

TOSHIBA MACHINE

BTH-110.R18

Table-Type Horizontal Boring and Milling Machine



Experience with over 8 000 machines with continual technical improvements, the "BTH-110.R18, H³" has been developed to provide horizontal boring operational ability with machining center productivity and flexibility.

BTH-110.R18 H³

Why the **H³**!

High-Rigidity

High-Accuracy

High-Speed

Designed by us to provide you with:

Floor space saving	Efficient 6m by 6m (20ft by 20ft) "Square floor space"
Easy chip disposal	High-level side discharge hinge-type chip conveyor
Protective covers	Operator protection from chip and coolant with easy access
Workability	Ease of operation with manual pendant box and environmental platform
Operation capability	Enhanced functions and options from TOSNUC 999



That's why the H³!



Why the **H³**!

High-Rigidity

Solid and rigid cast iron table, bed and column structures

High-Accuracy

Accuracy of feed mechanism with minimal backlash

High-Speed

18m/min rapid speed is now available on Box-way guide
High power spindle motor with 4 000min⁻¹ spindle speed



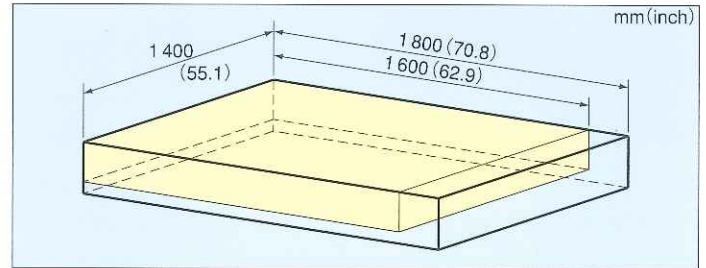
Table bed and Column bed

Rotary table

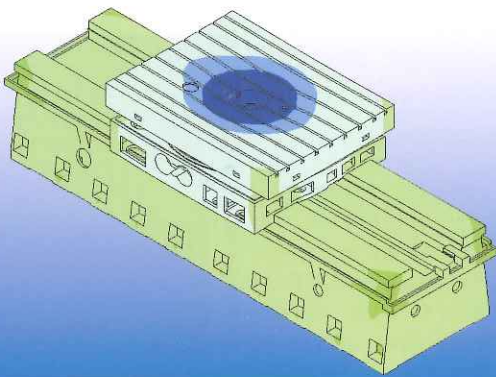


The extreme thick table which withstands heavy loads

Expanded area of B axis slideway which takes heavy loads (1.4 times area of conventional machines), and increased thickness of the area.



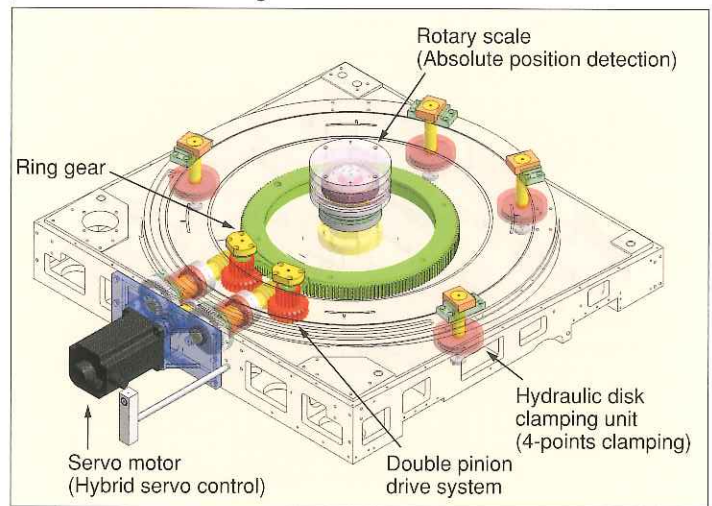
Structure analysis



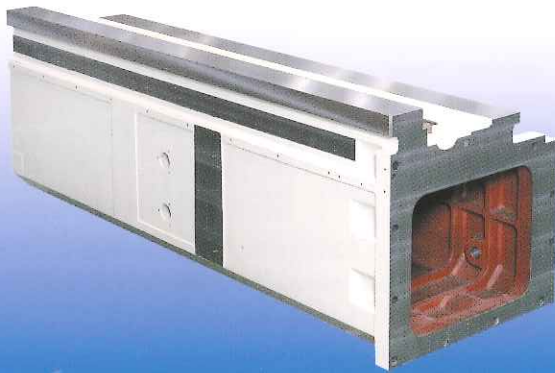
High speed precision machining is achieved through the use of a new B-axis drive mechanism (pat. pending).

B-axis positioning time : 15sec (0°~90°)

The revolutionary type of clamp is standard with a highly rigid double pinion-type drive system and rotary scale for stabilized precision table indexing.



