



Super NTJ



E V O L U T I O N



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NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

Super NTJ

One hit machining
Finished parts, complete in one set up

Nakamura-Tome

Innovation Technology
Creating Value

High Productivity Multi-Tasking Machine
From diversified small-lot production to mass production



182 deg.
Swiveling range

Perform angular hole and surface machining as well as free-form surface contour-milling easily, using standard driven-tool holders.



High productivity

Top leader of one-hit machining

No work in process
One-hit machining
Less set up time

Evolution of “Monozukuri”

Upper turret with B and Y axis swivels ± 91 degrees
Milling of complex contours at any angle can be easily performed.



Upper left side lower right side cutting



Upper left side, lower right side milling



Upper right side, lower left side cutting



Upper left side, lower right side milling



Simultaneous upper & lower right side cutting



Simultaneous upper & lower right side milling



Multi-surface angular machining and complex contour Meeting the needs of complex machining...

milling are performed automatically.
A machine featuring the latest in engineering technology.



C Left Spindles

[Main spindle motor] 15/11kW
[Rotating speed] 4,500min⁻¹
[Bar capacity] dia.65mm
[C-axis control function] CS control
[C-axis rapid feed] 600min⁻¹
[Least input increment] 0.001

B Y M Upper Turret

12-Station dodecagonal drum turret with 24 indexing positions
[Number of tool positions] 24
[Number of driven-tool stations] 12
[B axis swiveling range] ±91 deg.
[B axis rotation] 180 deg./sec.
[Curvic coupling indexing angle] 5 deg.
[Driven-tool motor] 5.5/3.7kW
[Rotating speed] 6,000min⁻¹
[Y-axis stroke] ±45mm

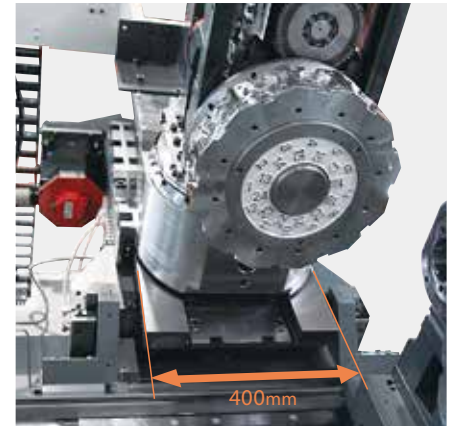
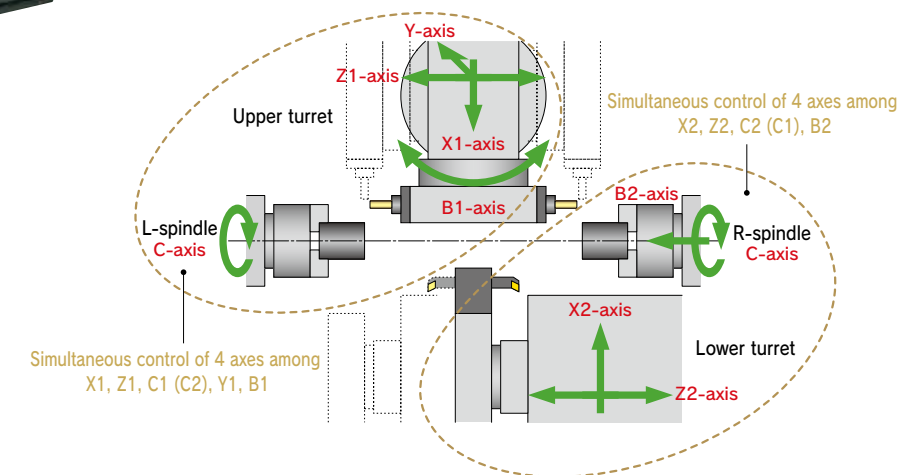
C Right Spindles

[Main spindle motor] 11/7.5kW
[Rotating speed] 5,000min⁻¹
[Bar capacity] dia.51mm
[C-axis control function] CS control
[C-axis rapid feed] 600min⁻¹
[Least input increment] 0.001

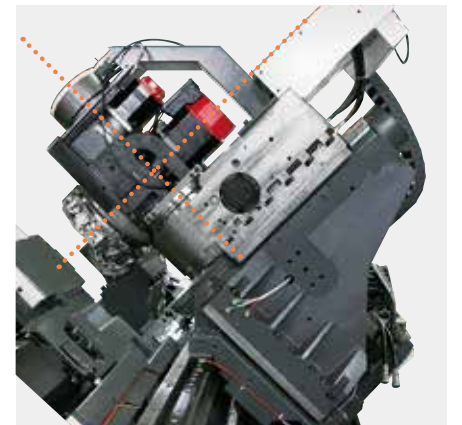
M Lower Turret

12-station dodecagonal drum turret with 24 indexing positions
[Number of tool stations] 24
[Number of driven-tool stations] 12
[Driven-tool motor] 5.5/3.7kW
[Rotating speed] 6,000min⁻¹

Max turning length 620mm
Max turning diameter 190mm
Distance between spindle noses 970mm



The upper X and Y-axis slides, hand-scraped with a proud traditions, are featuring high rigity and durability. Using high-grade Turcite-B[®] and slide-scraping ensures low fricrtion, no vibrations and ultra-precision gliding qualities, resulting in superior machining qualities and long tool life. Additionally, all index units, spindle headstocks, and ball screw bearing-housings are also hand scraped by highly skilled specialists before their final assembly.



In addition to servo-driven positioning of the B-axis, a curvic-coupling is also employed.

Curvic coupling

The curvic-coupling with 120 divisions provide hydraulic clamping of the B-axis at every 5 degrees.

Servo-motor

The B-axis adopts a high rigidity roller gear cam system that is servo driven at incremental units of 0.001 degrees. A hydraulic disk brake holds the B-axis at any programmed position.



Tool to tool 0.2 sec.
Productivity superior to that of a Machining Center



Idle time is drastically reduced
High accuracy synchronization function

Spindle
synchronization

C-axis
synchronization



Medical industry



Content

Industry	Medical instruments
Quality name	Thighbone
Cycle time	30min.
Material	β Titanium
Material shape	Bar / dia.15mm×300mm



Construction
machinery



Content

Industry	Construction machine
Quality name	Spool
Cycle time	12min. 56sec.
Material	SCM415
Material shape	Shaft / dia. 30mm×250mm



Dia.6mm deep drilling

[Drilling dia.] 6mm
[Hole depth] 130mm
[Rotating speed] 4200min⁻¹
Main spindle 2100min⁻¹, Milling 2100min⁻¹
[Feed rate] 80m/min
[Feed rate] 0.2mm/rev
[Machining method] Non-step
[Cycle time] 15sec.

Spindle synchronization

0 ⇒ 3000min⁻¹ : 2.2sec.

