NTJ-100

NAKAMURA-TOME PRECISION INDUSTRY CO., LTD.

http://www.nakamura-tome.co.jp

Netsuno 15, Hakusan city, Ishikawa, 920-2195 Japan
Phone : +81 76 273 8100 Fax : +81 76 273 4312
E-mail : nt-jpn@nakamura-tome.co.jp

* This catalog was published in June, 2016. Specifications, illustrations and data given herein are subject to change without notice.
* The products in this catalog are controlled based on Japan's "Foreign Exchange and Foreign Trade Law". The export of the products are subject to an export license by the Japanese government.

Cat.No.0122E03011606N-1209

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

NTJ-100 Leading the industry in Multitasking Technology

One-hit Machining

MINIMIZED LEAD TIME

All in one as standard

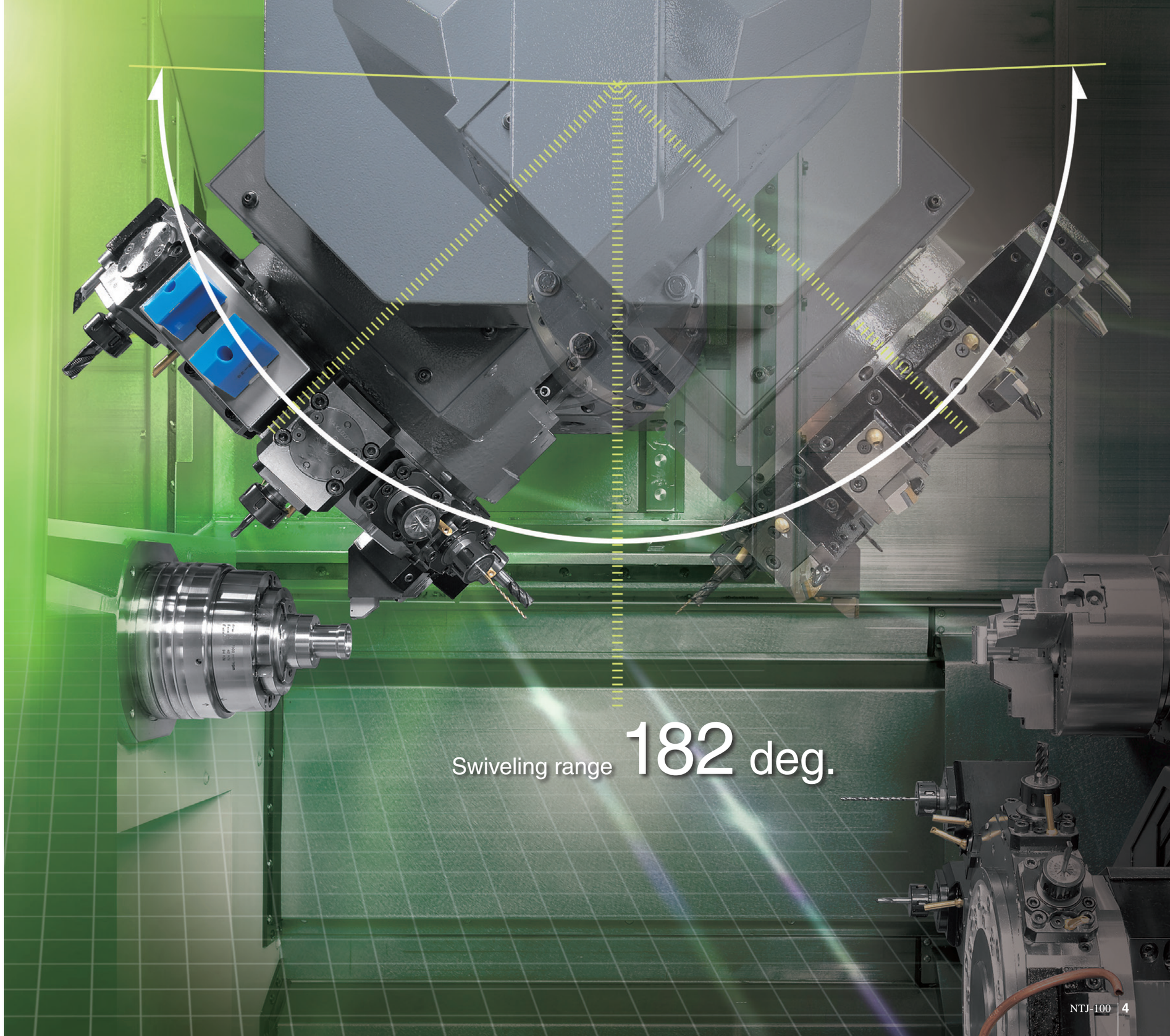
- NT Work Navigator
- NT Collision Guard
- Airbag
- NT Manual Guide i
- NT Nurse
- NT-IPS
- NT Machine Simulation
- NT Multitasking Office (op.)

ULTIMATE

From diversified small lot production to mass production

B -axis

With milling-tools
and Y-axis offered
as standard equipment



54

24 + 24 + 6

Up to 54 tool stations
for Turning, 24 tool stations
for milling tools

M×2

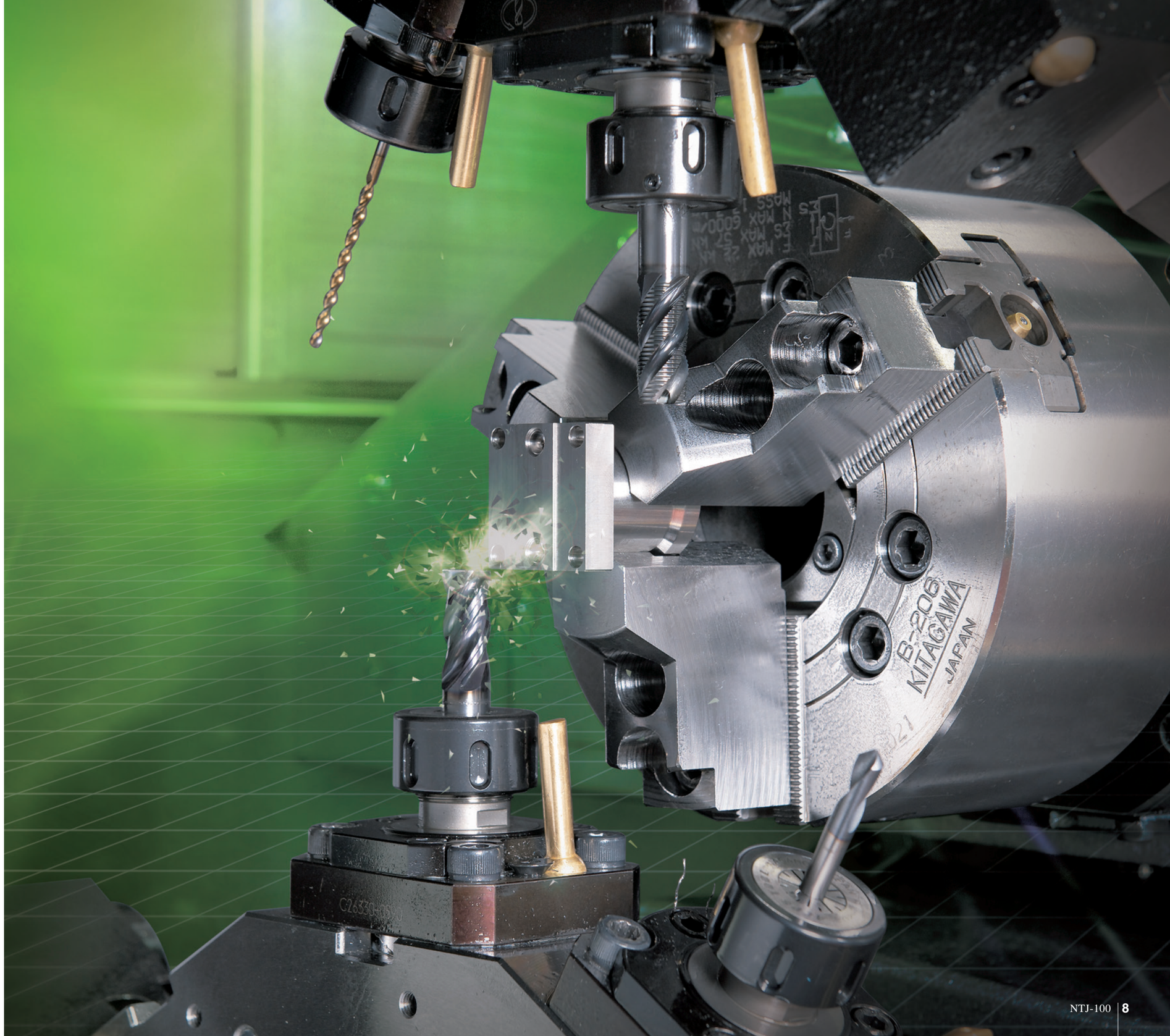
Double Performance!

Milling-tool motor
7.1 / 2.2kW × 2

Y×2

Y-axis on upper and lower turret

Y-axis stroke
Upper / 80mm, Lower / 65mm

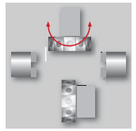


NTJ-100 B-axis Swiveling range : 182 deg.

Productivity superior to that of a machining center!

