

# NTJ-100

**NAKAMURA-TOME**  
PRECISION INDUSTRY CO.,LTD.

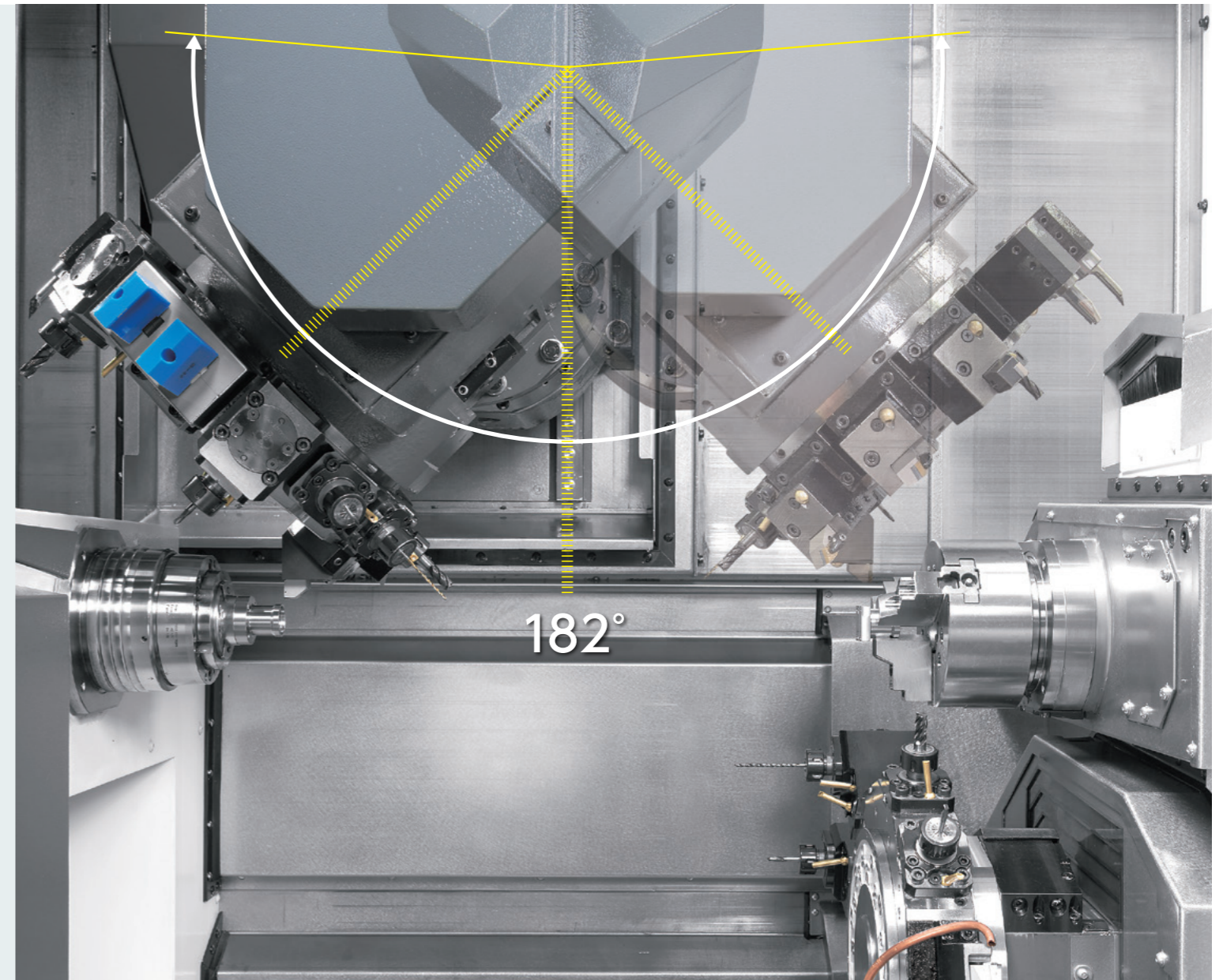
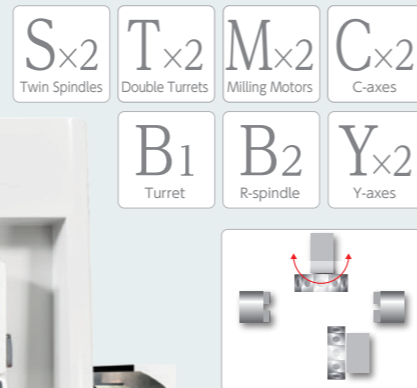
## Flexible Machining at Any Angle

Innovative Technology

~ Creating new values ~

# NTJ-100

- Upper turret B-axis swiveling range 182°  
Angular drilling, end milling, and arbitrary contour-milling can be performed with standard driven-tool holders.
- Y-axis slide travel  $\pm 40\text{mm}$ (Upp) /  $\pm 32.5\text{mm}$ (Low)
- Milling motor 7.1/2.2kW  
Milling spindle speed  $6,000\text{min}^{-1}$
- Reduce setup time with permanent tooling
- Cycle times are faster thanks to simultaneous machining with the L/R spindles and upper/lower turrets.
- NT SmartX as standard equipment with a large variety of software.



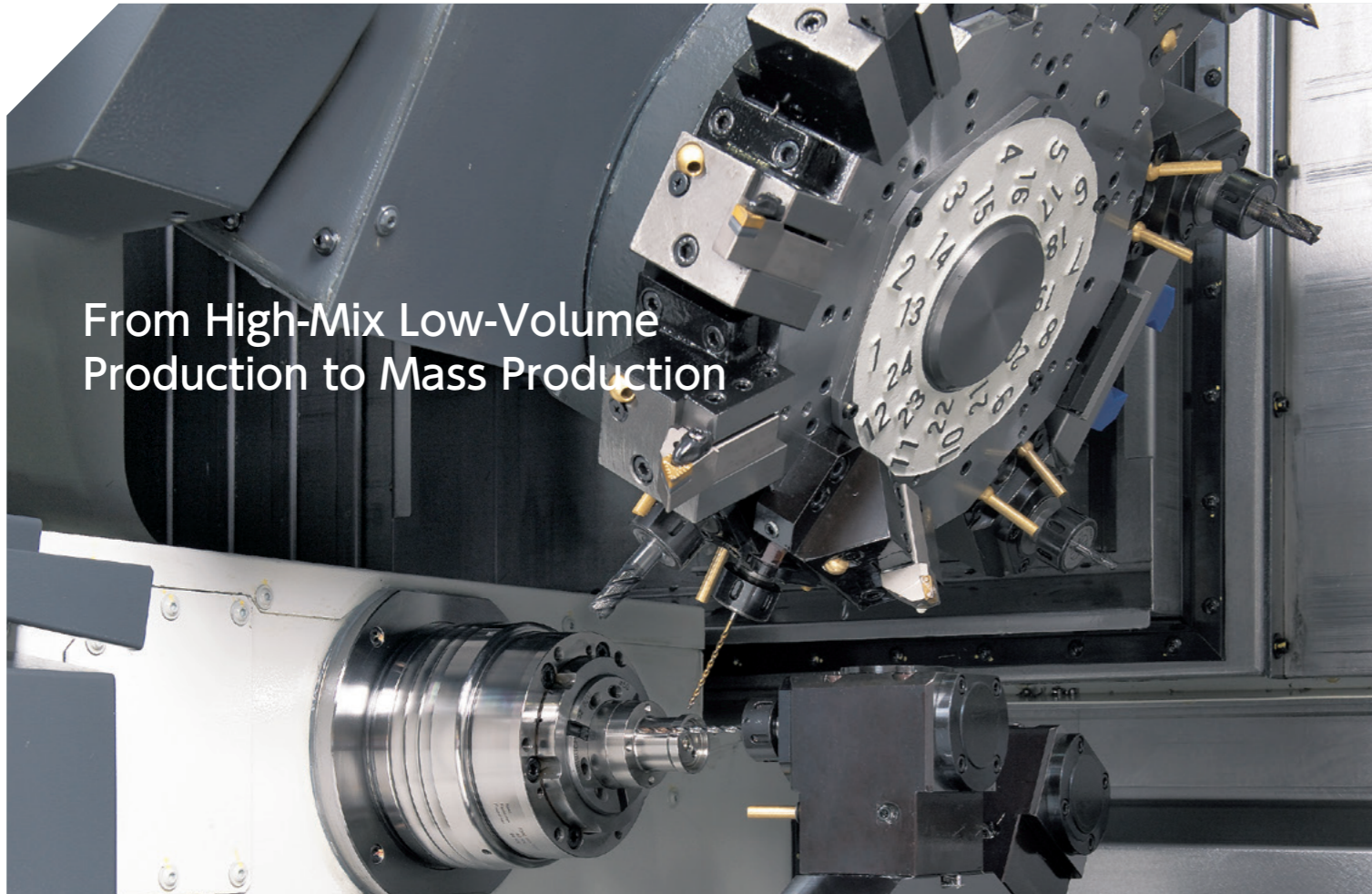
### B-axis swiveling range 182°

NTJ-100 has two-opposed spindles, milling, and a Y-axis on both turrets, ensuring that flexible machining is performed simultaneously on either spindle with the upper and lower turrets. In addition, the upper turret is equipped with a swiveling B-axis, enabling the machining of angled holes, inclined surfaces, and arbitrary surfaces with standard tools. The number of tools can be minimized for efficient machining.

