TOSHIBA MACHINE

FLEXMACHINE
BTD-200QH

BTD20116-CED-05

Highly Preferred FLEXMACHINE

Supported by many users from generation
Easy-to-use and equipped with new features
advanced machining operations.

FLEXMACHINE
BTD-200QH

Main features

1. Easy-to-operate compact pendant for manual machining operations.
2. Best suited for face milling and end milling operations.
3. Most sophisticated CNC system TOSNUC 999.
4. NC rotary milling function (option) which allows four-axis control in lieu of current three-axis control.
5. Enhanced productivity with spindle of 5000 min^{-1} speed (option).

Main specifications

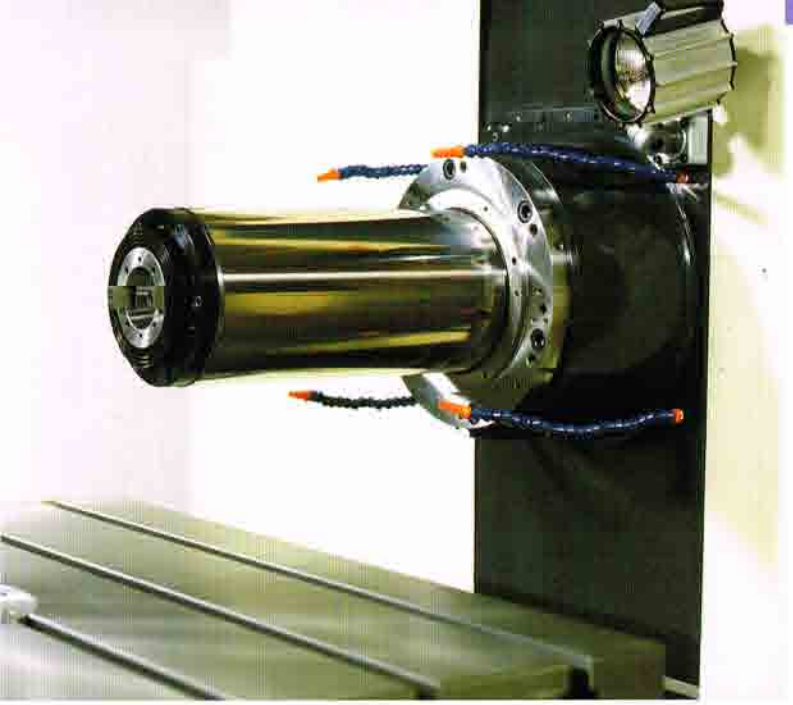
			BTD-200QH
Table working surface		mm (in)	1 000×1 200 (39.3×47.2)
Table loading capacity		kg (lbs)	4 000 (8 800)
Axis travel	X	mm (in)	1 500 (59.0)
	Y	mm (in)	1 200 (47.2)
	Z	mm (in)	700 (27.5)
	W	mm (in)	400 (15.7)
Minimum indexing angle of table	B	deg	0.0001°
Spindle speed		min^{-1}	20~3 000 [15~5 000]
Spindle drive motor		kW (HP)	AC30/22 (AC40/30)
Tool storage capacity			30 [60, 90]

Note: Values in brackets [ ] refer to the options.

FLEXMACHINE

to generation.
supporting more

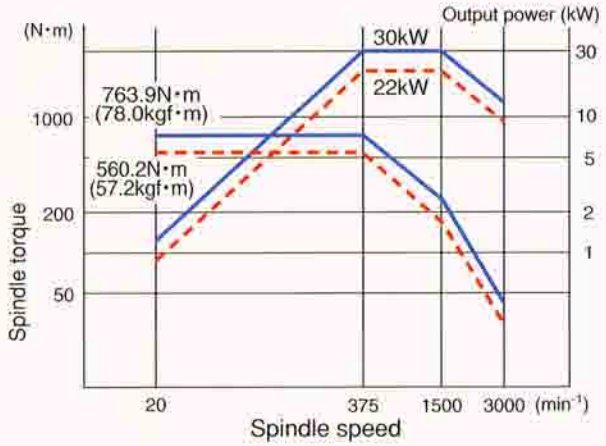
Photo shows with options.



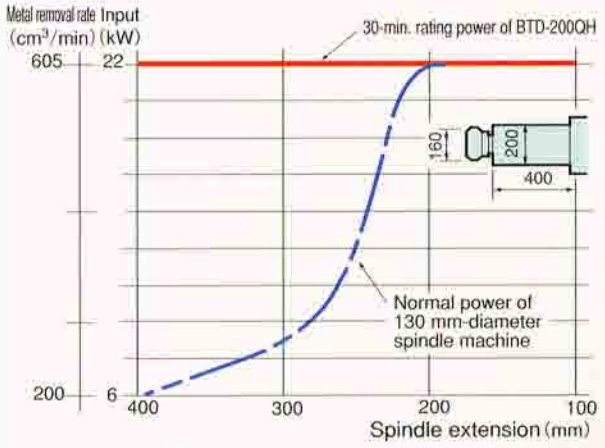
Quill at 400 mm extended (W-axis)

Fully extended 200 mm-diameter quill type shown at 400 mm maximum.