19″ Color LCD Touch Panel

NT IPS



T×2 Two turret | M×2 Two Milling Motor | B B-axis | Y×2 Two Y-axes | S×2 Twin-Spindle | C×2 C-axes

Capacity	ϕ42mm	ϕ51mm (op.)	ϕ65mm (op.)
Max. turning diameter / Max. turning length	175mm / 678mm		
Distance between centers	max.910mm / min.200mm		
Bar capacity	42mm	51mm	65mm
Chuck size	6” 165mm		
Axis travel			
Slide travel (X1/X2)	330mm / 127.5mm		
Slide travel (Z1/Z2/B2)	1040mm / 678mm / 710mm		
Slide travel (Y1/Y2)	±40mm / ±32.5mm		
Left and Right spindles			
Spindle speed	6,000min^{-1}	5,000min^{-1}	4,500min^{-1}
Left spindle	11/7.5kW		
Right spindle	11/7.5kW		
B1-axis (Swiveling axis for upper turret)			
Swing range	182degree (±91degree)		
Swing mechanism	Servo motor + Roller cam		
Clamp function	Curvic coupling (5degree), Brake (0.001degree)		
Upper turret			
Number of tools	24 + 6		
Type of turret head	Dodecagonal drum turret		
Number of Indexing position	24		
Milling system	Individual rotation		
Number of milling stations	12		
Milling speed	6000min^{-1}		
Milling motor power and torque	7.1/2.2kW 16/8N·m		
Lower turret			
Number of tools	24		
Type of turret head	Dodecagonal drum turret		
Number of Indexing position	24		
Milling system	Individual rotation		
Number of milling stations	12		
Milling speed	6000min^{-1}		
Milling motor power and torque	7.1/2.2kW 16/8N·m		
General			
Floor space (L × W × H)	3,799mm × 2,100mm × 2,565mm		
Machine weight	10,000kg		

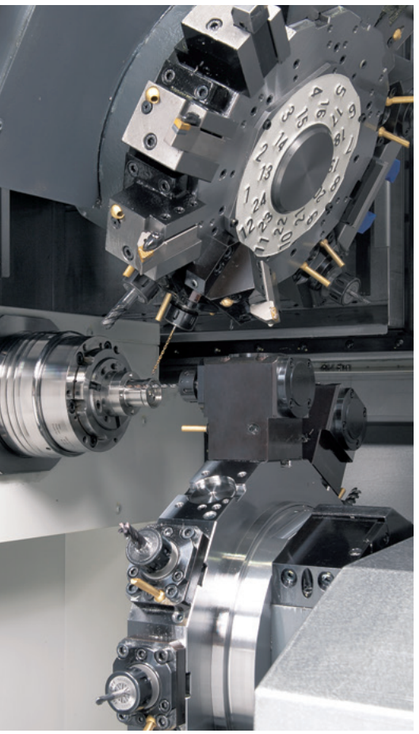
NTJ-100 Machine Structure

Stable Accuracy Ensured

54 stations

High-rigidity turret

Upper turret



Lower turret

Bar capacity ϕ51mm

Spindle motor
11 / 7.5kW
75.4 / 51.4 / 38.6N·m
5000min^{-1}

Bar capacity ϕ65mm

Spindle motor
11 / 7.5kW
77.8 / 53.1 / 39.8N·m
5000min^{-1}

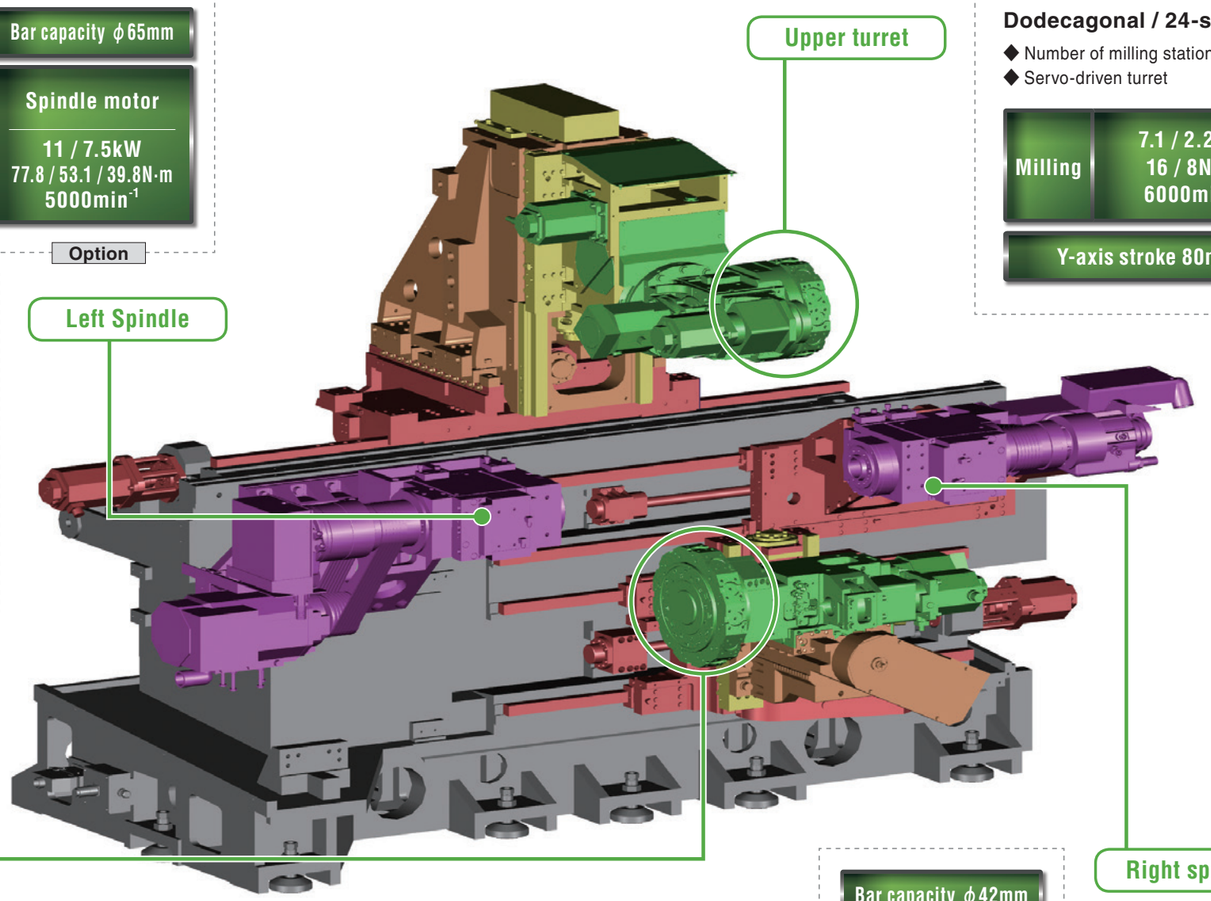
Option

Bar capacity ϕ42mm

Spindle motor
11 / 7.5kW
75.4 / 38.6N·m
6000min^{-1}

C-axis
C-axis synchronization

Standard



Dodecagonal / 24-station

- Number of milling stations : 12
- Servo-driven turret

Milling	7.1 / 2.2kW 16 / 8N·m 6000min^{-1}
Y-axis stroke 80mm	
Swiveling range (B1)	182° / ±91°
Swing mechanism	Servo motor + Roller cam
Clamp function	Curvic coupling (5degree) Brake (0.001degree)
Number of tools	24 + 6

Standard

Larger window ensures better visibility

Lower turret

- Number of milling stations : 12
- Servo-driven turret

Milling	7.1 / 2.2kW 16 / 8N·m 6000min^{-1}
Y-axis stroke 65mm	

Standard

Bar capacity ϕ42mm

Spindle motor
11 / 7.5kW
75.4 / 38.6N·m
6000min^{-1}

C-axis
C-axis synchronization

Standard

Bar capacity ϕ51mm

Spindle motor
11 / 7.5kW
79.2 / 54.0 / 40.5N·m
5000min^{-1}

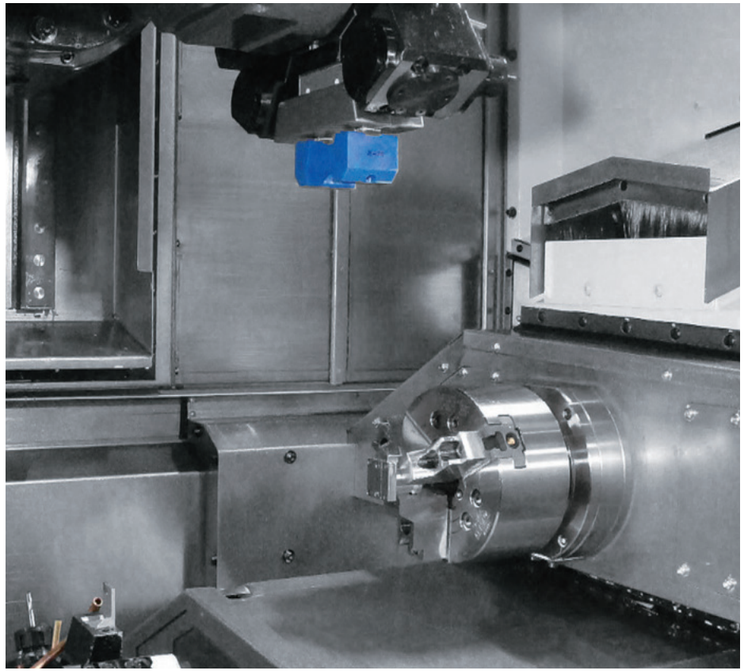
Bar capacity ϕ65mm

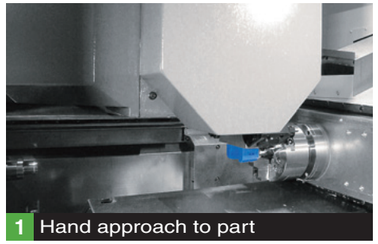
Spindle motor
11 / 7.5kW
77.8 / 53.1 / 39.8N·m
5000min^{-1}

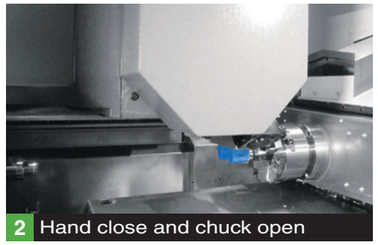
Option

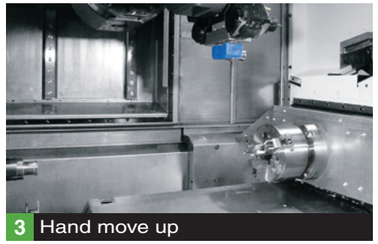
NTJ-100 Unloading System

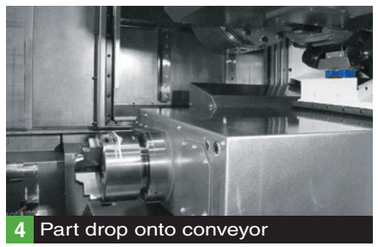
Part catcher is a device to unload the workpiece and bring it out of the machine.