This is a multitasking machine superior to that of a machining center in productivity thanks to short tool change time and unique turret design.

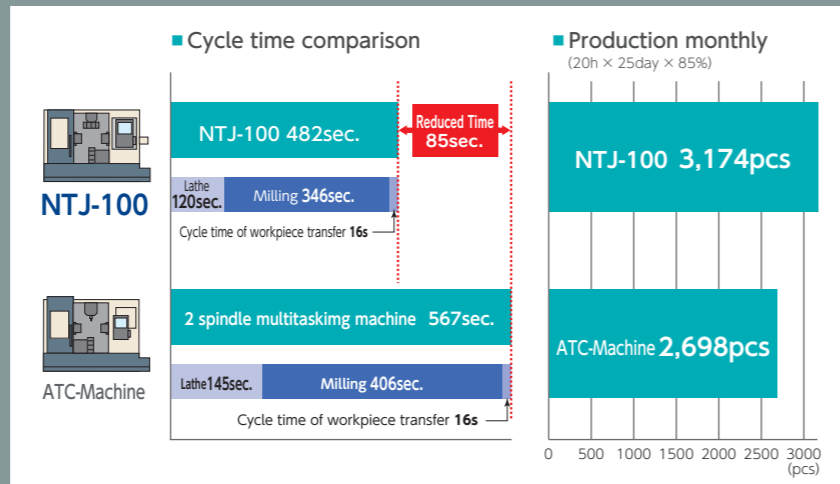
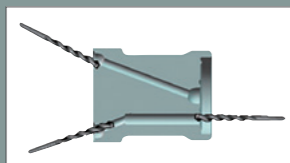
A full range of software is also available, such as programming support, tool management, and setup support.

From High-Mix Low-Volume Production to Mass Production



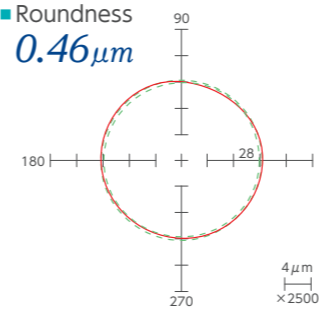
Although the NTJ-100 is a turret machine, it is capable of machining like a tool spindle machine. Being a turret machine, it has the advantage of short tool indexing time. The indexing time of a tool spindle machine is 2.5 seconds, whereas the turret indexing time is only 0.7 seconds (half a revolution). The more tools are changed, i.e., the more machining processes are involved, the greater NTJ-100's advantage.

Time	8min.2sec.
Material	X10CrNiS 18-9
Blank	Bar / $\phi 50\text{mm}$

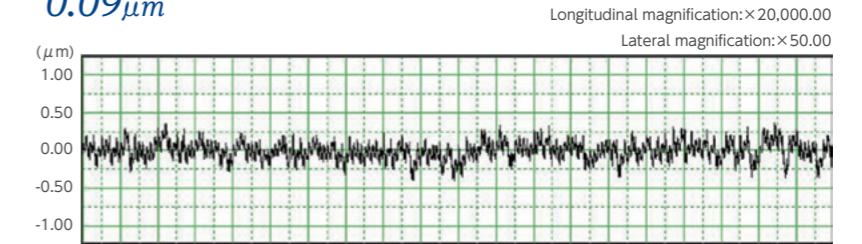


Turning Accuracy

Roundness  $0.46\mu\text{m}$



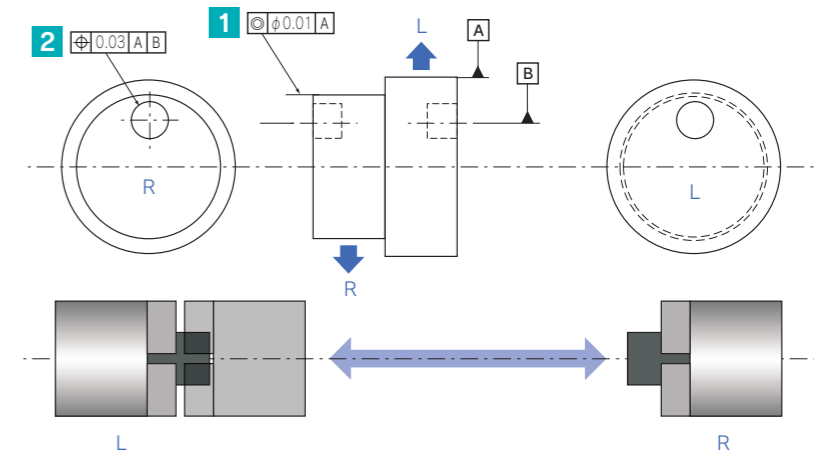
Surface roughness (Ra)  $0.09\mu\text{m}$



- Spindle speed:  $5,000\text{min}^{-1}$
- Depth of cut:  $0.05\text{mm}$
- Feed:  $0.05\text{mm/rev}$
- Material: BsBM

Transferring Accuracy

Coaxiality  $\phi 5\mu\text{m}$   
(Required accuracy:  $\phi 10\mu\text{m}$ )



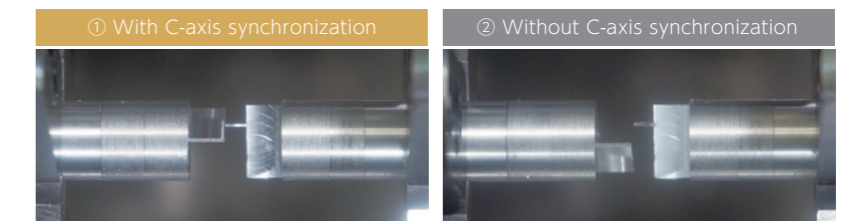
Hole position  $\phi 9\mu\text{m}$   
(Required accuracy:  $\phi 30\mu\text{m}$ )

\* The actual measured values shown in this catalog are for reference only and may differ depending on cutting conditions and specifications.

C-axis Synchronization

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

C-axis indexing speed	$600\text{min}^{-1}$
180 indexing	0.3sec.
360 indexing	0.38sec.



## Productivity superior to that of a machining center!

### L-spindle

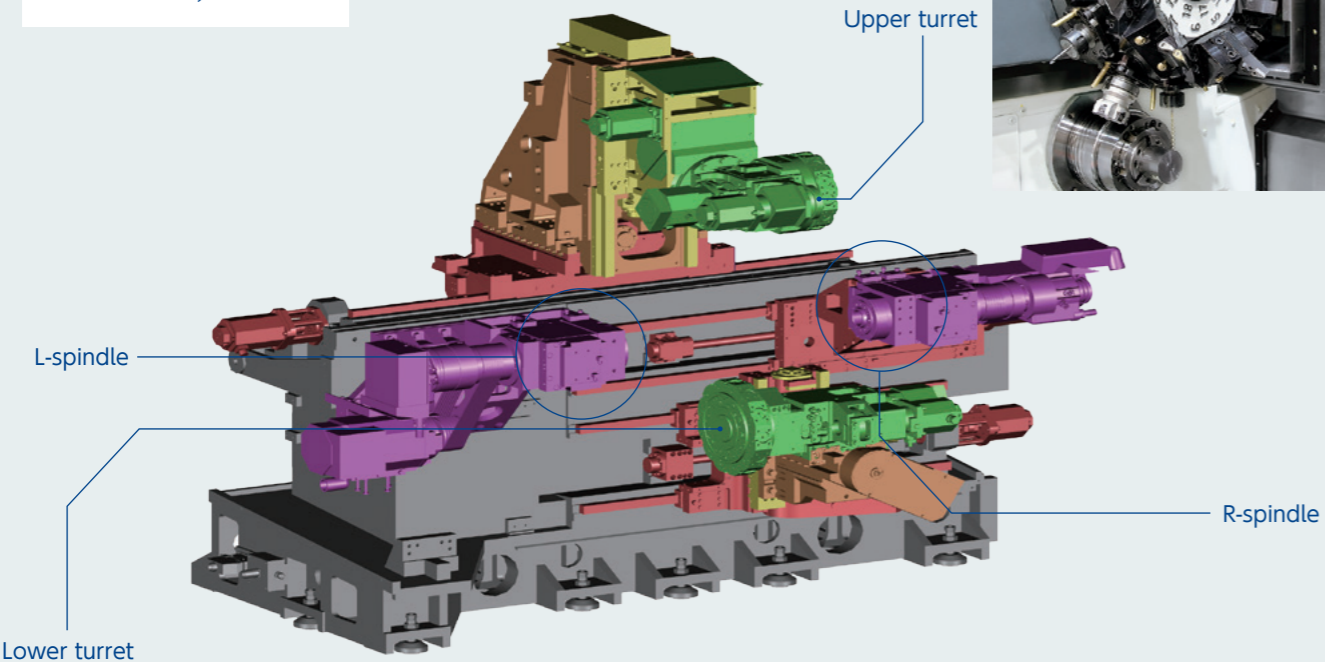
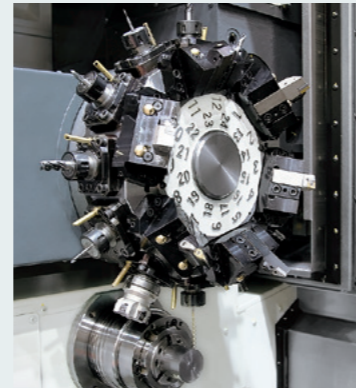
<b>Standard</b>	
Bar capacity	$\phi 51mm$
Spindle motor	11/7.5kW 5,000min <sup>-1</sup>
<b>Option</b>	
Bar capacity	$\phi 65mm$
Spindle motor	11/7.5kW 4,500min <sup>-1</sup>

### Upper turret

<b>Standard</b>	
Type of turret head	<i>Dodecagonal</i>
Number of milling stations / Number of indexing positions	12/24
Y-axis slide travel	$\pm 40mm$
Milling motor	7.1/2.2kW 6,000min <sup>-1</sup>

### Extra tools(op.)

Up to six turning tools can be mounted on the turret face. Maximizes the advantages of the turret with a swiveling B-axis and reduces lead time.



