WT-100

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

Space-saving Two-spindle Two-turret Multitasking Machine

Compact, yet Capable to Cut

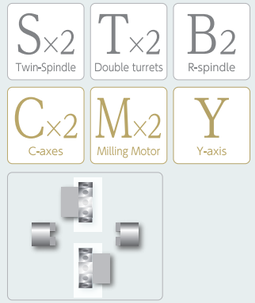
Innovative Technology

～Creating new values～

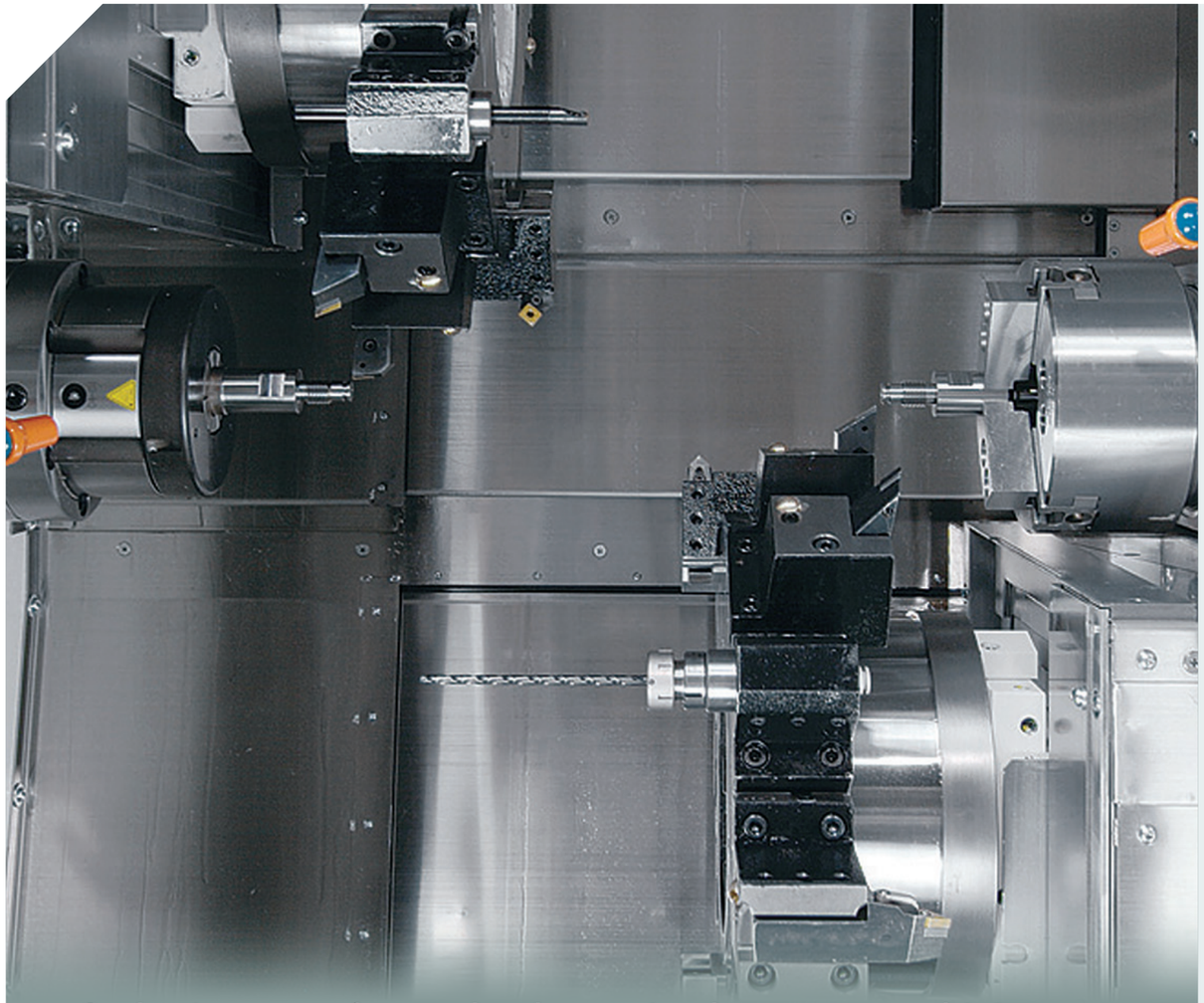
WT-100

This is a space-saving multitasking machine equipped with Upper/Lower turrets and two opposed spindles.
The smallest machine in its class packs all the features of a multitasking machine, achieving both space-saving and machining capacity.
Automated systems with bar feeders and gantry loaders are also supported.
Simultaneous L/R machining and simultaneous top and bottom machining to reduce cycle time and support your machining.