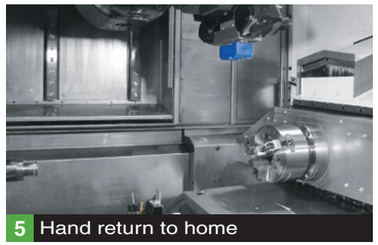












Patent pending

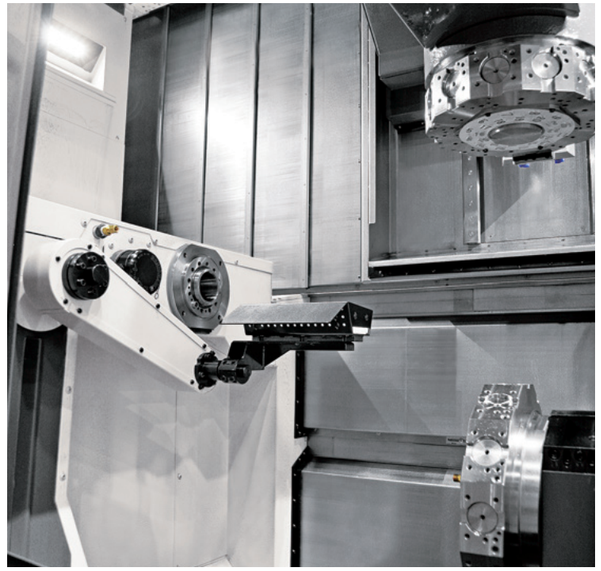
Turret Servo Gripper type

Option

Unloading Time 2.6 sec.

* 2.6 sec. is 1 to 3

Method		Hand
Part size	Diameter	ϕ 12 - 65mm
	Length	150mm
	Weight	3kg
Ejection method		Conveyor + Chute type
Drive	Hand Open / Close	Used with Milling drive on Turret
	Traverse	Used with axis drive
	Shutter	Air Cylinder

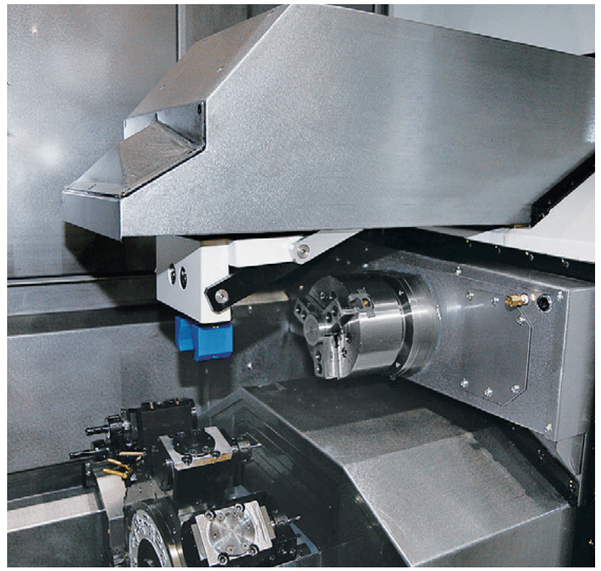


Part catcher A / Bucket type

Unloading Time 4 sec.

Option

Method		Swing-in Bucket
Part size	Diameter	ϕ 15 - 65mm
	Length	20 - 150mm
	Weight	3kg
Parts outlet		Stocker type Outlet chute type



Part catcher G / Gripper type

Unloading Time 4.8 sec.

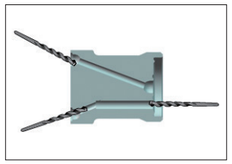
Option

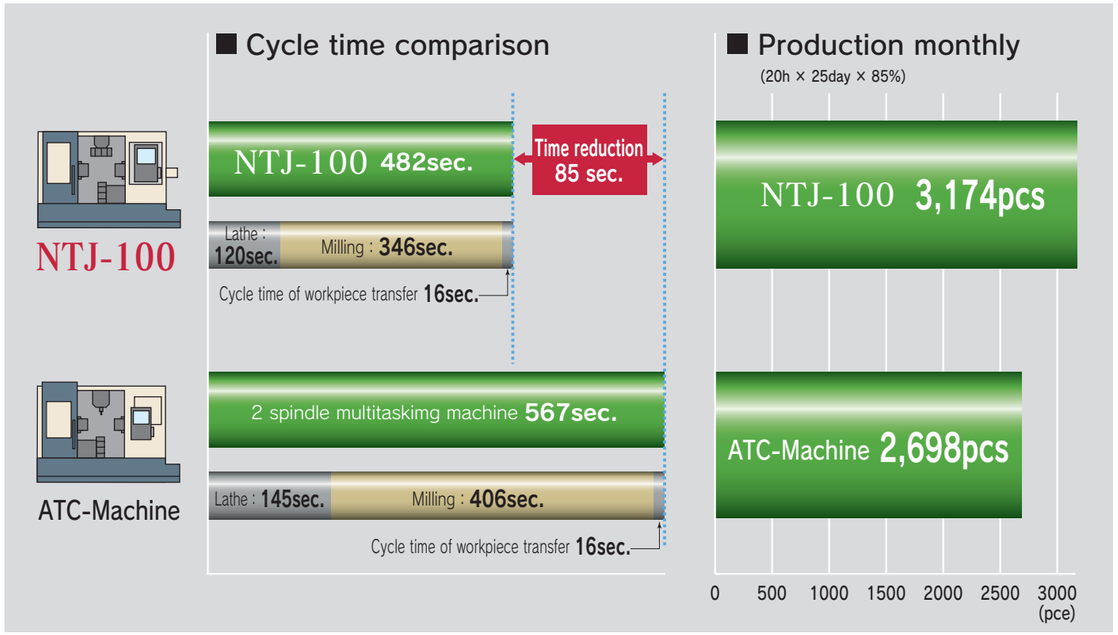
Method		Hand
Part size	Diameter	ϕ 12 - 65mm
	Length	15 - 200mm
	Weight	1.5kg
Ejection method		Conveyor + Chute type

NTJ-100 Substantially Higher Productivity

New Era of Multitasking!
A machine featuring the fastest cycle-time ever!

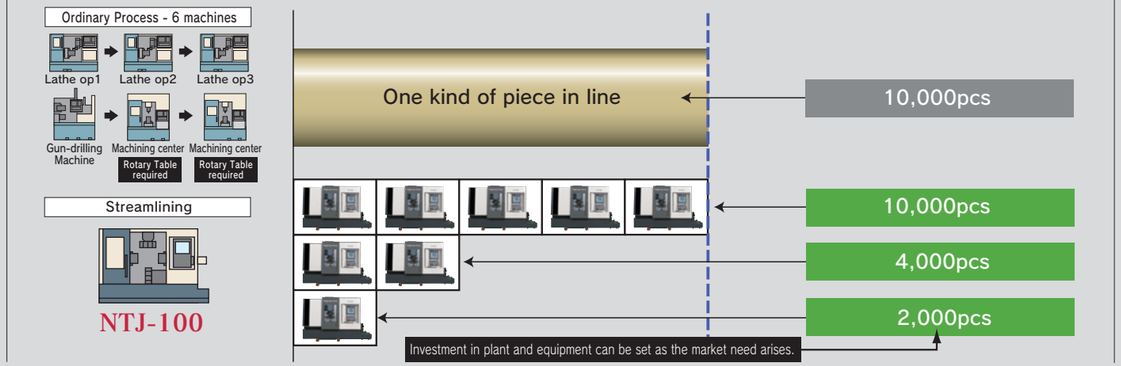
Machining time	8min.2sec.
Material	SUS303 (JIS)
Blank	Bar / ϕ 50mm



