WT-150Ⅱ

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

The Best-Selling Multi-Turret Type Multitasking Turning Center

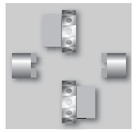
A machine successfully differentiating itself from others, when it comes to multitasking

This is an innovative multi-turret multitasking machine for production. Thanks to the opposed twin-spindles and upper & lower turret design, simultaneous machining with multiple tools becomes a reality, contributing to process efficiency, drastic cycle time reduction and higher productivity. By offering Nakamura-Tome own-made automation systems, such as built-in gantry loaders, shaft loaders, shaft un-loaders and bar feeders, independent cells can be customized for production needs.
The WT-150II is a high productivity Multitasking Turning Center, featuring the latest in technology and in manufacturing.

High-Speed, High-Rigidity Compact Multitasking Machine

19″ Color LCD Touch Panel

NT Smart X



WT-150II

S² Twin-Spindle
T² Double turret
M² Double Milling Motor (OP.)
C² C-axes (OP.)
Y Y-axis (OP.)

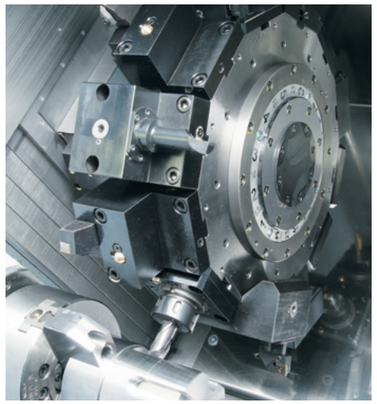
Capacity	WT-150II	
Max. turning diameter / Max. turning length	190mm / 515mm	
Distance between centers	max.800mm / min.200mm	
Bar capacity	51mm	65mm (op. L)
Chuck size	6” 165mm, 8” 210mm	
Axis travel		
Slide travel (X1/X2)	167.5 / 167.5mm	152.5 / 167.5mm
Slide travel (Z1/Z2/B)	515mm / 515mm / 600mm	
Slide travel (Y Upper turret)	±35mm (op.)	
Left and Right spindles		
Spindle speed	5,000min^{-1}	4,500min^{-1}
Left spindle	15/11kW 136.4 / 113.7 / 83.4N·m	
Right spindle	11/7.5kW 89.1 / 83.2 / 56.7N·m	
Upper Turret		
Number of turrets	1	
Spindle speed	6,000min^{-1} (op.)	
Drive motor power and torque	5.5/3.7kW 24/16N·m (op.)	
Type of turret head / Number of indexing position	Dodecagonal / 24	
individual rotation	Individual rotation/12 (op.)	
Lower Turret		
Number of turrets	1	
Spindle speed	6,000min^{-1} (op.)	
Drive motor power and torque	5.5/3.7kW 24/16N·m (op.)	
Type of turret head / Number of indexing position	Dodecagonal / 24	
individual rotation	Individual rotation/12 (op.)	
General		
Floor space (L×W×H)	3,674mm × 2,264mm × 1,885.2mm	
Machine weight (incl Control)	9,000kg	