- Y-axis on Upper turret as standard
  Y-axis slide travel ±31mm
- Milling motor 7.1/2.2kW
  Milling spindle speed 6,000min^{-1}
- Capacity for up to 48 tools.
- Cycle times are faster thanks to simultaneous machining with the L/R spindles and upper/lower turrets.
- The spindle centers are closer thanks to the 60 degrees slanted bed.
- NT SmartX as standard equipment with a large variety of software.



Machining Capabilities



Cycle times are faster thanks to simultaneous machining with the L/R spindles and upper/lower turrets.

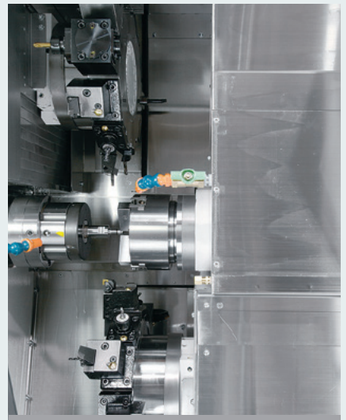
The WT-100 has two-opposed spindles, milling on both turrets and a Y-axis on the upper side, ensuring that flexible machining can be performed simultaneously on either spindle with the upper and lower turrets. Those features enable providing the most suitable machining to several parts and shortening cycle time easily. Despite having 2 spindles, 2 turrets, and a Y-axis, the WT-100 has a very compact floor space of 3.73m² (2,300 × 1,620mm).
A full range of software is also available, such as programming support, tool management, and setup support. This machine supports customers' production in terms of both hardware and software.

Achieve High Productivity from Small Space

This very compact machine features 11/7.5KW motors on the left and right spindles with max. 75Nm torque.
It is capable of reducing two to three workpieces of Dia. 48mm x Length 110mm into cutting chips in one minute.

Part size	ϕ48mm × 110mm
Metal volume	199ml／Part
Material	S45C
Cutting depth	4.0mm
Feed rate	0.6mm/rev
Cutting Speed	25m/min

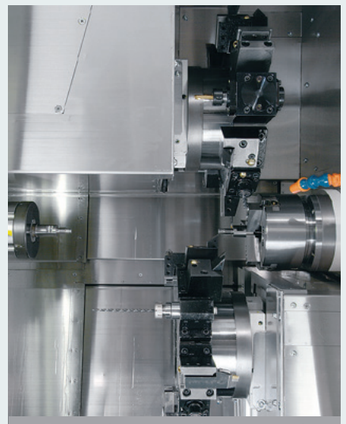
Upper turret on L-spindle / Lower turret on R-spindle



Transfer

Upper turret on R-spindle / Lower turret on L-spindle

L-simultaneous Upper and Lower Machining



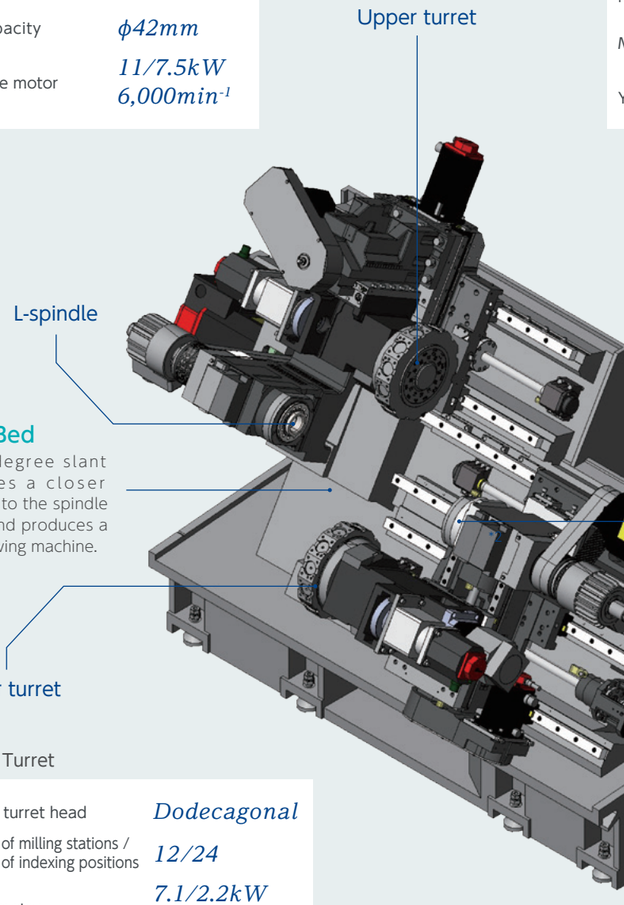
R-simultaneous Upper and Lower Machining

Milling

All the Features of a Multitasking Machine in This Small Space

■ L-spindle

Bar capacity	*ϕ42mm*
L-spindle motor	*11/7.5kW 6,000min^{-1}*



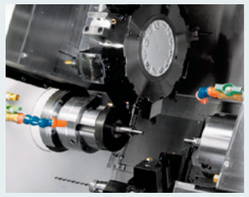
Slant Bed

Its 60-degree slant achieves a closer distance to the spindle center and produces a space-saving machine.