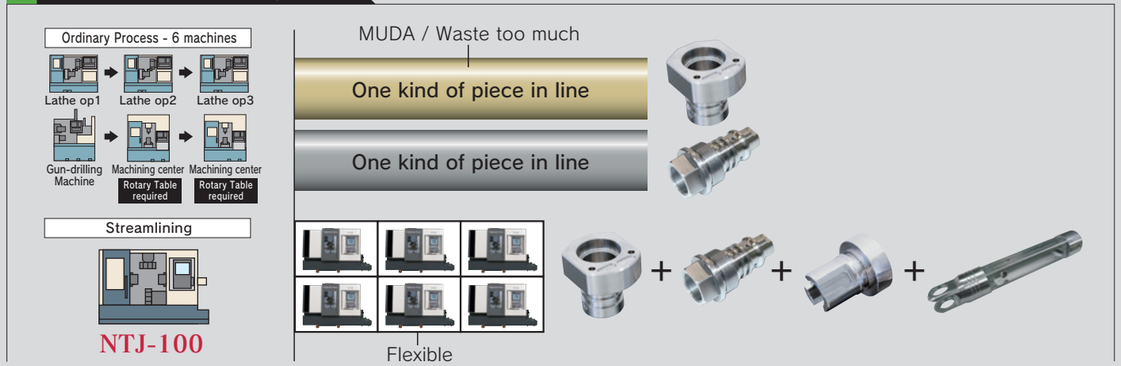


Cell Production System

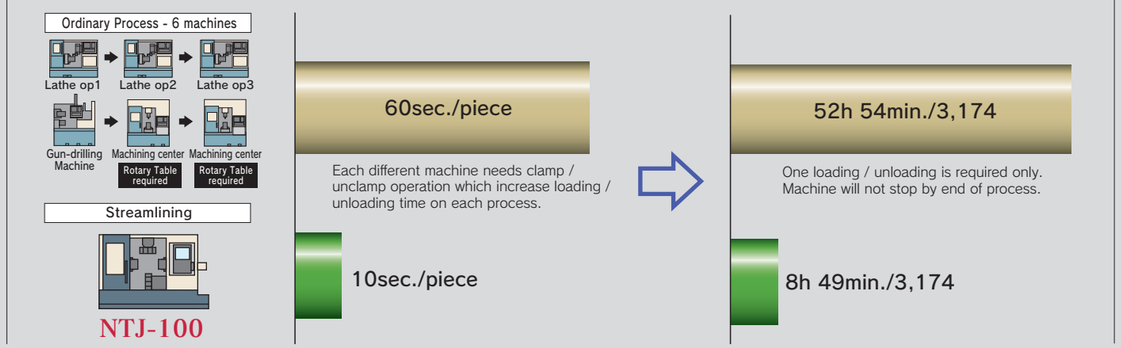
1 Risk of Investment



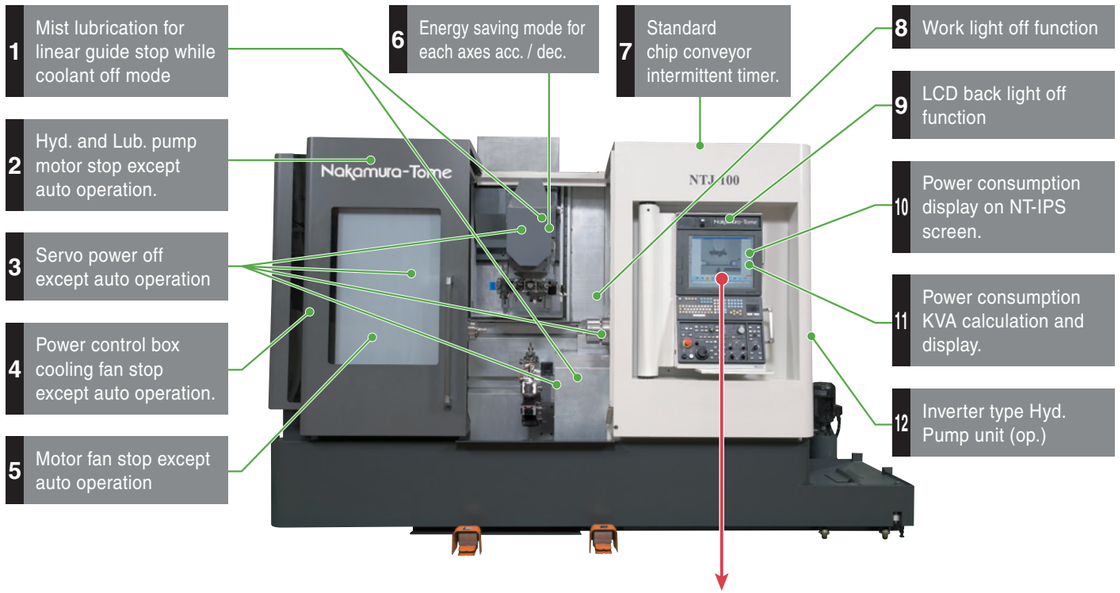
2 Scale of Production Space



3 Reduce Chucking time for a line

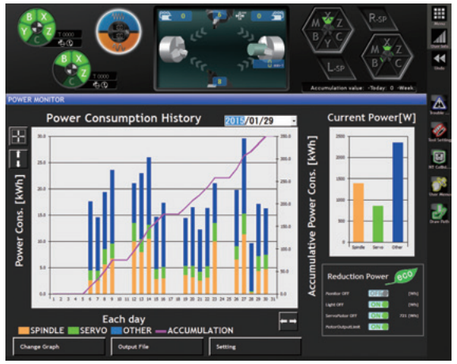


NTJ-100 Energy Saving



Power consumption can be seen on the list below.

POWER Consumption history on NT-IPS screen.



Power consumption history.
Daily power consumption kWh each day as a bar graph.
Accumlative power consumption as a line graph.

Power consumption history with numerical value.
Spindle, Servo and Others are shown each day.

NTJ-100 C-axis synchronization

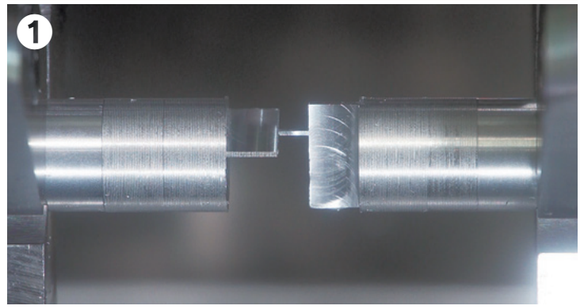
Drastic idle time reduction

■ **C-axis**

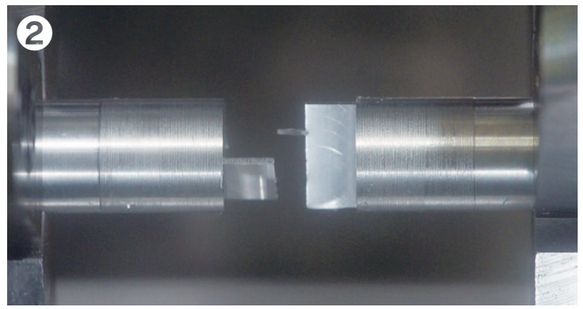
C-axis indexing speed : 600min^{-1}
180˚ indexing : 0.3sec.
360˚ indexing : 0.38sec.

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

With C-axis synchronization



Without C-axis synchronization



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

Comparison of C-axis indexing time

With
C-axis synchronization
G00H180. ⇒ **0.3sec.**

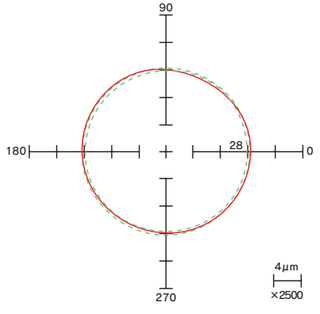
Without
C-axis synchronization
G98G01H180.F4000 ⇒ **2.9sec.**

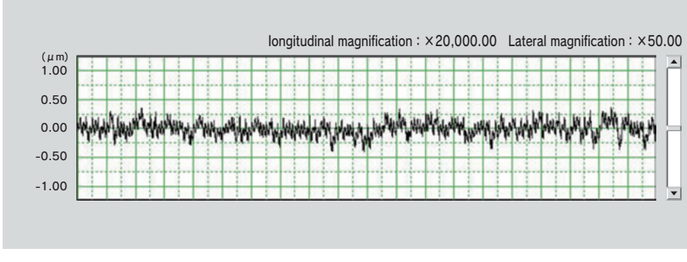
In case of no C-axis synchronization
1) Open the chuck on one side or the other
2) Close the chuck, and then rotate the spindle slowly

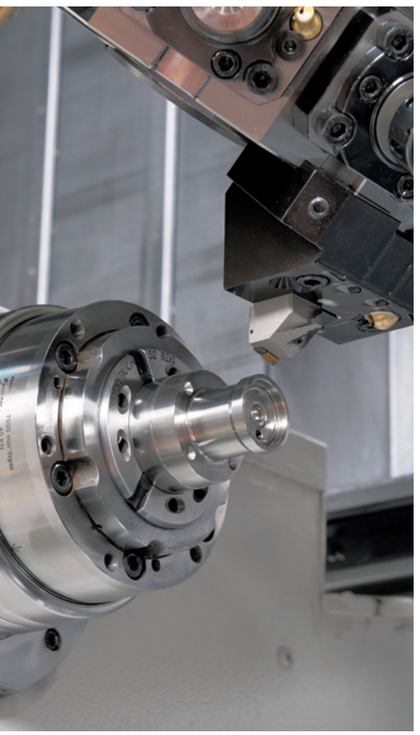
Turning Accuracy (Actual value)

Roundness	Surface roughness (Ra)
0.46μm	0.09μm

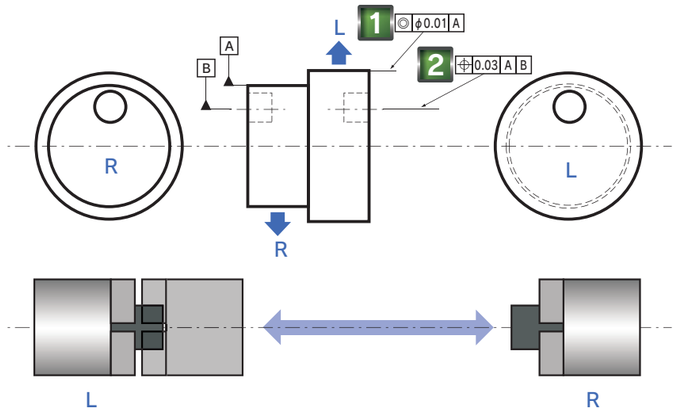
- Cutting condition
  Spindle speed : 3,000min^{-1}
  Feed : 0.05mm/rev
  Depth : 0.05mm
- Material : C3604 (BSBM)
- Tool : Diamond nose R0.8







Transferring Accuracy (Actual value)



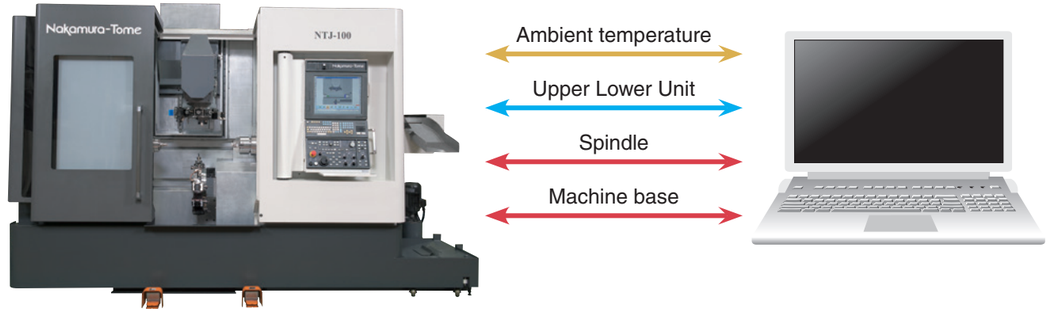
* Actual value data indicated in this catalog is for reference. and may vary depending on cutting environment and specifications.