Milling and Y-axis are standard on the Upper and Lower turrets.



### Lower turret

<b>Standard</b>	
Type of turret head	<i>Dodecagonal</i>
Number of milling stations / Number of indexing positions	12/24
Y-axis slide travel	$\pm 32.5mm$
Milling motor	7.1/2.2kW 6,000min <sup>-1</sup>

### R-spindle

<b>Standard</b>	
Bar capacity	$\phi 51mm$
Spindle motor	11/7.5kW 5,000min <sup>-1</sup>
<b>Option</b>	
Bar capacity	$\phi 65mm$
Spindle motor	11/7.5kW 4,500min <sup>-1</sup>

## Swiveling B-axis to expand the range of machining!

Turret with a swiveling angle of 182 ° enables the machining of slanted holes, inclined surfaces, and arbitrary surfaces with standard tools. The number of tools can be minimized for efficient machining.



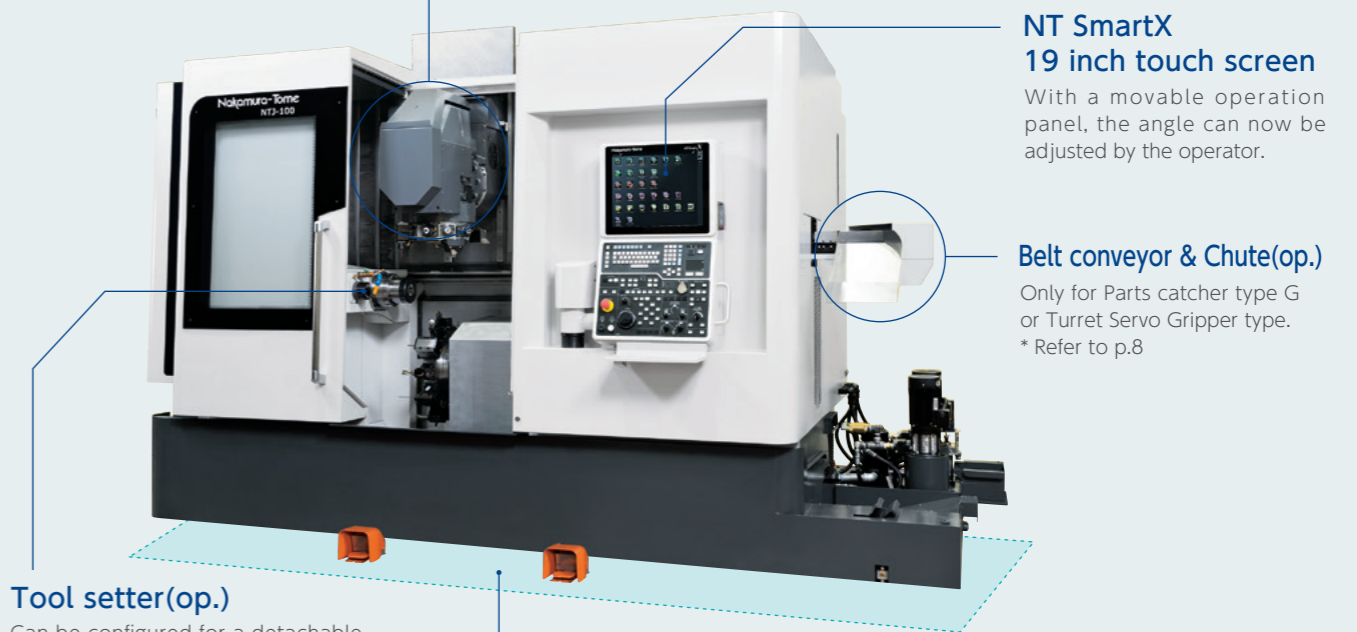
### Turning with Extra tools



### Angular drilling and milling+ Support by lower turret



### Simultaneous upper and lower milling



### NT SmartX 19 inch touch screen

With a movable operation panel, the angle can now be adjusted by the operator.

### Belt conveyor & Chute(op.)

Only for Parts catcher type G or Turret Servo Gripper type.  
\* Refer to p.8

### Tool setter(op.)

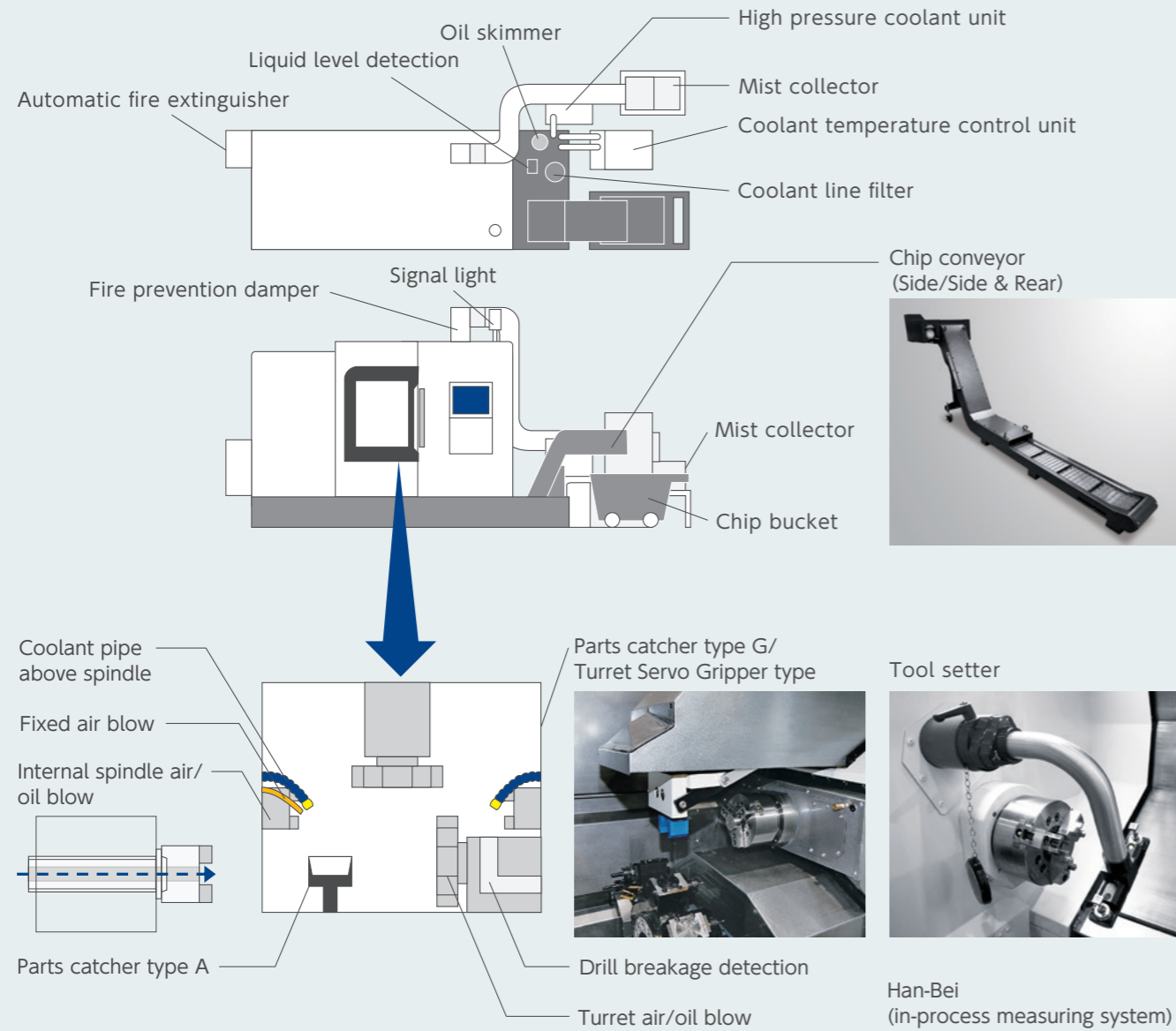
Can be configured for a detachable, or for an automatic swing-down type tool setter.