■ Upper Turret

Type of turret head	*Dodecagonal*
Number of milling stations / Number of indexing positions	*12/24*
Milling motor	*7.1/2.2kW 6,000min^{-1}*
Y-axis slide travel	*±31mm*

Y-axis and Milling are standard on the Upper turret



■ Lower Turret

Type of turret head	*Dodecagonal*
Number of milling stations / Number of indexing positions	*12/24*
Milling motor	*7.1/2.2kW 6,000min^{-1}*

■ R-spindle

Bar capacity	*ϕ42mm*
R-spindle motor	*11/7.5kW 6,000min^{-1}*

Reliable Covers

All moving units including the upper slide, lower slide, and R-spindle, come equipped with top-class stainless-steel covers and protective wipers, preventing cutting chip accumulation, and providing cover against cutting chips and coolant. The entire machining area is leakage-proof thanks to its completely protective covering.

GR-203 High-Speed(op.)

The whole process from loading a blank material to unloading a finished part can be automated.
It improves productivity.

* The image is of NTY3-100.

Machine Dimensions(Machine only)

*The sizes of a chip conveyor and a parts catcher are not included.

Standard

W2,630mm × D1,923mm × H1,940mm

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	Original Menu screen
QWERTY keyboard	Voice guidance
PC memory 8 GB	Multi-Touch Screen
	Touch pad

Cut in check

Nakamura-Tome AI

■ Powered by AI as standard equipment

- NT Thermo Navigator AI
- 3D Smart Pro AI

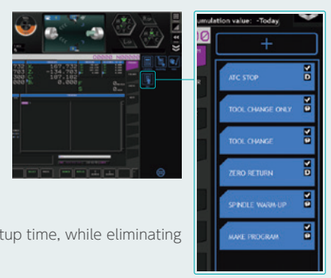
Digital Chuck Interlock

Set the Chuck Open and Close detection position easily.
The chuck open / close position is set up on the NT SmartX 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

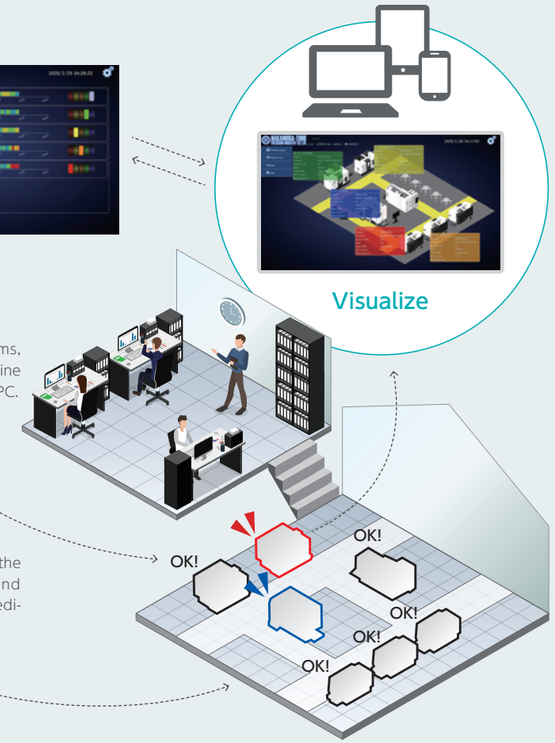
Real Time Monitoring of machine running conditions, in addition to visualizing alarm history and past events.

■ 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.

① Time
② Measured Dimensions
③ Retrieval of Wear Offset Data

Acquired Data analyzed with NT Thermo Navigator AI

Feedback

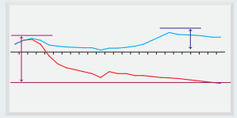

Standard for NT SmartX

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.

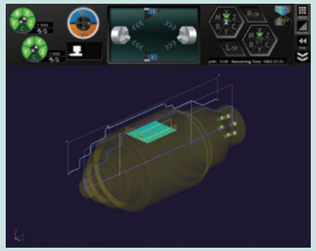


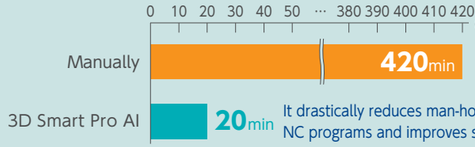
— Pre-correction thermal displacement data
— Thermal displacement data after correction

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.