1 Outside turning coaxiality	
Required accuracy	φ0.01mm
Actual value	φ0.005mm

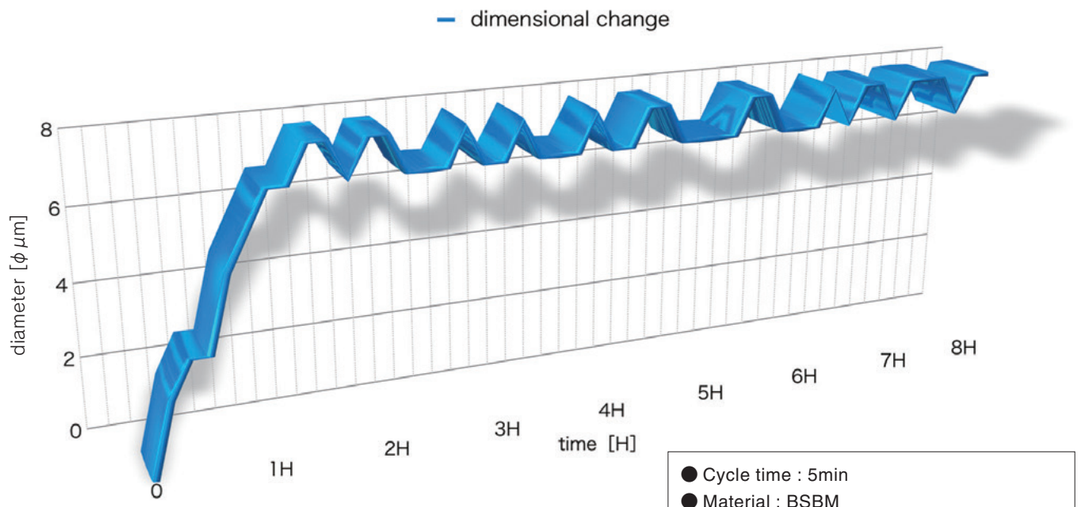
2 Hole positioning accuracy	
Required accuracy	φ0.03mm
Actual value	φ0.009mm

NT thermal compensation

Every machine compensates for thermal growth by using a CNC software compensation technique for automatically correcting thermal errors. Deflections caused by thermal growth can be predicted, based on input from sensors placed on various components in the machine.



8μm dimensional change (actual value)



* Actual value data indicated here is for reference. Depending on machining conditions and specifications, there is a possibility these values are not reached.

- Cycle time : 5min
- Material : BSBM
- Coolant : Water soluble coolant
- Room temp change : less than 5 degrees

Combining Turning and Milling Capabilities

From diversified small-lot production to mass production

S×2 Twin-Spindle — NTJ-100

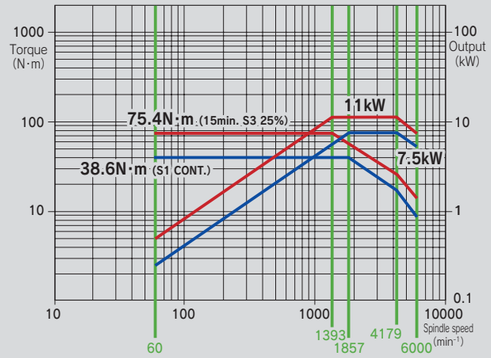
By introducing faster motor acceleration / deceleration, machining efficiency was improved.