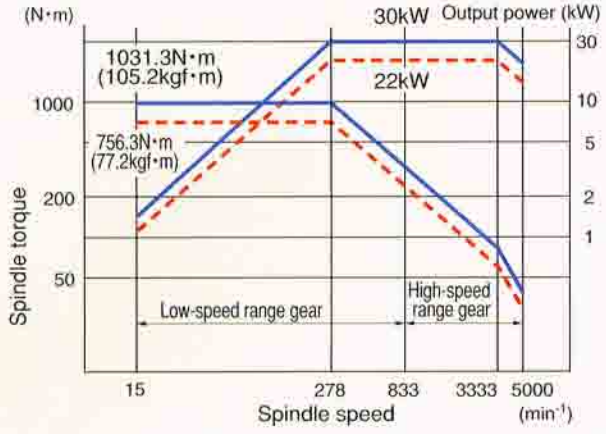
Spindle torque/output power diagram (standard specification) 3000min^{-1}



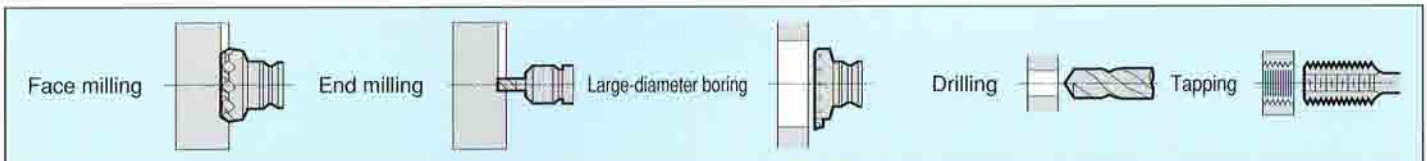
Face milling ability (workpiece material: AISI 1055)



Spindle torque/output power diagram (option) 5000min^{-1}



An example of cutting ability (workpiece material: AISI 1055)



	Cutter dia. mm (in)	Cutting speed m/min (fpm)	Spindle speed min^{-1}	Feedrate mm/min (ipm)	Width of cut mm (in)	Depth of cut mm (in)	Metal removal rate cm³/min (in³/min)	W-axis extension mm (in)
Face milling	160 (6.3) dia. No. of flutes:8	125 (400)	250	840 (33.1)	120 (4.7)	6 (0.2)	605 (36.9)	400 (15.7)
End milling	80 (3.1) dia. No. of flutes:6	100 (328)	400	720 (28.3)	20 (0.8)	50 (2.0)	720 (43.9)	400 (15.7)
Large-diameter boring	ϕ392	110 (361)	90	26 (1.0)	–	6 (0.2)	189 (11.5)	400 (15.7)
Drilling	ϕ69.5	22 (72.2)	100	50 (2.0)	–	–	–	–
Tapping	M60×P5.5	10 (32.8)	53	291.5 (11.7)	–	–	–	–
Tapping	M4×P0.75	8 (26.2)	640	480 (18.9)	–	–	–	–

* The above cutting data may differ with each machine, fixtures, machining position, cutter, holder, etc.
* The above cutting data refer to the 3,000 min^{-1} spindle.

Spindle capable of powerful cutting with quill extended at 400 mm.

Wide table withstand heavy load and allows easy set-up.

The table as wide as 1 000 × 1 200 mm has a standard maximum load mass of 4 tons. Thus, enabling the set-up of work-pieces with longer widths.

High rigidity bed supports the entire machine.

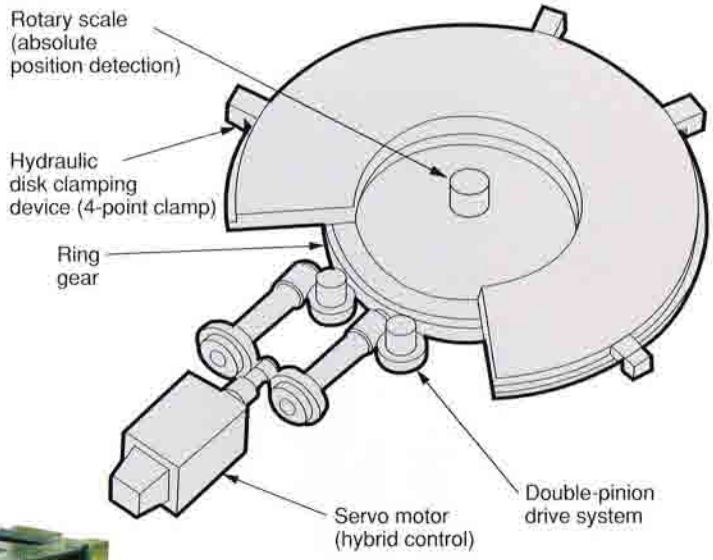
The new integrated type 4-way structure bed minimizes influences of load fluctuations caused by the movements of saddle and table, and maintains machining accuracy even at heavy-duty cutting operations.

5 000 min^{-1} spindle with high-speed and high-torque specifications (option)

The mechanical two-stage gear change system with high-speed and high-torque 5 000 min^{-1} spindle can cope with more extensive machining operations, exceeding the current high-rigidity quill structure.

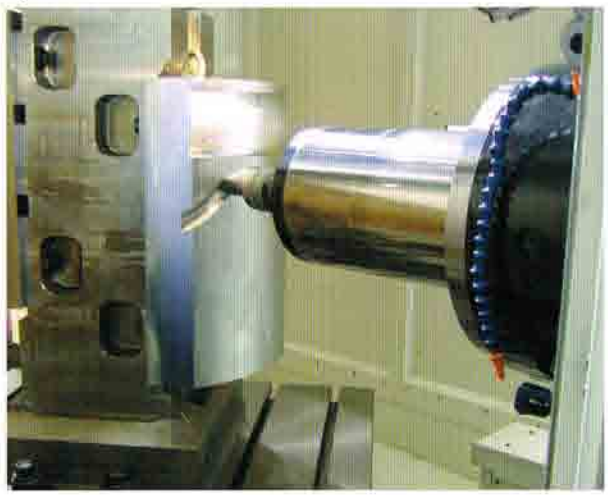
B-axis drive mechanism provides high-speed and high-accuracy machining.