No segment-fracture :
0 → 3000min⁻¹, CCW → 0 → 3000min⁻¹, CW → 0

C-axis synchronization

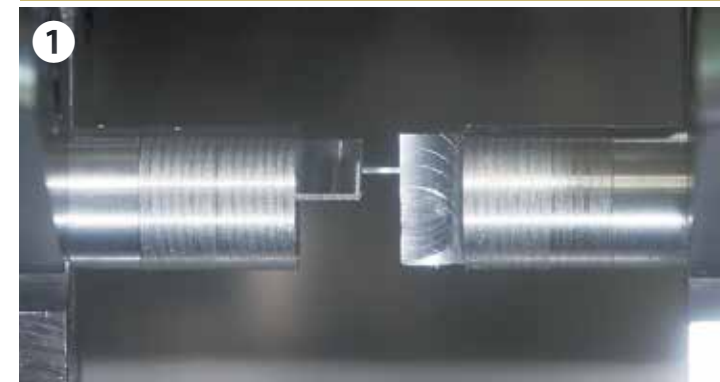
C-axis indexing speed : 600min⁻¹

180° indexing : 0.6sec.

360° indexing : 1.2sec.

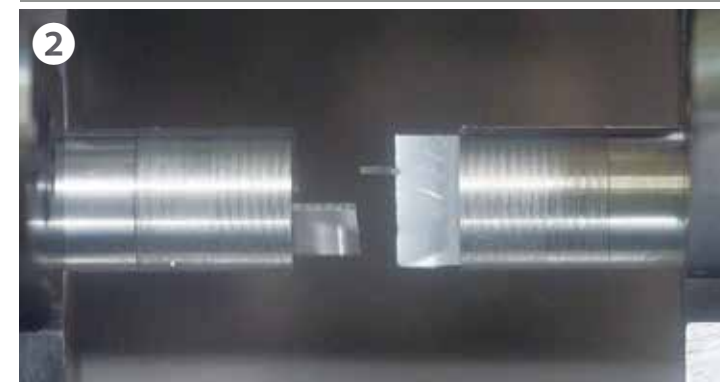
Left and right C-axis synchronization for parts clamped
by the left and right side chucks simultaneously

With C-axis synchronization



Picture 1 shows 1mm-thick rectangular
segment in the middle.
Picture 2 shows segment-fracture due to no
C-axis synchronization

Without C-axis synchronization



Comparison of C-axis indexing time

With
C-axis synchronization

G00H180.

⇒ 0.6sec.

Without
C-axis synchronization

G98G01H180.F4000

⇒ 2.9sec.

In case of no C-axis synchronization
1) Open the chuck on one side or the other
2) Close the chuck, and then rotate the spindle slowly

Combining Turning and Milling Capabilities

From diversified small-lot production
to mass production

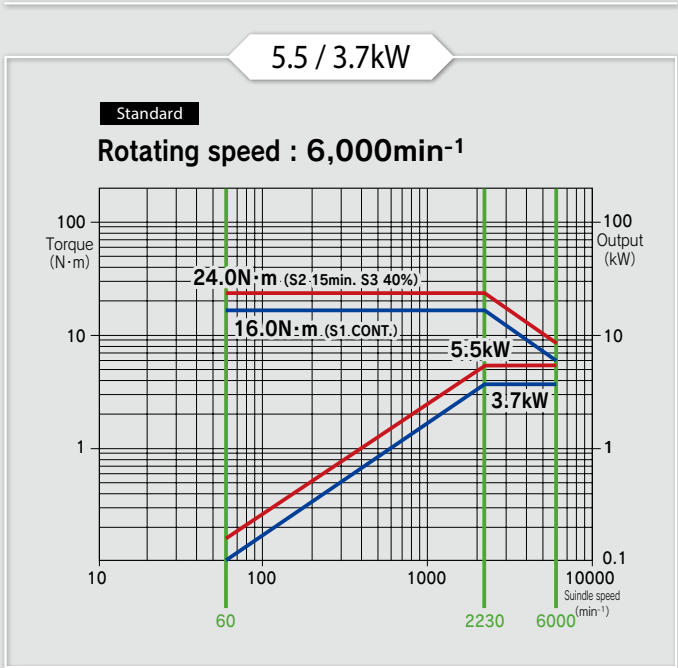


Super NTJ
24 driven tools available for extensive machining processes



Super NTJ
By introducing faster motor acceleration / deceleration, machining efficiency was improved.