Machine Structure

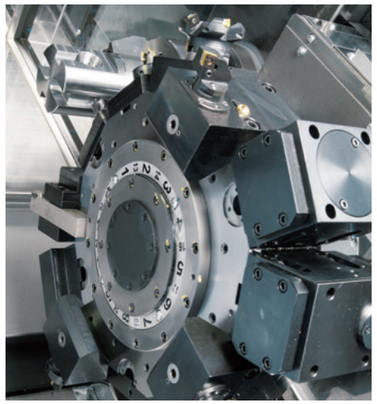
48 stations

High-rigidity turret

Upper turret



Lower turret



Left Spindle

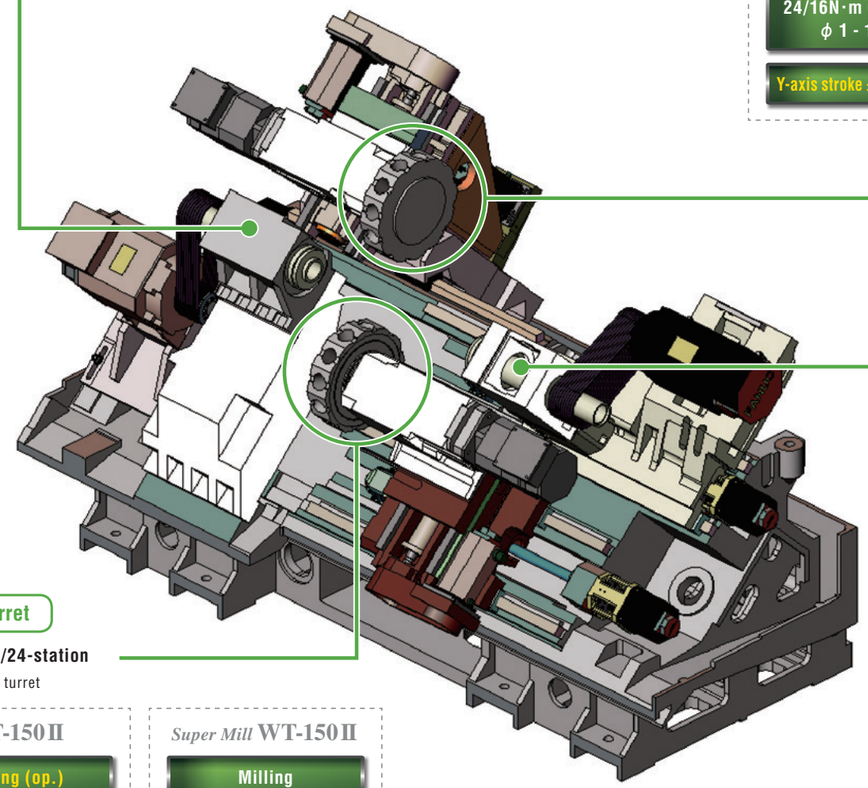
High-efficiency spindle motor

- Spindle nose : A2-5 / A2-6 (op.)
- Least input increment : 0.001°
- C-axis rapid speed : 600min^{-1}
- C-axis synchronous control

Bar capacity ϕ51mm	Bar capacity ϕ65mm (op.)
Spindle motor	Spindle motor
15/11kW 136.4/113.7/83.4N·m 5000min^{-1}	15/11kW 152.8/127.3/93.4N·m 4500min^{-1}

C-axis (op.) — WT-150II

C-axis — *Super Mill* WT-150II



Upper Turret

Dodecagonal/24-station

- Servo-driven turret

WT-150II	*Super Mill* WT-150II
Milling (op.)	Milling
Driven-tool spindles	Driven-tool spindles
5.5/3.7kW 24/16N·m 6000min^{-1} ϕ 1 - 16mm	7.5/3.7kW 40/16N·m 6000min^{-1} ϕ 1 - 20mm
Y-axis stroke ±35mm (op.)	Y-axis stroke ±35mm (op.)

Lower turret

Dodecagonal/24-station

- Servo-driven turret

WT-150II	*Super Mill* WT-150II
Milling (op.)	Milling
Driven-tool spindles	Driven-tool spindles
5.5/3.7kW 24/16N·m 6000min^{-1} ϕ 1 - 16mm	7.5/3.7kW 40/16N·m 6000min^{-1} ϕ 1 - 20mm