Use of the highly rigid double-pinion drive system and standard rotary scale emphasizes stable high-speed and high-accuracy table indexing operations.



NC rotary milling operation (option)

A cylindrical surface and end surface can be machined continuously by using the B-axis continuous indexing function of the table without using a special independent NC rotary table. Easily create an NC program for the cylindrical surface using the cylindrical interpolation function (G67).



TOSNUC 999 (Triple nine) permits quick switchin[g] between manual, MDI and Automatic operation mode[s]

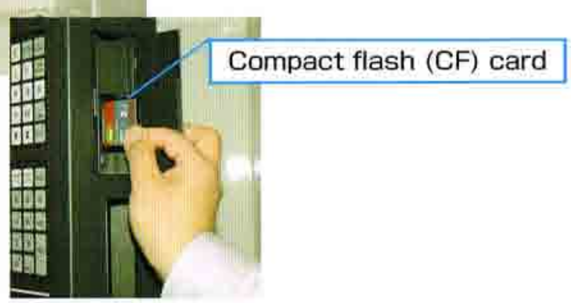
● **Customizing keys**

1.Memorize a series of input operations beforehand in one of the special keys (⚀ ⚁ ⚂ ⚃ ⚄ ⚅) and press these keys to execute operations continuously.

2.Memorize a combination of NC standard displays such as main, sub and window displays in one of the special keys (♠ ♥ ♦ ♣). By pressing these keys it displays the combination memorized.

● **Supporting both USB memory and compact flash (CF)**

A compact flash (CF) slot is standard-equipped to cope with large-capacity NC programs.



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Manual mode

aching

Full screen program editing function helps create an NC program easily.

●Multi-window triple display

The display of TOSNUC 999 can be divided into three separate screens where simultaneous display of two different programs and offset data necessary for machining is possible. Also, data entry and editing can be done separately on each screen.

●Multi-editing function

A new program can be easily created by referring to and utilizing a previously made program on the multi-window display.

Visual program check function (option)

During programmed operation (i.e., background operation), an NC tape image of another program can be checked graphically. After program check, relevant tool path is drawn.

Triple teaching function for simultaneous machining and NC programming (option)

TOSNUC 999 stores in its memory all data created by the operator as NC programs. Programming is very easy by combining these programs, using various teaching functions.

●Manual teaching function

All machining data such as tool path, spindle speed and feedrate as obtained in the manual mode are stored automatically as an NC program.

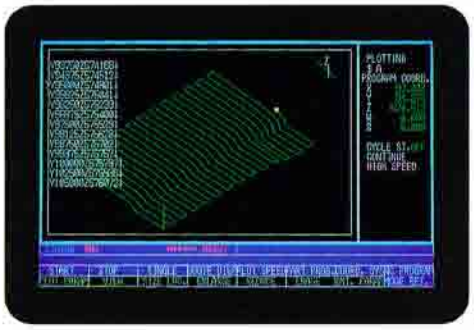
●MDI teaching function

When machining processes are executed one by one consecutively in the MDI mode, all such data are stored automatically as an NC program.

●Auto teaching function

In the AUTO or DNC mode, any data which has been modified can be fed back to the memory automatically.

Multi-window triple display



NC plotting function

Manual measurement

Various functions shown above significantly improve operability

●Manual alignment (centering) function

The touch sensor or master tool comes into contact with the measured surface of a workpiece according to the interactive screen, inner and outer diameters and angle of inclination of the specific workpiece that automatically calculates set-up.

