Shibaura Machine

View the Future with You

ISO 9001

GOTEMBA plant

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

URL : https://www.shibaura-machine.co.jp

SM20009-1100-SZ
Printed in Japan

MCW-4624

Shibaura Machine

MCW-4624

Wall Column Type Machining Center
(Crossrail Feed Type)

Catalog MCW46156-CED-04

Innovation in manufacturing

NEW CONCEPT MACHINE THAT IS highly cost effective and assures higher productivity & performance.

Wall Column Type travel instead of standard table type travel utilizes minimal floor space in the processing of large workpieces.

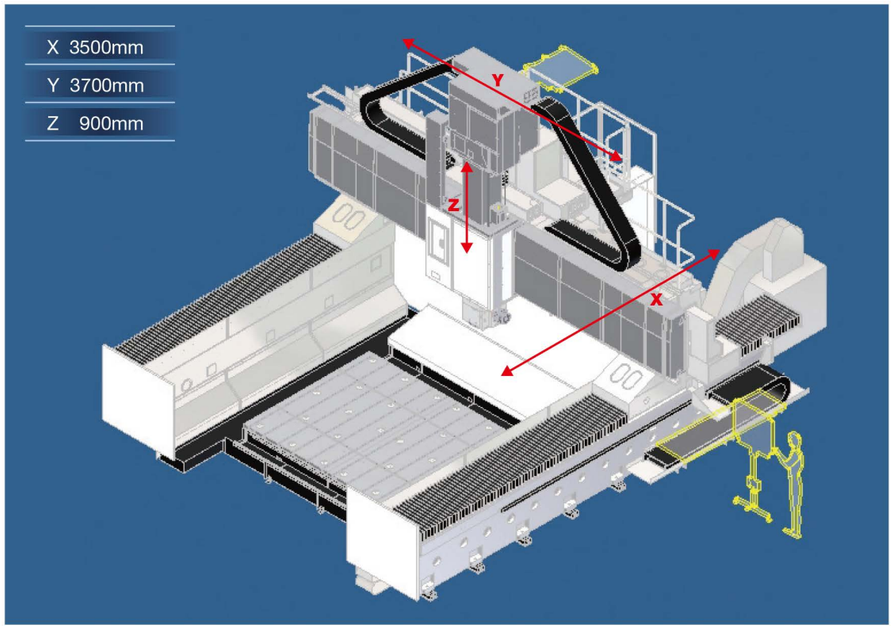
- Basic table is located and fixed of the shop floor level to facilitate operator Accessibility and case of operation.
- INSTALLATION area is minimized to a rectangular shape which allows a 75% saving in space when compared of a conventional type table travel machine.
- 4.9 meter machine height is beneficial when confronted with a factory that has a low ceiling.
- This machine is very flexible when interphasing additional attachments such as a rotary table.
- ALL OF THE MAIN COMPONENTS, wall column, crossrail, spindle head and table are casted in our foundry to assure high quality.
- THE SPINDLE is surrounded AND SUPPORTED by a square ram quided by a fully enclosed Monoblock to assure stable and rigid machining.
- TOSNUC PX100 , Our state-of-the-art controller developed by Shibaura Machine Contributing and complementing the capability of the machine.

Wall Column Type Machining Center

MCW-4624

The picture above is a special case where the machine is installed on a shop floor.
Detail on such things as cover might be different in each case.

Axis configuration



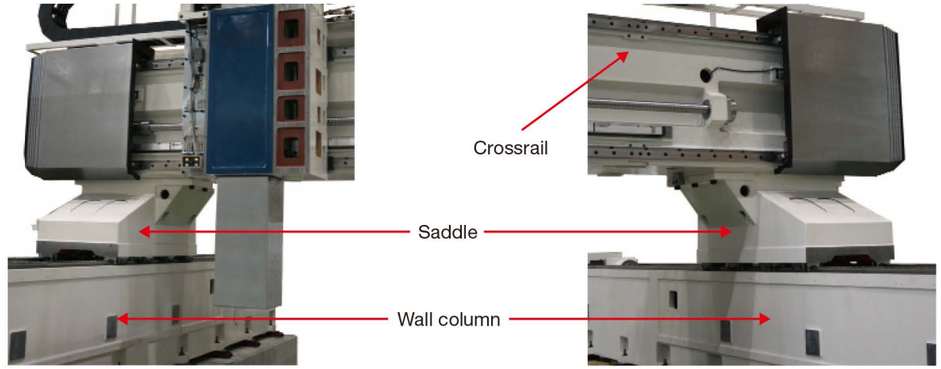
Better Accessibility & Easy Chip Discharge

- Table top is the same as the shop floor level eliminating steps in order to give the operator bellow accessibiling and efficiency in operation.
- The table parameter has a chip chute or chip conveyor to facilitate easier chip removal.
- Wall columns plevent chips from accumulating around the machine and are located along both sides of the table in the longitudinal direction supported by guide-ways for bridge travel in the X direction.

High accuracy & High rigidity

Rigid and stable movement in positioning is derived from crossrail configuration.

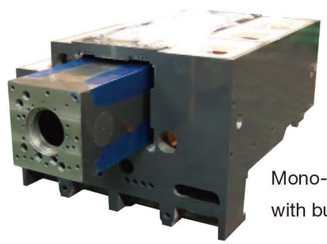
Crossrail, which travel on wall column, is supported by two rigid and stable saddles and has low gravity center to assure high accuracy and rigidity.



Each of master side saddle (left) and slave side saddle (right) are guided on two roller type rolling guideways and fed by ball screw located at center of them to assure high accuracy.

Mono-block casted spindle head has full closed carefully adjusted guide for square ram (ram section is 380mm x 380mm).

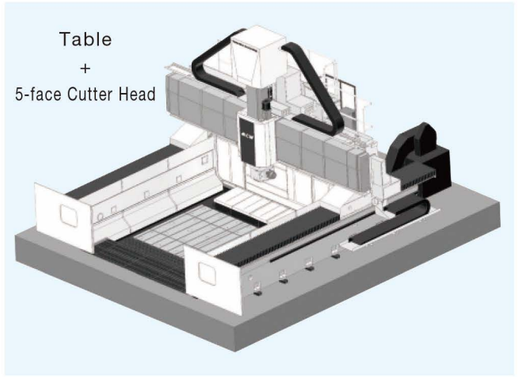
Hand scraping on ram guideway.



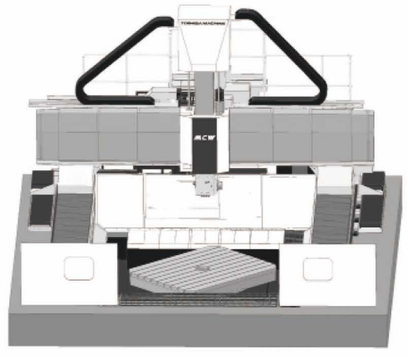
Mono-block casted spindle head with buit-in ram guideway.

Several variations and layouts are available from the basic construction of the machine to a combination of basic machine and configuration with special attachments and optional accessories as shown below.