Right spindle

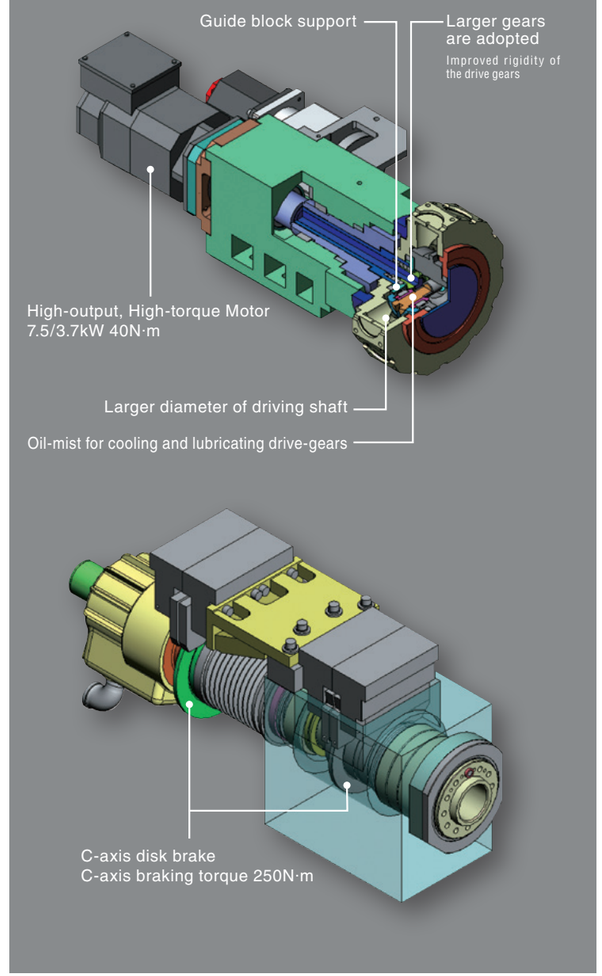
High-efficiency spindle motor

- Spindle nose : A2-5
- Least input increment : 0.001°
- C-axis rapid speed : 600min^{-1}
- C-axis synchronous control

Bar capacity ϕ51mm
Spindle motor
11/7.5kW 89.1/83.2/56.4N·m 5000min^{-1}
C-axis (op.) — WT-150II
C-axis — *Super Mill* WT-150II

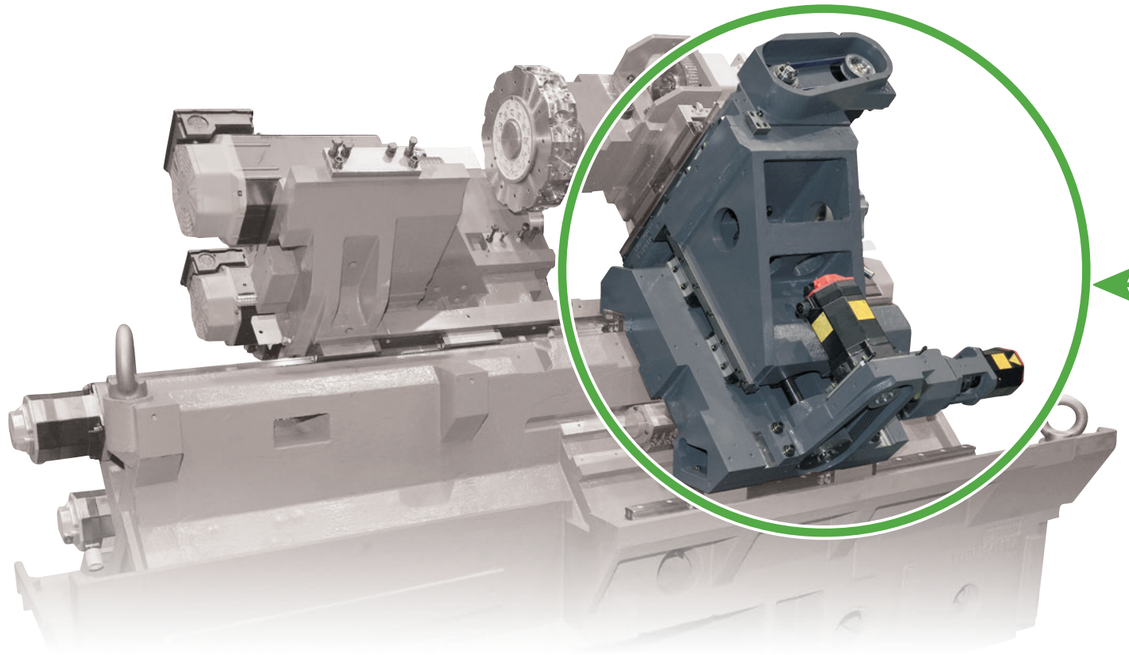
Major improvement of the milling-unit, resulting in higher rigidity

7.5/3.7kW (op.)