Machine Specifications

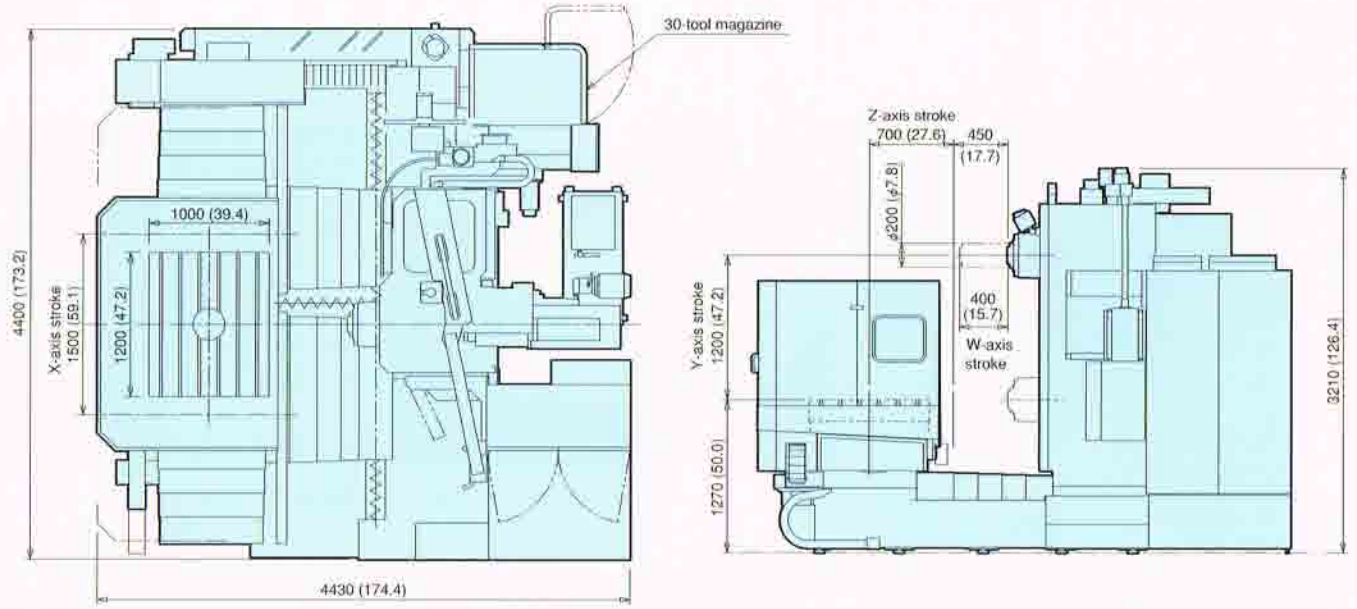
Main machine specifications (standard)				BTD-200QH	
				Standard	with APC
Travel	X-axis travel (Cross movement of table)		mm (in)	1 500 (59)	
	Y-axis travel (Vertical movement of spindle head)		mm (in)	1 200 (47.2)	1 000 (39.3)
	Z-axis travel (Longitudinal movement of table)		mm (in)	700 (27.5)	
	W-axis travel (Quill extension)		mm (in)	400 (15.7)	
	Distance from table surface to spindle centerline		mm (in)	0~1 200 (0~47.2)	0~1 000 (0~39.3)
	Distance from table centerline to spindle gage plane		mm (in)	450~1 150 (17.7~45.2)	
Table	Table working surface		mm (in)	1 000×1 200 (39.3×47.2)	
	Table loading capacity		kg (lbs)	4 000 (8 800)	3 500 (7 700)
	Table surface configuration (Pitch of T-slots: 160 mm)		mm (in)	6 T-slots, size 22 ,pitch 160 (size 0.86, pitch 6.2)	
	Minimum table indexing angle		deg	0.0001°	
Spindle	Rotating spindle diameter		mm (in)	110 (4.9)	
	Extended quill diameter		mm (in)	200 (7.8)	
	Spindle speed		min^{-1}	20~3 000 [15~5 000]	
	Number of spindle speed ranges			1 range [2 ranges]	
	Type of spindle taper hole			7/24 taper No.50	
	Spindle bearing inner diameter		mm (in)	110 (4.9)	
Feedrate	Rapid traverse rate	X,Y,Z	mm/min (ipm)	12 000 (472.4)	
		W	mm/min (ipm)	5 000 (196.8)	
		B	deg/min	1 080	
	Feedrate	X,Y,Z	mm/min (ipm)	1~6 000 (0.039~236.2)	
Automatic tool changer	Type of tool shank			MAS BT50	
	Type of retention knob			MAS P50T-1 (45 degree)	
	Tool storage capacity			30 [60, 90]	
	Maximum tool diameter	When pots are full	mm (in)	125 (4.92)	
		When adjacent pots are empty	mm (in)	240 (9.44)	
	Maximum tool length		mm (in)	400 (15.74)	
	Maximum tool mass		kg (lbs)	25 (55)	
	Method of tool selection			Pot address random short-cut	
Spindle drive motor	(30-min. rating/cont. rating)		kW (HP)	AC30/22 (AC40/30)	
Power sources	Electric power supply			AC200/220V±10%, 50/60Hz±2%	
	Power capacity		kVA	68	72
	Compressed air supply	Pressure	Mpa {kgf/cm^2} (psi)	0.5~0.8 {5~8} (82.5~116)	
		Flowrate	N ℓ /min	150	
Machine size	Machine height		mm (in)	3 210 (126.4)	
	Floor space		mm (in)	4 400×4 430 (173.2×174.4)	4 870×6 690 (191.7×263.4)
	Mass of machine (including CNC system)		kg (lbs)	18 000 (39 600)	23 000 (50 600)
Accuracy	Positioning accuracy	X,Y,Z	mm (in)	±0.005/full length (±0.00019/full length)	
		X,Y,Z (with scale)	mm (in)	±0.003/full length (±0.00011/full length)	
		W	mm (in)	±0.012/full length (±0.00047/full length)	
	Repeatability	X,Y,Z	mm (in)	±0.003 (±0.00011)	
		X,Y,Z (with scale)	mm (in)	±0.002 (±0.00007)	
		W	mm (in)	±0.008 (±0.00031)	
	Table indexing accuracy (arbitrary angle)			±3″	
	Table indexing repeatability (arbitrary angle)			±1.5″	
Exterior painting color				R4-383 (Munsell Y8.4/0.5) and N2.5 (For CNC system, servo motors and cooler, each maker's standard color shall apply.)	

Note: Values in brackets [ ] refer to the options.
The values in the specifications table above indicate the maximum capacity. If a continuous long-hour operation is required at the maximum capacity, please consult with us beforehand.