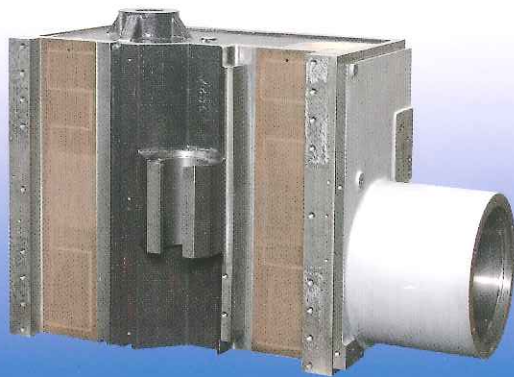
Column



Minimal spindle overhang with stepped guideways on the column

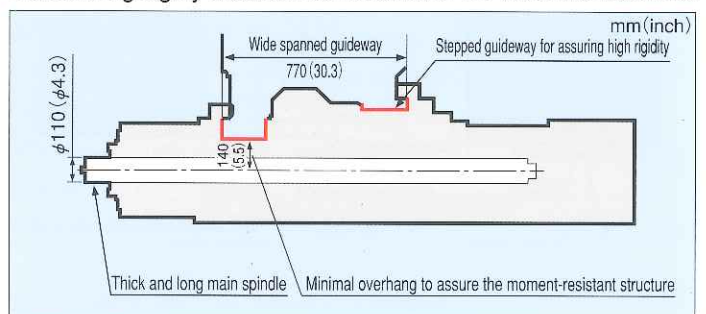
Extra wide spanned guideways that withstand heavy-duty cutting forces, thus improving the overall performance.

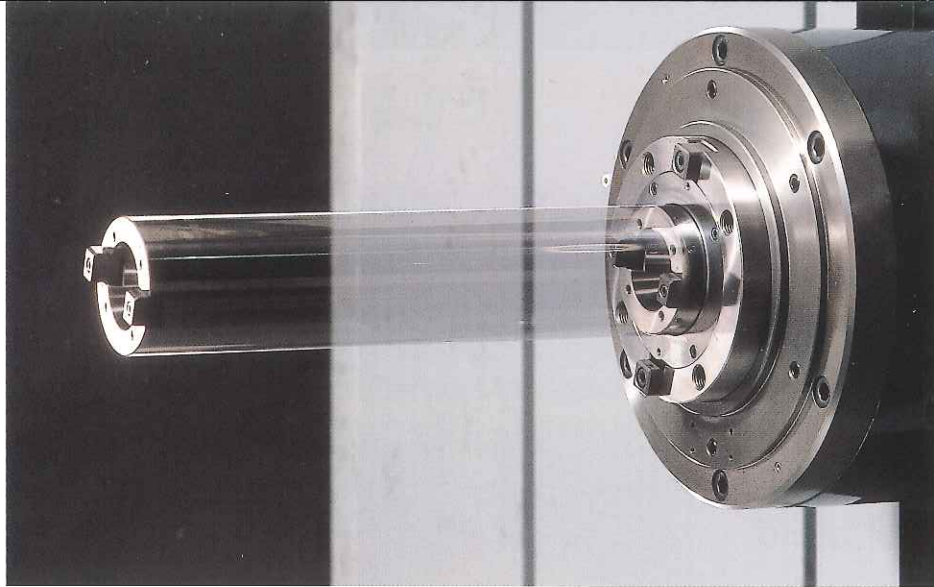
Spindle head



Hardened and ground spindle

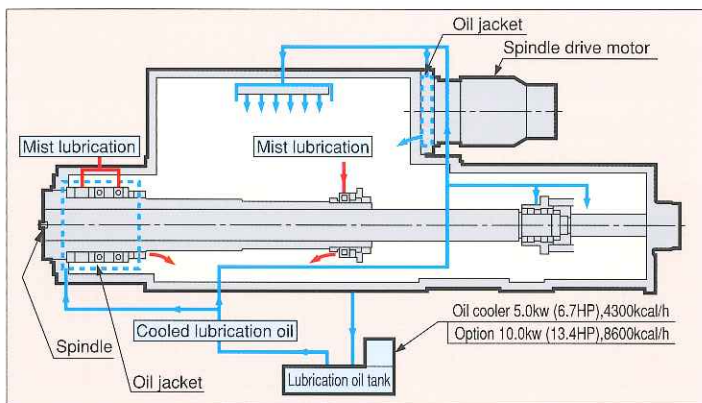
Main spindle completely nitrided, hardened and ground for maintaining highly accurate condition over the life of the machine.





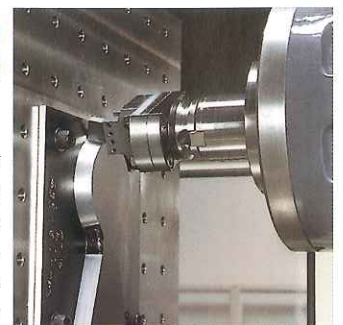
A newly developed assurance of high

The gear transmission and the winding switching control type spindle motor adapted for the main-spindle drive system realize the wide speed range, high rigidity and high torque performance. BTH-110.R18 complies with various machining needs for horizontal boring & milling machine, such as milling, boring, drilling, tapping, etc., wherefore highly accurate and efficient machining can be performed.



Spindle normal direction control ((spring necked turning)) (option)

Composite machining of any shape such as cutoff and hale type finishing on an arc or along a straight line on any plane is possible with this C axis spindle control. Simple-type programs and tooling available for the machining of complex seal surfaces on the slots of such workpieces as vacuum devices.