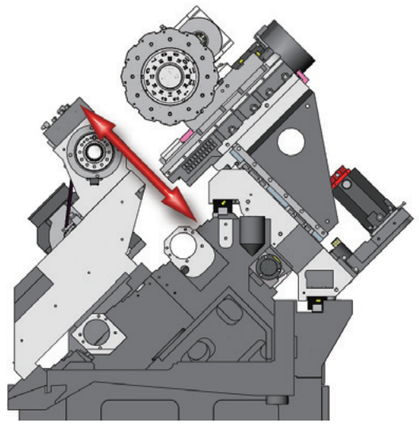
WT-150II Machine Structure

High rigidity index unit ensures stable cutting capacity



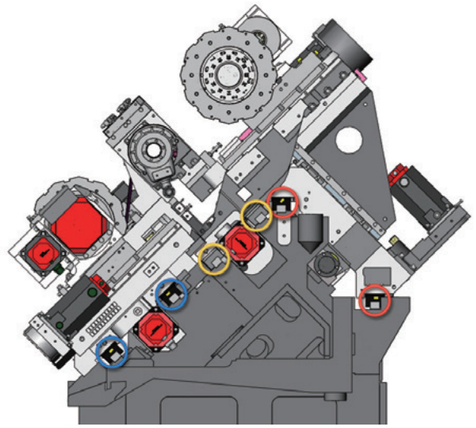
• Wide and very rigid slides for Z-axis slide

The upper Z-axis slide was designed in the direction of gravity to avoid any load unbalance.



• High rigidity Y-axis slide

The Upper machine-structure was designed with the Y-axis in mind. High rigidity of the machine ensures maximum stability during heavy duty turning and milling with full power



• 3 way slide

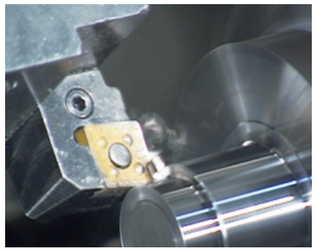
Upper and lower index units, as well as right spindle unit are mounted on individual saddles, so they can move freely without limitations

Stable cutting capacity ensured

Metal Removal Rate 432mL/min

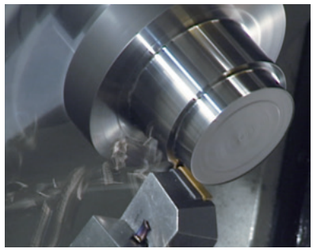
Upper turret

Cutting Sectional area : 3.6mm^2
Cutting Depth : 6mm
Feed : 0.6mm/rev
Spindle speed : 1270min^{-1}
Load : 140%
Material : S45C (JIS)

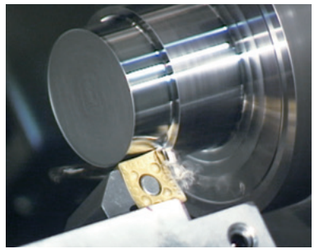


Cutting Sectional area : 2mm^2
Cutting Depth : 5mm
Feed : 0.4mm/rev
Spindle speed : 1270min^{-1}
Load : 140%
Material : S45C (JIS)