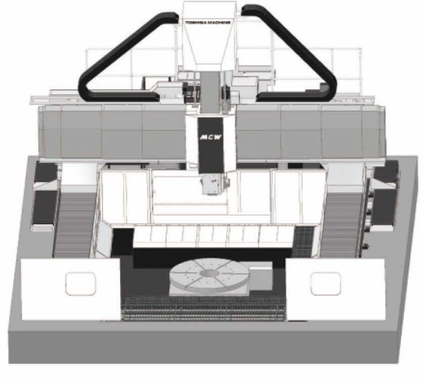
Standard Layout



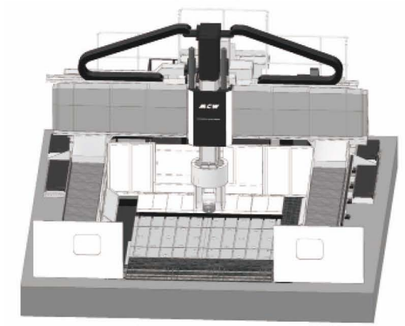
Example 1 Integrated Rotary Table



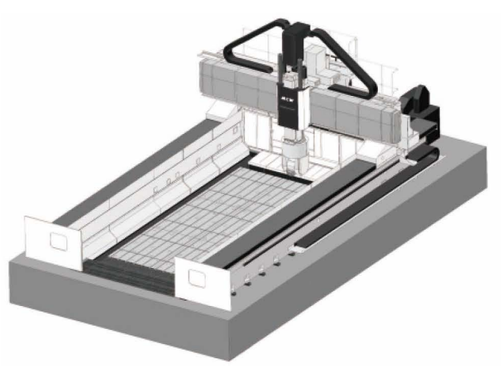
Example 2 Additional Portable Rotary Table



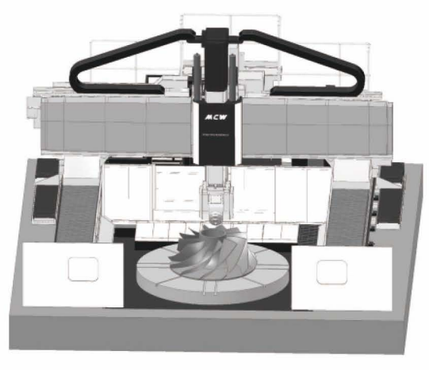
Example 3 Optional 5-axis Head



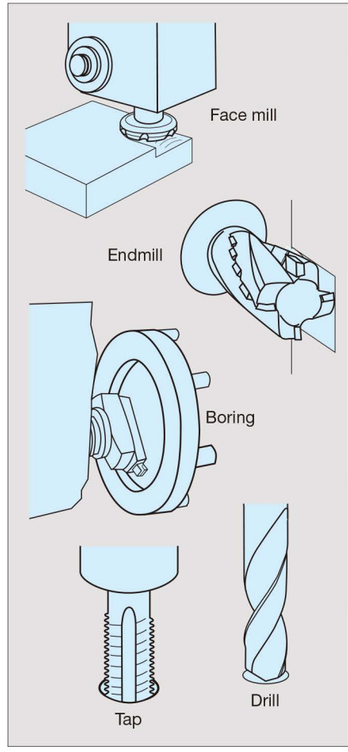
Example 4 Extended X Travel and Optional 5-axis Head



Example 5 Integrated Turning Table and Optional 4-axis Head



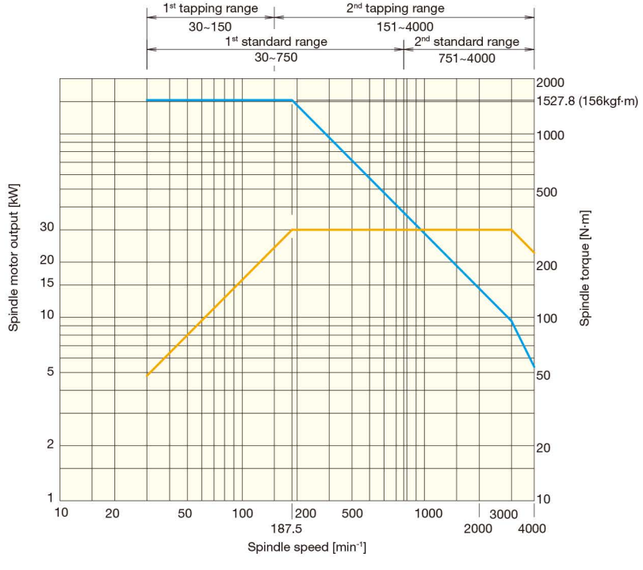
Machining capability table Machining example (Sample data)



Material S55C

Machining process			5-face Cutting Head	
			Vertical spindle	Horizontal spindle
Face mill	Cutter diameter	mm[in]	Φ 200 [7.9], Z10	Φ 200 [7.9], Z10
	Surface speed	m/min[fpm]	135 [443]	135 [443]
	Machining width (W)	mm[in]	140 [5.5]	140 [5.5]
	Depth of cut (T)	mm[in]	6 [0.24]	6 [0.24]
	Feedrate	mm/min[ipm]	1 000 [39.4]	1 000 [39.4]
	Power consumption	kW[HP]	30 [40]	31 [41]
	Chip volume	cm^3/min[in^3/min]	840 [51.2]	840 [51.2]
	Chip volume	cm^3/KW[in^3/HP]	28 [1.7]	27 [1.7]
	Ram extension	mm[in]	600 [23.6]	870 [34.2]
Endmill	Cutter diameter	mm[in]	Φ63 [2.5]	Φ63 [2.5]
	Surface speed	m/min[fpm]	80 [262.4]	80 [262.4]
	Machining width (W)	mm[in]	63 [2.5]	63 [2.5]
	Depth of cut (T)	mm[in]	50 [2.0]	50 [2.0]
	Feedrate	mm/min[ipm]	176 [6.9]	211 [8.3]
	Power consumption	kW[HP]	25 [33]	31 [41]
	Chip volume	cm^3/min[in^3/min]	554 [33.8]	665 [40.5]
	Chip volume	cm^3/KW[in^3/HP]	22 [1.3]	22 [1.3]
	Ram extension	mm[in]	600 [23.6]	900 [35.4]
Boring	Bore dimension	mm[in]	Φ 280 [11]	Φ 280 [11]
	Cutting speed	m/min[fpm]	110 [360]	110 [360]
	Depth of cut (T)	mm/radius[in/radius]	10 [0.4]	10 [0.4]
	Feedrate	mm/rev[in/rev]	0.3 [0.012]	0.3 [0.012]
	Load ratio on spindle motor	%	52	50
Drill	Drill diameter	mm[in]	Φ 69.5 [2.7]	Φ 69.5 [2.7]
	Cutting speed	m/min[fpm]	22 [72]	22 [72]
	Feedrate	mm/rev[in/rev]	0.35 [0.013]	0.35 [0.013]
Tap	Tap diameter	mm	M60 × P5.5	M60 × P5.5
	Cutting speed	m/min[fpm]	10 [32.8]	10 [32.8]
	Feedrate	mm/rev[in/rev]	5.5 [0.216]	5.5 [0.216]