### Machine dimensions \* Including Chip tank

Standard  
**W3,799mm × D2,110mm × H2,565mm**

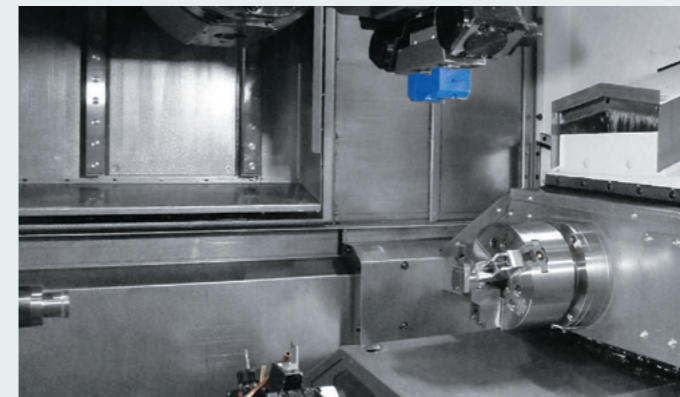
## Various Options to Meet our Customer's Needs



And many others.  
For items not listed, please feel free to contact your Nakamura-Tome representative.

3 types of parts catchers are available for ejecting finished components out of the machine. Gripper type, bucket type and servo gripper type can be selected according to the shape of components.

### Parts catcher (Turret Servo Gripper type) option



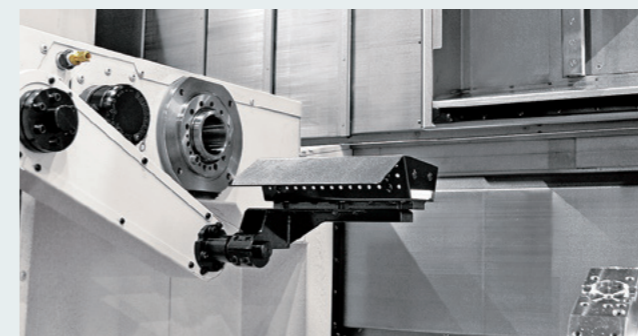
Unloading Time **2.6s**

\* 2.6s is 1 to 3

Method	Gripper
Part size Diameter	Φ12~65mm
Part size Length	20~150mm
Part size Weight	3.0kg
Ejecting method	Belt conveyor & Chute
Drive Gripper Open / Close	Used with Milling drive on Turret
Drive Traverse	Used with axis drive
Drive Shutter	Air Cylinder



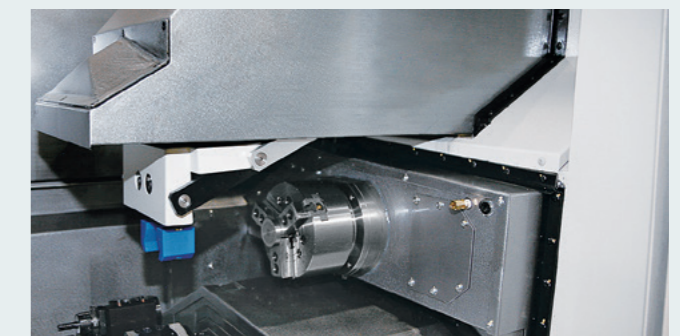
### Parts catcher type A (Bucket type) option



Unloading Time **4.0s**

Method	Swing-in Bucket
Part size Diameter	Φ15~65mm
Part size Length	20~150mm
Part size Weight	3kg
Ejecting method	Stocker / Outlet chute

### Parts catcher type G (Gripper type) option



Unloading Time **4.8s**

Method	Gripper
Part size Diameter	Φ12~65mm
Part size Length	15~200mm
Part size Weight	1.5kg
Ejecting method	Belt conveyor & Chute

## NT SmartX

Full Operator Support from Ease of Use to Reliability

### Main features of NT SmartX

#### Standard

- NT WORK NAVIGATOR
- Airbag (Overload detection)
- NT NURSE
- Status Display Function
- Setup Display
- Trouble Guidance
- Productivity Function
- Warm up Function
- Smart Support
- Drop Converter
- Cut in check
- Program Optimizer
- NT Machine Simulation
- NT Collision Guard
- NT Thermo Navigator AI
- Digital Chuck Interlock
- NT Manual Guide i
- One touch MDI
- 3D Smart Pro AI

- 19 inch color LCD touch panel
- QWERTY keyboard
- PC memory 8 GB
- Original Menu screen
- Voice Guidance
- Multi-Touch Screen
- Touch pad



- Powered by AI as standard equipment
- NT Thermo Navigator AI
- 3D Smart Pro AI



Cut in check



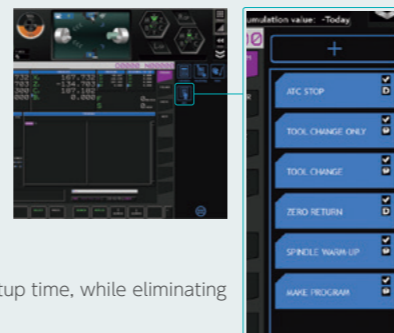
### Digital Chuck Interlock

Set the Chuck Open and Close detection position easily. The chuck open / close position is set on the NT Smart X screen. Setup time and machining cycle time are reduced.

### One Touch MDI

This function is to register frequently used program blocks or cycles, such as zero return or tool change, and call them again with one touch.

Reduce programming and setup time, while eliminating input errors.



## NT Smart Sign

Nakamura-Tome IoT software

※Please refer to the NT Smart Sign exclusive catalog for details.

### Monitoring



Real Time Monitoring of machine running conditions, in addition to visualizing alarm history and past events.

### Data Input / Output

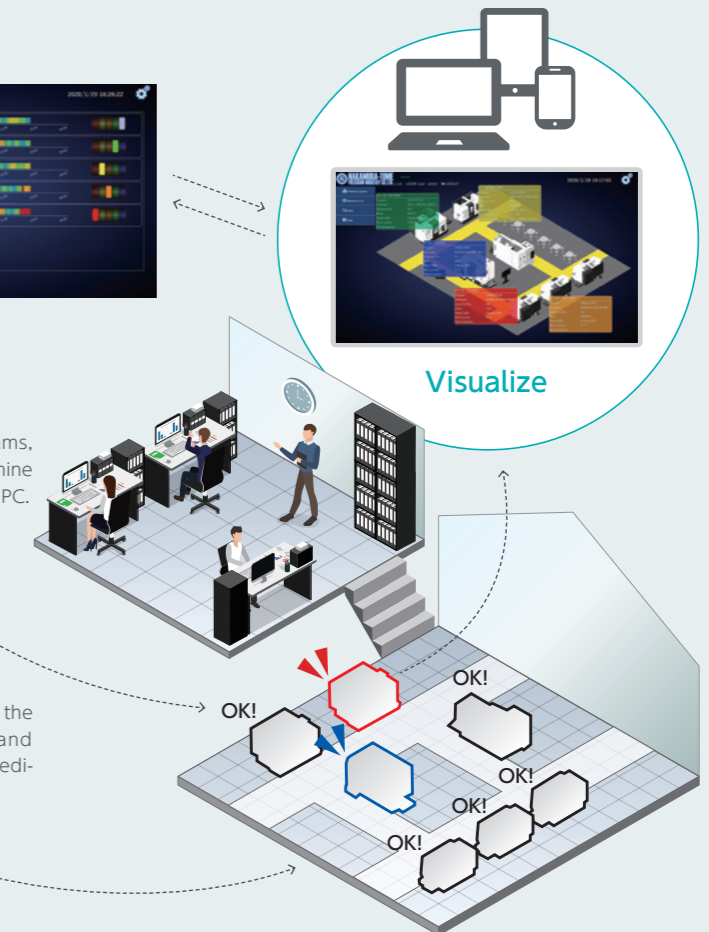


Input and output programs, tool data and other machine data from the monitoring PC.

### Diagnosis



Diagnose problems with the machine servo drives and spindle drives, using a dedicated program.



## NT Thermo Navigator AI

Thermal Growth Compensation Using AI

Compensation model built using AI machine learning.

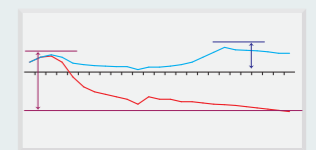
Powered by AI

Time and measured dimension data are input into a dedicated AI Learning software, to build an optimized thermal growth compensation model.



### High Precision Thermal Growth Compensation

The compensation value is calculated from acquired data. The more data is input, the more accurate is the compensation value.