It drastically reduces man-hours required for creating NC programs and improves set-up and production efficiency.

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

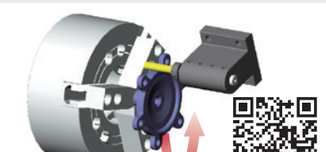
Once the tolerance value is input, the target value for machining can be set.

NT WORK NAVIGATOR

X Y Z B C

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 WORK NAVIGATOR is eliminating the need for positioning fixtures and special clamping devices.



▲Video

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.

Barrier?
Even with barrier function, machine collisions may occur

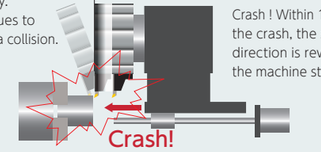
Without Airbag

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

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.

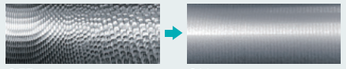


▲Video

* This feature does not mean zero impact.

Chatter Canceller

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



OFF ON

* 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.

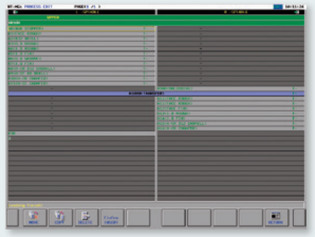
Oscillation cutting (op.)

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.

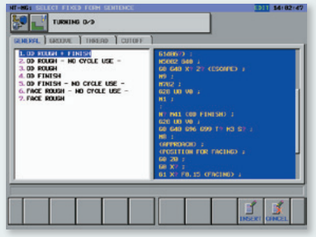
Material : Aluminum
Cutting speed : 200mm/min
Cutting feed : 0.1mm/rev
Cutting depth : 1.0mm

NT Manual Guide i (LUCK-BEI II)

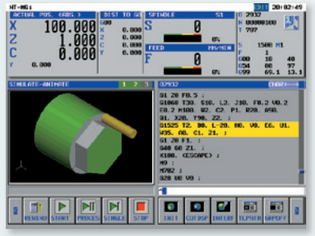
A programming guidance system with the ability to generate NC programs (ISO/EIA G-code programs) easily. Processes created in conversational mode can be cut, copied or pasted ensuring flexibility. Additionally, several cycles such as part-transfer cycle, requiring waiting *M*-codes, are readily made 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.

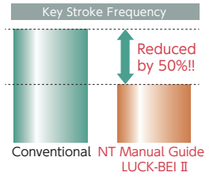


▲Fixed-form Sentence Function
NT Manual Guide i contains more than 300 types of fixed form sentences. Operator can select these fixed form sentences for the program from a menu screen.



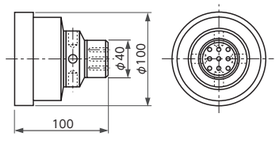
▲Simulation
Accurate simulation of turning and milling operations using a 3D solid model.

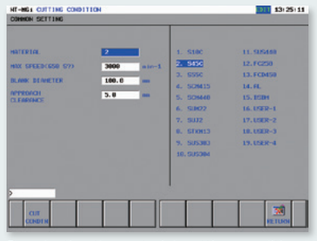
By introducing the “automatic cutting condition setting function”, the number of key strokes required to make a program were reduced by 50% reduced, compared with the previous NT-Manual guide version.



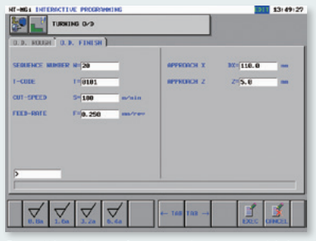
Automatic Cutting-Condition Setting Function

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

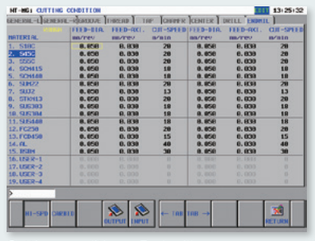




By selecting the material, cutting conditions B are automatically input.