Torque and power diagram



5-face Cutter Head

Machine Specifications

Machine specifications			Unit	MCW-4624
Travel	X axis travel (bridge longitudinal direction)		mm[in]	3 500 [137.8]
	Y axis travel (spindle head crosswise direction)		mm[in]	3 700 [145.7]
	Z axis travel (ram vertical direction)		mm[in]	900 [35.4]
	Height (distance from table top to gauge plane on vertical spindle)		mm[in]	1 050 [41.3]
	Distance between wall columns		mm[in]	4 580 [180.3]
Table	Table size		mm[in]	3 200×2 400 [126×94.5]
	Maximum mass on table		kg/m²[IP/]	10 000 [393.7]
	T-slot on table		mm[in]	24 [0.94]
Spindle	Spindle speed		min^{-1}	30~4 000
	Number of speed range			2 ranges
	Taper on the spindle			7/24 taper No.50
	Maximum torque		N.m[Ft-lb]	1 528 [1127.8]
Ram	Guide for ram			Full closed mono-block
	Sectional dimensions		mm[in]	380×380 [15×15]
Feedrate	Rapid traverse rate	X/Y	mm[in]/min	25 000 [984]
		Z	mm[in]/min	10 000 [393.7]
	Feedrate for machining	X/Y/Z	mm[in]/min	1–10 000 [0.04–393.7]
Tool	Tool shank			MAS BT50
	Pull stud			MAS P50T-1(45°)
	Tool storage capacity			36 tools
Motors	Spindle drive motor		kW[hp]	AC30 [40](50%ED)/22 [29.5]
	Feed motors	X	kW[hp]	AC10.5×2 [AC14×2]
		Y	kW[hp]	AC7.5 [AC10]
		Z	kW[hp]	AC5.5 [AC7.4]
Machine size	Machine height		mm[in]	4 900 [192.9]
	Floor space required		mm[in]	7 900×8 223 [311×323.7]
	Mass of machine		kg[lb]	50 000 [110 230]
Accuracy	Positioning accuracy	X/Y/Z	mm[in]	± 0.007/1 000 [±0.00027/39.4]
	Repeatability	X/Y/Z	mm[in]	± 0.003 [±0.00012]

Standard accessories

***(1) Automatic attachment indexing device (AAI) : at 4 positions every 90 degree.**
***(2) 5-face cutter head**
***(3) Automatic tool changer (ATC) ; 36 tools.**
(4) Bellows type wall column covers for X-Axis
(5) Telescopic steel cover for bridge
(6) Special maintenance tool set
(7) Hydraulic ram balance cylinder
(8) Automatic tool clamp/unclamp device
(9) Oil mist lubrication unit for gears
(10) Oil mist lubrication unit for bearings
(11) Hydraulic unit
(12) Ram slideway (Z-axis) lubrication unit
(13) Electrical outlet for external devices
***(14) Operation panel on stand**
(15) ATC cover
(16) Chip cover at table end behind the machine
(17) Coolant and chip chute along table longitudinal sides
(18) Coolant and chip chute at front and rear end of table

Note : Standard accessories marked with "*" shall be deleted, when a relevant optional accessory is selected in stead of the standard accessories.

Optional accessories (Items marked with ☆ are included in the pack specifications.)

☆1. Automatic power shut down
Primary power to the machine will be shut-down automatically after power to CNC has been OFF, when M02 or M30 in a program has been executed while the switch "AUTO POWER OFF" had set at "ON".

☆2. Work light
Water proof type 40W fluorescent lamp is mounted under crossrail of bridge.

☆3. Operator call lamp (LED)
3-color lamp is mounted on top of right end of bridge.
Green lamp show the machine is running under automatic mode.
Yellow lamp show one of M00, M01, M02, N30 and M52 is executed to wait for operator's assistance.
Red lamp show the machine is stopping in some alarm.

4. Automatic tool changer (ATC)
Tool storage capacity 60, 90, 120 tools
Maximum milling tool size
Adjacent pots have same size tools Φ125 mm
Adjacent pots are empty Φ240 mm
Maximum length of tool 400 mm
Maximum mass of tool 30 kg
Maximum moment around gauge line 53 N-m (5.4 kgf-m)
Tool selection Pot address random short way
A dummy tool for protecting spindle taper should be stored in No. 1 pot.

5. Tool breakage detection device for small drill or tap
The machine will check length of the tool twice, before loading it on the spindle and after removed it from the spindle, to find tool breakage by comparing these two data, when T80xxx is programmed for tool number.

6. Pull stud
Type MAS P50T-2 (30°)

7. Automatic attachment changer (AAC)
Attachment will be mounted on the ram automatically through program.
Number of attachment to be stored 2 units

8. Attachment indexing at every 5 degree or every 1 degree (AAI)
There are two ways for program as bellow.
Automatic indexing at every 5 degree or every 1 degree M37C
When selected three dimensional coordinate conversion in CNC G37C (G14/G10)

9. Attachments and their support bases
・Snout 240
・1 degree indexing head
・0.07 Angle head
Please refer to page 19 in this catalogue in detail.

10. Power chip conveyor
There are two type of layout.
Type A Refer to sketch on P-18
Type B Refer to sketch on P-18

11. Block for coolant-through tool
The block is mounted on ram face.
NOTE
1. Center distance between the oil hole on the block and spindle is 80 mm.
2. This block is designed for the holders made by Daishowa Seiki.
3. Coolant is delivered through the same tool, but not through external nozzles, when the coolant-through tool is mounted on the spindle.

12. Coolant-through spindle
This is for spindle on basic cutter head, but not available to air.
Please contact us when the attachment requires this feature.

13. Coolant unit
Coolant tank and additional short hinged type chip conveyor are included.
M08 command deliver coolant through external nozzles.
Coolant will be delivered through nozzles mounted on the ram or the attachments. (refer to attachment drawings for detail)
Coolant tank capacity 800 liter
Please contact us when much coolant are expected in workpiece or setting jigs.
Delivery 10 litter/min
Coolant pressure at pump delivery port 1.0 Mpa
Coolant fire-resistant non-soluble water base coolant
Conveyor motor AC 4P 0.75 kW
A splash cover (or chip cover) is not included.

14. Installation parts (leveling blocks)
Note : Unless selected, all necessary installation parts shall be provided by the customer.

15. Chip bucket
This is a portable type bucket to be utilized together with above item 13.
The bucket could swing for discharging chips from it easily.

16. Air blow function
Air can be exhausted through the same nozzle as coolant.
M51 command deliver air through external nozzles.
Maximum air volume Approx. 800 normal liters/min
Total air volume required Approx. 2000 normal liters/min
(including 1200 normal liters/min required for the basic machine)

17. Mist coolant unit
M07 command delivers mist coolant through the same nozzles as coolant

18. Automatic measuring device
This device consists of radio touch probe (Renishaw), one set of standard software generated and a calibration block.
Printer is not included in the system.

19. Feedback Scale for closed-loop control
X axis, Y axis and Z axist

20. Air compressor
A screw type low noise compressor will be supplied and air dryer is included in it.
Independent power line to the unit must be prepared by the customer.
11 kW for the case without item 16 (air blow function)
15 kW for the case with item 16 (air blow function)

21. Air dryer
Only dry air must be supplied to this machine.

22. Customer's machine color
Machine colors can be designated by the customer.
Color samples shall be submitted to manufacturer at the time of contract.