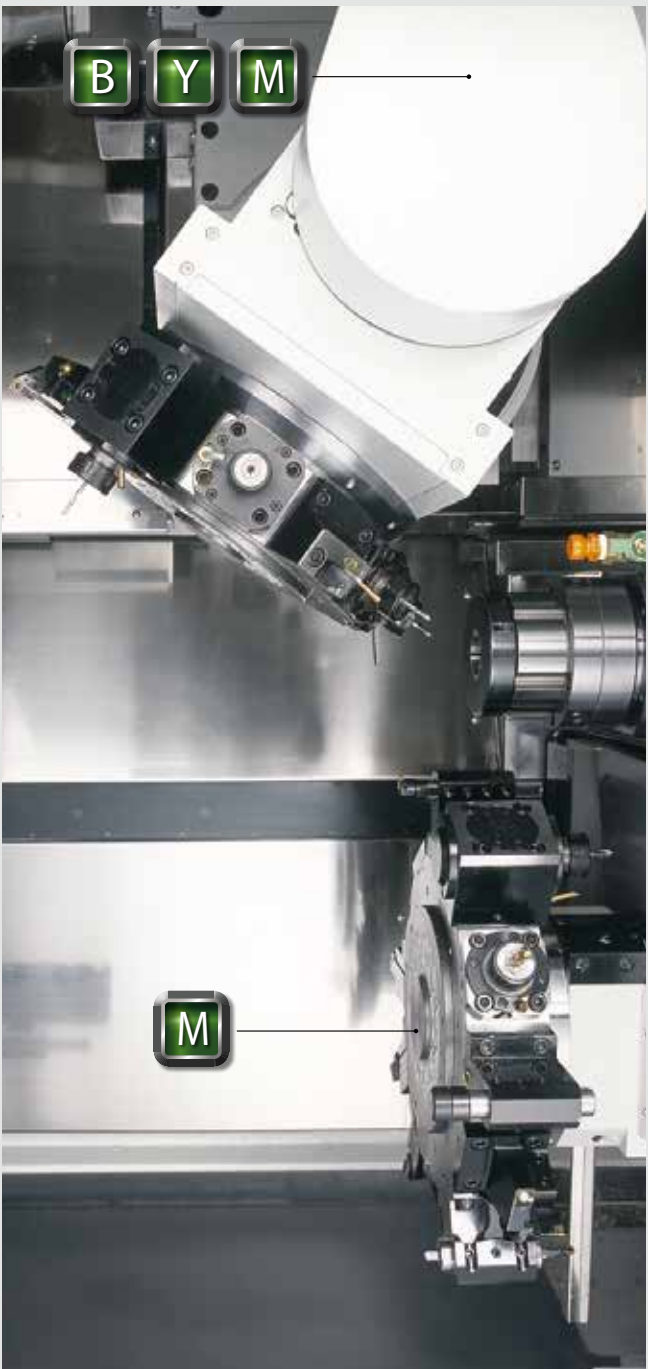
Driven-tool motor



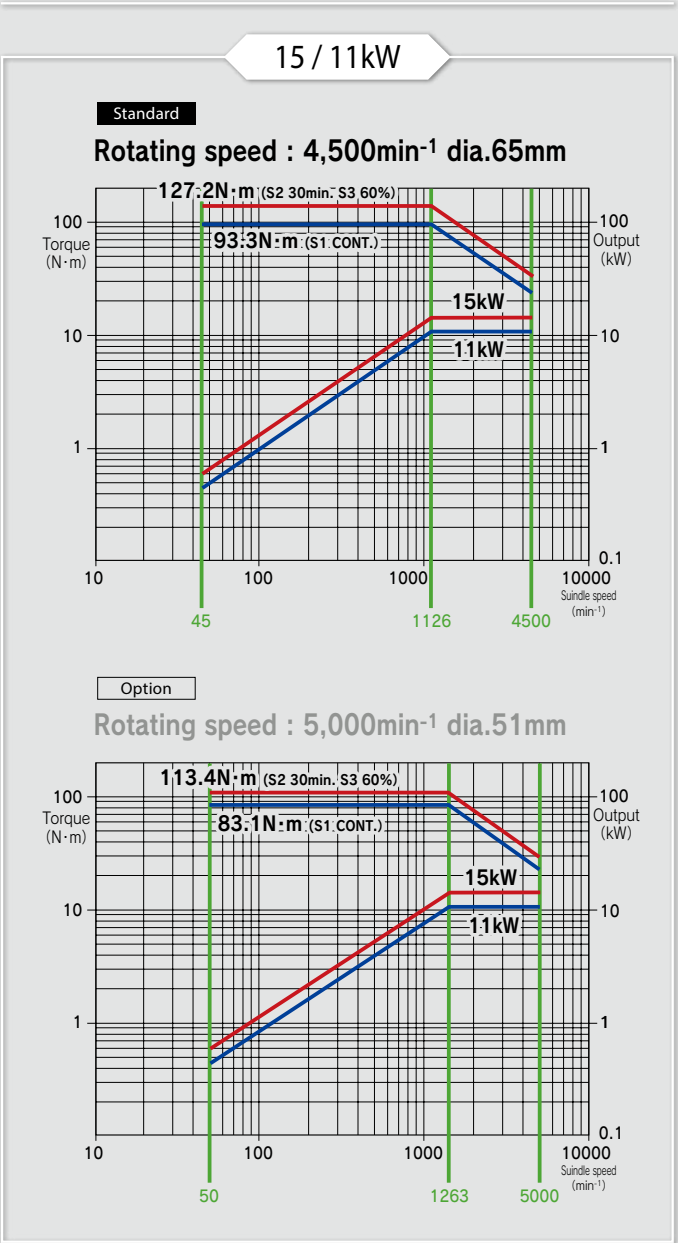
High rigidity milling

- Equipped with Max. 24 driven-tools
- High-speed C-axis rapid feed 600min⁻¹
- Innovative milling drive

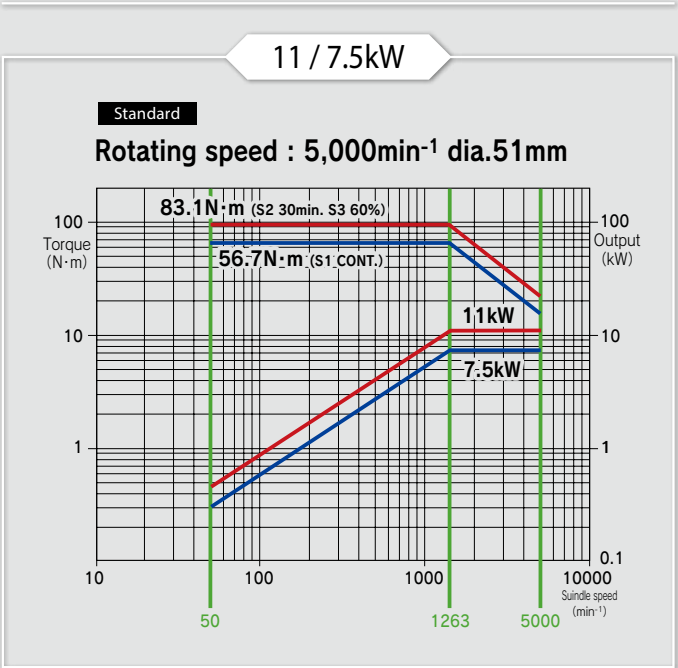
By integrating the non-lift servo-index and milling drive (patent pending), rigidity was increased, and machining efficiency became 20% higher.



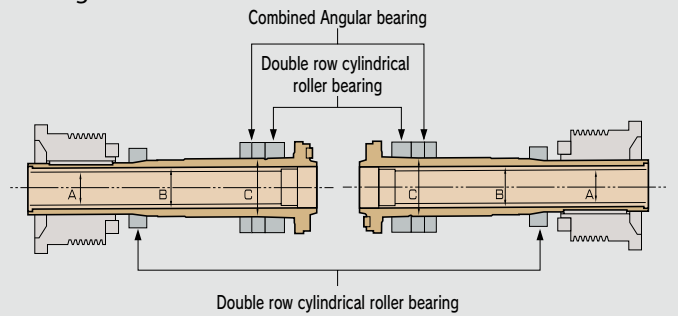
L Spindle motors



R Spindle motors



Bearing structure



Main spindle bearing	Dia.65 L spindle	Dia.51 R spindle
A I.D. of draw tube	Dia. 66 mm	Dia. 52 mm
B Spindle bore	Dia. 80 mm	Dia. 63 mm
C I.D. of front bearing	Dia. 110 mm	Dia. 90 mm

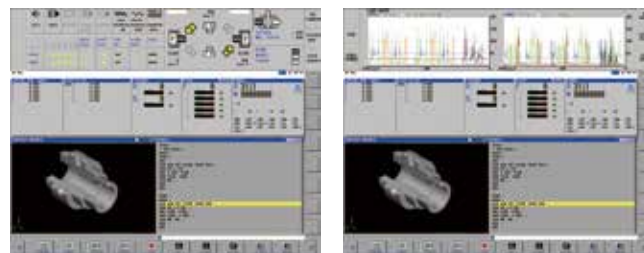
Full operator support for more ease of use and reliability

Largest Display : 19" Touch Panel



19" Color LCD Monitor

With the user in mind, a large high-resolution (19" SXGA 1280x1024) color LCD is introduced. Nakamura-Tome's original screens are featured on a large CNC display unit. Switch between machine status screen and load graph screen by pressing a single button, or return to the previous NT screen by simply pressing the NT screen button.



STATUS DISPLAY

LOAD GRAPH

Open CNC

Several original screens developed by Nakamura-Tome, such as Tool Setting Screen and Work-piece Status Screen, are featured on this machine to ensure ease of set up and ease of operation with loading / unloading devices.



CNC SCREEN

PROGRAM CHECK



NT SETTING

TOOL SETTING



Program storage length	2560mm	5120mm	10240mm	20480mm
Program registered number	2000	1000 or 4000		
Tool offset pairs	99+ 99			

Standard

Option

Illuminated Switches

LED light switches are introduced on the operation panel. When machine power is on, a backlight makes it possible to see the switch even in a dark condition. When pressed, the switch is fully illuminated. When the spindle, tool spindle or feed override rotary switches are set to 100%, the lit LED switches enable the operator to see the override condition from a distance.



Spindle override switch

Feed-rate override switch

NT-Original screen

Setting and operation integrated in one screen

Switches on the control panel, NT-setting screen commands and other buttons were all put together in one screen. All setting operations can be done from within one screen, which is displayed by pushing one button, ensuring easy operation.