— Pre-correction thermal displacement data  
— Thermal displacement data after correction

- ① Time
- ② Measured Dimensions
- ③ Retrieval of Wear Offset Data

Acquired Data analyzed with NT Thermo Navigator AI



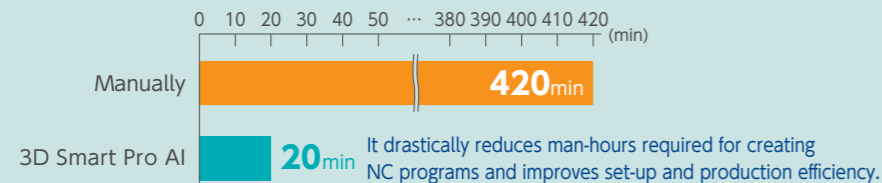
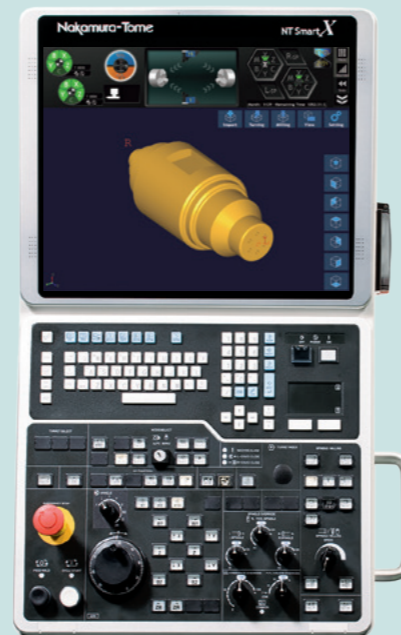
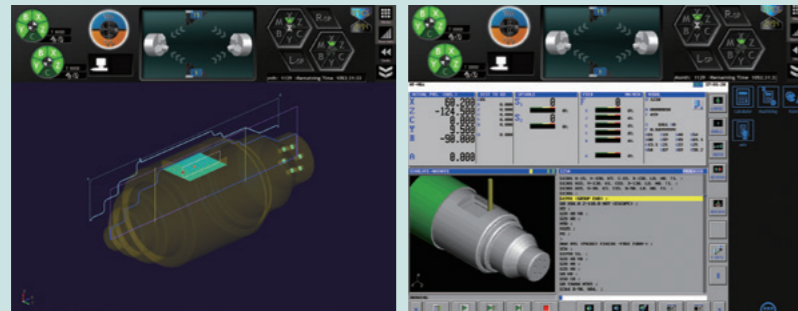
Feedback



Standard for NT Smart X

## 3D Smart Pro AI AI Analysis NC Programming Support Function

From the 3D CAD drawing, AI automatically analyzes "model geometry", "machining path", "machining tools", "machining conditions", and "machining process sequence", to create NC programs for all processes from raw material to finished product.



### 3 useful features available with 3D Smart Pro AI

#### 1. Transfer setting

Once the transfer position is set, the machining area and transfer program are created.



#### 2. Optimization of machining processes

In addition to defining the required machining processes, AI proposes a suitable machining process sequence.

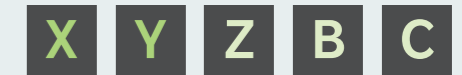


#### 3. Tolerance setting

Once the tolerance value is input, the target value for machining can be set.



### NT WORK NAVIGATOR

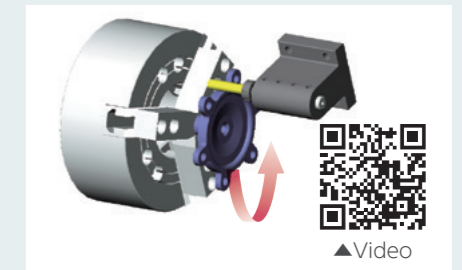


No fixtures required

Machining parts with non-round shapes, such as forgings or castings require that the raw part coordinates be recognized by the CNC control.

It works just by touching the part with a simple inexpensive probe (mostly round bar mounted on a tool holder) and using the torque control feature of the servo-motor, which is to record required coordinates in the CNC.

The NT Navigator is eliminating the need for positioning fixtures and special clamping devices.



## Double safety features for maximum protection

NT Machine Simulation / NT Collision Guard + Airbag (Overload detection)

The machine is protected with dual safety features: "NT Machine Simulation / NT Collision Guard" to prevent a collision beforehand, and the "Airbag Function" minimizes damage to the machine in case of collision.

### NT Machine Simulation

#### Preventive safety technology - Machine collisions are avoidable!

By checking in advance for interference between chucks and tools, or between tools and covers, ...etc., in addition to checking the machining processes, the risk of a machine collision is drastically reduced, and the machining processes can be optimized.



Simulation is performed while checking the remaining movement amount and modal information.

It is possible to override the settings for rapid feed and cutting feed individually. Additionally, simulation by process or by single block is possible.

By process  
Single feed

Image shown here is of a 2-turret machine

### NT Collision Guard

Available in automatic mode or in manual mode. Using registered 3D models of machine, chucks, tools, holders and parts, machine collisions can be monitored and prevented in real time during automatic, manual or jog movements. Even turret indexing is monitored to prevent collisions, drastically reducing collision risks, especially during machine setup.



Image shown here is of a Tool spindle machine

### Airbag (Overload detection)

Compared to other machines, Nakamura-Tome machines will not break after the slightest collision. The "Airbag Function" minimizes the damage that may occur during a collision.

If a machine collision occurs, there is good reason to be confident: Airbag!

#### When the machine collides, there is no reason to panic.

The Airbag (Overload detection) of the machine tool greatly reduces the impact of a collision, and protects the machine.



#### Without Airbag

Machines will not stop immediately. The slide continues to move even after a collision.



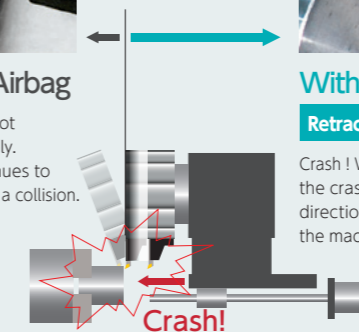
▲Video



#### With Airbag

Retraction within 0.001 sec

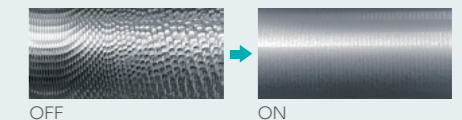
Crash! Within 1 millisecond after the crash, the servo motor motion direction is reversed and the machine stops in EMG mode.



\* This feature does not mean zero impact

### Chatter Cancellor

Reduce the chatter and vibration by changing spindle speed up/down continuously during cutting. Function can be turned ON/OFF simply by M code.



\* It does not guarantee that the function works without chatter and vibration.  
\* Chatter and vibration may not be reduced depends on setting up as well as cutting condition.

### Oscillation cutting (op.)

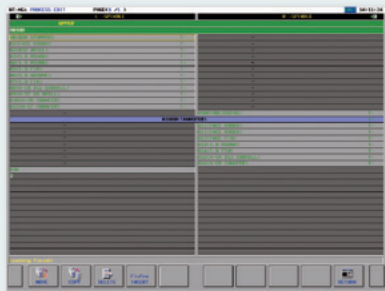
By oscillating the tool for a certain period, the chips are cut into small pieces. It can be activated easily by using simple Fanuc G-code and resolve workpiece damage issues caused by chips twined around the part.



Material : Aluminum  
Cutting speed : 200mm/min  
Cutting feed : 0.1mm/rev  
Cutting depth : 1.0mm

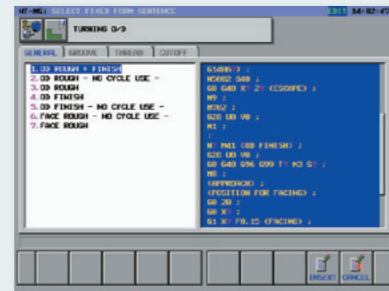
NT Manual Guide i (LUCK-BEI II)

A programming guidance system with the ability to generate NC programs (ISO/EIA G-code programs) easily. Processes created in conversational mode can be cut, copied or pasted ensuring flexibility. Additionally, several cycles such as part-transfer cycle, requiring waiting M-codes, are readily made with the "NC program editing support function". The "NC program simulation function" can be used to check created programs by tool-path simulation or solid-model animation.



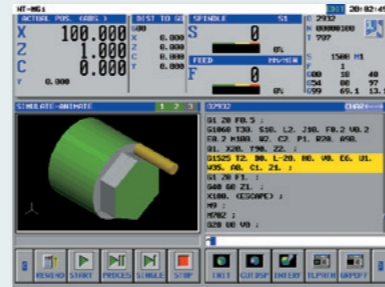
▲ Process Editing Function

NT Manual Guide i automatically recognizes each process and lists all processes. Operator can easily change and optimize the program by moving processes, copying processes or adding waiting-functions.



▲ Fixed-form sentence function

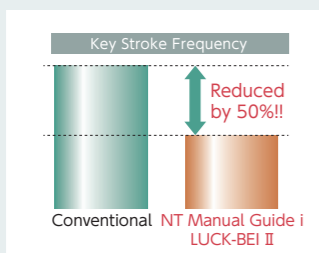
NT Manual Guide i contains more than 300 types of fixed form sentences. Operator can select these fixed form sentences for the program from a menu screen.



▲ Simulation

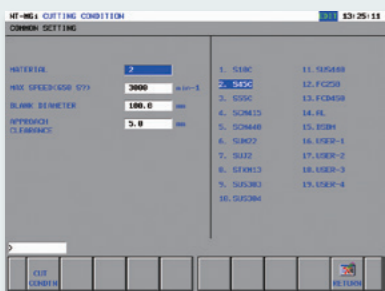
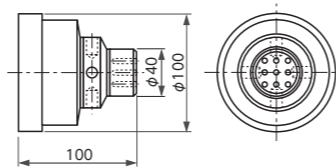
Accurate simulation of turning and milling operations using a 3D solid model.