23. Free arm pendant
The pole of arm pendant will stand on shop floor as shown on P-18.
Operator stand will be deleted when this is selected.

24. Pre-heat timer
There are two type of pre-heat timer as follow.
Type A : Power to the machine, CNC and hydraulic unit will be turned ON by a timer
Type B : In addition to function type A, the machine will be warmed up automatically with the special program

25. Ball screw cooled through its core
Ball screws applied on linear axes of X, Y, and Z. are cooled through center core for better positioning accuracy in higher feedrate.

26. Spindle designed for BIG-PLUS
Spindles on the machine and attachments are manufactured for the tool shank of BIG-PLUS.

27. Customer's power specification
Independent transformer will be supplied.

28. Customer's slot layout on table
Size and layout of slots on table are acceptable in stead of our standard slot layout shown on the drawing.

29. Automatic tool length measuring unit
The unit is located at the left rear corner on table.
Reference tool for calibration is excluded.

30. High-speed snout 240
Maximum spindle speed is 6,000 min^{-1}

31. High-speed 0.07 angle head
Maximum spindle speed is 5,000 min^{-1}

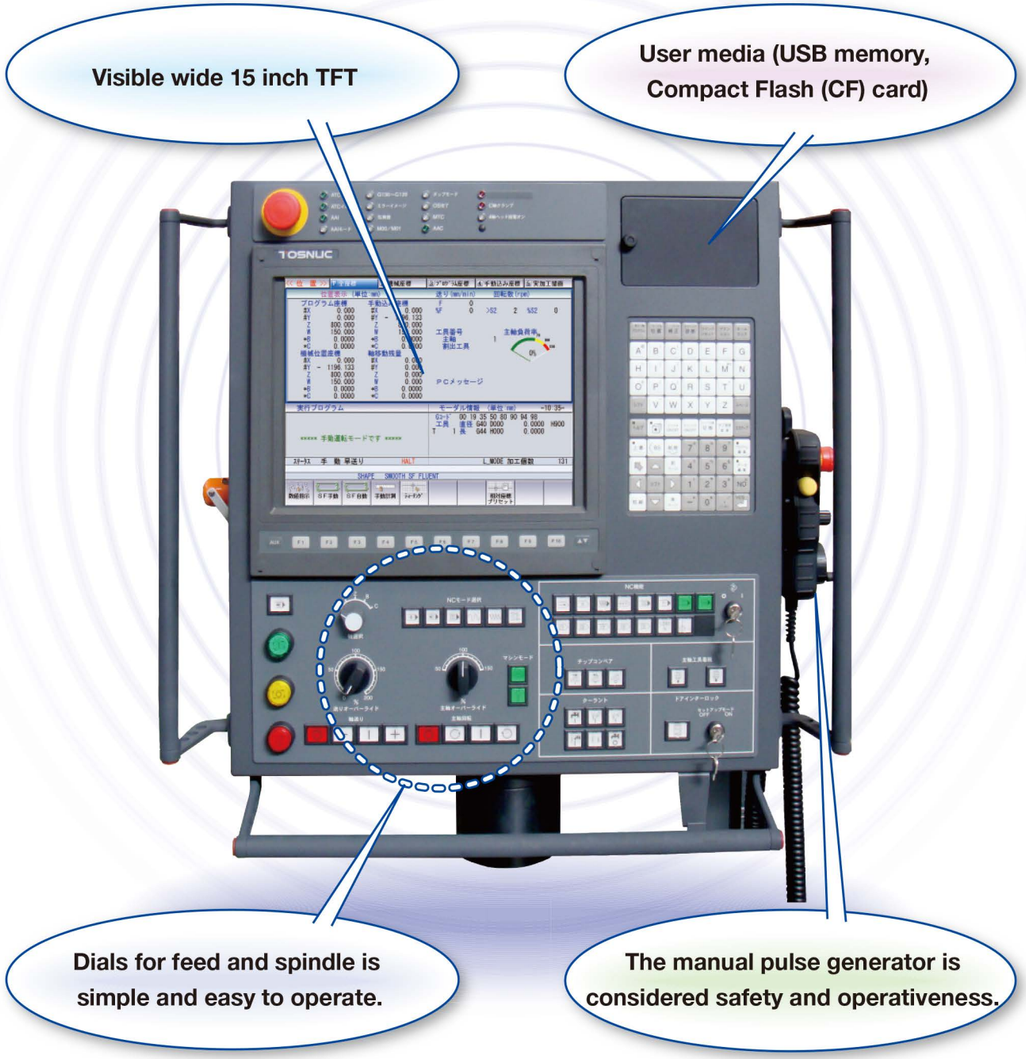
32. Front chip cover
The cover with electromagnetic lock is located at the front end of machine as shown on drawing S-6F170.

33. Witnessed inspection attended by customer's inspector

TOSNUC PX100 STATE OF THE ART CNC CONTROLLER DEVELOPED TO MAXIMIZE MACHINE PERFORMANCE & PROFITS.

TOSNUC PX100

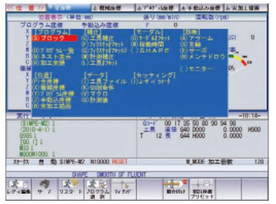
TOSNUC PX100, A personal computer architecture. Integrated into our TOSNUC controller developed specifically to enhance our CNC controller with higher performance functions and even more versatility. Our goal to create more innovative features that support easier operation thus contributing to an increase in productivity and machine performance.



Versatility in operation based on our vast experience

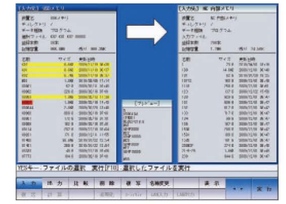
Based on our extensive experience integration between mechanical and electronic technology. Our new CNC controller was developed with an emphasis on easy operation, easy to understand and easy to remember. This perfect combination is the Key to achieving higher machining accuracy in high speed machining.

Pop-up menu



By pressing a soft key on the selected screen a menu will appear showing the desired function on a sub display window.
Having a pop up display menu type system avoids complicated hierarchy in software and shortening the scan time to process a desired function.

File editing screen

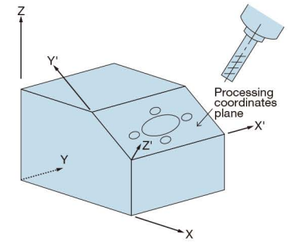


Multi-task and multi-window is a feature that enables you to open a window file from any current screen to perform program input/output deleting or copy a program to execute a calculator screen clipboard.
Program list and memory are connected to a user media and displayed on the screen allowing the program to be checked in a preview window within the same screen during input or output of programs from a user media.

Multi screen background edit

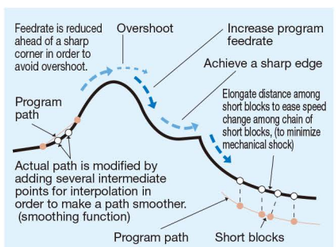
The screen can be divided into three sections to display two program screens and the third shown MODAL OFFSET DATA compensation information which is required upon machining.
These three screens run independently during automatic operation and during editing.
A new program can be generated and created utilizing a clipboard feature and or background split screen edit two programs simultaneously as compared to a personal computer.