NT SETTING

All required information displayed on one screen

Set up can be easily performed without changing screens. Graphic displays of working-area units, such as chucks, parts, tool spindle, ...etc, are great visual aids to ensure ease of understanding.



TOOL SETTING

Coolant setting screen

Coolant setting screen pops up by pushing one button on the control panel. Easy to see! Easy to use!



TOOL INFORMATION

Coordinate and tool setting integrated in one screen

Geometry & wear offsets, work coordinates and Manual Guide i tool information were all put together in one screen. Easy to see! Easy to use!



Pop up display

By pressing the AUX key, registered screens subsequently pop up, showing machine conditions on several screens. Thanks to the NTIPS large screen, it became possible to look at the NC program while watching 3D interference check, or to look at the CNC coordinates while watching the machining area through a video camera, ... etc. Easy to see! Easy to understand! Easy to use!



Monitoring System (op.)

It is possible to mount an external CCD camera inside the machine. Using the screen controller, the video camera can be panned, tilted or zoomed. Additionally, it is possible to pre-register up to 6 camera positions, which can be quickly recalled later by simply pressing the "AUX" key. Full screen display is also available by pressing the provided " " button, similar to several Windows applications.



Dual safety

NT Collision Guard
+
Airbag

Double safety features for maximum machine protection

Full operator support for more ease of use and reliability

NT Collision Guard

ACTIVE SAFETY

Preventive safety technology – Machine collisions are avoidable!

NT Collision Guard to avoid machine collision before machining and Air bag function (Abnormal load detection) to minimize damage even in case of collision during actual machining.

If interference is detected, the machine stops with the affected area highlighted in red on the CNC display.

Airbag (Overload detection)

PASSIVE SAFETY

Input drill length

Input material dimension

Input tool overhang

Input rotating center shape

That...

Other companies' machine

This...

Inputing a great amount of data comes with the risk of making mistakes

Even with barrier function, machine collisions may occur

Soft barrier function is not perfect. If wrong data is input, a collision will occur.

When unavoidable human error results in machine collision, there is no reason to panic.

All Nakamura-Tome machines are equipped with a safety feature called "airbag" (overload detection), which will greatly reduce the impact force and prevent heavy damage to the machine.

Without Airbag

Machine will not be stop immediately. The slide continues to move even after collision.

With Airbag

Retraction within 0.008 sec

Crash !

Within 8 milliseconds after the crash, servo motor-feeding direction is reversed and the machine stops in EMG mode.

Crash

* This feature does not mean zero impact.

Jig less! Set-up less! Skill less!

This essential function for multitasking machines is standard.

Safety Technology.

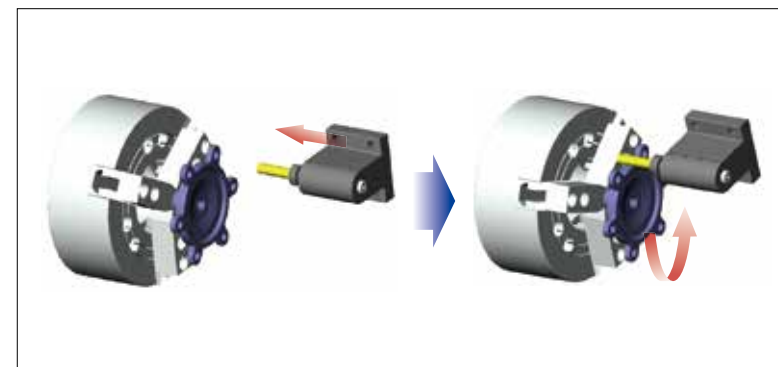
"Program and setup is difficult...." "If the machine stops during the process...." "Costly jigs and fixtures for Complex parts...." You may have similar production concerns. Having the NT Nurse system, NT Work Navigator and Overload detection, reduces manufacturing headaches and provides precious production support.

NT Work Navigator

ACTIVESAFETY

X
Y
Z
B
C

- Advanced NT Work Navigator !
- No fixtures required



- Air Cutting Mode
- Index Speed override

Machine set-up essentials
- Jump Programming (G411)

Continuous-machining essentials
- Axis Torque Limit Function (G359)
- Cut-in Check
- Program Resume Function
- Manual Handle Retrace (op.)

NT Multitasking Office

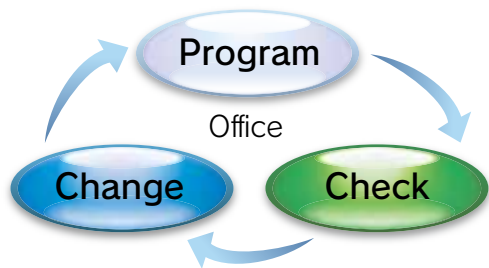


Programming and test cut can be done in the office.

By integrating 3D CAD models of the machine, chucks, tools and part, with the dynamics of the real machine (parameter settings) as well as guided programming, Multi-Tasking Office enables virtual planning and verification of the production process.

Efficient Programming for Higher productivity

Shorter set-up times

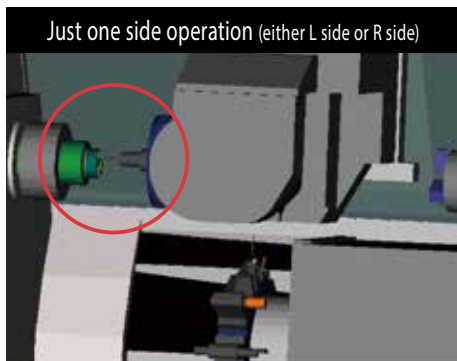
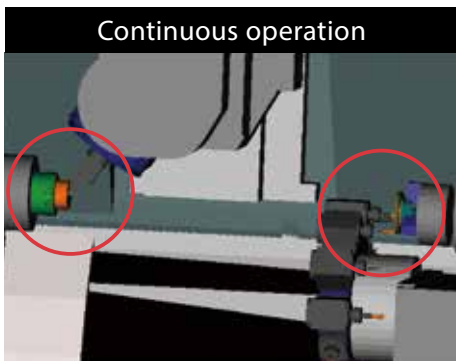
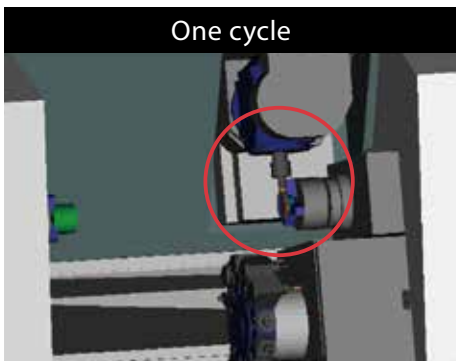