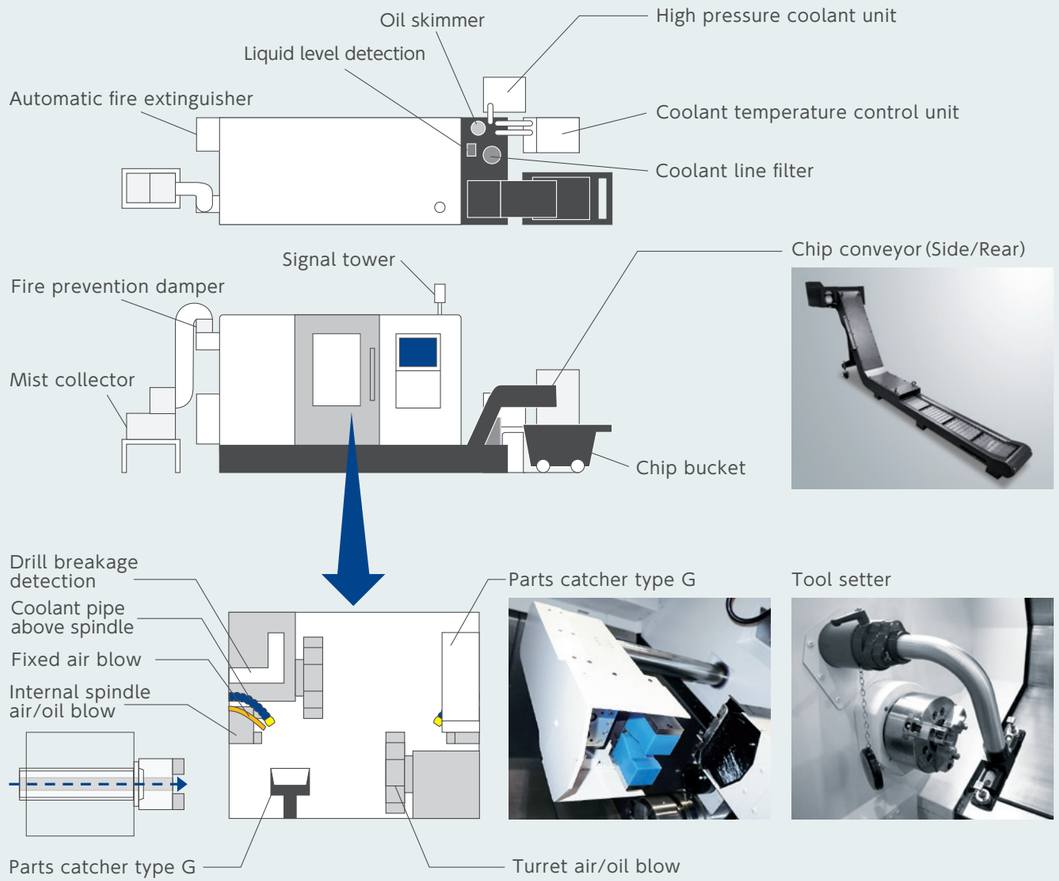


By setting the surface roughness, machining conditions are automatically input

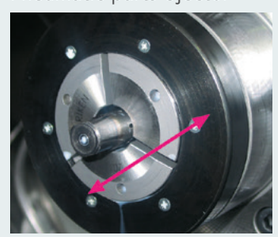


Cutting conditions. End mill

Various Options to Meet our Customer's Needs.



Pneumatic parts ejector



HAN-BEI (in-process measuring system)

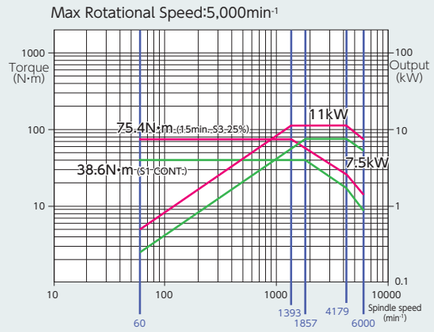
And many others.
For items not listed,
please feel free to contact your Nakamura-Tome representative.

