϕ32 (BH38) Shank dia. ϕ25 (BH20) Position Rear turret 															
2-drill holder	 (Reverse mounting is prohibited.)	<ul style="list-style-type: none"> ●Cutting tools Shank dia. ϕ32 (BH38) Shank dia. ϕ25 (BH20) Position Rear turret 															
Powered cross drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ16mm Max. tap size M10 Collet AR25 (Alps Tool) ESX25 (Schaublin) ER25 (REGO-FIX) Speed 100 to 2,000min⁻¹ 															
Cross drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ10mm Max. tap size M8 Collet AR16 (Alps Tool) ESX16 (Schaublin) ER16 (REGO-FIX) Speed 200 to 5,000min⁻¹ 															
High speed cross drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ7mm Collet AR11 (Alps Tool) ESX11 (Schaublin) ER11 (REGO-FIX) Speed 200 to 7,790min⁻¹ 															
Power drilling head		<table border="1"> <thead> <tr> <th></th> <th>●Main spindle</th> <th>●Back spindle</th> </tr> </thead> <tbody> <tr> <td>Max. shank dia.</td> <td>ϕ16mm</td> <td>ϕ13mm</td> </tr> <tr> <td>Max. tap size</td> <td>M10</td> <td>M10</td> </tr> <tr> <td>Collet</td> <td>AR25 (Alps Tool) ESX25 (Schaublin) ER25 (REGO-FIX)</td> <td>AR20 (Alps Tool) ESX20 (Schaublin) ER20 (REGO-FIX)</td> </tr> <tr> <td>Speed</td> <td colspan="2">100 to 2,000min⁻¹</td> </tr> </tbody> </table>		●Main spindle	●Back spindle	Max. shank dia.	ϕ 16mm	ϕ 13mm	Max. tap size	M10	M10	Collet	AR25 (Alps Tool) ESX25 (Schaublin) ER25 (REGO-FIX)	AR20 (Alps Tool) ESX20 (Schaublin) ER20 (REGO-FIX)	Speed	100 to 2,000min ⁻¹	
	●Main spindle	●Back spindle															
Max. shank dia.	ϕ 16mm	ϕ 13mm															
Max. tap size	M10	M10															
Collet	AR25 (Alps Tool) ESX25 (Schaublin) ER25 (REGO-FIX)	AR20 (Alps Tool) ESX20 (Schaublin) ER20 (REGO-FIX)															
Speed	100 to 2,000min ⁻¹																