Drastically reducing set-up time leads to higher productivity

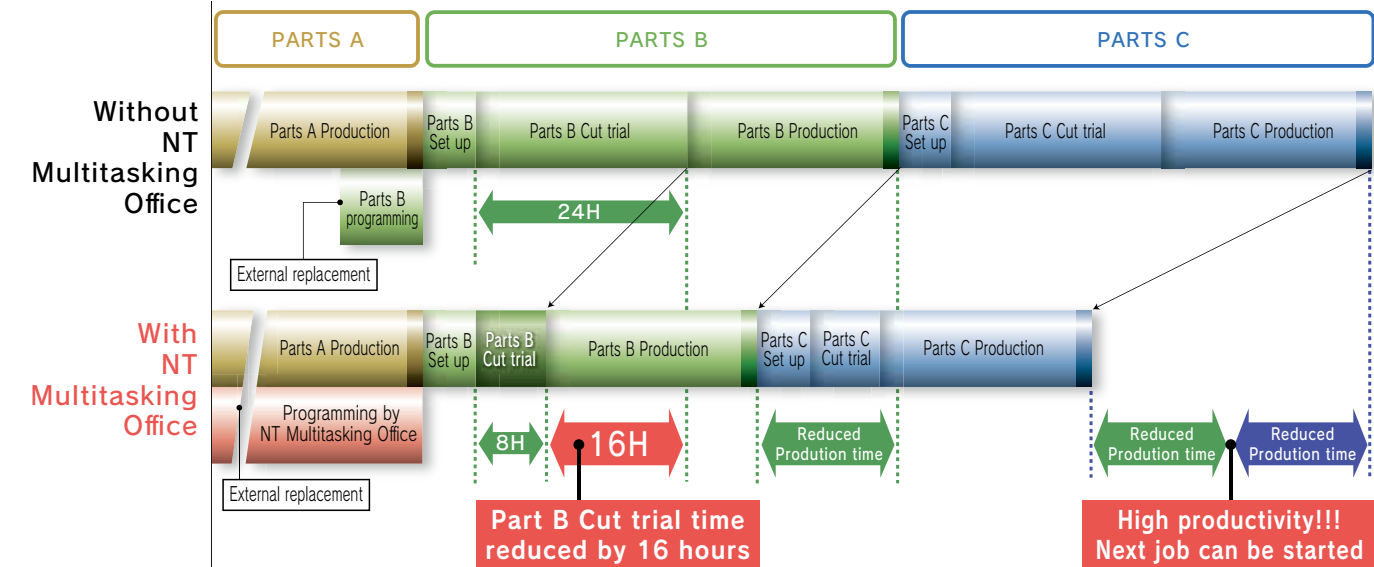
Virtual simulation of the machining processes using 3D solid models of the machine, chucks, tool holders and tools, coupled with all the features of NT-Manual guide I, contribute to not only high efficiency programming and reduced cycle times, but also prevent collisions and reduce set up time.

Features

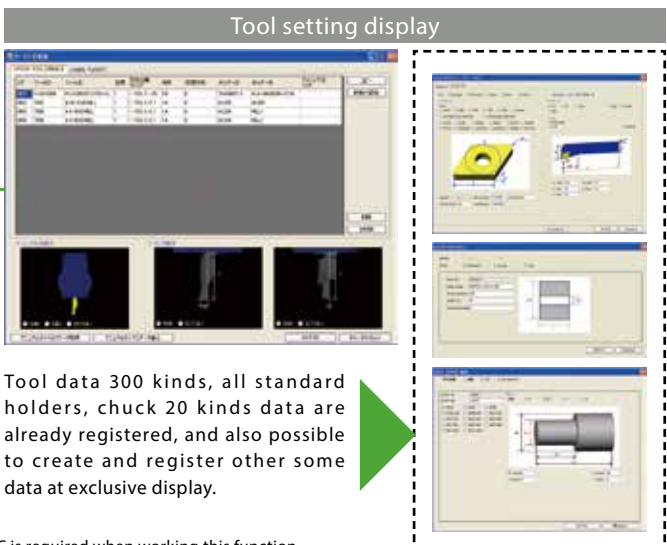
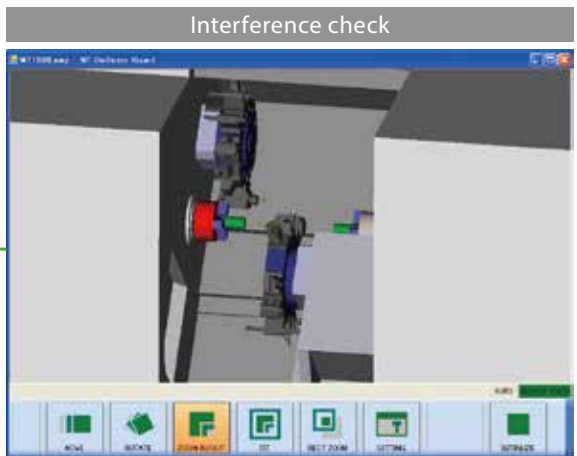
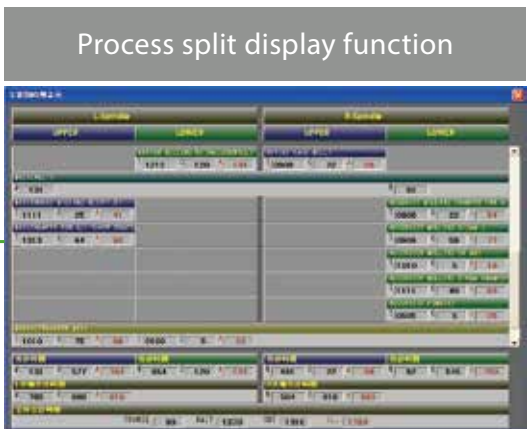
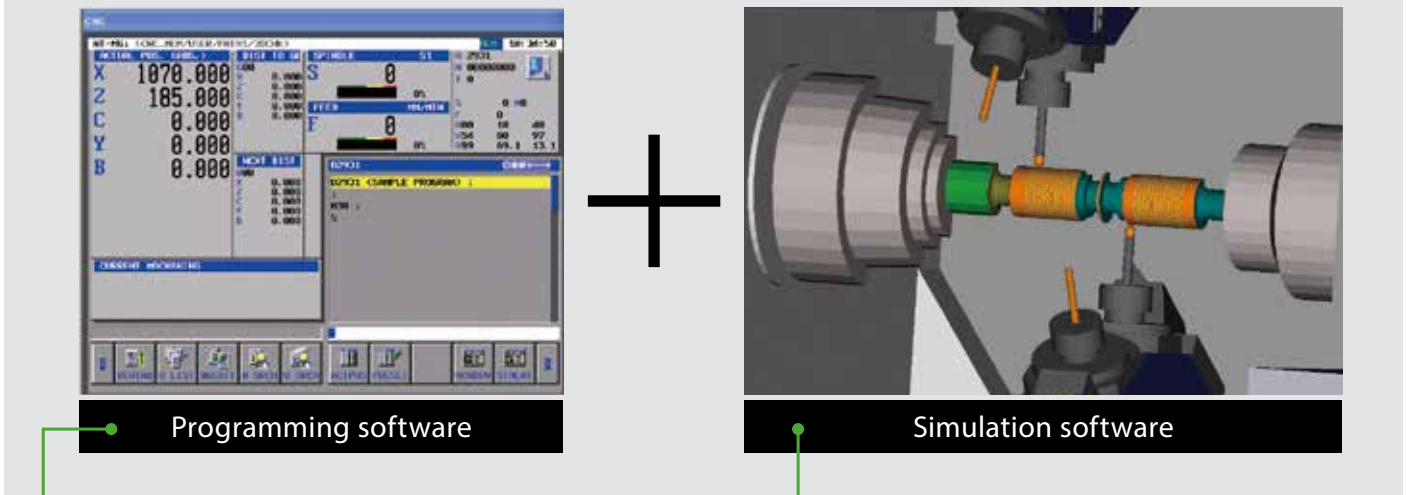
- 1 Simulation is possible either from Manual guide program (including 4-digit G-codes), or from ISO NC program.
- 2 Simulation of Canned cycles such as G71, G83, ...etc.
- 3 Simulation of programs using Jump programming function (G411) is available as well.