Spindle motors

dia. 42mm 11/7.5kW

Standard **L / R Spindle motor**

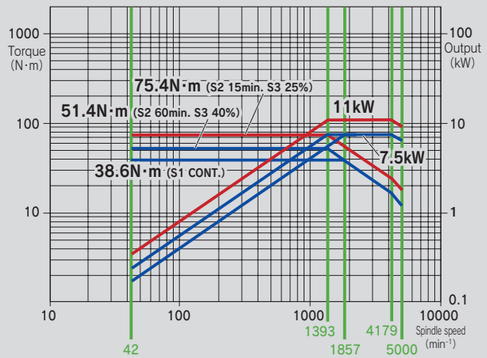
Spindle speed : 6,000min-1



dia. 51mm 11/7.5kW

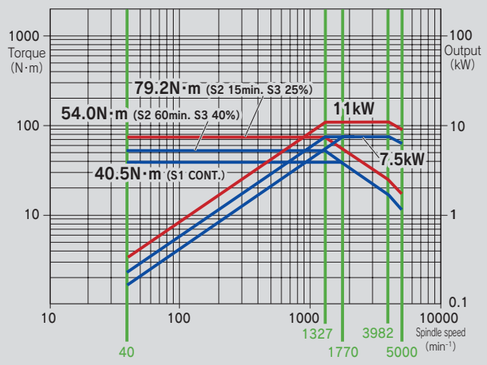
Option **L Spindle motor**

Spindie speed : 5,000min-1



Option **R Spindle motor**

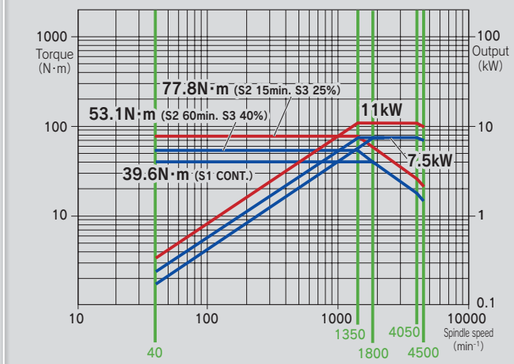
Spindle speed : 5,000min-1

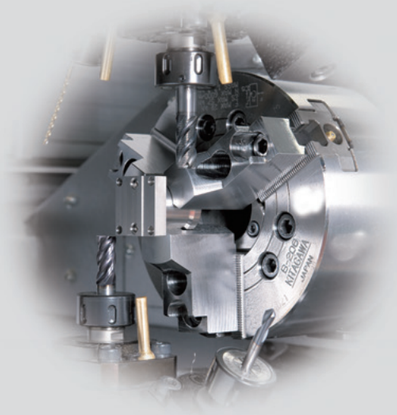


dia. 65mm 11/7.5kW

Option **L / R Spindle motor**

Spindle speed : 4,500min-1





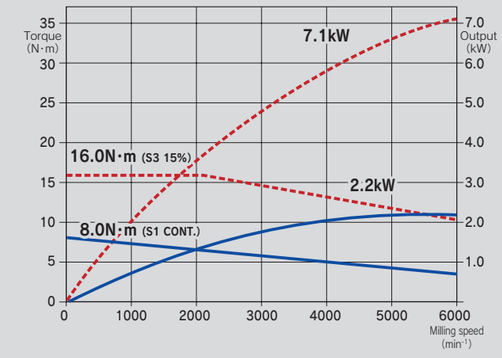
M×2 Doubie Milling Motor — NTJ-100

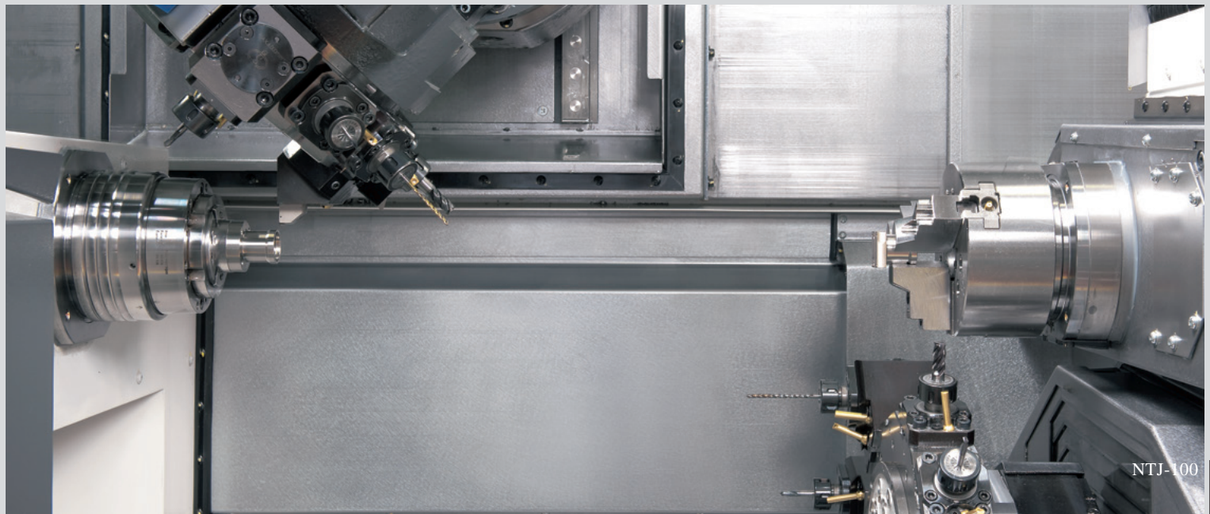
Milling motor

7.1 / 2.2kW

Standard **Upper / Lower**

Milling speed : 6,000min-1



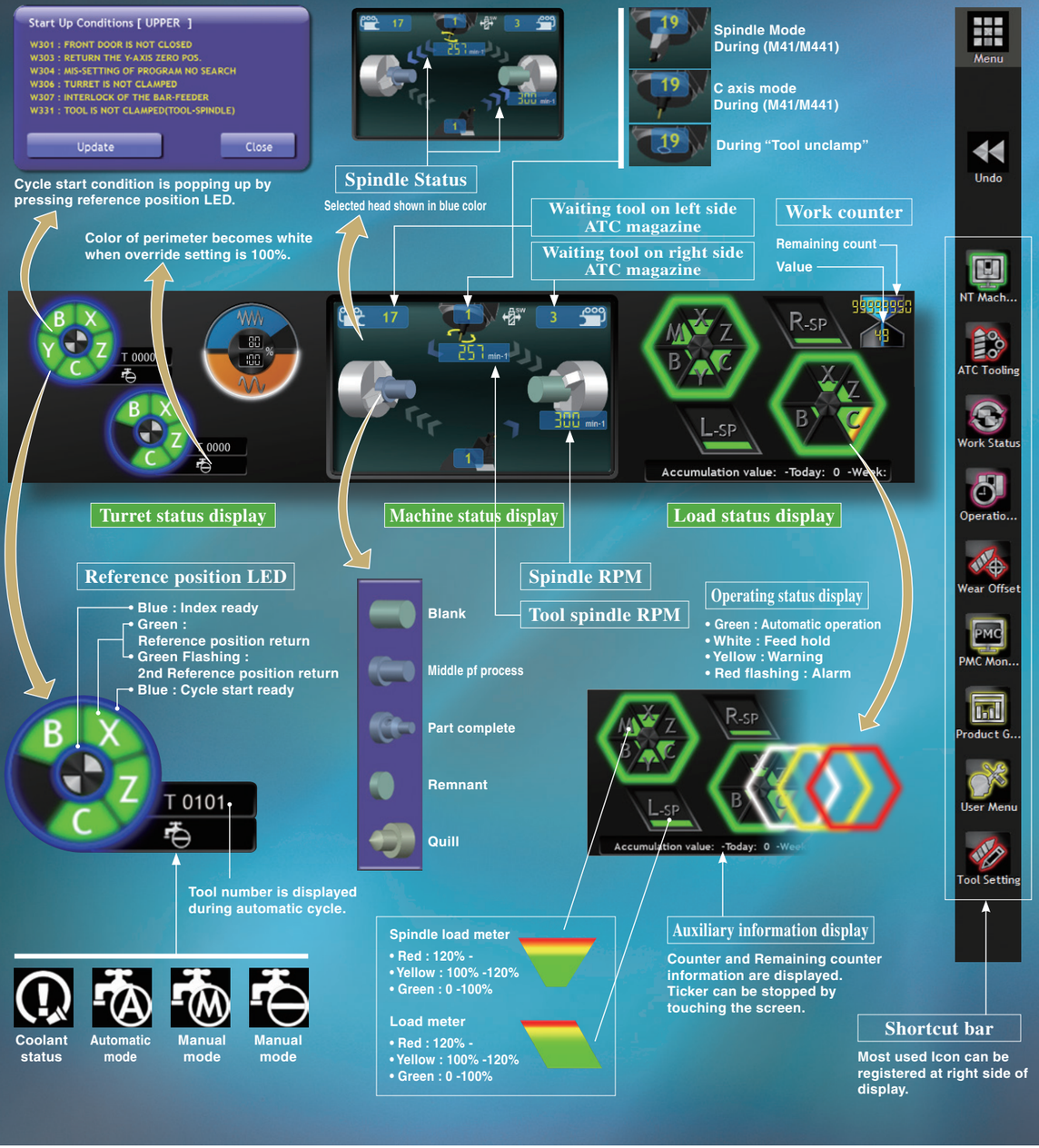


Nakamura-Tome Intelligent System

Advanced Production System

• 19 inch color LCD Touch panel • PC memory 9GB • QWERTY Key board • Windows 8 • Touch Pad • USB 2.0 port x 2

Program storage length	1Mbyte (2560m)	2Mbyte (5120m)	4Mbyte (10240m)	8Mbyte (20480m)
Program registered number	2000	4000		
Tool offset pairs	99 + 99	Standard / Option		



Main function

- NT Manual Guide i
- NT Work Navigator
- Airbag (Overload detection)
- Advanced NT Nurse
- Status Display Function
- Setup Display
- Trouble Guidance
- Productivity Function
- Operation Level Control Function
- Warm up Function
- Built-in Loading Device Setting Screen
- Parts Catcher G Operation Function
- NT Machine Simulation
- NT Collision Guard
- NT Multitasking Office
- Net Monitor

Cut-in Check

The machine can be stopped immediately while in automatic cycle. After reading G00 command in the machining program, the Spindle, Tool spindle, Axis Feeding and Coolant will stop. It is faster than M01 optional stop. After checking the machine internal status, the machining can be restarted by pressing "Program restart" button.

G131 Soft work pusher

This cycle is used during part transfer from left to right side spindle. Once part contact with the jaws or stopper of the right side spindle has been confirmed, the right side spindle servo axis stops.

- Contact force can be changed in the program.
- It is possible to set OK/ NG range as well.
- An additional work pusher for the right side is not required and cycle time can be reduced.

G376 Soft quill pusher cycle

Thrust force of center support can be set in the program by using servo motor technology, which helps keeping a constant pushing thrust during cutting.

- It is available for Z axis and B2 axis.
- Quill thrust force can be changed in the program.
- It is possible to set OK/ NG range as well.

Dual safety

NT Machine Simulation / NT Collision Guard + Airbag

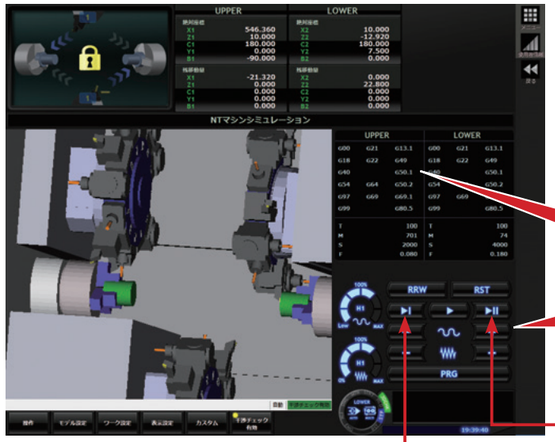
Dual safety

Double safety features for maximum protection

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

NT Machine Simulation

Prevent the collision due to tooling, chuck, and program.



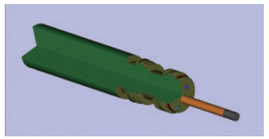
Simulation is performed to check the programs without running the machine.
This helps prevent machine collisions due to programming or setup errors.

"Distance to go" and "Modal information" can be checked during with simulation.

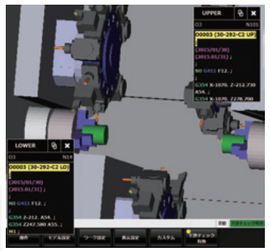
Rapid feed and Cutting feed can be adjusted using override setting. It is possible to make Simulation of each process, or to use single block.

Process

Single block



Simulation of part machining.
There are several view screen display settings, such as machine display, turret display and tooling display.

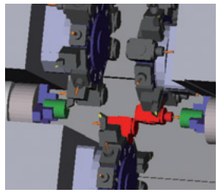


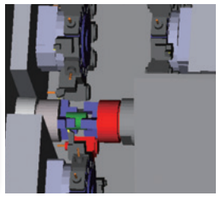
It is possible to choose between "with" or "without" program display. The color of the program block being simulated can be set to be displayed in a different color.

NT Collision Guard

Preventive safety technology - Machine collisions are avoidable!

This function is available in automatic mode and manual mode. Collisions can be prevented, especially after modifying the program, or changing the tool geometry offset. Registered machine data, chucks, tools, holders, and parts are used to monitor the machine during automatic, manual or jog movement, and recognize in advance collisions before they happen. Even turret indexing is monitored to avoid collisions, drastically reducing machine collision risks, especially during set up.





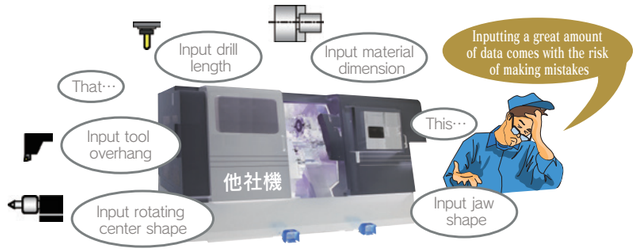
• Model setup was simplified.
Type of tool being indexed is automatically sorted out from the program, and the tool model can be selected from a displayed list.

Airbag (Overload detection)

Nakamura-Tome machines will not break for the slightest collision, as other machines do. The function minimize damage in case of collision.

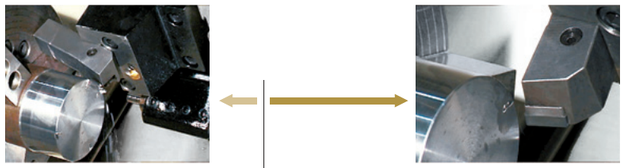
Even with barrier function, machine collisions may occur

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

▲ Video

* This feature does not mean zero impact.