By introducing the "automatic cutting condition setting function", the number of key strokes required to make a program were reduced by 50% reduced, compared with the previous NT-Manual guide version.

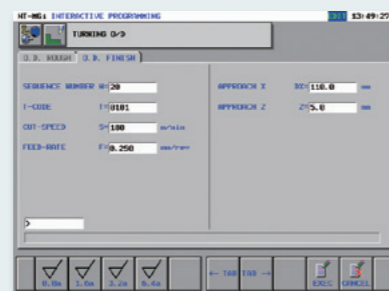


Automatic Cutting-Condition Setting Function

By setting the material type and required surface roughness, cutting conditions are automatically generated. These can be also changed depending on customer's experience.



By selecting the material, cutting conditions B are automatically input.



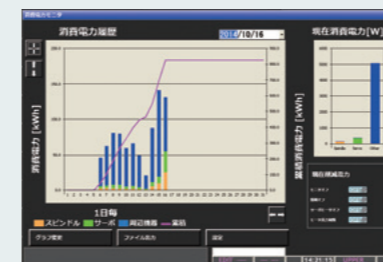
By setting the surface roughness, machining conditions are automatically input



Cutting conditions. End mill

Nakamura-Tome is committed to the environment as an eco-friendly manufacturer.

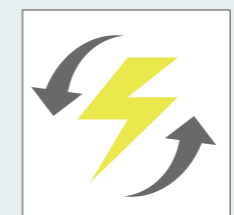
- 1 Work light off function
- 2 Operation panel fan stop except during auto operation
- 3 Motor fan stop except during auto operation
- 4 Servo power off except during auto operation
- 5 Energy saving mode for each axis acc. / dec.
- 6 LCD back light off function
- 7 Electric consumption display function on the operation screen
- 8 Use of regenerative energy
- 9 Standard chip conveyor intermittent timer
- 10 Mist lubrication for guide block stops when coolant is stopped.
- 11 Hyd. and Lub. pump motor stop except during auto operation



Power consumption monitoring screen

The monitor, lighting, and servo can be set to automatically turn off from the power saving setting screen. The amount of power consumption and the amount of power reduction by power saving settings are displayed.

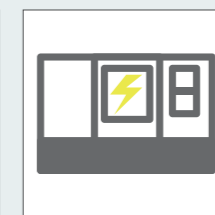
Use of regenerative energy



Amount of electricity recovered approx. 13.7%

\* For WY-100 II

Addition of ECO mode function to NT SmartX Improvement of power control system



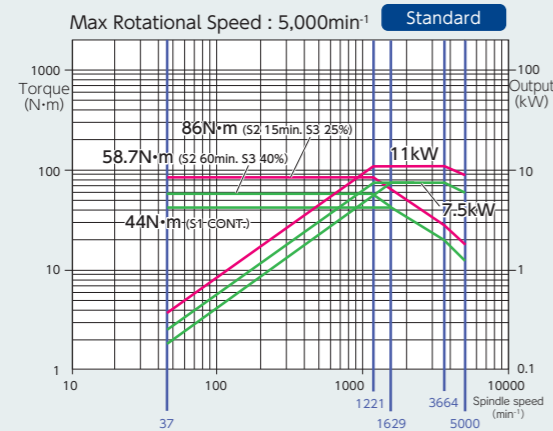
Cut down power consumption by approx. 73%

\* When ECO mode is enabled



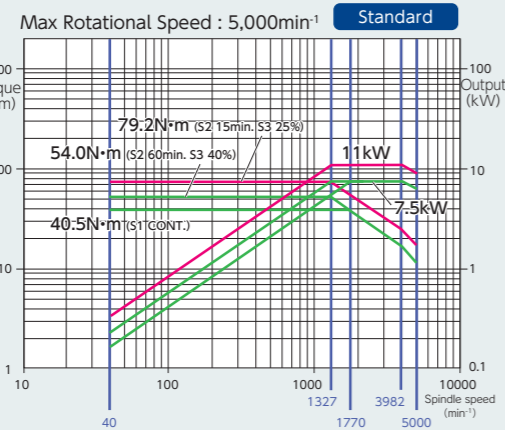
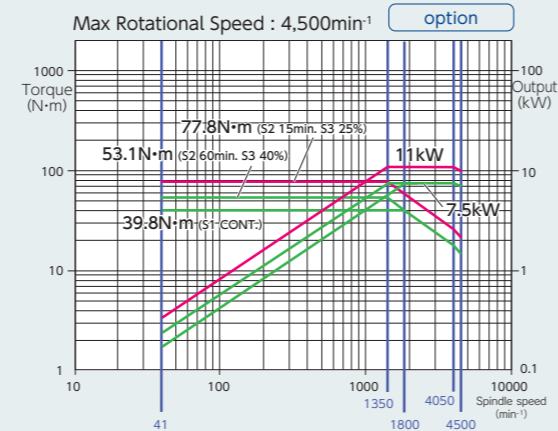
Torque/Output Chart