Effect of NT Multitasking Office

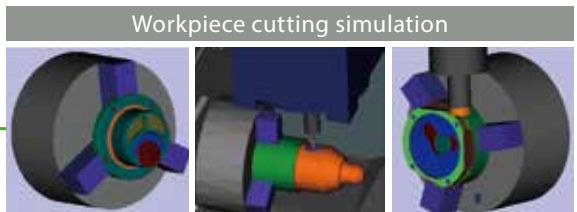
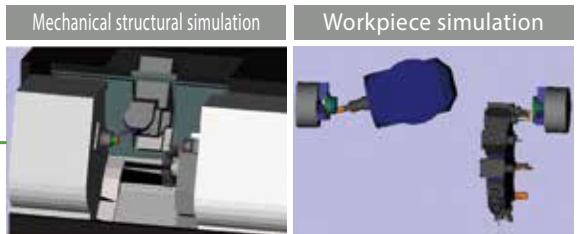


NT Multitasking Office



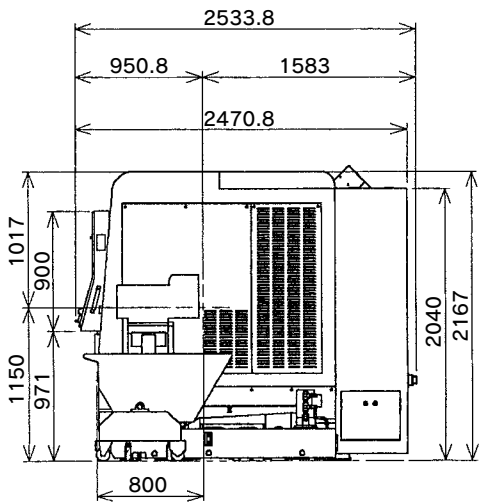
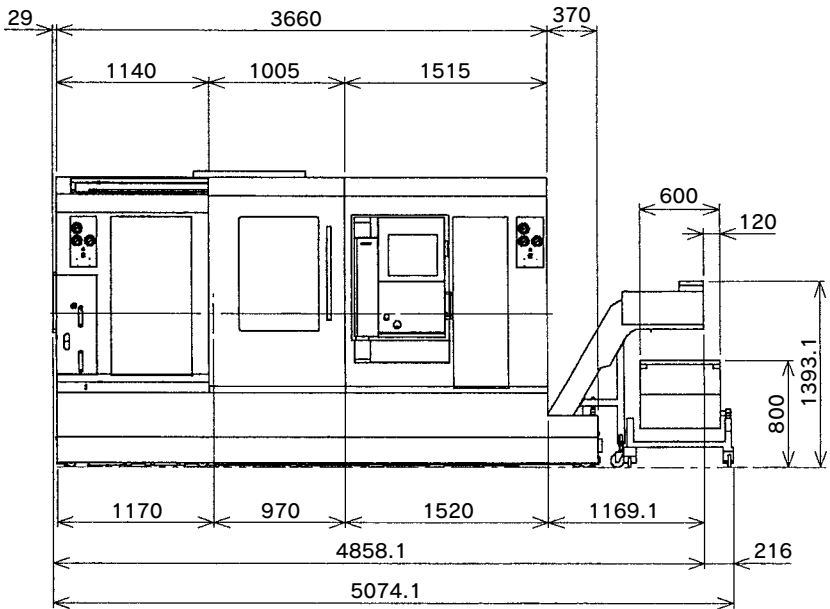
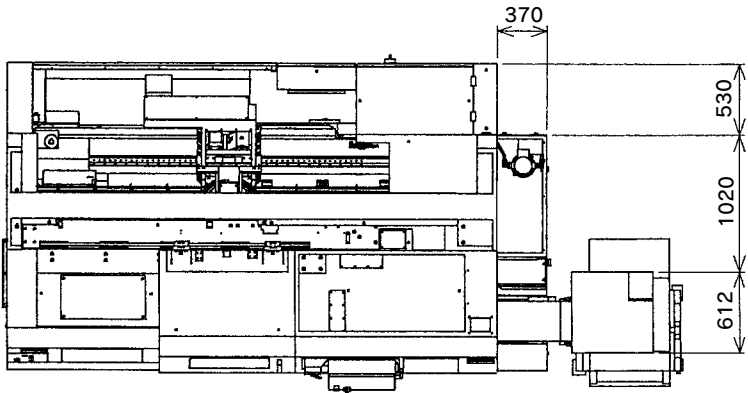
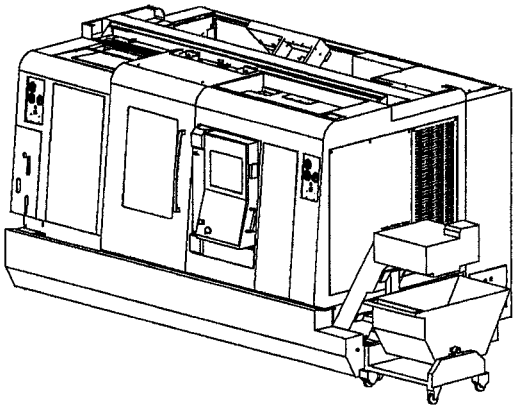
Tool data 300 kinds, all standard holders, chuck 20 kinds data are already registered, and also possible to create and register other some data at exclusive display.

* Other PC is required when working this function.