Minimal thermal displacement of spindle head

Use of an oil jacket and constant lubrication air mist volume for stabilized high accuracy cutting operations.

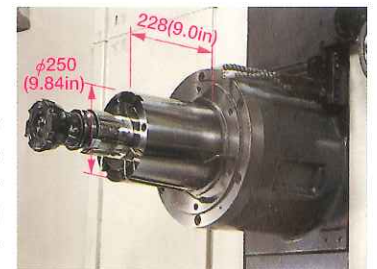
- Spindle bearings constant mist lubrication

Long nose type spindle head (option)

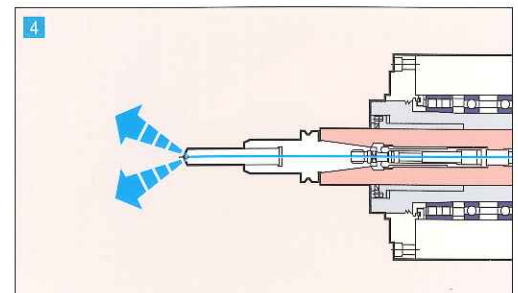
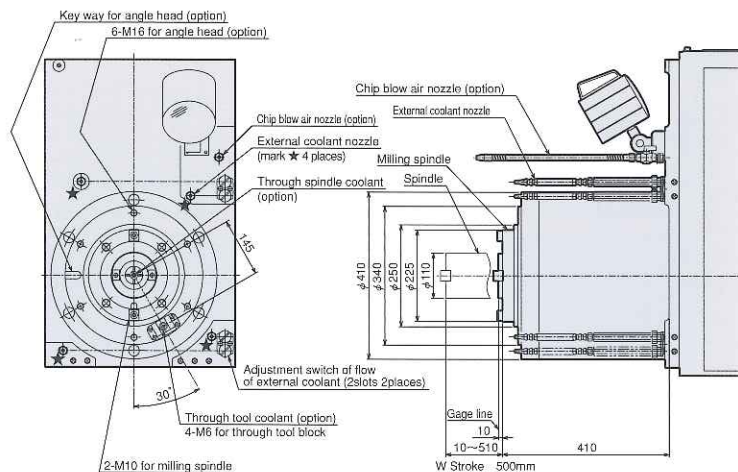
A long spindle head nose allows easy access to the workpiece, assuring stabilized accuracy even during heavy-duty machining operations.

(The spindle extension is 500 mm (19.7 in) same as standard.)

Note : Detailed of option specifications to be decided at a separate meeting.



Spindle detailed drawings



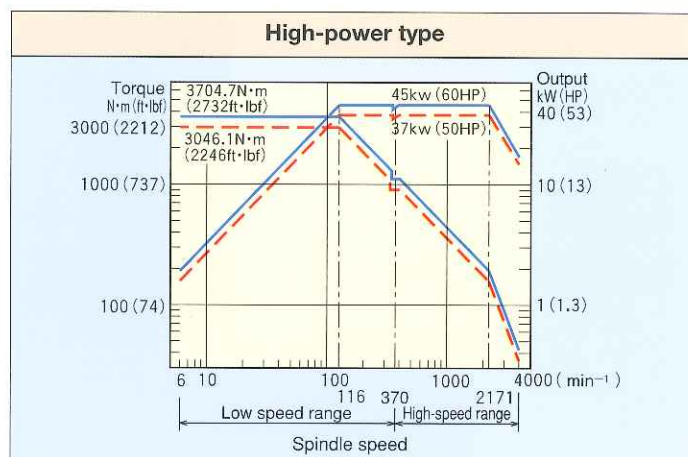
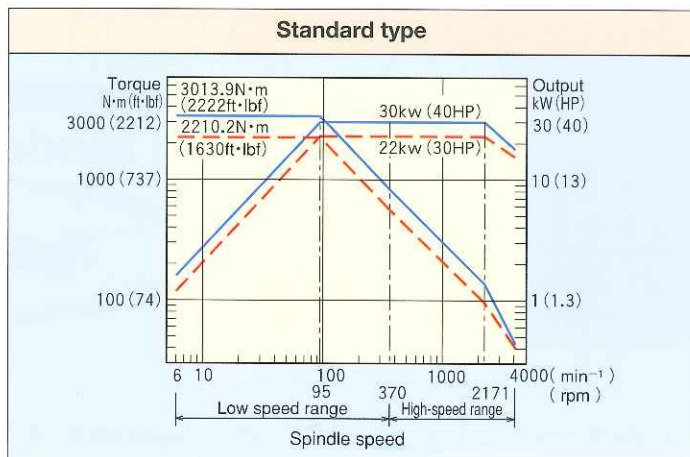
■ Through-spindle type coolant (option)

spindle for optimum high speeds, accuracy and heavy duty machining.