Program support functions



A general program running on G17 plane when programmed on X-Y plane and machining a depth on inclined surface as shown does not require a program modification. This very important feature convenient and executable with G command and canned cycle simplify machining of an inclined surface without effort.

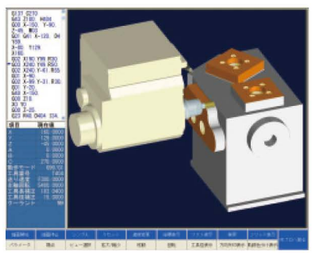
Advanced functions for high speed machining and higher machining accuracy



Preview control

Generally, a profile to be machined requires a true shape and shape error decrease as servo gain increase. However high gain causes over shoot and increases machine vibration from large acceleration to mechanical system, which causes a bad surface finish in machining.
Preview control based on optimum control theory is developed to prevent such affect on machined surface and minimize shape error without setting high gain.

Graphic machining simulation



PX100 graphic simulation

Simulation of a created program is executed on the screen, after starting the program editor on TOSNUC PX100.
- This simulation function utilizes solid wireframe method.
- Format check feature is integrated to check a program beforehand starting machining.
  (Including machining time estimation function)
- Interference between workpiece and tool is checked by this, and the final shape of the workpiece is checked by utilizing Preview control function, which might be caused by program errors.
- The macro program created by the customer is checked by plotting with "MACRO DEBUGGER" function.

CNC specifications TOSNUC PX100

Basic and pack specifications
Items with mark "☆" are pack specifications.

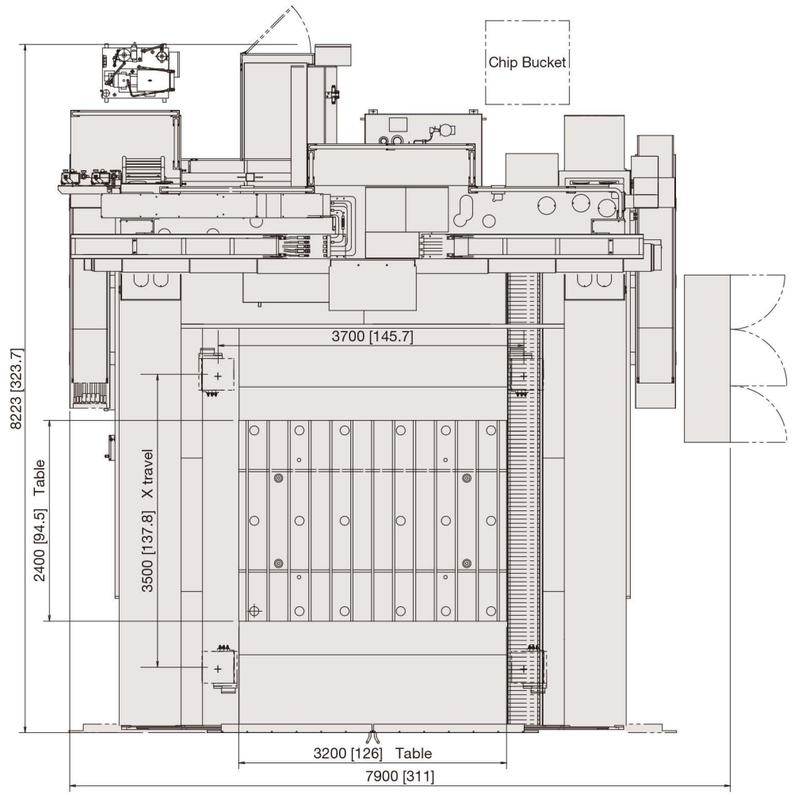
A. Controlled axes	
Number of controlled axes	4 axes (XM, XS, Y, and Z)
Number of simultaneously controlled axes	
Positioning (G00) and linear interpolation (G01)	4 axes
Circular interpolation (G02 and G03)	2 axes
☆Synchronously controlled axes	XM, XS
B. Input command	
Programming resolution	
Linear axis	0.001 mm
Maximum programmable dimensions	
Linear axis	±99999.999 mm
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 decimal point word address format
Absolute/incremental programming	G90/G91
Decimal point input	
C. Interpolation functions	
Positioning	G00
Linear interpolation	G01
Circular interpolation	G02 (CW), G03 (CCW)
D. Feed functions	
Rapid traverse rate	refer to machine specifications
Feedrate	F5 direct programming in mm/min
F1-digit feedrate programming	
Dwell	G04 and 0 to 999.99 seconds with "F" or "P" code
Jog feed The selected axis is moved continuously at a rapid traverse rate or cutting feedrate by manual operation.	
Rapid traverse override	0 ~ 100 % in 10% increments
Feedrate override	0 ~ 200 % in 10% increments
Automatic acceleration/deceleration Linear type acceleration/deceleration on rapid and jog feed	
Automatic acceleration/deceleration for cutting feed G08/G09, or G50/G51 Linear acceleration/deceleration on cutting feed	
S-shape acceleration/deceleration for rapid traverse	
☆Threading G33, In-feed is synchronized with spindle revolution.	
☆Feed per minute/ Feed per revolution	G94/G95
☆Dwell per revolution	G05
☆Tapping range	G63
☆Spindle inertia threading	G84
☆Hand wheel feed (portable type) Linear axis	0.001 mm, 0.01 mm, 0.1 mm/division
☆Random start angle threading Threading is initiated at the specified spindle angle for multi-start thread.	
E. Program memory and editing	
☆Part program storage capacity 600 m (1970 ft) or approx. 258 kB, 512 program can be registered. 100 ~ 200m (32.8 to 65.6 ft) is reserved for optional functions by the manufacturer.	
Part program edit (in background) Various editing operations are possible on programs in memory. Program delete, program copy, program rename, search, jump, deletion and copy, by designating a range, replace, program insertion, etc.	
Program name 8 digit characters following address $ or O. Program comment in ( ) can be 32 characters.	
Sequence number	N5
Sequence number search A block containing specified sequence number is searched in forward or backward.	
Program nesting list	List of program nesting is displayed
Program offset list List of following data is displayed on a screen after searched from the head of program, fixture offsets, tools	
Syntax check	program format is checked.
F. Operation and display	
☆Operation panel	Keyboard with membrane switches
Customized keys Series of key-in operation operated very often can be registered into one key for quick and efficient operation.	
Parameter editing	Parameters can be edited.
Tool file List of tool data such as length, diameter and offset are displayed on a screen.	
Display capability Part program, positions, compensation value, etc are displayed on the main screen, window screen or sub screen.	
Screen clear Screen is erased when no operation is performed in a specified time or more.	
S, F manual setting S and F code can be used in the manual mode.	
S, F automatic setting S and F code can be recorded automatically in the manual mode	
Spindle motor load indication Power consumption on spindle drive motor is displayed.	
Run hour indication NC working time is displayed.	
Machined workpiece counting Number of workpieces finished is displayed.	
Calendar timer Date and time are displayed on the run hour screen.	
Machining record Machining history in auto-mode is recorded.	
User name registration A user name is displayed at system start-up.	
Memory operation The machine is controlled by a part program in AUTO mode.	
MDI operation Two or more blocks can be input and executed in MDI mode.	
G. Input and output functions and devices	
RS-232-C interface port A NC program, tool offset data, etc. can be input and outputted via this port.	
☆User media NC program, tool offset data, etc. can be input and outputted via USB port and/or CF card slot.	
H. S, T, M function	
Spindle speed (S) function	5 digits integer following address "S"
Spindle speed override	50 ~ 200% in 10 % increment
Tool (T) function	6 digits integer following address "T"
Miscellaneous (M) function	4 digits integer following address "M"
I. Tool offset	
Tool length offset	G43, G44, G49
Tool offset	G45, G46, G47, G48
Cutter compensation C	G40, G41, G42
☆Tool offset capacity	899 sets for Tool length offset 899 sets for Cutter compensation
J. Coordinate system	
Automatic reference point return	G28, G29, G20
Coordinate system setting	G92
Fixture offset	G53, G57 9 sets
☆Additional fixture offset capacity	90 sets
Fixture offset 2	G54, G55, G56
2nd, to 4th reference point return	G21
K. Operation support function	
Control IN/OUT Data and comments in "( )" are ignored.	
Single block Program is executed block by block.	
Optional stop	M01
☆Optional block skip Blocks containing " / " at head of them are ignored.	
End of program	M02, M30
Dry run A machine moves at feedrate set in a parameter in place of programmed feedrate.	
Machine lock	All travel commands are neglected.
Auxiliary function lock	M, S and T commands are neglected.
Z axis feed cancel	Z axis travel commands are neglected.
Manual absolute ON/OFF Jog travel distance is neglected or added on the current position data on the screen.	
Override cancel	M48, M49
Mirror image	
All clear	The push button initializes NC memories.
Reset	The push button resets the current command.
Cycle start	The push button starts a program.
Feed hold	The push button holds travel in AUTO mode.
Cycle stop The push button holds travel and spindle rotation in AUTO mode.	
Re-start Restart after interrupted require several measures for safety.	
Sequence number collation and stop Machine stop after executed operation in the block with the specified sequence number.	
Manual numerical command Data input via keyboard is available in manual mode.	
Single block suppression	G990, G991
Feed hold suppression	G992, G993
Override suppression	G994, G995
Hand wheel interruption suppression	G996, G997
Manual interruption and manual return Machine can return to the interrupted position after some manual interrupting operation.	
☆Additional optional block skip Blocks containing " // " and " /// " at head of them are ignored.	
☆Hand wheel interruption	G996 or G997
☆Manual tool length and diameter measurement Offset data are checked based on reference tool and stored on memories specified in manual.	
L. Programming support function	
Plane selection	G17, G18, G19
Radius programming in circular interpolation	R data is radius on circle.
Circle cutting	G12, G13, G22, G23 and G222, G223
Positioning on machine coordinate system	G73
Sub program call	G72
Arbitrary angle chamfering / corner R	
Canned cycle	G77 to G89, and G98, G99
Automatic corner override	G08, G09 and G50, G51
☆Programmable mirror image	G62, G66
☆Plane conversion	G35 to G39
☆Macro programming	G72, G74, G75, G76
☆Pattern cycle	G109 to G119, and G121, to G132
☆Coordinate conversion	G10, G11
☆Three dimensional coordinate conversion	G14
☆Spindle C-axis control Spindle rotational position is controlled as a rotary axis.	
M. Mechanical error compensation	
Backlash compensation type A At time of reversing travel direction.	
Backlash compensation type B Referring position detector on feed motor.	
Backlash compensation type C For hybrid control axis.	