Machine Dimension

■ Chip conveyor right side outlet

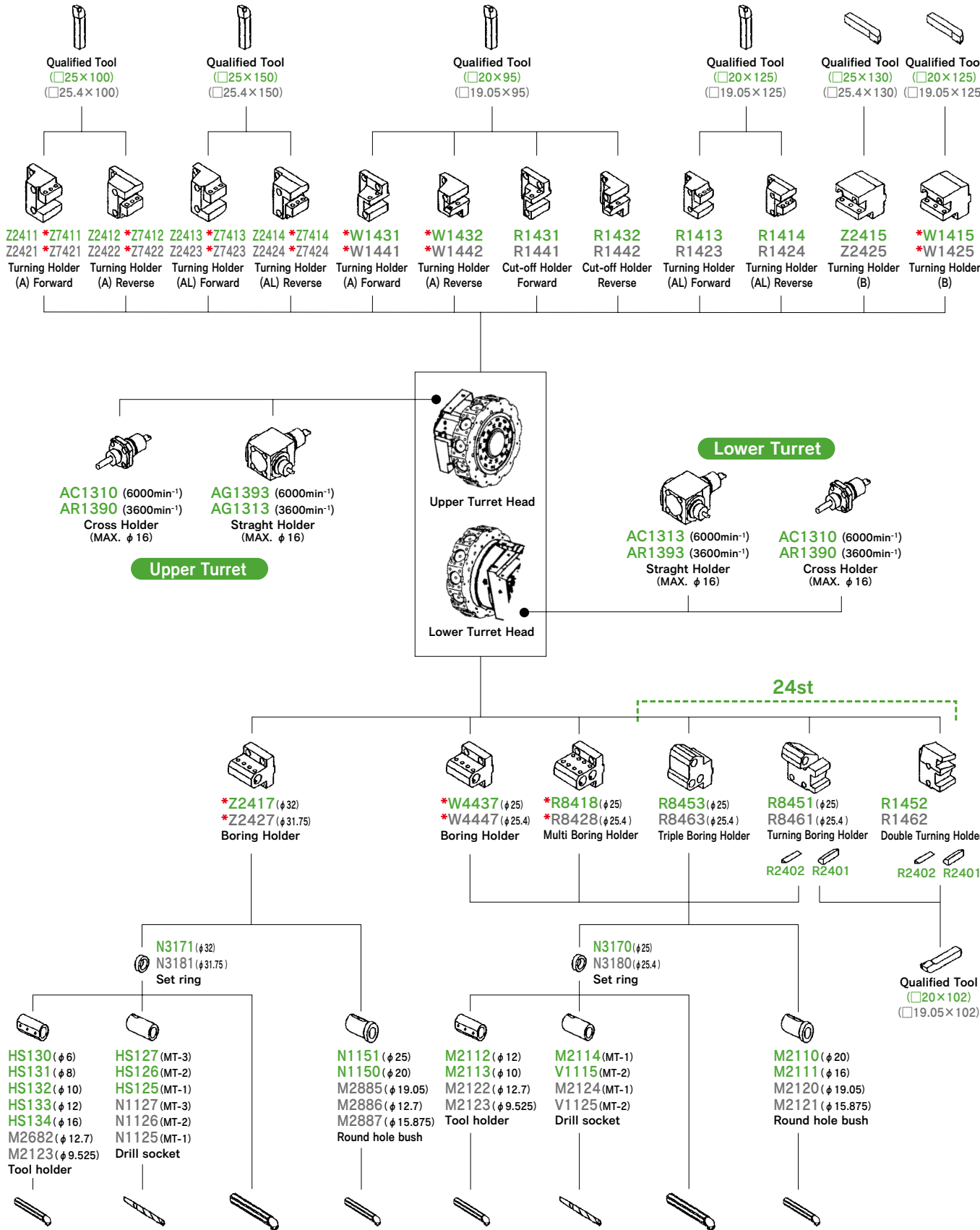


(Unit mm)

Tooling system diagram

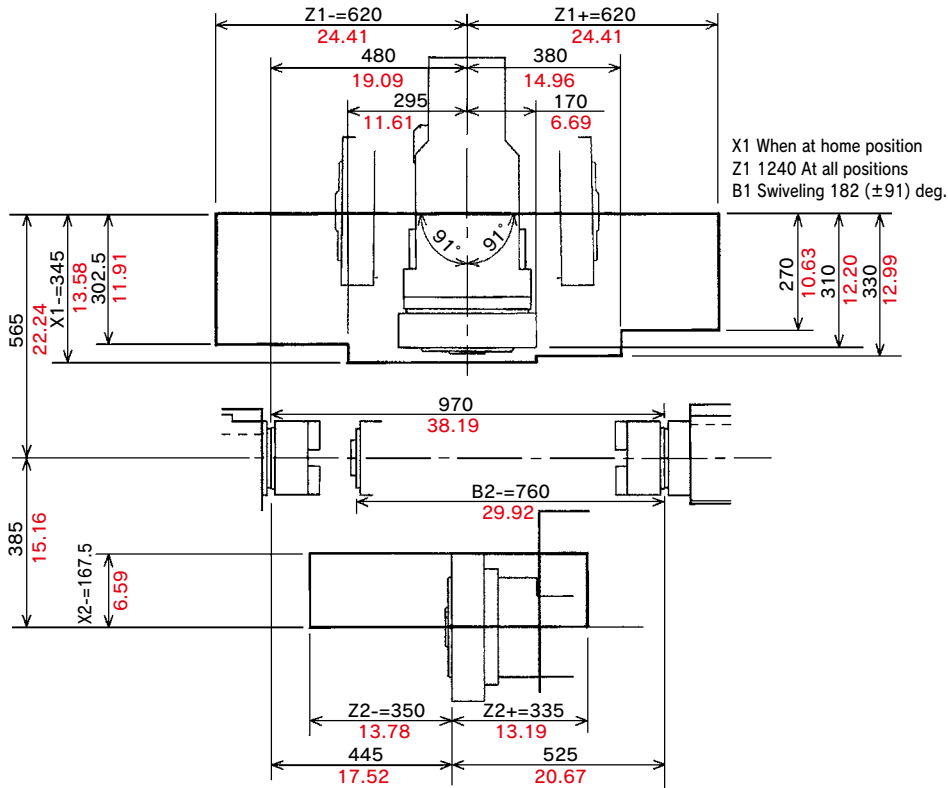
mm
inch

For * marked tool holders, coolant comes out from both sides of holder when machining on either L or R hand side. For other tool holders, by connecting a pipe from the turret face to the holder, coolant can come out from both sides.