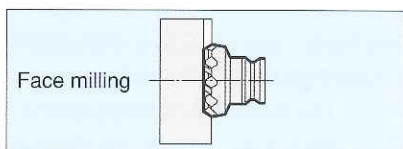


Spindle variations

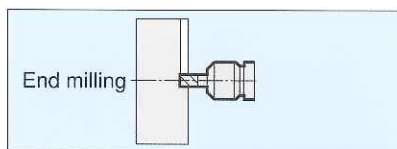
Spindle-torque-output diagram



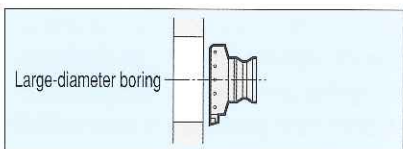
Examples of cutting capacity (Test-piece material: S55C[AISI 1055])



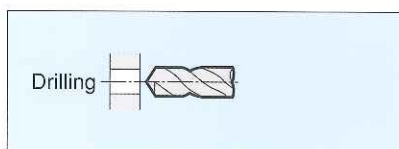
Tool diameter	160mm (6.3in)
No. of flutes	8
W axis extension	0mm (0in)
Y position	1060mm (41.7in)
Cutting depth	7mm (0.3in)
Wide of cut	120mm (4.7in)
Cutting speed	150m/min (492fpm)
Spindle speed	300min ⁻¹
Feedrate	1000mm/min (39.3ipm)
Volume of cutting	843cm ³ /min (51.4in ³ /min)



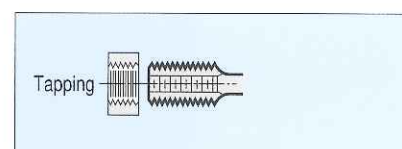
Tool diameter	80mm (3.1in)
W axis extension	150mm (5.9in)
Y position	1250mm (49.2in)
Cutting depth	25mm (1.0in)
Wide of cut	50mm (2.0in)
Cutting speed	100m/min (328fpm)
Spindle speed	400min ⁻¹
Feedrate	480mm/min (18.8ipm)
Volume of cutting	597cm ³ /min (36.4in ³ /min)



Tool diameter	600mm (23.6in)
Cutting depth	7mm (0.3in)
Cutting speed	100m/min (328fpm)
Feedrate	28mm/min (1.11ipm)
Volume of cutting	355cm ³ /min (21.6in ³ /min)



Tool diameter	69.5mm (2.7in)
W axis extension	0mm (0in)
Y position	1250mm (49.2in)
Cutting speed	22m/min (72.1fpm)
Spindle speed	100min ⁻¹
Feedrate	0.5mm/rev (0.02in/rev)



Tool diameter	M60×P5.5
W axis extension	0mm (0in)
Y position	350mm (13.8in)
Cutting speed	10m/min (32.8fpm)
Spindle speed	53min ⁻¹
Feedrate	291.5mm/min (11.5ipm)

These cutting results may differ depending on the fixturing and machining criteria, such as cutters tool-holders, etc.

TOSNUC 999 (Triple nine) permits quick switching between manual, MDI and Automatic operation modes.



Automatic mode

MDI mode

Full tea

● 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 flash drive and compact flash (CF)

TOSNUC 999 is standard equipped with USB port and CF card slot in response to capacity enlargement of NC programs.



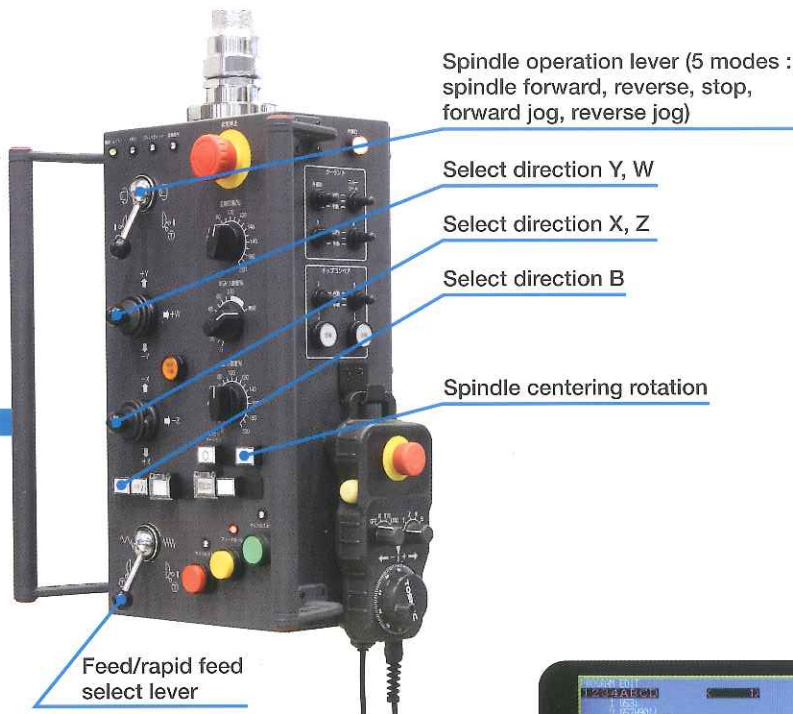
USB flash drive



Compact flash

Manual mode

atching



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 drawing 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

[OP: North-America version]