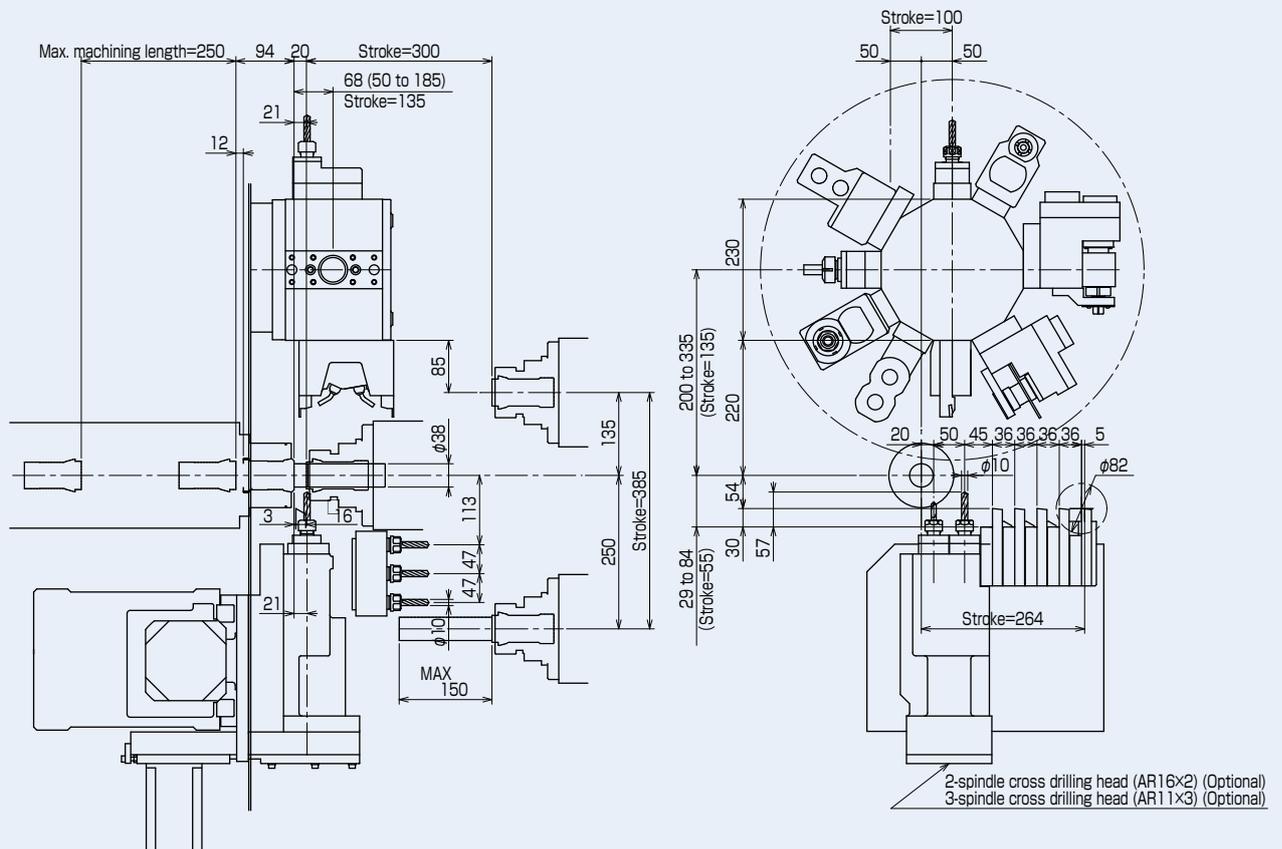
Item	External View	Function
Drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ10mm Max. tap size M6 Collet AR16 (Alps Tool) ESX16 (Schaublin) ER16 (REGO-FIX) Speed 200 to 6,000min⁻¹
High speed drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ7mm Collet AR11 (Alps Tool) ESX11 (Schaublin) ER11 (REGO-FIX) Speed 200 to 7,790min⁻¹
Whirling head		<ul style="list-style-type: none"> Maximum turning diameter ϕ13 Depth of cut MAX2.5 Cutting length BH20: 60 (Z3 stroke) BH38: 140 (Z3 stroke) Chip Inscribed circle dia. ϕ9.525 Thickness \sim4.76 Cutter spindle inclined angle \pm10° Cutting speed MAX251m/min⁻¹ (ϕ20) Speed 200 to 4,000min⁻¹
Helical gear hobbing head		<ul style="list-style-type: none"> Head inclined angle θ (Main spindle) $5^\circ \leq \theta \leq 30^\circ$ Speed 200 to 4,000min⁻¹ Restrictions Adjacent holder mounting disabled
Helical gear hobbing head		<ul style="list-style-type: none"> Head inclined angle θ (Main spindle) $5^\circ \leq \theta \leq 30^\circ$ (back spindle) Speed 200 to 4,000min⁻¹ Restrictions Adjacent holder mounting disabled
Milling head		<ul style="list-style-type: none"> Max. cutter dia. ϕ75mm Cutter spindle speed 100 to 2,700min⁻¹
High speed angular drilling head		<ul style="list-style-type: none"> Max. shank dia. ϕ7mm Swiveling range 0° to 90° Collet AR11 (Alps Tool) ESX11 (Schaublin) ER11 (REGO-FIX) Speed 200 to 7,820min⁻¹
Angular drilling head (For BH38 only)		<ul style="list-style-type: none"> Max. shank dia. ϕ10mm Max. tap size M6 Swiveling range 0° to 90° Collet AR16 (Alps Tool) ESX16 (Schaublin) ER16 (REGO-FIX) Speed 200 to 5,000min⁻¹

Tooling zone

BH20/BH20Z



BH38



Machine specifications (Standard)