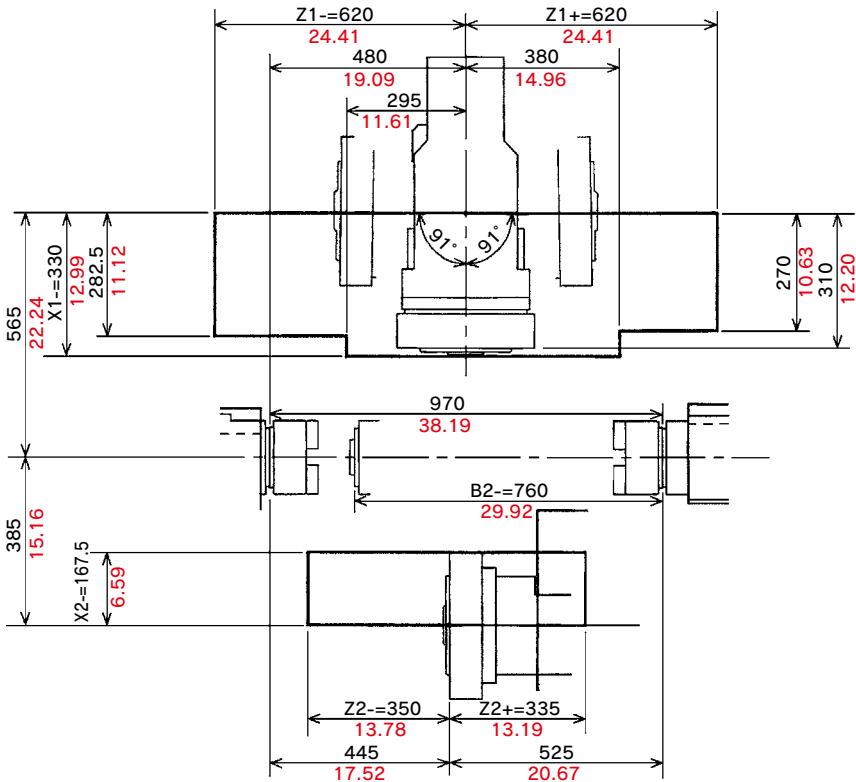
Slide Travel Range

φ 51



Unit mm
inch

φ 65



Unit mm
inch

Machine Specification

■ Capacity		
Max. turning diameter	190mm	
Standard turning diameter	170mm	
Distance between spindle noses	max.970mm / min.210mm	
Max. turning length	620mm	
Bar capacity	65mm (op. 51mm) / 51mm	
Chuck size	165mm (6")	
■ Axis travel / speed		
Slide travel X1 / X2	345mm / 167.5mm	
Slide travel Z1 / Z2	1240mm / 685mm	
Slide travel Y-axis	± 45mm	
Slide travel B2-axis	760mm	
Rapid feed X1 / X2	16m/min	
Rapid feed Z1 / Z2	40m/min	
Rapid feed B2 axis	40m/min	
Rapid feed Y-axis	6m/min	
■ B1 axis		
installed position	Upper turret	
Swiveling over slide	+91deg. -91deg.	
Swivel speed	180 deg/ sec.	
Least index angle increment of curvic coupling	5 deg.	
■ Left spindle		
Spindle speed	4500min ⁻¹	5000min ⁻¹ (op. 51mm)
Spindle speed range	Stepless	
Spindle nose	A2-6	A2-5
Hole through spindle	80mm	63mm (op.)
I.D. of front bearing	110mm	90mm (op.)
Hole through draw tube	66mm	52mm (op.)
■ Right spindle		
Spindle speed	5000min ⁻¹	
Spindle speed range	Stepless	
Spindle nose	A2-5	
Hole through spindle	63mm	
I.D. of front bearing	90mm	
Hole through draw tube	52mm	
■ C-axis L/R		
Least input increment	0.001°	
Least command increment	0.001°	
Rapid index speed	600min ⁻¹	
C-axis cutting feed rate	1 - 4800° /min	
C-axis clamp	Disk clamp	
C-axis connecting time	1.5sec.	
■ Upper & Lower turrets		
Number of turrets	2	
Turret type	Dodecagonal drum turret	
Number of tool stations	24 stations	
Number of indexing positions	24	
Tool size (square shank)	25mm	
Tool size (round shank)	dia.32mm	
■ Driven-tools		
Drive system	Individual rotation	
Spindle speed	6000min ⁻¹	
Spindle speed range	Stepless	
Number of driven-tool stations	12	
Holder type and tool size	Straight holder dia.1mm - dia.16mm Cross holder dia.1mm - dia.16mm	
■ Drive motor		
L spindle motor	Power	15/11kW
	Torque	127.2/93.3N·m 113.4/83.1N·m
R spindle motor	11/7.5kW 83.1/56.7N·m	
Rotating tool spindle	5.5/3.7kW 24/16N·m × 2	
■ General		
Machine height	2170mm	
Floor space	3660mm × 2320mm	
Machine weight (including tooling)	12,500kg	
■ Main Power supply		
Power supply	61.7kVA	
Air supply	200NL/min	

● Safety quality specification
Safety devices such as various interlock, various safety fences, auto loading device, work stocker, automatic fire extinguisher etc are available as options which can be included in your purchase package. Please contact our local distributor and dealer for your specific requirements.

● Precautions about the use of cutting coolant
Synthetic Coolants are Damaging to Machine Components Concerning the use of cutting fluids, cautions have to be taken on the type of coolant being used. Among coolants available in the market, some types are damaging to machine components and should be avoided. Typical damages are turctite wear, peeling of paint, cracking and damage to plastics and polymers, expansion of rubber parts, corrosion and rust build up on aluminum and copper. To prevent such damages, coolants that are synthetic, or containing chlorine have to be avoided. Machine warranty terms do not apply to any claims or damage arising from the use of improper coolant.

Control Specification

Items	
Control type	FANUC 31i-B 2 PATH
Controlled axes	
Controlled axes	9axes
Simultaneously controlled axes	4 axes upper (X1, Z1, C1 (C2), Y1, B1) + 4 axes lower (X2, Z2, C2 (C1), B2)
Input command	
Least input increment	0.001mm/0.0001inch (diameter for X-axis), 0.001°
Least command increment	X : 0.0005mm, Z : 0.001mm, Y : 0.001mm, C : 0.001°, B1 : 0.001°, B2 : 0.001mm
Max. programmable dimension	± 999999.999mm/ ± 39370.0787inch, ± 999999.999°
Absolute / incremental programming	X, Z, C, Y, B1, B2 (only absolute for B1, B2) / U, W, V, H
Decimal input	Standard
Inch / Metric conversion	G20 / G21
Programmable data input	G10
Feed function	
Cutting feed	feed / min X : 1 - 4800mm/min, 0.01 - 188inch/min Z : 1 - 4800mm/min, 0.01 - 188inch/min Y : 1 - 4800mm/min, 0.01 - 188inch/min C : 1 - 4800degree/min B2 : 1 - 4800mm/min, 0.01 - 188inch/min feed / rev : 0.0001 - 4800mm/min 0.000001 - 188inch/min
Dwell	G04
Feed per minute / Feed per revolution	G98/G99
Thread cutting	G32
Thread cutting retract	Standard
Continuous thread cutting	G34
Handle feed	Manual pulse generator 0.001/ 0.01/ 0.1mm,* (per pulse)
Automatic acceleration / deceleration	Standard
Linear accel. / decel. After cutting feed interpolation	Standard
Rapid feed override	F0 / 25 / 100% (from NT setting screen, changeable 0 ~ 100% at 10% steps)
Cutting feedrate override	0 - 150% at 10% steps
Program memory	
Part program storage length	Total 2560m
Part program editing	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of registerable programs	2000programs
Program storage memory	Backed up by battery
Multiple program simultaneous editing	Standard (Background program editing cannot be used when PCC or Gantry loader is in automatic operation)
DNC operation through memory card	Standard (Only one turret can access memory card at a time) (not including memory card)
Extended part program editing	Standard
Operation and display	
Operation panel : Display	19inch color SXGA liquid tough panel
Operation panel : keyboard	QWERTY keyboard
Programming assist function	
Circular interpolation R programming	Standard
Direct drawing dimension programming or Chamfering / Corner R	Standard (by setting parameter)
Canned cycle	G90, G92, G94
Multiple repetitive canned cycle	G70 - G76
Multiple repetitive canned cycle II	Standard
Canned cycle for drilling	G80 - G89
Synchronized mixture control	Standard
Sub program	Standard
Balance cut	G68, G69
Custom macro	Standard (#100 - #149, #500 - #549)
Addition to custom macro common variables	Standard (After addition, #100 - #199, #500 - #999)
FS15 tape format	Standard
Luck-bei II NT Manual Guide i	Standard
Abnormal load detection function	Standard
NT Work Navigator	Standard (not including contact bar)
NT Nurse	Standard
NT Collision Guard	Standard
Machining support functions	
Rigid tapping	Standard
Spindle synchronization control	Standard
C-axes synchronization control	Standard
Spindle orientation	Standard (360 deg. Possible to command optional degree, control unit : 0.088)
NT-IPS	
O/S	Windows XP Embedded (There are some restrictions depending on application to be installed)
Pointing device	Touch pad