Machine Specifications				BTH-IIO.R18
Travel	X-axis travel (Cross movement of table)		mm (in)	2 500 [100]
	Y-axis travel (Vertical movement of spindle head)		mm (in)	2 000 [80]
	Z-axis travel (Longitudinal movement of column)		mm (in)	1 500 [60]
	W-axis travel (Spindle extension)		mm (in)	500 [20]
	Distance from table surface to spindle center		mm (in)	0 to 2 000 [0 to 80]
	Distance from table center to milling spindle gauge plane		mm (in)	600 to 2 100 [23.5 to 83.5]
Table	Table working surface		mm (in)	1 400 x 1 800 (55.1 x 70.8)
	Table loading capacity		kg (lbs)	10 000 (22 000)
	Table surface configuration		mm (in)	9 T-slot, size 22, pitch 160 (size 0.86, pitch 6.2)
	Minimum table indexing angle (B-axis)		Degree	0.0001
Spindle	Spindle diameter		mm (in)	110 (4.3)
	Spindle speed range		min ⁻¹	6 to 4 000
	Milling spindle nose diameter		mm (in)	225 (8.8)
	Type of spindle taper			7/24 tape NO.50
Feedrate	Rapid traverse rate	X, Y, Z	mm/min (ipm)	18 000 (708.7)
		W	mm/min (ipm)	6 000 (236.2)
		B	deg/min	720
	Feedrate	X, Y, Z	mm/min (ipm)	1 to 10 000 (0.04 to 393.7)
Automatic tool changer (ATC)	Type of tool shank			MAS BT50 (CAT 50V)
	Type of retention knob			MAS P50T-1 (45 degree)
	Tool storage capacity			38 [60, 90, 120] tools
	Maximum tool diameter	When adjacent pots are occupied	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)	
Tool selection			Pot address random short-cut	
Spindle drive motor	(30 min./cont. rating)		kW (HP)	AC30/22 (AC40/30)
Power source	Electric power supply			AC200/220V +/-10%, 50/60Hz +/-2%
	Power capacity		kVA	80
	Compressed air supply	Pressure	MPa (psi)	0.5 to 0.8 (72.5 to 116)
		Flowrate	NI/min	900
Machine size	Machine height		mm (in)	4 600 (181)
	Floor space		mm (in)	6 100 x 6 100 (240 x 240)
	Mass of machine (including NC equipment)		kg (lbs)	30 000 (66 000)
Accuracy	Positioning accuracy	X, Y, Z	mm (in)	Without linear scale: +/-0.008/full length (+/-0.00032/full length) With linear scale: +/-0.004/full length (+/-0.00016/full length)
		W	mm (in)	+/-0.010/full length (+/-0.00040/full length)
	Repeatability	X, Y, Z	mm (in)	Without linear scale: +/-0.004 (+/-0.00016) With linear scale: +/-0.002 (+/-0.00008)
		W	mm (in)	+/-0.006 (+/-0.00024)
	Table indexing accuracy (arbitrary angle)		sec	+/-3
	Table indexing repeatability (arbitrary angle)		sec	+/-1.5
Machine colour				R4-383 (Munsell 5Y8.4/0.5) and N2.5 For the NC system, servo motors and cooler, each maker's standard colors shall apply

Accessories (Machine)



STANDARD ACCESSORIES

1 Numerical control system TOSNUC 999	1 set
2 Machine operation box (Pendant type)	1 set
3 Spindle orientation stop function	1 set
4 Spindle speed drop monitoring function	1 set
5 Constant volume mist unit for spindle bearing lubrication	1 set
6 Spindle head cooling unit (main bearing, motor flange oil jacket)	1 set
7 Hand wheel feed unit (portable) for X, Y, Z, W and B axes	1 set
8 Automatic table random angle indexing unit, every 0.0001 degree (with B-axis rotary scales feedback)	1 set
9 Automatic table clamping unit (hydraulic)	1 set
10 Table oil pan	1 set
11 High type Chip cover (with operator door) at table side	1 set
12 Table-bed slideway cover on X-axis (both right and left side)	1 set
13 Column-bed slideway cover on Z axis (front side)	1 set
14 Column-front slideway cover: Y axis (column vertical)	1 set
15 ATC rail cover	1 set
16 Chip disposal chute for Z-axis (both sides of column-bed)	1 set
17 Spindle head cooling unit and hydraulic unit Inverter controlled oil cooler Cooling capacity: 2.8/3.2kW [3.7/4.3 HP] (50/60 Hz): 2400/2750 kcal/h	1 set
18 Assembly and reassemble tools for maintenance	1 set
19 Installation parts	1 set
20 Operator call lamp: one color (Yellow)	1 set
21 Automatic power OFF device	1 set

MECHANICAL ACCESSORIES

1 Flood coolant set	
• X-axis chip conveyor combined with Lift-up type chip conveyor (incorporating coolant tank) Mainly used for cast and steel milling chips.	
Processing capability	liters/min
• Flood coolant unit	(13.2 gal./min., head 16.4 ft)
Pump capacity	50 liters/min., head 5 m
Tank capacity	400 liters (105 gal)
2 Through-tool type coolant set	
• Flood coolant set	
• Through-tool coolant set	
Pump capacity	1.2 MPa (12 kgf/cm ²) (170 psi)
3 Coolant/Air blow set	
It is necessary to attach air-compressor of 1 200/1 300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)	
• Flood coolant set	
• Through-tool coolant set	
• Coolant/air blow unit	
4 Through spindle type coolant set	
It is necessary to attach air-compressor of 1200/1300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)	
• Flood coolant set	
• Through-spindle type coolant unit (including sub-tank)	1.2 MPa (12 kgf/cm ²) or 2.0 MPa (20 kgf/cm ²) (170 or 290 psi)
• Through-spindle type air blow unit	
5 Through-spindle type mist coolant set	
It is necessary to attach air-compressor of 1 200/1 300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)	
• Flood coolant set	
• Through-spindle type coolant unit (including sub-tank)	1.2 MPa (12 kgf/cm ²) or 2.0 MPa (20 kgf/cm ²) (170 or 290 psi)
• Through-spindle type air blow unit	
• Fine particle oil mist unit	