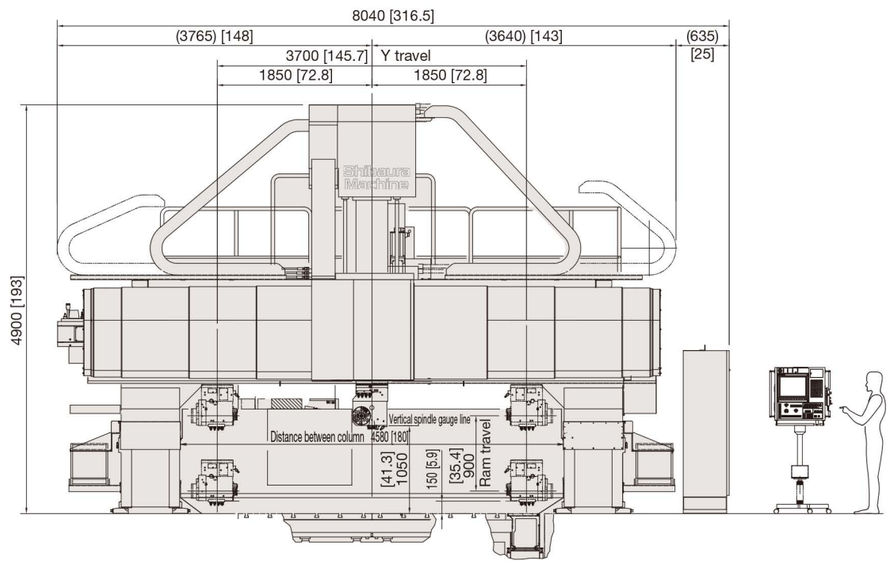
Backlash compensation for MPG	
For hand wheel travel	
Backlash compensation for each axis feed	
Compensation data is different for rapid and cutting feed mode.	
Fluent backlash compensation	
Compensation based on travel distance from return point.	
Pitch error compensation	
Compensation points are mot more than 160.per axis.	
Uni-directional positioning	
Positioning approach is always single direction specified.	
☆Pitch error gradient compensation	
Approximation with up-to 30 line	
☆Straightness compensation	
Approximation with up-to 9 straight line.	
N. Machine control support function	
Feed interlock	External signal stop machine travel.
☆External deceleration	External signal slow down federate.
O. Safety and maintenance	
Emergency stop	
Push button stop machine in emergency.	
Overtravel check	
External over travel signal stop machine travel.	
Stored stroke check	
Allowable stroke are stored for each axis.	
Axis interference check Ⅱ	G26, G27
Self-diagnosis	Errors are monitored in controller.
Software configuration display	
Alarm screen and alarm record	
Recording past operation, alarm, and machine conditions	
Screen copy	
☆Interference check Ⅰ	G24, G25
☆Door interlock	
Power will be turned off when door on controller is open.	
P. Enclosures and room condition	
Power specifications	AC 3 phase 200/220 V + 10% ~ -15%
	50/60 Hz +/- 1 Hz
Room conditions	Temperature 0 to 45 degree centigrade
	Humidity 75 % or less (No condensation)
Q. Servo system	
Servo motors	AC servo motors
Position detectors	Absolute position detectors on each axis