Torque/Output Chart ／ Tool Interference ／ Machine Dimensions

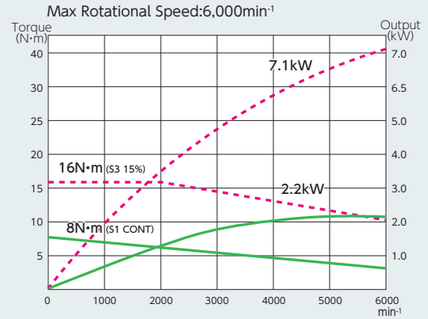
Torque/Output Chart

L/R spindle motor

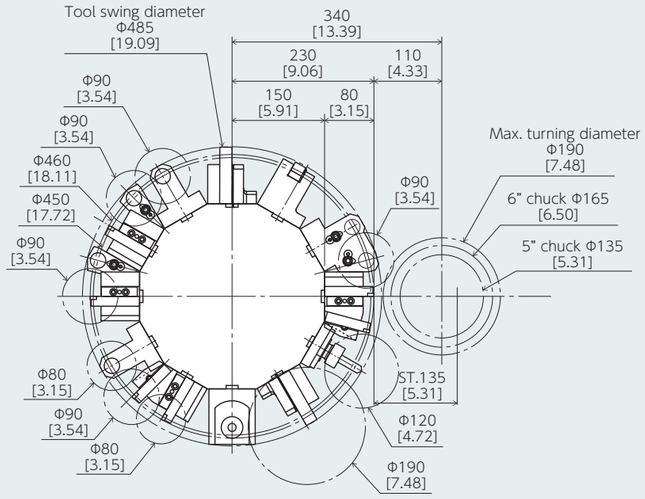
Bar capacity ϕ42mm



Milling motor



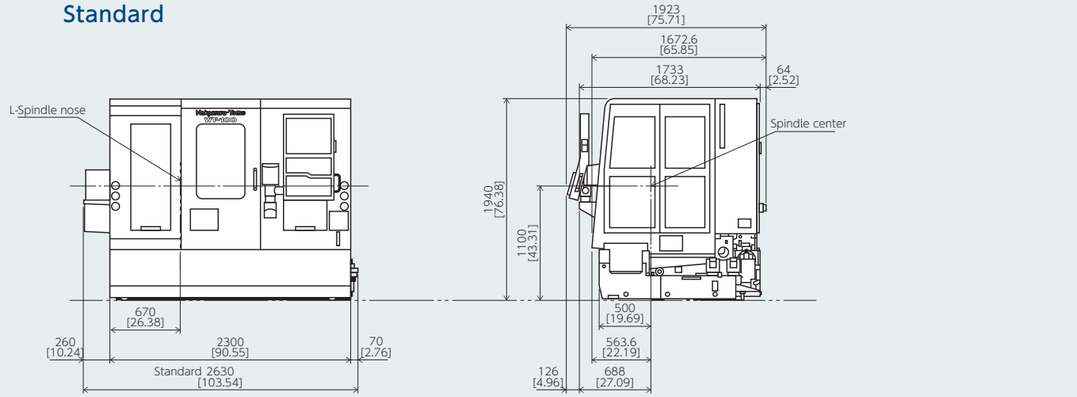
Tool Interference



mm[inch]