***Coolant set cannot be selected at the same time. Please select either one from Item No. 1 to 5.

***Caution: To avoid serious case of fire, we recommend the followings.

- Must provide fire extinguisher near machine in case of using inflammable type coolant material(s), which may cause fire. And also must observe machine during using coolant by machine operator(s).
- Regarding the ignition point of coolant material, there are two kinds of Open-type and Closed-type features.
If your facility has a Closed-type splash cover, you must obtain details of

coolant material(s) and make cross check to avoid unfavourable situation of fire. Before to use machine, must provide Prevention of fire or equivalent facility, just in case.

- Must use anti-inflammable coolant material for un-manned operation.

6 Chip blow air unit	
It is necessary to attach air-compressor of 1 200/1 300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)	
7 Intermittent coolant unit	
8 Type of retention knob	MAS P50T-2 (30 degree)
9 Attached retention knob	MAS P50T-1 (45 degree)
10 Automatic tool changer (ATC)	Tool storage capacity 60, 90, 120 tools
In case of ATC-60, 90 and 120, required floor space will be larger than standard	
11 Maximum tool length up to 600 mm [23.6 in]	
12 Z-axis Coil type chip conveyors for both sides of column-bed (AC 0.4 kW x 2) [AC 0.53 HP x 2]	
13 Chip cover-A (Simple and detachable)	
14 Chip bucket C (Capacity: 0.18m ³ [6.3 ft ³])	
15 Box type cover, totally closed, for Standard type machine	
16 Automatic pallet changer (APC) two (2) pallets	
Pallet loading capacity:	7 000 kg (15 400 lb)
Note that some of machine specifications will be changed when APC selected.	
17 Automatic measuring function and dedicated touch probe (Renishaw made) (FM wave type and part program storage capacity reduces approximately 50 m [164 ft])	
18 Calibration block (for Automatic measuring function)	
19 Automatic tool length measurement	
(Part program storage capacity reduces approximately 30 m [98.4 ft])	
20 Reference tool for Automatic tool measurement function	
21 Test bar: diameter 60 x 310 mm length (diameter 2.36 x 12.2 in length)	
22 Table reference piece	
23 B-axis set-up compensation function	
Shift workpiece setup position in B-axis direction is automatically measured and compensated.	
Automatic measuring function option is required.	
24 Continuous table indexing device: 0.0001-degree NC rotary milling operation	
25 Automatic table indexing unit, every 90 degree	Locator pin at every 90 degree
26 High power output type spindle drive motor: AC 45/37 kW [60/50HP] (30min/cont.) (Note) 400V, Transformer required and floor space will be changed.	
27 Spindle lock device (at random angle)	
28 High rigid type X-axis feed system	
Ball-screw diameter: 80 mm and Feed-motor: AC 15 kW	
(Ball-screw diameter: 3.14 in and Feed-motor: AC 20 HP)	
29 High rigid type Z-axis feed system	
Ball-screw diameter: 80 mm and Feed-motor: AC 15kW	
(Ball-screw diameter: 3.14 in and Feed-motor: AC 20 HP)	
30 Linear scale feedback for X, Y and Z-axes	
31 Z axis thermal displacement compensation	
32 External M-code: 8 types	
33 Operator call lamp: three (3) colours	
34 Residual current operated protective device	
35 Customer's specified painting colour	
Submit a colour samples to us	
For internal painting colour, however, our standard colour shall govern.	

Note) Air source to be supplied by the customer
Screw type air compressor: 1 100 N-litre/min. AC200V, 7.5kW
Screw type air compressor: 1 600 N-litre/min. AC200V, 11kW
When conventional type air compressor is used, must prepare Air dryer.

CNC system specifications TOSNUC 99



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.)

User's name registration

A user's name is displayed at system startup.

Customized display color tone

●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
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
Tapping range selection G63
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 working time 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 and 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)Parabolic interpolation G06
Note: It is not compatible with NURBS interpolation.
(4)Hypothetical axis interpolation (i.e., interpolation with sine curve) G07
(5)Cylindrical interpolation G67
(6)Involute interpolation G105
(7)Spindle normal direction control
(Spring necked turning) G140/G141/G142
(8)Archimedes interpolation (Spiral interpolation)
G102/G103

●Feed

(9)Synchronous thread-cutting
(10)Per-revolution feed G95
(11)Per-revolution dwell G05

●Part Program Storage and Edit

(12)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)
*(13)Mass memory 2GB

●I/O Functions and Devices

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

●Tool Offset

(16)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)

(17)Three-dimensional tool compensation G30/G31

●Operation Support Function

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

●Programming Support Function

(20)Programmable mirror image G62/G66
(21)Programmable data input
Updating of offsets by G58/G59.