Machine External View

BTD-200QH

mm(in)



BTD-200QH (APC)

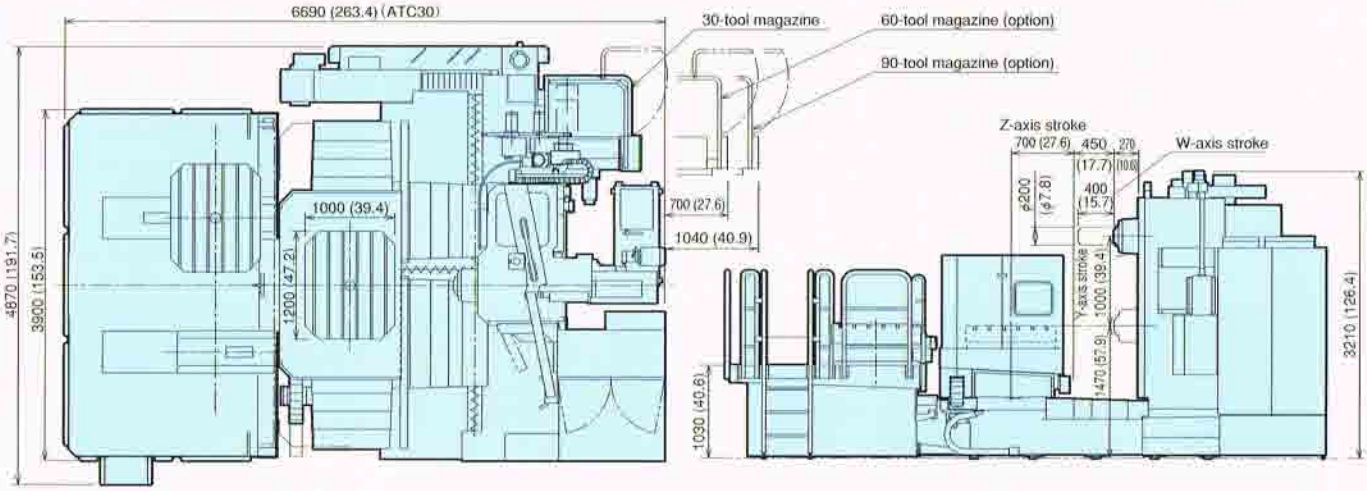
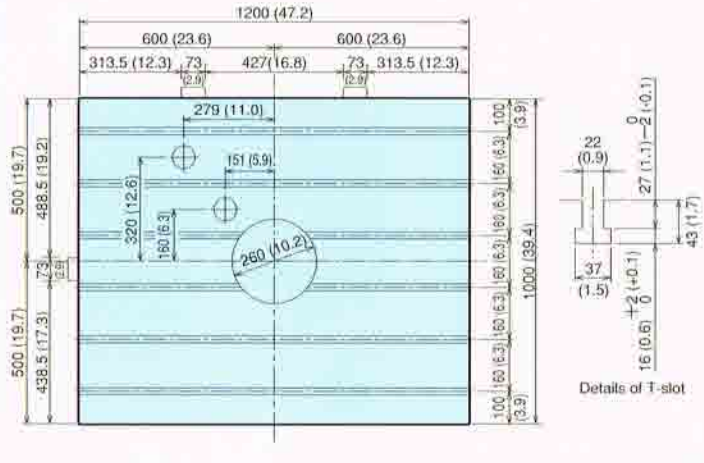


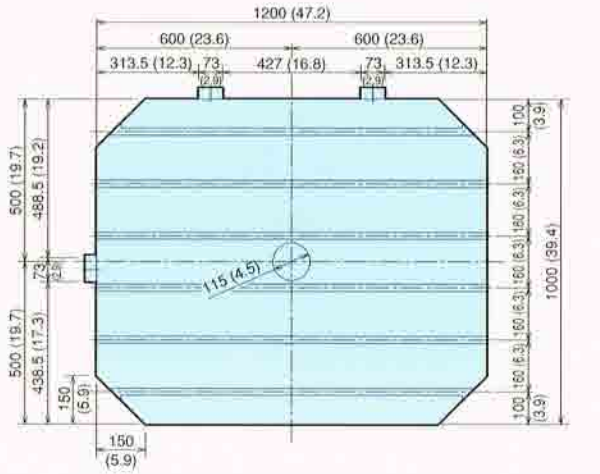
Table Top View

BTD-200QH



BTD-200QH (APC)

mm(in)



Accessories

Standard accessories

❶	Numerical control system TOSNUC 999	1 set
❷	Machine operation box (pendant type)	1 set
❸	Automatic quill clamping unit	1 set
❹	Spindle orientation stop function	1 set
❺	Spindle speed drop monitoring function	1 set
❻	Handwheel feed unit for X-, Y-, Z-, W-, B-axes (portable)	1 set
❼	Incremental 0.0001° automatic table indexing unit (with rotary scale)	1 set
❽	Automatic (hydraulic) table clamping unit	1 set
❾	Table oil pan	1 set
❿	Saddle slideway cover	1 set
⓫	Bed slideway cover	1 set
⓬	Column front cover	1 set
⓭	Work light (spot light)	1 set
⓮	Assembly and disassembly tools for maintenance	1 set
⓯	Installation parts	1 set
⓰	Automatic main power OFF unit	1 set
⓱	Plug receptacle for external equipment (AC100V, 5A)	1 set
⓲	Hydraulic unit with oil cooler	1 set

Special accessories (options) - Set A

1 Flood coolant set
- ·Lift-up chip conveyor (incorporating a coolant tank)
  Mainly used for casting and steel milling chips.
  Chip processing capacity 3 ℓ /min (0.78 gal/min)
- ·Coil conveyor (built in the bed)
- ·Flood coolant unit
  Pump capacity 50 ℓ /min, head 5 m (13 gal/min, head 16.4 ft)
  Tank capacity 250 ℓ (65 gal)