Optional specifications

A. Controlled axes	
Additional controlled axis	
When the machine has CNC controlled additional options.	
Hybrid control	
When the machine has optional scales on a axis.	
B. Input command	
Inch/metric selection	G70/G71
C. Interpolation functions	
Helical interpolation	G02/G03
Hypothetical axis interpolation	G07 α0/1
α is an axis address. The axis specified for α will never move in this program.	
Cylindrical interpolation	G67 for machining cylindrical cam
Involute interpolation	G105
Archimedean interpolation	G102/G103
Spindle normal direction control	G140/G141/G142
D. Feed functions	
Synchronous tapping	G843/G844/G845
	Available spindle speed is 20 ~ 750 min^{-1}.
Synchronous threading	
For threading on large diameter by boring tool	
E. Program memory and editing	
Part program storage capacity	1200 M (approx. 3940 ft.), 538 kB
	Number of program is 1024
	3000 M (approx. 9840 ft.), 1.3 MB
	Number of program is 1024
	5400 M (approx. 17720 ft.), 2.2 MB
	Number of program is 1024
	7800 M (approx. 25590 ft.), 3.3 MB
	Number of program is 1536
	10200 M (approx. 33460 ft.), 4.2 MB
	Number of program is 1536
Mass memory (1) (CF)	Compact flash memory with 256 MB
F. Operation and display	
Selection of display language	English
	Chinese
G. Input and output functions and devices	
DNC connection	EIA SP1292 level 3 protocol
Remote buffer operation	Protocol A (handshake type)
	Protocol B (DC control code type)
Binary operation	Binary data
External data output	
High-speed LAN linkage (1)	
Host	FTP server
Protocol	TCP/IP
Connecting cable	10 base-T
Capacity	2 GB
NOTE	
Followings are customer's responsibility.	
1, Installation and set-up of LAN network	
2, Connecting cable and connection to the LAN network	
Select one of the High-speed LAN linkage or Compact flash memory (CF).	
I. Tool compensation	
Wear offset memory	
Three dimensional tool offset	G30/G31
K. Operation support function	
Foreground plotting	
Tool path of active program on vertical spindle will be shown on the screen, but except program for the horizontal spindle and such machine sequence as ATC and likes.	
Help	
Help message for alarms are indicated on the screen.	
S&F analogue override	
Manual alignment	
Check a workpiece and set a coordinate for machining automatically with help of special macro program.	
Manual tracing back	
Up to 30 points are memorized for tracing back in manual.	
L. Programming support function	
Teaching	
A program is regenerated based on operation in MDI and manual mode automatically.	
Programmable data input	G58/G59
Programmable parameter input	G58/G59
Fixture offset data input	G158
Scaling	G64/G65
Figure copy	G721/G722
Compensated circle cutting	
Radius is adjusted in circle cutting.	
Estimation of machining time and NC plotting	
Executed in background	
Pattern cycle conversion to normal extended program	
A short condensed program of pattern cycle is converted to general program which consisted of many blocks	
M. Compensation function for mechanical accuracy	
Z axis thermal expansion compensation	In Z axis direction
O. Automation support function	
Skip function	G61 for several kinds of measurement
Tool breakage/wear detection	Load on the tool is monitored.
Counting tool working time	
Working time is counted, and alarm is the result when life has expired.	
Feedrate regulation	
Spare tool selection	
A spare tool will be selected automatically when a tool had such trouble as life, breakage, wear	
Tool wear coefficient function	For Figuring tool working time
Automatic measuring	Measuring on workpiece
Scheduled operation	NEXUS schedule
Program check and listing slated tool	
Format on the next program will be checked and prepare a tool list for it while a current program is working.	
Interruptive macro	
A macro program is activated by a external signal and interrupt machine movement.	
Two additional M codes output	M192, M193
Q. Servo system	
Shape recognition preview positioning control	
(CNC shape Ⅱ)	
Target are accurate shape and smooth surface in contouring surface machining.	
NRBS interpolation	Three dimensional NURBS
Spindle load factor setting	M400, M499

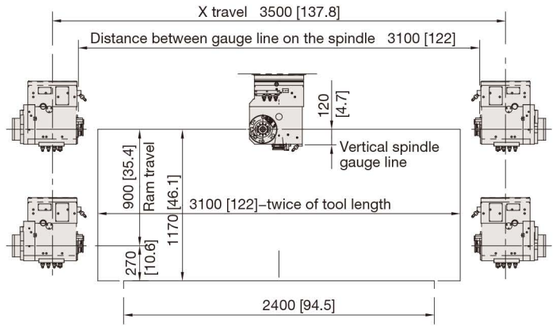
General view and Machine Layout

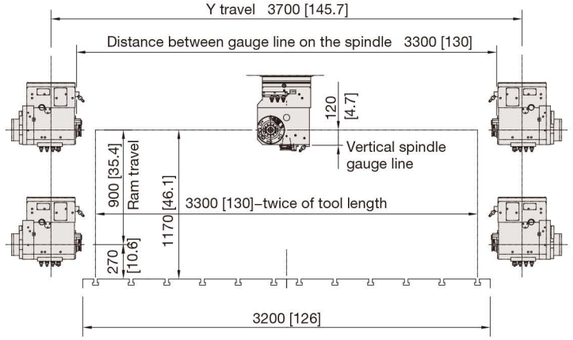




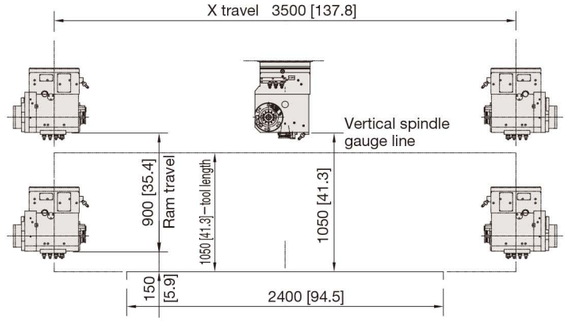
Machining Area of 5-face cutter head

In the case of the horizontal spindle





In the case of the vertical spindle



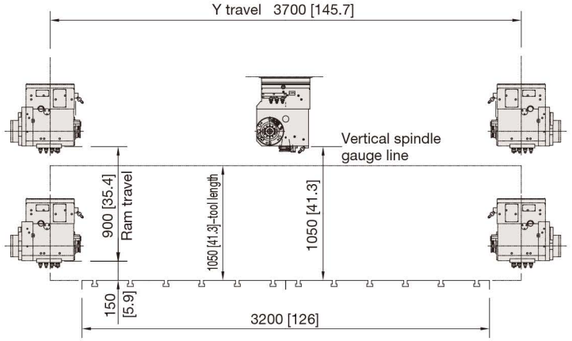
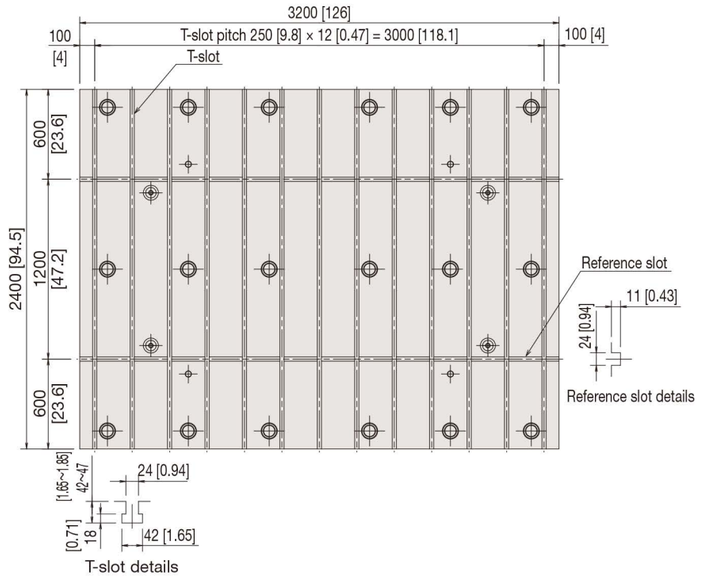
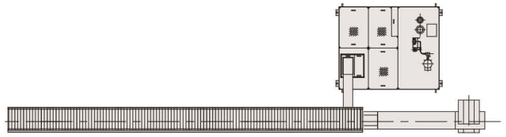