(22)Scaling G64/G65

(23)Plane conversion G35~G39

(24)Three-dimensional coordinate conversion G14

(25)Figure copy function G721/G722

(26)Circle cutting compensation

(27)Machining time estimate & NC plotting function
--

Machining time estimate and tool path plotting
for non-active program on the background.

(28)Pattern cycle division into NC statements

(29)W axis travel distance Conversion function
--

●Automatic Support Function

(30)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.

(31)Program check & used tool list creation

Check of a program to be executed next
and creation of a slated tool list.

(32)Cutting start detection Used for spot facing, etc.
--

(33)NEXUS Schedule operation function

●Safety and Maintenance

(34)Memory lock

●High-Accuracy Machining & Servo System

(35)Shape recognition preview positioning control

(36)NURBS interpolation

Note: Shape recognition preview control function is required.

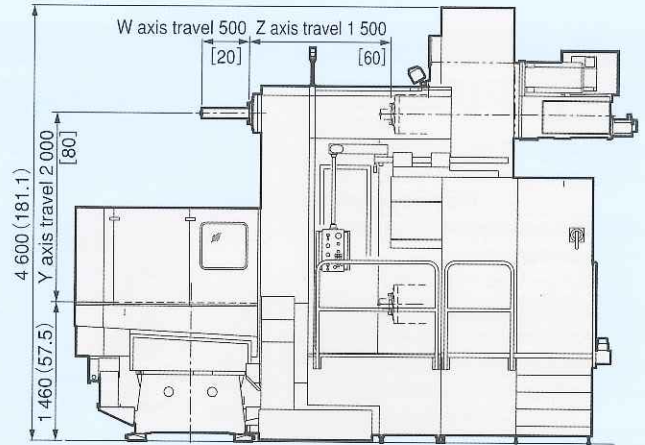
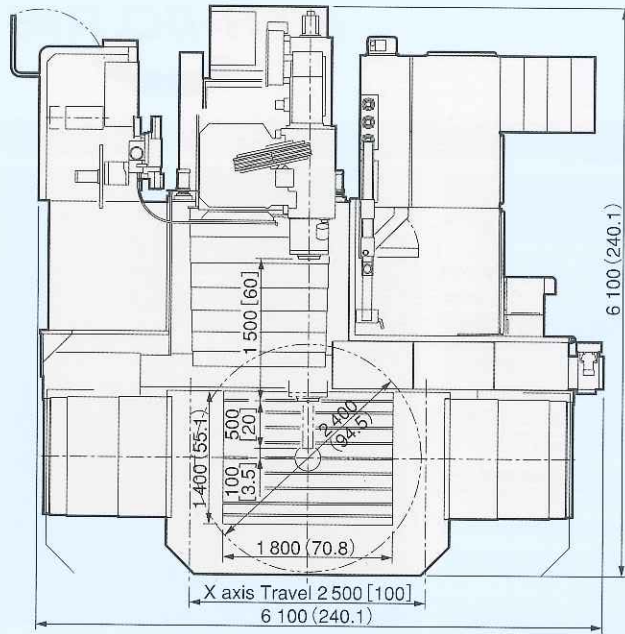
●Cable

(37)RS232C cable 10 m-long

Note) Marked with *, selectable between two options.

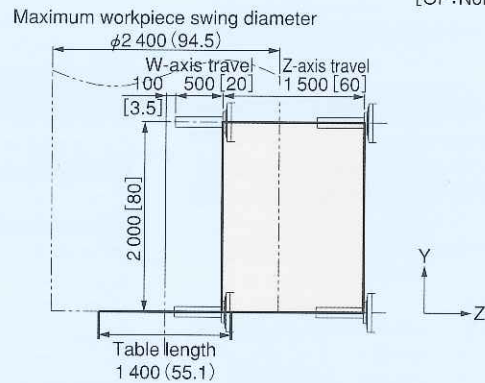
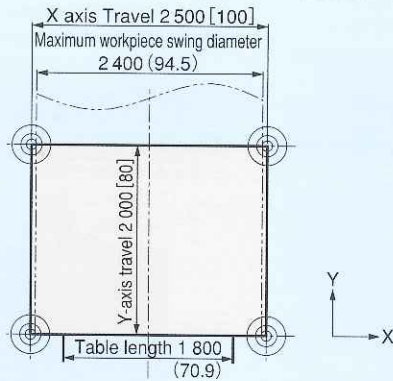
General View

mm (inch)
[OP:North-America version]