2 Chip cover A

3 Operator call lamp (1 color: yellow)

Notes: The air compressor should be provided by the customer.
(1) Air compressor: Delivery 145 normal liters/min, AC200 V, 1.5 kW (standard)
(2) Air compressor: Delivery 265 normal liters/min, AC200 V, 2.2 kW (chip air blow)
(3) Air compressor: Delivery 430 normal liters/min, AC200 V, 3.7 kW (chip air blow + linear scale)

Note : Use a fire-resistant water-soluble coolant

Other special accessories (options)

1 Automatic pallet changer

2 Spindle nose coolant set (flood coolant type)
Pump master pressure: 1.2 MPa [12 kgf/cm²] (170 psi)

3 Spindle nose coolant set (through-tool type)
Pump master pressure: 1.2 MPa [12 kgf/cm²] (170 psi)

4 Through-spindle coolant set
Pump master pressure: 1.2 MPa [12 kgf/cm²] (170 psi)

5 Through-spindle coolant set
Pump master pressure: 2.0 MPa [20 kgf/cm²] (290 psi)
(A special coolant tank is included.)

6 Chip bucket (C)

7 Type of retention knob MAS P50T-2 (30°)

8 Attached retention knob MAS P50T-1 (45°)
MAS P50T-2 (30°)

9 Automatic tool changer
Tool storage capacity: 60, 90
Note) When this specification is selected, required floor space exceeds the standard space.

10 Angle head (Type of spindle taper hole: JIS 7/24 taper No.50)

11 Automatic measuring function and exclusive touch probe (FM type)
Note) Program storage capacity reduces 50 m (164 ft).

12 Calibration block (for automatic measuring function)

13 Test bar (60-dia. × 310) [2.36-dia. × 12.2]

14 Table edge locators

15 B-axis setup compensation function
(Shift of workpiece setup position in B-axis direction is automatically measured and compensated.)
Note) Optional automatic measuring function is required.

16 Rotary milling function

17 Linear scale feedback X-, Y-, Z-axes
Positioning accuracy ±0.003 mm/Full stroke (±0.00011/Full stroke)
Repeatability ±0.002 mm (±0.00007)

18 Z-axis thermal displacement compensation function

19 Hydraulic unit pursuant to the Fire Prevention Law

20 Operator call lamp (3 colors: red, yellow, green)

21 Customer's designated machine exterior painting color

22 Block (for tool-type angle head)

23 Coolant/air blow unit
Note) Including the spindle nose coolant set (through-tool type)

24 Chip air blow unit

25 Intermittent coolant unit

26 External M code: 8 types

27 High-speed spindle (15 ~ 5000 min^{-1})

28 Automatic tool length measuring function

29 Master tool (for automatic tool length measuring function)

30 Operator side cover (operator side door)

31 ATC side cover

32 Flex drill
Note) Optional three-dimensional coordinate conversion function is required.

Available options

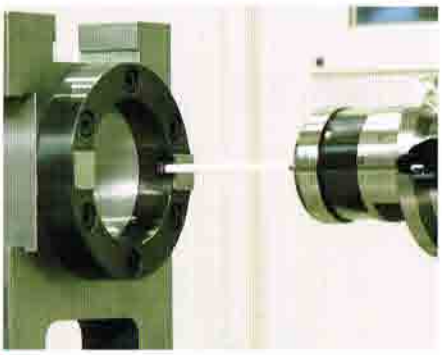
1 Lift-up chip conveyor (set A)
6 Chip bucket C

2 Chip cover A (set A)

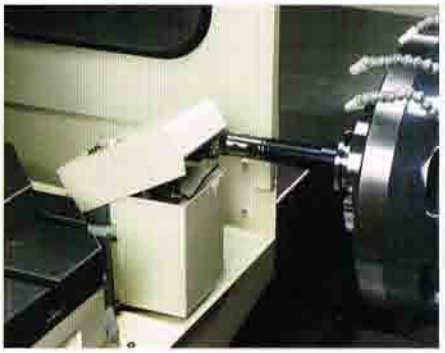
3 Spindle nose coolant (through-tool type)
23 Coolant/air blow unit

9 60-tool ATC

10 Angle head

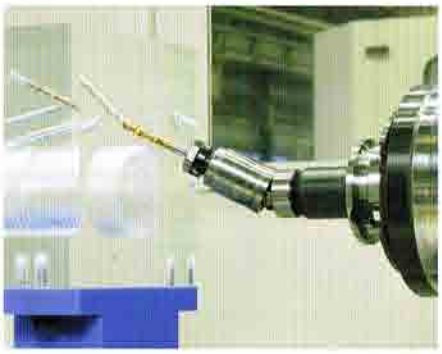


11 Automatic measuring function and exclusive touch probe
15 B-axis setup compensation function

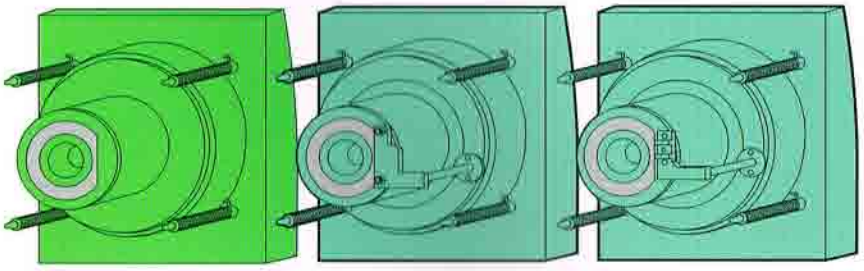


28 Automatic tool length measuring function

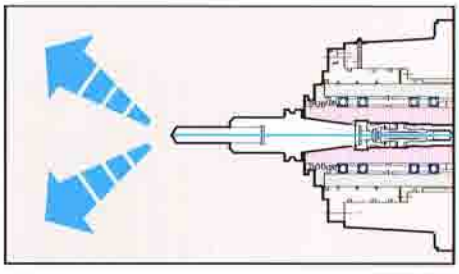
30 Operator side cover (operator slide door)