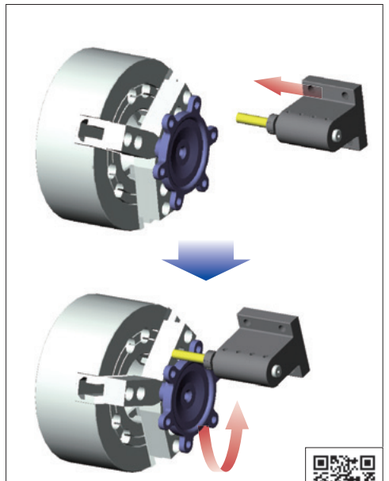
NT Work Navigator

New Navigator for X-axis and Y-axis

X Y Z B C

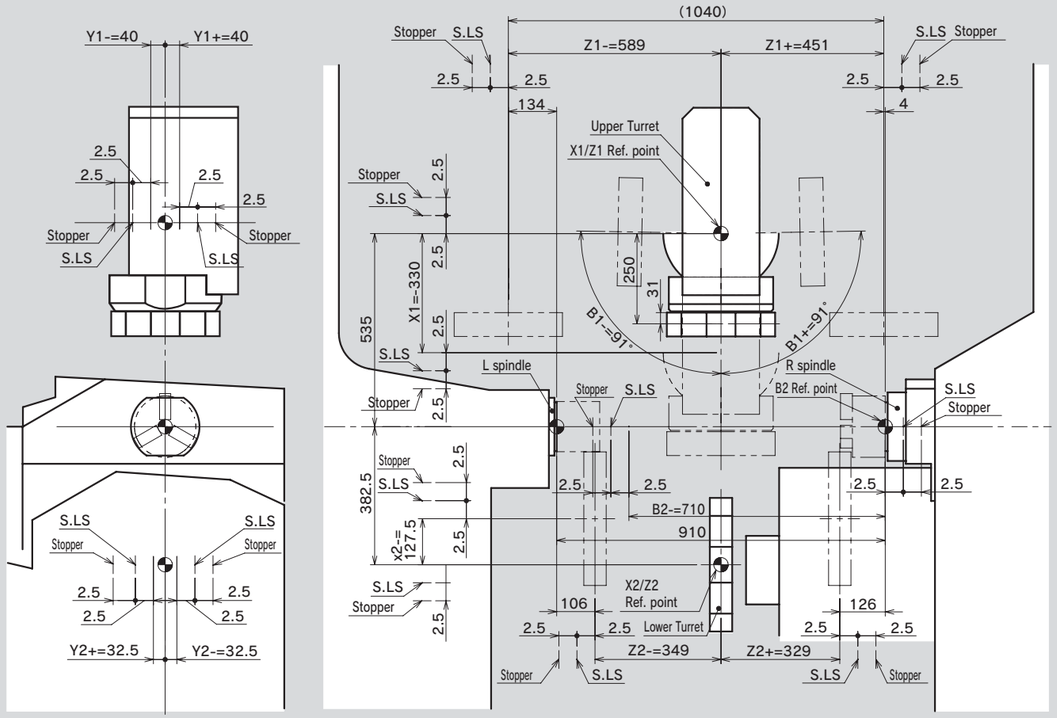
• Advanced NT Work Navigator !
Navigation function is expanded to also include the X and Y-axis. Coordinate Recognition can made the part’s outer surface in the X or Y-Axis direction.

• No fixtures required
Machining parts with non-round shapes, such as forgings or castings requires that the raw part coordinates be recognized by the CNC control. In order to achieve this without requiring extra cost or additional options, the NT Navigator is used. 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 a cost cutting feature in multitasking machines, eliminating the need for positioning fixtures and special clamping devices.