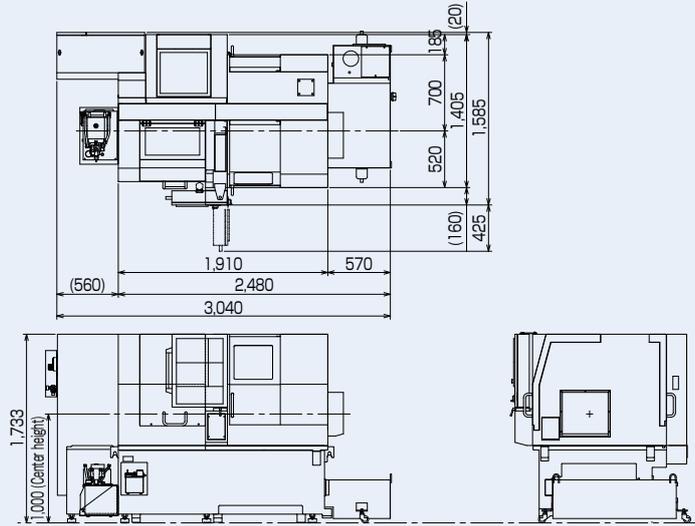
Item		BH20	BH20Z	BH38		
Machining range, machining capacity	Working barstock diameter	$\phi 3$ to $\phi 20$ mm		$\phi 8$ to $\phi 38.1$ mm		
	Max. machining length	80 mm (Carrier type rotary GB)		250 mm		
		170 mm (Direct-drive rotary GB) OP				
	Main spindle	45 mm (GB-less type) OP				
		Max. drilling diameter	$\phi 10$ mm		$\phi 16$ mm	
		Max. tapping size	M8		M14	
	Back spindle	Max. barstock diameter	$\phi 20$ mm		$\phi 38$ mm	
		Max. drilling diameter	$\phi 10$ mm		$\phi 16$ mm	
		Max. tapping size	M8		M12	
	Front tool post	Max. cross drilling diameter	$\phi 8$ mm		$\phi 10$ mm	
Max. cross tapping size		M6		M6		
Turret	Max. rotary tool drilling diameter	$\phi 10$ mm		$\phi 16$ mm		
	Max. rotary tool tapping size	M8		M10		
Machine	Main spindle speed	200 to 10,000 min ⁻¹		200 to 5,000 min ⁻¹		
	Back spindle speed	200 to 12,000 min ⁻¹		200 to 7,000 min ⁻¹		
	Cross drill speed on front tool post	200 to 8,000 min ⁻¹		200 to 5,000 min ⁻¹ (Optional)		
	Rotary tool speed on turret	200 to 8,000 min ⁻¹				
	Main spindle indexing	C axis		5°		
	Back spindle indexing	C axis (optional)				
	Total tool storage capacity	Turret	12 stations			
		Front tool post	Turning	4		5
			Cross drill	3		2 (Optional)
	Back tool post	4		3		
Tool size	Turret	12 mm × 12 mm × 85 mm		20 mm × 20 mm × 125 mm		
	Front tool post	12 mm × 12 mm × 85 mm		16 mm × 16 mm × 125 mm		
Rapid traverse rate	X1, Y3	12 m/min		Y3	12 m/min	
	Z3	—	18 m/min	X1, Y1, X2, X3	20 m/min	
	X3	20 m/min		Z1, Z2, Z3	24 m/min	
	Y1, Z1, X2, Z2	24 m/min				
Controlled axes	7 axes	8 axes	8 axes			
Motors	Main spindle	2.2/3.7 kW		7.5/11 kW		
	Back spindle	2.2/3.7 kW		3.7/5.5 kW		
	Cross drill on front tool post	1.0 kW				
	Rotary tool speed on turret	1.4 kW				
	Coolant pump	0.39/0.62 kW (50/60Hz)				
	Lubricating oil pump	3 W				
Power source and other	Net weight	4,500 kg		5,800 kg		
	Power source requirement	30 KVA		45 KVA		
	Compressed air requirement	0.5 MPa or more				
	Air discharge rate	100 NL/min				
	Width x depth x height	2,480 x 1,585 x 1,733		2,730 x 1,790 x 1,700		

NC Specifications (Standard)

Item	Specification
NC unit	FANUC 31i-B
Axis names	X1, Y1, Z1, X2, Z2, X3, Y3, Z3
Least input increment	0.001 mm (X1, X2, X3 axes in diameter)
Least command increment	X1, X2, X3 axes: 0.0005 mm, other: 0.001 mm
Maximum programmable dimension	±8 digits
Interpolation method	Linear/Circular
Cutting feedrate	1 to 6,000 mm/min
Feedrate override	0 to 150% in 10% increments
Dwell	G04 0 to 99999.999
ABS/INC command	X, Y, Z: absolute, U, V, W: incremental
Tool offset value	±6 digits
Tool offsets pairs	Sum of all paths: 200 pairs
LCD/MDI	10.4" color LCD
Tape storage size	Sum of all paths: 256 kbytes (equivalent to 640 m tape length)
Number of registerable programs	500
Auxiliary functions	M5 digits
Spindle function	S5 digits
Tool function	T4 digits

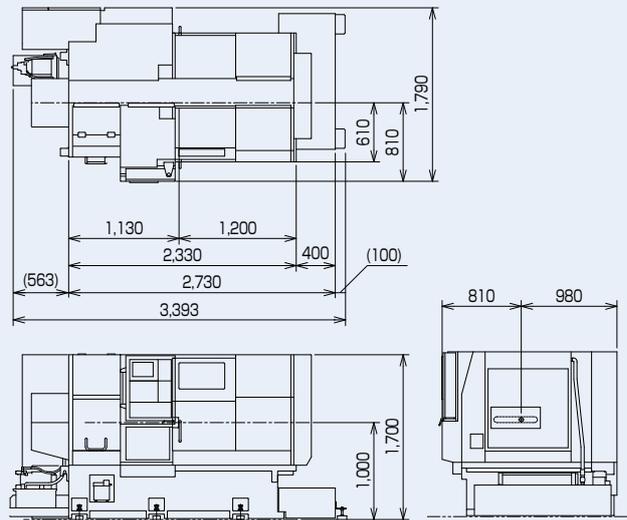
External View

BH20/BH20Z



External View

BH38



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



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