Table dimensions and slot layout

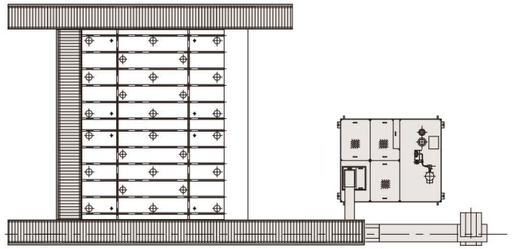


Optional Accessories Detail

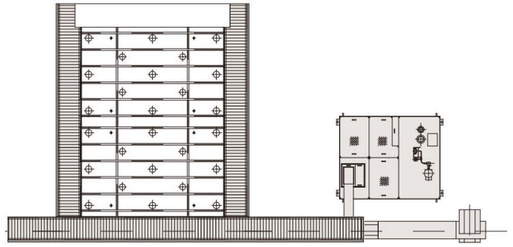
Coolant unit (Item 13)



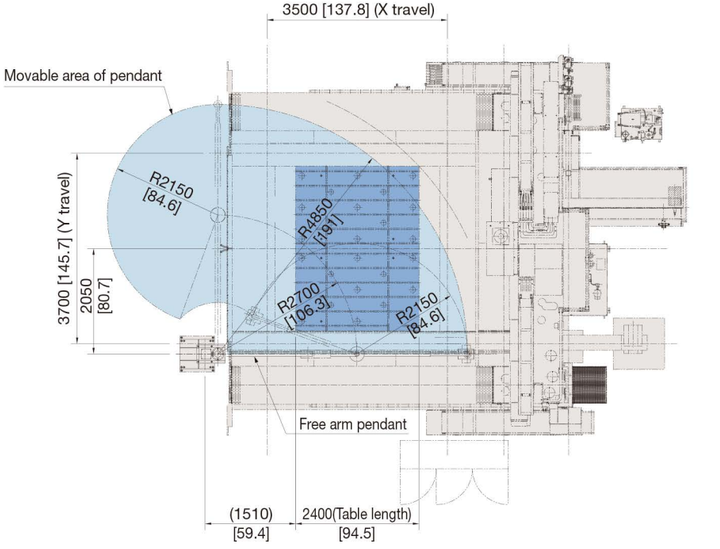
Chip Conveyor Layout (Item 10-A)



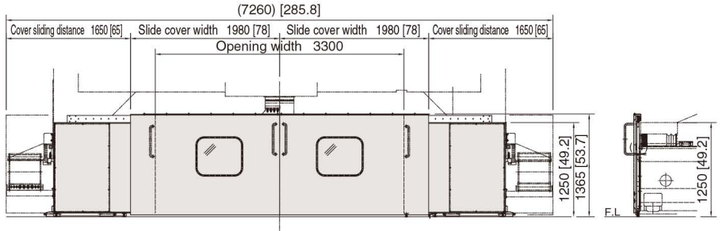
Chip Conveyor Layout (Item 10-B)



Free arm pendant (Item 24)

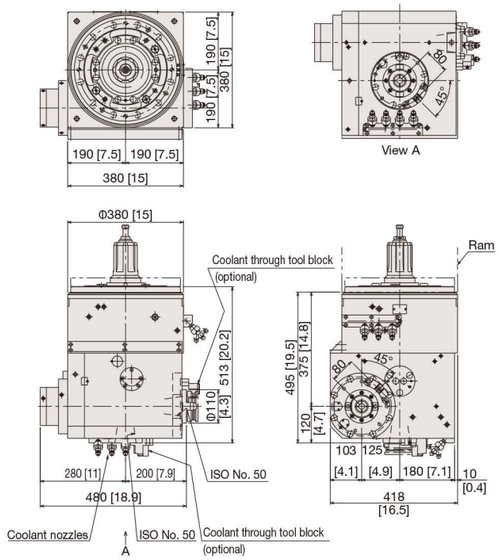


Front Chip Cover (Item 33)

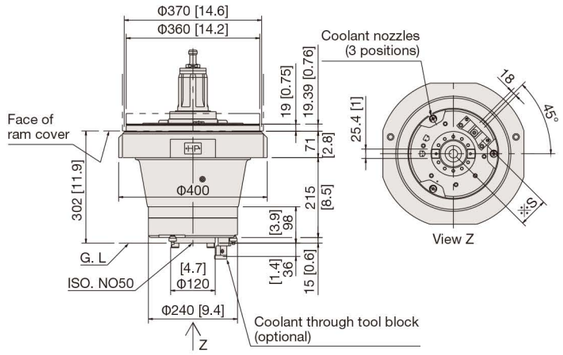


Attachments

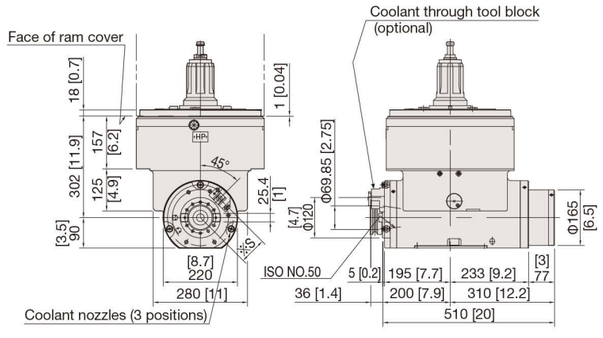
5-Face Cutter Head (standard accessories)



Snout 240 (optional accessories 9)

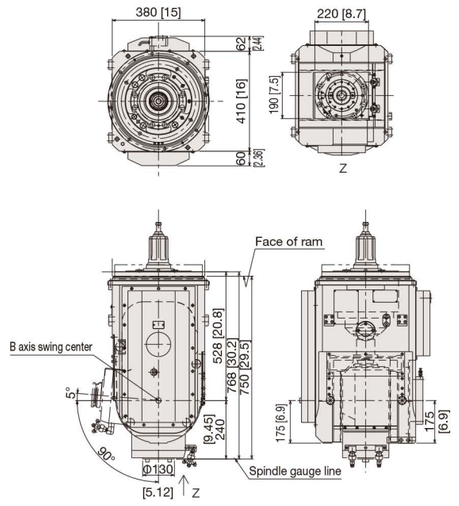


0.07 Angle Head (30kW [40hp]/430min^{-1}) (optional accessories 9)



1) Output power : 7 kW/100 min^{-1}
2) Spindle torque : 668 N·m (68 kgf·m)
3) Allowable spindle speed : 4000 min^{-1} (High speed type : 5000 min^{-1})
4) Standard distance for4 S
   Unless otherwise specified in the contract specification

1-degree indexing head (optional accessories 9)



NOTE Please contact us before finalizing contract when this head is required.