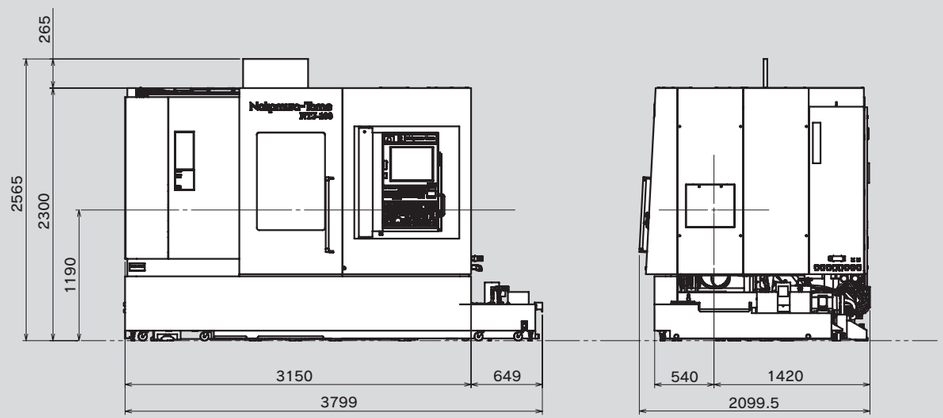


Video ▶

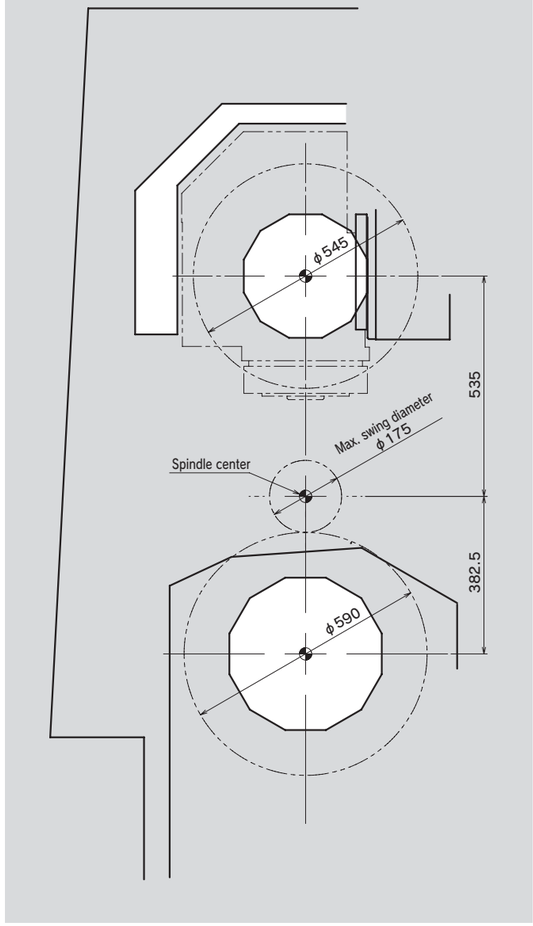
Slide Travel Range



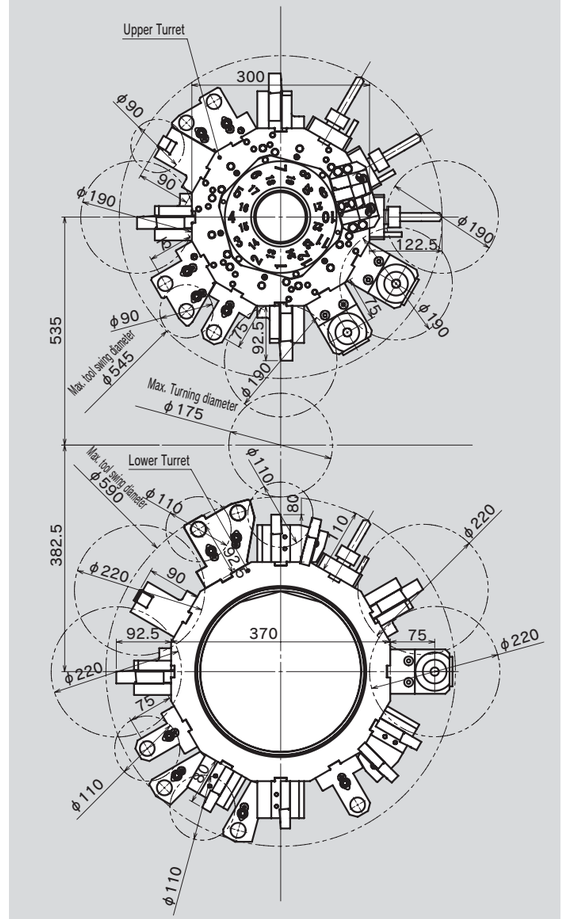
Machine Dimensions

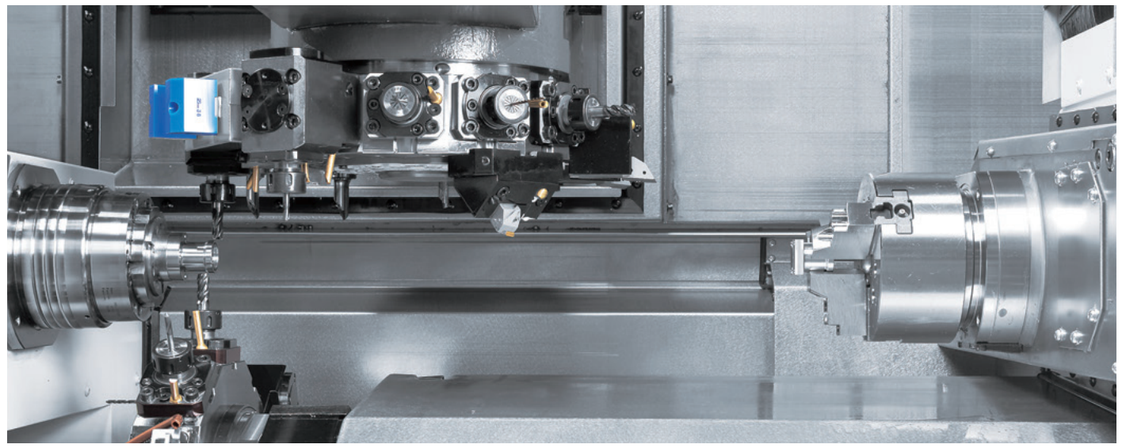


Maximum Tool Diameter

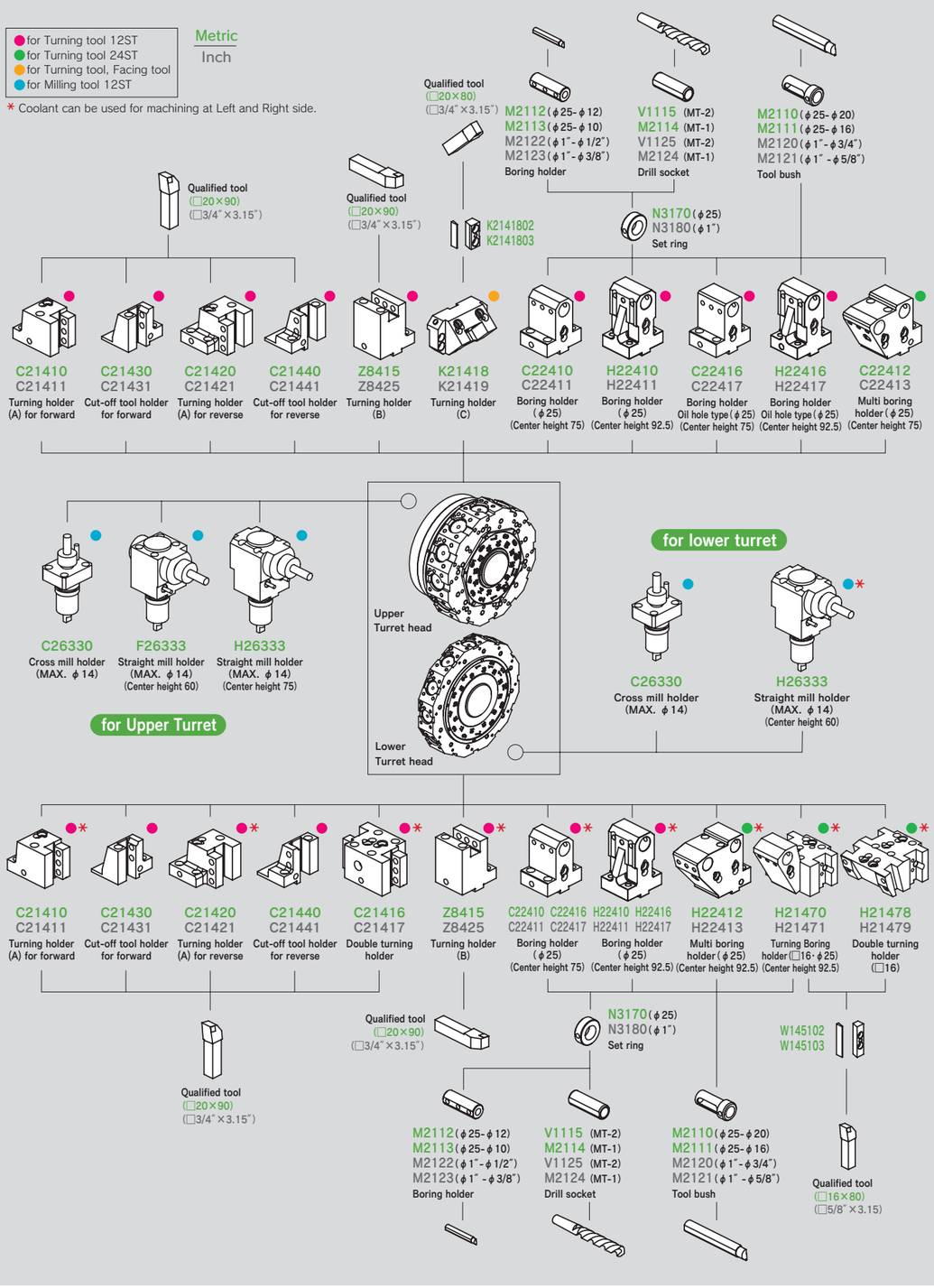


Tool interference





Tooling System Diagram



Machine Specification

■ Capacity			
Max. turning diameter	175mm		
Standard turning diameter	170mm		
Distance between spindles	max.910mm / min.200mm		
Max. turning length	678mm		
Bar capacity	42mm	51mm (op.)	65mm (op.)
Chuck size	165mm (6")		
■ Axis travel			
Slide travel (X1 / X2)	330 / 127.5mm		
Slide travel (Z1 / Z2)	1040 / 678mm		
Slide travel (Y1 / Y2)	±40mm / ±32.5mm		
Slide travel (B2-axis)	710mm		
Rapid feed X1 / X2	20m/min		
Rapid feed Z1 / Z2	40m/min		
Rapid feed B2 axis	40m/min		
Rapid feed Y1 / Y2	6m/min		
■ Left and Right spindles			
Spindle speed	6000min^{-1}	5000min^{-1}	4500min^{-1}
Spindle speed range	Stepless		
Spindle nose	A2-5	A2-5	A2-6
Hole through spindle	56mm	63mm	80mm
I.D. of front bearing	80mm	90mm	110mm
Hole through draw tube	43mm	52mm	66mm
■ C-axis			
Least input increment	0.001°		
Least command increment	0.001°		
Rapid index speed	600min^{-1}		
Cutting feed rate	1 - 4800°/min		
C-axis clamp	Disk clamp		
C-axis connecting time	1.5sec.		
■ B1-axis (Swiveling axis for upper turret)			
Swing range	182degree (±91degree)		
Swing mechanism	Servo motor + Roller cam		
Clamp function	Curvic coupling (5degree), Brake (0.001degree)		
■ Upper turret			
Number of tools	24 + 6		
Type of turret head	Dodecagonal drum turret		
Number of Indexing position	24		
Milling system	Individual rotation		
Number of milling stations	12		
Milling speed	6000min^{-1}		
Milling motor power and torque	7.1/2.2kW 16/8N·m		
Tool size (Square shank)	□ 20mm		
Tool size (Round shank)	ϕ25mm		
Tool size (Milling collet)	Straight / Cross holder ϕ1 - 14mm		
■ Lower turret			
Number of tools	24		
Type of turret head	Dodecagonal drum turret		
Number of Indexing position	24		
Milling system	Individual rotation		
Number of milling stations	12		
Milling speed	6000min^{-1}		
Milling motor power and torque	7.1/2.2kW 16/8N·m		
Tool size (Square shank)	□ 20mm, □ 16mm		
Tool size (Round shank)	ϕ25mm		
Tool size (Milling collet)	Straight / Cross holder ϕ1 - 14mm		
■ Drive motor			
L-spindle	11/7.5kW		
R-spindle	11/7.5kW		
■ General			
Machine height	2,565mm		
Floor space	3,799mm × 2,100mm		
Machine weight	10000kg		
■ Power source			
Power supply	38.2kVA		
Air supply	200NL/min, 0.5 - 0.7MPa		
Hydraulic unit / Coolant	50L / 350L		
Lubrication	4.6L		

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

Control Specification

■ items	
Control type	FANUC 31i-B 2-PATH
■ Controlled axes	
Controlled axes	10axes
Simultaneously controlled axes	4axes (Upper X1, Z1, C1 [C2], Y1, B1) + 4axes (Lower X2, Z2, C2 [C1], Y2, B2)
■ Input command	
Least input increment	0.001mm / 0.0001inch (diameter for X-axis)
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 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 - 8000mm/min, 0.01 - 314inch/min (1 - 4800mm/min, 0.01 - 188inch/min) 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 - 4800degree/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 Note) Max.cutting feed is the value when AI contouring mode.
Dwell	G04
Feed per minute / Feed per revolution	G98/G99
Thread cutting	G32
Thread cutting retract	Standard
Continuous thread cutting	Standard
Handle feed	Manual pulse generator 0.001/0.01/0.1mm, 0.001/0.01/0.1° (per pulse)
Automatic acceleration / decelaration	Standard
Linear accel. / decel. After cutting feed interpolation	Standard
Rapidfeed override	F0 / 25 / 50 / 100%
Cutting feedrate override	0 - 150% (each 10%)
AI contouring control I	G5.1
■ Program memory	
Part program storage length	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
DNC operation through memory card	Standard (Only one turret can access memory card at a time) (not including memory card)
■ Operation and display	
Operation panel : Display	19" color SXGA LCD touch panel
: keyboard	QWERTY keyboard
■ Program support	
Circular interpolation R programming	Standard
Direct drawing dimension programming or Chamfering / Corner R	Standard (Direct drawing dimension programming is standard)
Canned cycle	G90, G92, G94
Multiple repetitive canned cycle	G70 - G76
Multiple repetitive canned cycle II	G71,G72
Canned cycle for drilling	G80 - G89
Axis recomposition	Standard (used for C axis control from Lower)
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)
Helical interpolation	Standard
Luck-bei II / NT Manual Guide i	Standard
Abnormal load detection function	Standard
NT Work Navigator (torque type)	Standard (not including contact bar)
NT Nurse	Standard
NT Collision Guard	Standard
■ Mechanical support	
Rigid type	Standard
Spindle synchronised control	Standard
C axis synchronised control	Standard
Spindle orientation	Standard
■ NT-IPS	
O/S	Windows XP Embedded
Pointing device	Touch pad

● **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 turcite 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.