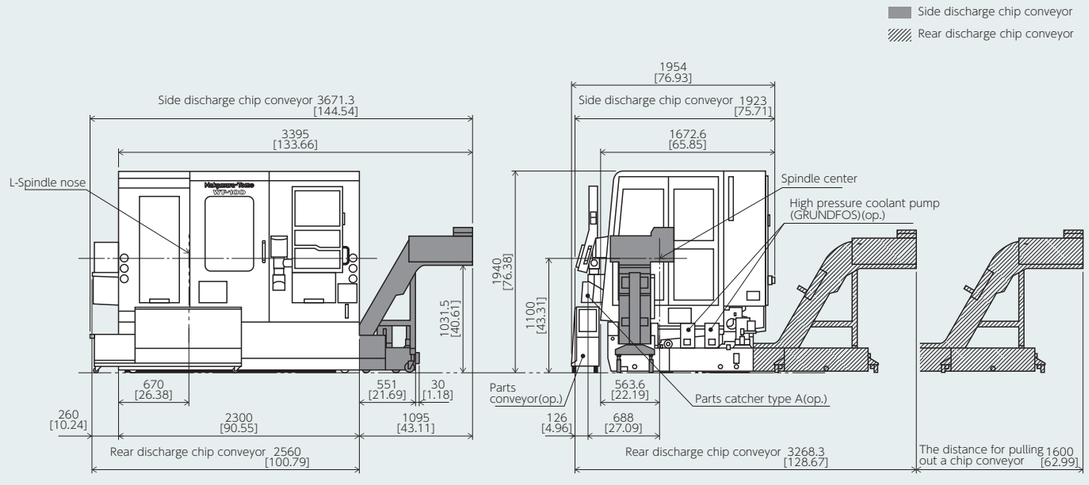
Machine Dimensions

Standard



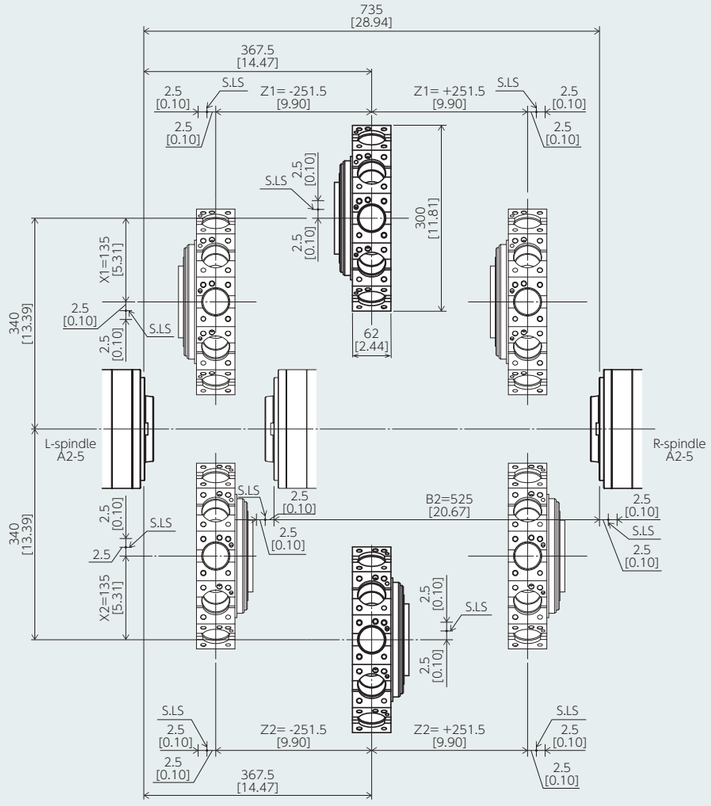
mm[inch]

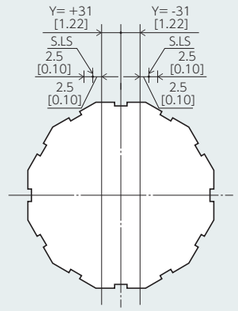
Chip conveyor



mm[inch]

Travel Range

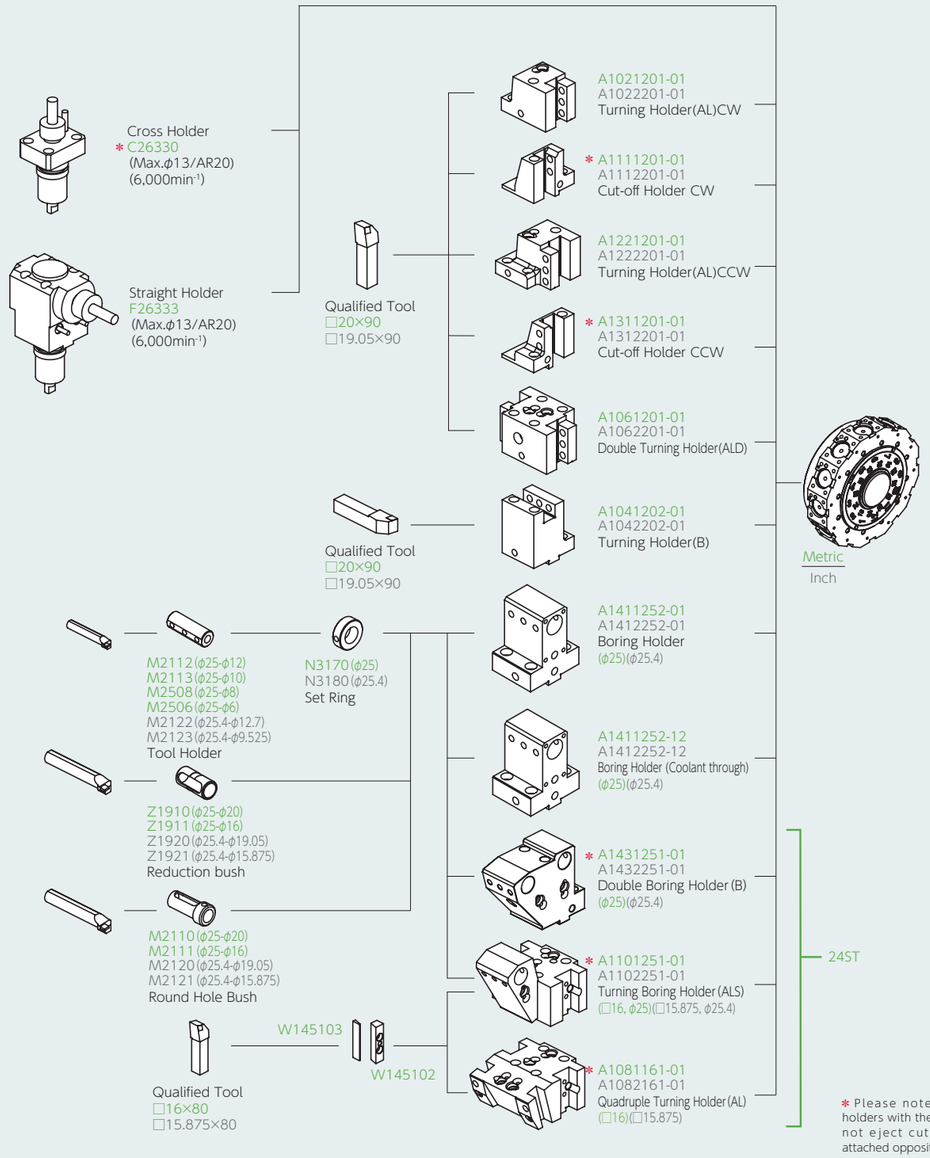




L, R ϕ42 仕様

mm[inch]

Tooling System



* Please note that the holders with the * mark do not eject cutting oil if attached oppositely.