The maximum work-piece range and travel for each axis

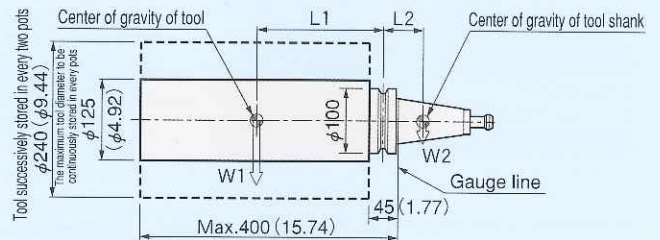
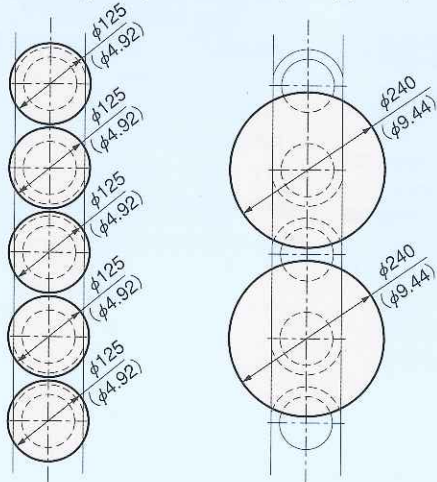
mm (inch)
[OP:North-America version]



The maximum tool size

mm (inch)

Tool successively stored with adjacent pots empty.
max. $\phi 125$ ($\phi 4.92$) max. $\phi 240$ ($\phi 9.44$)



maximum tool mass: 25 kg (55 lb) or less
Imbalance amount: 24.5 N·m (18.1 ft·lbf) or less

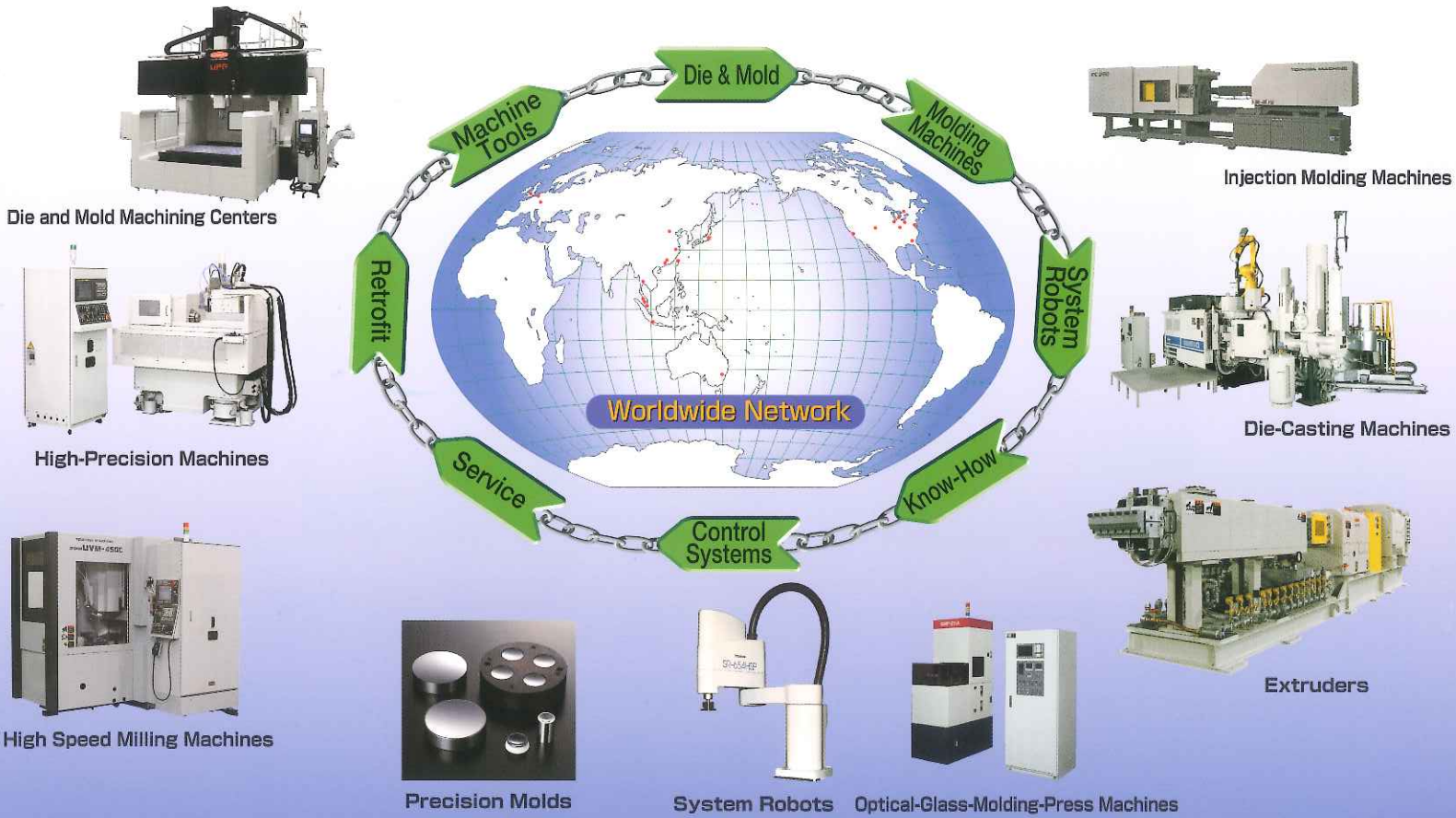
* In the case of typical BT50 taper shank

W2 = approximately 3.8 kg (8.4 lb)

L2 = approximately 38.2 mm (1.5 in)

(Changed with differences in the type of pull stud, the manufacturer of tool shank, etc.)

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