Lower turret



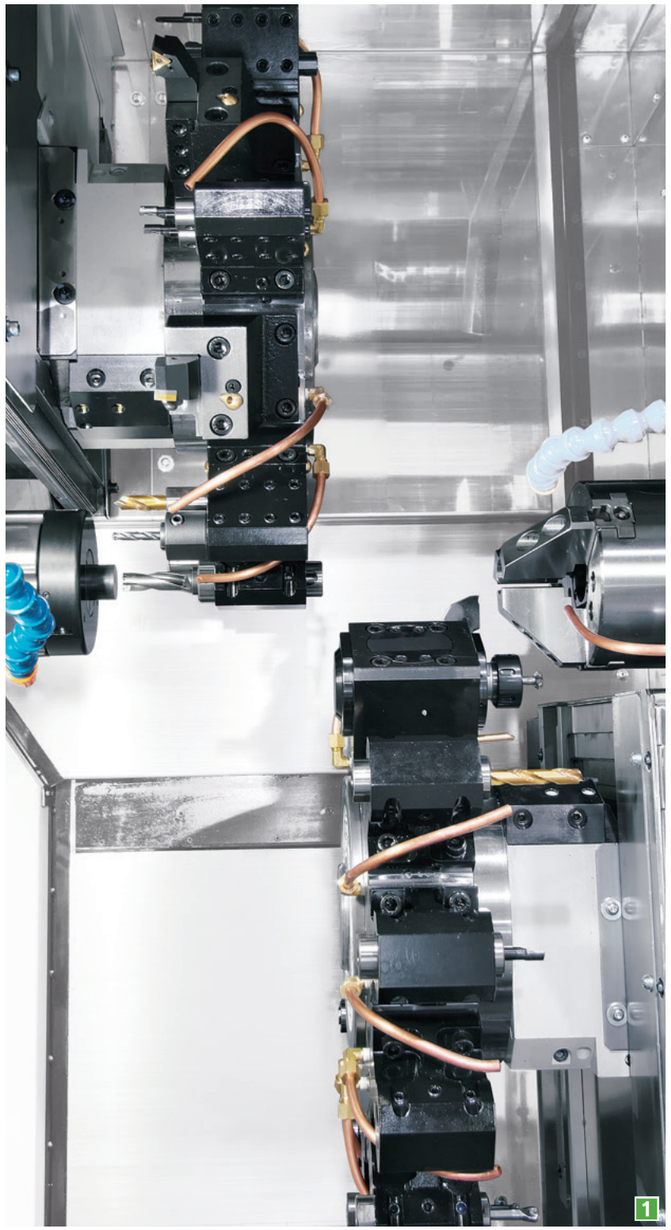
Cutting Sectional area : 3.3mm^2
Cutting Depth : 6mm
Feed : 0.55mm/rev
Spindle speed : 1270min^{-1}
Load : 137%
Material : S45C (JIS)

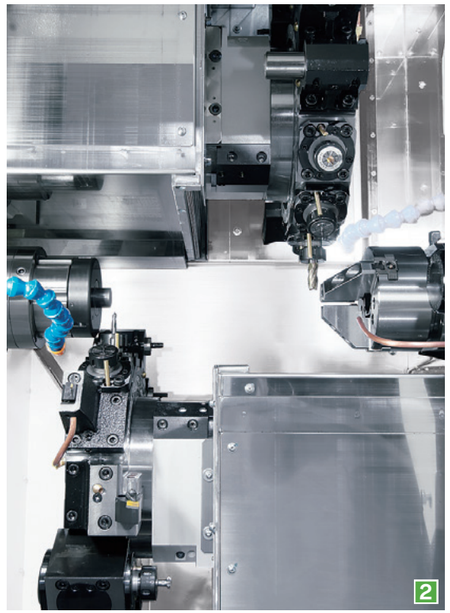


Cutting Sectional area : 2mm^2
Cutting Depth : 5mm
Feed : 0.4mm/rev
Spindle speed : 1270min^{-1}
Load : 135%
Material : S45C (JIS)