Machine• Control Specifications

■ Capacity

Max. turning diameter	190mm
Standard turning diameter	170mm
Distance between spindles	max.735mm / min.210mm
Max. turning length	503mm
Bar capacity	42mm
Chuck size	6"

■ Axis travel / Rapid feed

X1/X2 axis slide travel	135mm / 135mm
Z1/Z2 axis slide travel	503mm / 503mm
Y1-axis slide travel	±31mm
B2-axis slide travel	525mm
X1/X2 axis rapid feed rate	16m/min
Z1/Z2 axis rapid feed rate	40m/min
Y1-axis rapid feed rate	6m/min
B2-axis rapid feed rate	40m/min

■ L/R-spindle

Spindle speed	6,000min^{-1}
Spindle speed range	Stepless
Spindle nose	A2-5
Hole through spindle	56mm
I.D. of front bearing	80mm
Hole through draw tube	43mm

■ C-axis

Least input increment	0.001°
Least command increment	0.001°
Rapid speed	600min^{-1}
Cutting feed rate	1～4800° /min
C-axis clamp	Disk clamp
C-axis connecting time	1.5sec.

■ Upper/Lower turret

Type of turret head	Dodecagonal drum turret
Number of tool stations	24
Number of indexing positions	24
Tool size (square shank)	□20mm / □16mm(24st.)
Tool size (round shank)	φ25mm

■ Milling

Rotary system		Individual rotation
Milling spindle speed		6,000min^{-1}
Number of milling stations		Stepless
Number of milling stations		12×2
Holder type and Tool size	Straight holder	φ1mm～φ13mm
	Cross holder	φ1mm～φ13mm

■ Drive motor

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

■ General

Height	1,940mm
Floor space (W × D)	2,630mm ×1,923mm
Machine weight (incl. control)	5,700kg

■ Power supply

Power supply	32.7kVA

● 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.

①Safety 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.)

②In 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.

● 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, expanding 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.
- Machine warranty terms are void for any claims or damage arising from the use of inappropriate cutting fluids or lubricating oils.

■ Items

Control type	FANUC 32i-B 2-PATH

■ Controlled axes

Controlled axes	7 axes	
Simultaneously controlled axes	Upper	4 axes (X1, Z1, C1(C2), Y1axes)
	Lower	4 axes (X2, Z2, C2(C1), B2axes)

■ Input command

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

■ Feed function

Cutting feed	feed/minX,Z: 1～4800mm/min,0.01～188inch/min Y: 1～4800mm/min,0.01～188inch/min C: 1～4800° /min B: 1～4800mm/min,0.01～188inch/min feed/rev: 0.0001mm/rev～4800mm/min 0.000001inch/rev～188inch/min
Dwell	G04
Feed per minute / Feed per revolution	G98 / G99
Thread cutting	G32F designation
Thread cutting retract	Standard
Continuous thread cutting	Standard
Variable lead threading	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 / 50 / 100% (can be set from 0～100 in 10% intervals on NT Setting screen)
Cutting feedrate override	0～150%, each 10%

■ Operation&display

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

■ Program memory

Part program storage length / Number of registrable programs	256KB Total640m / 500 512KB Total1280m / 1000(op.) 1MB Total2560m / 1000 or 2000(op.) 2MB Total5120m / 1000 or 4000(op.) 4MB Total10240m /1000 or 4000(op.) 8MB Total20480m / 1000 or 4000(op.)
Part program editing	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of tool offset pairs	99+99 / 999(op.)
Program storage memory	Battery backup
Background editing	Standard
DNC operation through memory card	Standard(not including memory card)
Extended part program editing	Standard

■ Programming asssist 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
Synchronous mixture control	Standard
Sub program	Standard
Balance cutting	G68, G69
Custom macro	Standard (common variables#100～#149,#500～#549)
Additional custom macro variables	Standard (common variablesAfter 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

■ Machine support functions

Rigid tapping	Standard
Spindle synchronized control	Standard
C-axis synchronized control	Standard
Tool spindle orientation	Standard

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