Bar capacity  $\phi 51\text{mm}$

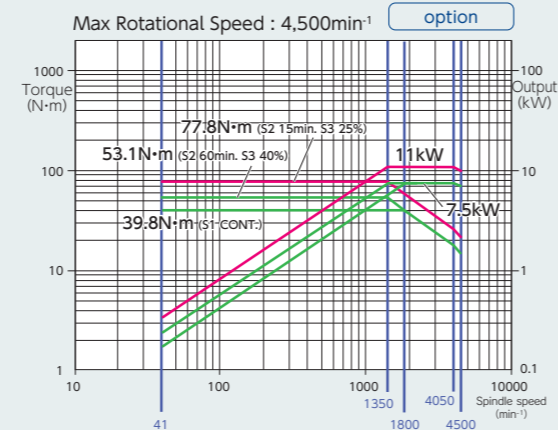


L-spindle motor

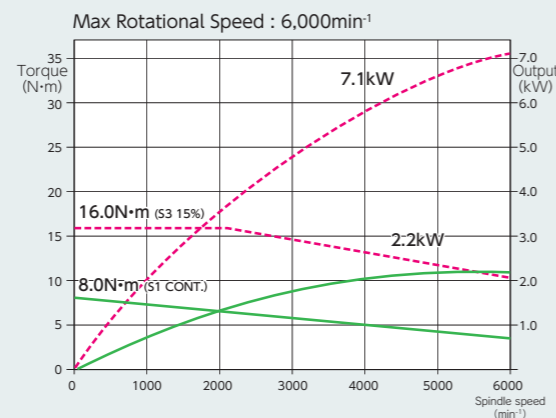
Bar capacity  $\phi 65\text{mm}$



R-spindle motor

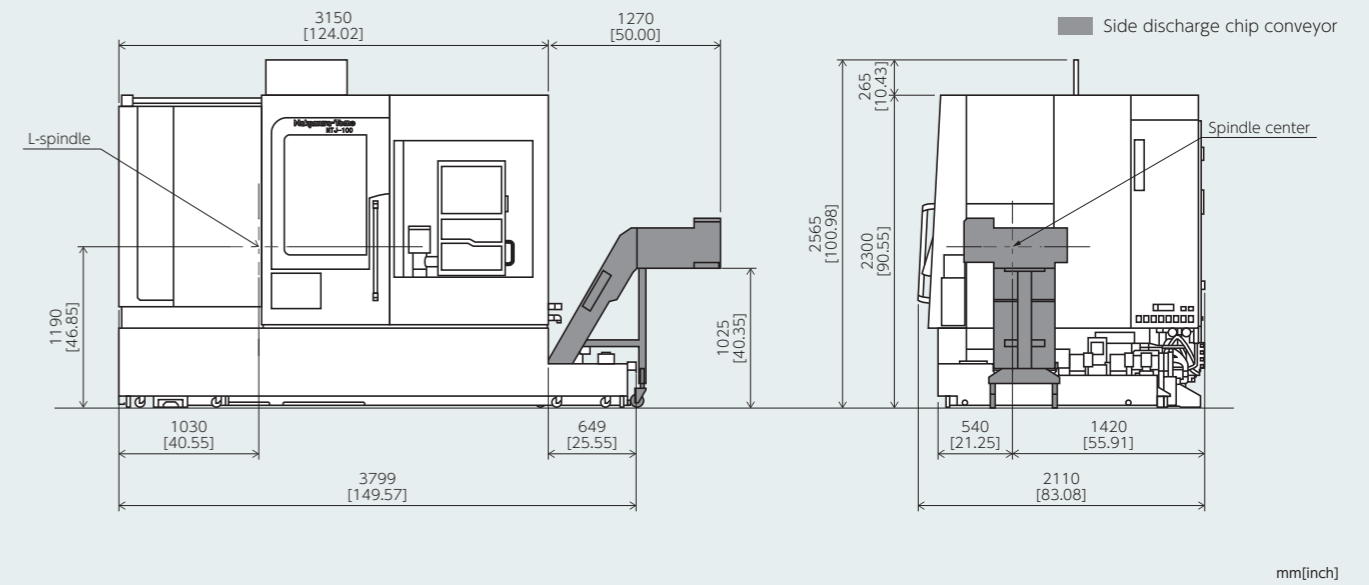


Milling motor

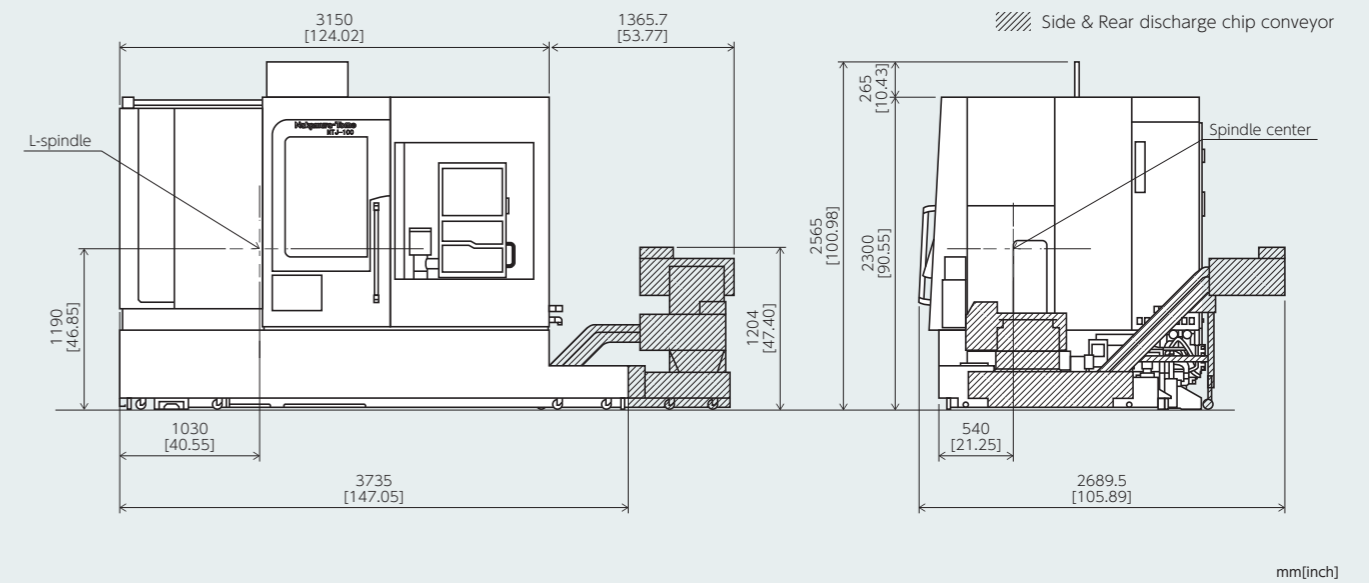


Machine Dimensions

Side discharge chip conveyor



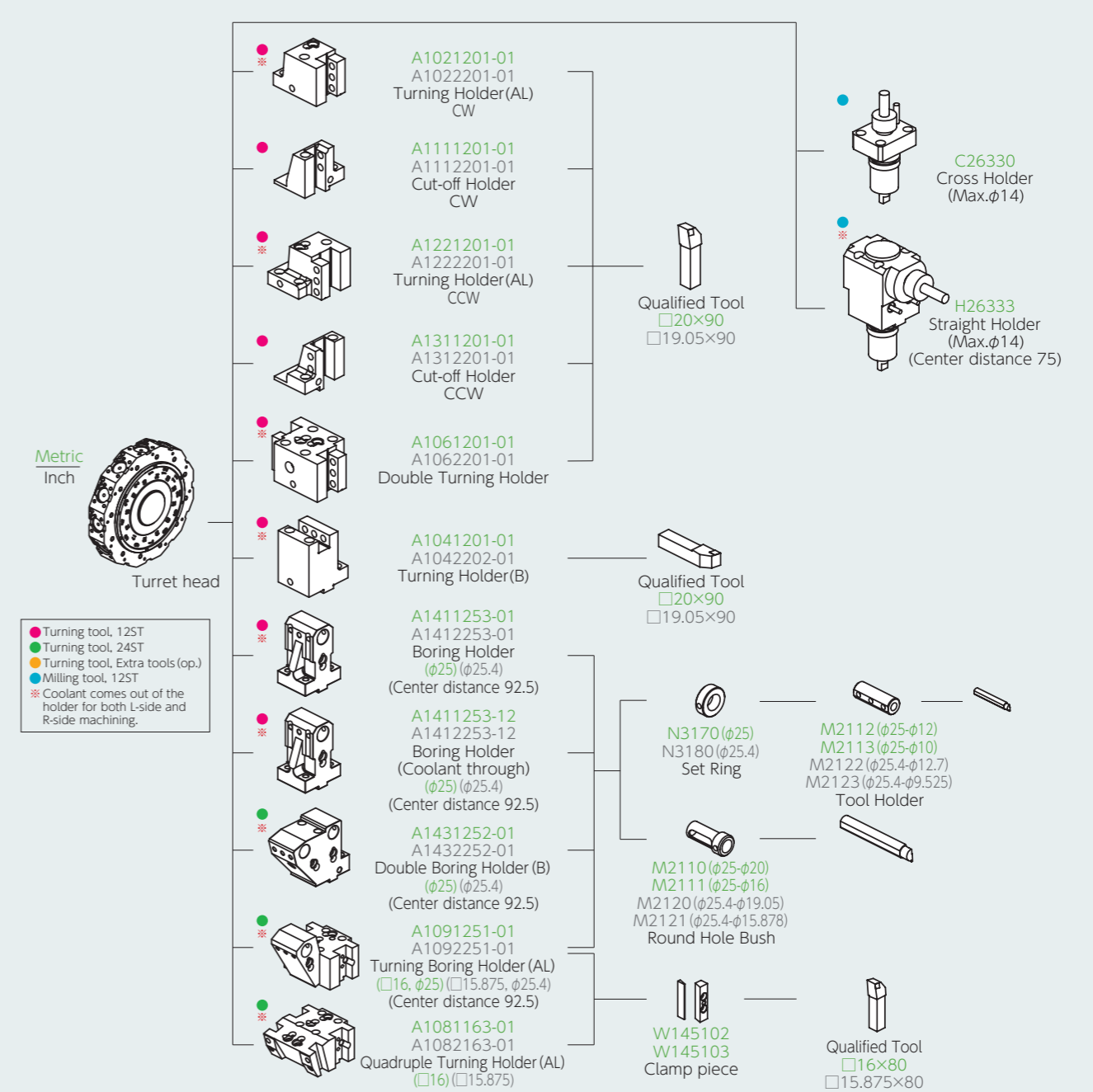
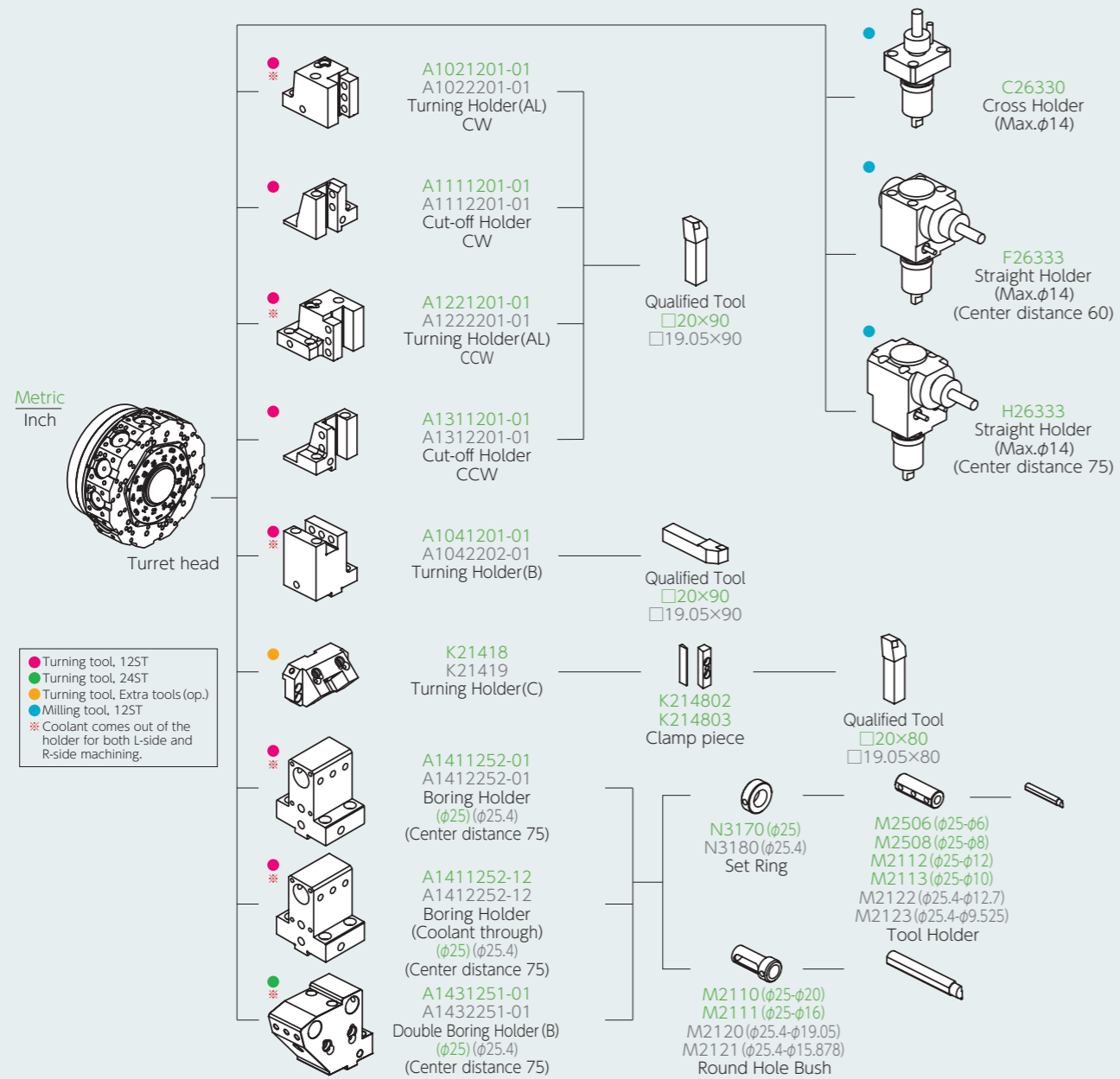
Side & Rear discharge chip conveyor