32 Flex drill



1 Flood coolant (set A)
2 Spindle nose coolant (flood coolant type)
3 Spindle nose coolant (through-tool type)
23 Coolant/air blow unit



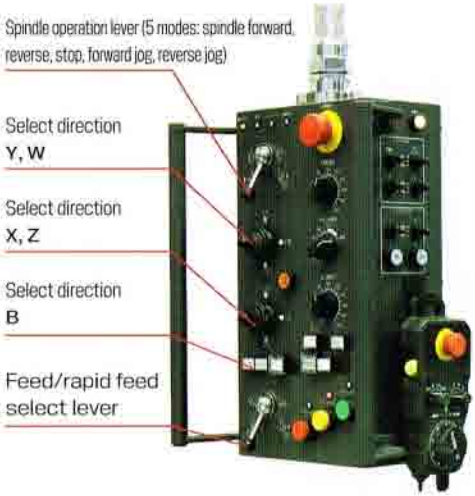
4 5 Coolant through spindle (CTS)

CNC System TOSNUC 999

User media (option set B)

Very useful device for managing long programs.

Pendant operation box



Manual operations relating to machine movements are separated from the NC operation unit and centrally arranged on the pendant operation box. Thus, combined NC and manual machining operations can be performed smoothly.

CNC System Specifications TOSNUC 999

Standard Specifications

●Controlled Axes

Controlled axes	5 axes : X,Y,Z,W,B
Simultaneously controlled axes	
3 axes (X, Y, Z) for positioning (G00) and linear interpolation (G01)	
2 axes (any two axes excluding W- and B-axes) for circular interpolation (G02, G03)	

●Programmable Methods

Programming resolution	Linear axis : 0.001 mm Rotating axis : 0.0001°
Maximum programmable dimension	Linear axis : ±99999.999mm Rotating axis : ±9999.9999°
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

●Interpolation

Positioning	G00
Linear interpolation	G01
Circular interpolation	G02/G03: CW/CCW

●Feed

Feedrate	F5-digit programming in mm/min
Dwell	G04 (0 ~ 999.99 sec)
Handwheel feed (portable)	
Linear axis : 0.001/0.01/0.1 mm (per division)	
Rotary axis : 0.0001/0.001/0.01° (per division)	
Continuous jog feed	
Rapid traverse rate override	0 ~ 100 % in 10 % increments
Feedrate override	0 ~ 200 % in 10 % increments
Override cancel	M48/M49
Automatic acceleration/deceleration	
Linear acceleration or deceleration is effected on rapid traverse rate and jog feedrate.	
Automatic acceleration/deceleration for feed	G08/G09 G50/G51

●Part Program Storage and Edit

Program storage	150 m equivalent punched tape (To be reduced as per the attached functions.)
No. of registrable programs	128 (To be reduced as per the attached functions.)
Program edit	Various editing operations are possible for stored programs.
Background edit	
Program deletion, insertion and modification are possible in the background edit mode.	
Program name	$ (or O) 8-digit programming (alphanumeric characters)
Program comment	No. of displayed characters max. 32 (max. 197 for input)
Control in/out	
Sequence number	N5-digit programming
Sequence number search	Bidirectional search is possible.
Program nesting list	
Fixture offset list	
T-code list	
Calendar timer	
Program creation date management, time display	

●Operation and Display

Operation panel	
Display section: 10.4 inch color TFT liquid crystal display	
Operation section: Keyboard with membrane switches	
Customizing keys	
A series of key input operations (key pattern) can be registered. (6 types)	
A combination of screens can be registered. (4 types)	
Tool file	
Tool information such as tool offset and tool name can be batch-displayed and edited.	
Automatic operation	Memory operation and DNC operation
MDI operation	Entry of multiple blocks and restart of an already executed block are possible.
Manual numerical input command	
S.F manual setting	Setting of S and F codes in manual mode.
S.F auto setting	
Automatic setting of S and F codes in manual mode.	
Spindle drive motor load factor display	
Load imposed on spindle drive motor is displayed.	
Run hour display	The NC working time is displayed.
Program record	A record of programs already executed is displayed. (Date of program execution, actual time, etc.)
Customized display color tone	
Display gray scale of window frame, background and characters can be changed.	

●I/O functions and Devices

RS232C interface port A	
Operation via external device, loading and dumping of programs and data are possible.	