Upper Turret

Lower Turret



Capacity	φ51	φ65(op.)
Max. turning diameter	175mm	
Standard turning diameter	170mm	
Distance between spindles	max. 910mm / min. 200mm	
Max. turning length	678mm	
Bar capacity	φ51mm	φ65mm
Chuck size	6"	

■ Axis travel / Rapid feed

X1/X2 axis slide travel	330mm / 127.5mm	
Z1/Z2 axis slide travel	1,040mm / 678mm	
B2 axis slide travel	680mm	
Y1/Y2 axis slide travel	±40mm / ±32.5mm	
X1/X2 rapid feed rate	20m/min	
Z1/Z2 rapid feed rate	40m/min	
B2 rapid feed rate	40m/min	
Y1/Y2 rapid feed rate	6m/min	

■ L/R spindle

Spindle speed	5,000min <sup>-1</sup>	4,500min <sup>-1</sup>
Spindle speed range	Stepless	Stepless
Spindle nose	A2-5	A2-6
Hole through spindle	63mm	80mm
I. D.of front bearing	90mm	110mm
Hole through draw tube	52mm	66mm

■ C-axis

Least input increment	0.001°	
Least command increment	0.001°	
Rapid speed	600min <sup>-1</sup>	
Cutting feed rate	1 - 4,800° /min	
C-axis clamp	Disk clamp	
C-axis connecting time	1.5sec.	

● Safety quality specifications

Various interlocks, such safety fences, auto extinguisher devices, and other safety related equipment may be required. These have to be selected during the configuration of the machine.

① Safety devices include electromagnetic door lock, chuck interlock, hydraulic

pressure switch, air pressure switch, short circuit breaker and quill interlock.

(Door interlock and chuck interlock are standard equipment.)

② In the case of automation, various safety fences may be required, such as work stocker safety fences, robot safety fences, etc.

During the configuration of machine specifications, please discuss these requirements with the Nakamura-Tome machine sales representative.

■ B1-axis (Swiveling axis for upper turret)

Swiveling range	182° (±91°)	
Swiveling mechanism	Servo motor + Roller cam	
B1-axis clamp	Curvic coupling(5°) / Disk clamp(0.001°)	

■ Upper turret

Type of turret head / Number of indexing positions	Dodecagonal drum turret / 24	
Number of tool stations	Standard	Turning/Milling tool: 24/0 - 0/12
	Extra tools specifications(op.)	Turning/Milling tool: 24/0 - 6/12
Tool size (square shank)	□20mm	
Tool size (round shank)	φ25mm	

■ Lower turret

Type of turret head / Number of indexing positions	Dodecagonal drum turret / 24	
Number of tool stations	Turning/Milling tool: 24/0 - 0/12	
Tool size (square shank)	□20mm / □16mm(24st)	
Tool size (round shank)	φ25mm	

■ Milling

Rotary system	Individual rotation	
Milling spindle speed	6,000min <sup>-1</sup>	
Spindle speed range	Stepless	
Number of milling stations	12	
Holder type and Tool size	Straight holder	φ1~φ14mm
	Cross holder	φ1~φ14mm

■ Drive motor

L-spindle	11/7.5kW
R-spindle	11/7.5kW
Milling	7.1/2.2kW

■ General

Height	2,565mm
Floor space (W×D)	3,799mm × 2,110mm
Machine weight (incl. control)	10,000kg

■ Power supply

Power supply	38.2kVA
Air supply	200NL/min, 0.5~0.7MPa

● Precautions on the use of cutting fluids and lubricating oils

Some types of cutting fluids (coolant) are harmful to machine components, causing damages such as peeling of paint, cracking of resin, expansion of rubber, corrosion, and rust build-up on aluminum and copper.

To avoid causing damage to the machine, never use synthetic coolants, or any coolants containing chlorine. In addition, never use coolants and lubricating oils which contain organic solvents such as butane, pentane, hexane, and octane.

■ Items

Control type	FANUC 31i-B(2-PATH)	
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■ Controlled axes

Controlled axes	10 axes	
Simultaneously controlled axes	Upper	4 axes(X1, Z1, C1(C2), Y1, B1 axis)
	Lower	4 axes(X2, Z2, C2(C1), Y2, B2 axis)

■ Input command

Least input increment	X, Z, Y, B2: 0.001mm/0.0001inch (diameter for X-axis), C, B1: 0.001°	
Least command increment	X: 0.0005mm / Z, Y, B2: 0.001mm / C, B1: 0.001°	
Max. programmable dimension	±999999.999mm/±39370.0787in, ±999999.999°	
Absolute / Incremental programming	X, Z, C, Y, B1, B2 (absolute only for B) / U, W, H, V	
Decimal input	Standard	
Inch / Metric conversion	G20 / G21	
Programmable data input	G10	

■ Feed function

Cutting feed	feed/min	X, Z: 1-8000mm/min, 0.01-314inch/min (1-4800mm/min, 0.01-188inch/min) Y: 1-6000mm/min, 0.01-236inch/min (1-4800mm/min, 0.01-188inch/min) C: 1-4800° /min B2: 1-8000mm/min, 0.01-314inch/min (1-4800mm/min, 0.01-188inch/min)
	feed/rev	X,Z,B2: 0.0001-8000.0000mm/rev (0.0001-4800.0000mm/rev) Y: 0.0001-6000.0000mm/rev (0.000001-50.000000in/rev)
The maximum cutting feed rate is the value in AI contour control mode. In normal operation, it is enabled with G316 command. The values in parentheses are normal values.		
Dwell	G04	
Feed per minute / Feed per revolution	G98 / G99	
Thread cutting	G32F designation	
Thread cutting retract	Standard	
Continuous thread cutting	Standard	
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	Low/25/50/100% (can be set from 0-100 in 10% intervals on NT Setting screen)	
Cutting feedrate override	0~150%, (each 10%)	
AI contouring control I	G5.1	
Spindle override	50%~120% Set every 10%	

■ Program memory

Part program storage length / Number of registrable programs	1Mbyte Total 2560m	2000
	2Mbyte Total 5120m(op.)	4000(op.)
	4Mbyte Total 10240m(op.)	
	8Mbyte Total 20480m(op.)	
Part program editing	delete, insert, change	
Program number search	Standard	
Sequence number search	Standard	
Address search	Standard	
Program storage memory	Battery backup	
Background editing	Standard	
DNC operation through memory card	Standard(not including memory card)	
Extended part program editing	Standard	

■ Operation and display

HMI (Human Machine Interface)	NT SmartX
Operation panel : Display	19-inch color SXGA LCD touch panel
Operation panel : Keyboard	QWERTY keyboard

■ Programming assist functions

Circular interpolation R programming	Standard
Direct drawing dimension programming or Chamfering/Corner R	Standard (Direct drawing dimension programming is standard)
Canned cycles	G90, G92, G94
Multiple repetitive canned cycles	G70~G76
Multiple repetitive canned cycles II	G71, G72
Canned cycles for drilling	G80~G89
Axis recomposition	Standard(used for C axis control from lower)
Sub program	Standard
Custom macro	Standard(common variables #100-#149, #500-#549)
Additional customer macro variables	Standard(After addition, #100-#199, #500-#999)
Luck-bei II / NT Manual Guide I	Standard
Abnormal load detection function	Standard
NT WORK NAVIGATOR	Standard(not including contact bar)
NT NURSE	Standard

■ Machine support functions

Rigid tapping	Standard
Spindle synchronised control	Standard
C axis synchronised control	Standard(G496 C1. rapid feed positioning)
Spindle orientation	Standard

■ ECO functions

Servo motor power off	Standard (Switch on Power Saving Mode in NT Setting screen)
Control of motor output during acceleration and deceleration	Standard (Switch on Power Saving Mode in NT Setting screen)
G code for servo motor energy-saving during acceleration and deceleration	G356 / G357
Automatic light off	Standard (Switch on Power Saving Mode in NT Setting screen)
Automatic monitor off	Standard (Switch on Power Saving Mode in NT Setting screen)



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