●S, T and M Functions

Spindle speed function	S5-digit programming
Spindle speed override	50 ~ 200 % (in 10 % increments)
Tool function	T4-digit programming
Miscellaneous function	M4-digit programming

●Tool Offset

Tool length offset	G43/G44/(G49)
Tool offset	G45/G46/G47/G48
Cutter compensation C	G40/G41/G42, point of intersection calculation
No. of tool offsets	60 sets (tool length offset, cutter compensation)

●Coordinate System

Coordinate system setting	G92
Machine coordinate system positioning command	G73
Plane selection	G17/G18/G19
Fixture offset	G53/G57, 9 sets
(This function cannot be used together with fixture offset 2.)	
Fixture offset 2	G53/G54/G55/G56 3 sets

●Operation Support Function

Single block	A program can be executed block by block.
Optional stop	
Optional block skip	
A block containing a "/" code at the head is ignored.	
Dry run	
Machine lock	
Auxiliary function lock	
Z-axis feed cancel	
Manual absolute ON/OFF	
All clear	
Reset	
Feed hold	
Cycle stop	

FLEXMACHINE

Program restart
Program restart, block restart
Sequence number collation and stop
Manual interruption
Handwheel feed interruption

●Programming Support Function

Circular interpolation by radius R designation
Radius of a circle can be specified directly, using R code.
Circle cutting Inner circle cutting: G12/G13, G22/G23
Outer circle cutting: G222/G223
Canned cycle
G77 ~ G89, G98, G99, G100, G186
Subprogram call G72 (Nesting of up to five levels is possible.)
Macro programming Single call: G72
Modal call 1: G74/G76
Modal call 2: G75/G76
Automatic corner override
Inside corner automatic override and inside corner cutting speed change.
Pattern cycle G109 ~ G119 (Drilling pattern)
G121 ~ G132 (Milling pattern)
Programming format check function Program format check
Single block suppression G990/G991
Feed hold suppression G992/G993
Override suppression G994/G995
Handwheel feed interruption suppression G996/G997

●Mechanical Error Compensation

Backlash compensation
Pitch error compensation
Pitch error gradient compensation
Origin correction
X-axis shift from table center is corrected.
Unidirectional positioning G60
Straightness compensation
Non-linear type compensation control

●Automatic Support Function

Tool life management
・ Counting of tool working time
・ Tool wear coefficient function Tool life and workingtime are counted by multiplying a specified coefficient.
・ Spare tool selection

●Machine Control Support Function

Integrated PLC TC200
Axis feed interlock

●Safety and Maintenance

Emergency stop
Stored stroke limit
Axis interference area setting and axis interference check G24/G25, G26/G27
Self-diagnosis function
Door interlock

●Servo System

Servo motor AC servo motors
Position detectors
Absolute encoders (All axes: Absolute position detection)
Rotary scale (B-axis)

Special Specifications (Options)

Options - Set B

(1) Helical interpolation G02/G03 (arc + linear)
(2) Synchronous tapping M843, M844, M845
(3) Part program storage
300 m equivalent punched tape (No. of registrable programs: 256)
(4) User media
(USB port + compact flash slot)
For loading and dumping of NC programs and tool offset data.
(5) No. of fixture offsets
99 sets (including the standard sets)
(6) Random angle chamfering & corner R
(7) Manual alignment function
Including manual tool length/diameter measurement and coordinate conversion (G10/G11).
(8) Teaching function
Automatic program creation by MDI and manual operations.
(9) W-axis offset function
W-axis extended position is compensated with Z-axis fixture offset.

Other Options

● Controlled Axes

(1) One additional controlled axis

●Programming Methods

(2) Inch/metric selection G70/G71

●Interpolation

(3) Hypothetical axis interpolation (i.e., interpolation with sine curve) G07
(4) Cylindrical interpolation G67
(5) Involute interpolation G105
(6) Archimedes interpolation (Spiral interpolation) G102/G103

●Feed

(7) Synchronous thread-cutting
(8) Per-revolution feed G95
(9) Per-revolution dwell G05

●Part Program Storage and Edit

(10) Part program storage
600 m equivalent punched tape (No. of registrable programs: 512)
1,200 m equivalent punched tape (No. of registrable programs: 1024)
3,000 m equivalent punched tape (No. of registrable programs: 1024)
5,400 m equivalent punched tape (No. of registrable programs: 1024)
7,800 m equivalent punched tape (No. of registrable programs: 1536)
10,200 m equivalent punched tape (No. of registrable programs: 1536)
(11) Mass memory
Selection of 256 MB, 512 MB or 1 GB.

●I/O Functions and Devices

(12) Remote buffer operation (including port C connection)
(13) High-speed LAN linkage
File transfer by connecting CNC and LAN.

●Tool Offset

(14) No. of tool offsets
No. of tool length offsets: 499 sets (including the standard sets)
No. of cutter compensations: 499 sets (including the standard sets)
(15) Three-dimensional tool compensation G30/G31

●Operation Support Function

(16) Foreground plotting function
A tool locus of active program is plotted.
(17) Additional number of optional block skips Max. 9

●Programming Support Function

(18) Programmable mirror image G62/G66
(19) Programmable data input
Updating of offsets by G58/G59.
(20) Scaling G64/G65
(21) Plane conversion G35~G39
(22) Three-dimensional coordinate conversion G14
(23) Figure copy function G721/G722
(24) Circle cutting compensation
(25) Machining time estimate & NC plotting function
Machining time estimate and tool path plotting for non-active program on the background.
(26) Pattern cycle division into NC statements

●Automatic Support Function

(27) Faulty cut detection & feedrate regulation function
Tool breakage and wear detection
Feedrate regulation
Note) Counting of tool working time and spare tool selection are included in the standard specifications.
(28) Program check & used tool list creation
Check of a program to be executed next and creation of a slated tool list.
(29) Cutting start detection Used for spot facing, etc.

●Safety and Maintenance

(30) Memory lock

●High-Accuracy Machining & Servo System

(31) Shape recognition preview positioning control
(32) NURBS interpolation

●Cable

(33) RS232C cable 10 m-long

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ISO 9001

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