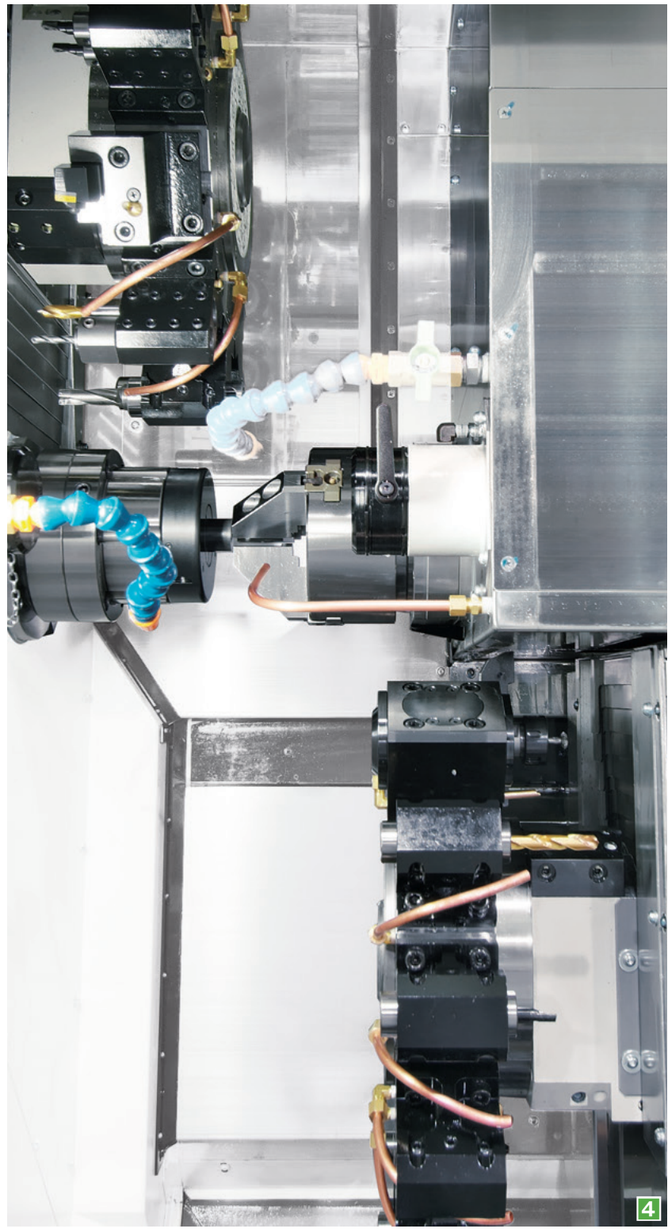
WT-150II Multi-point Machining

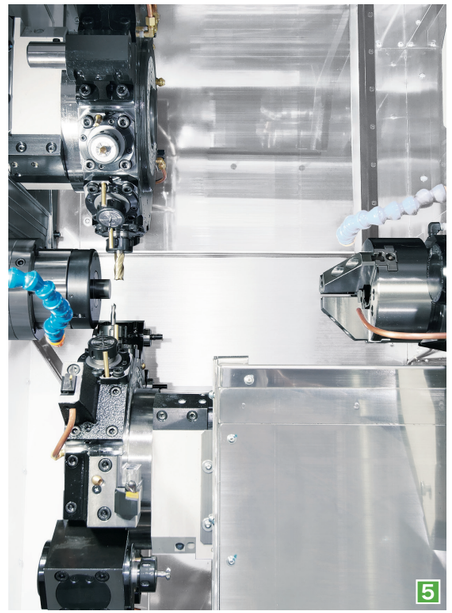
A wide range of parts can be machined from bar stock, blanks or forgings

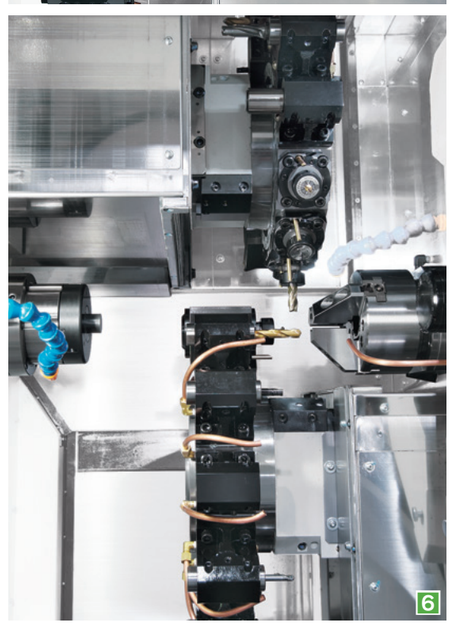




1 Upper-left/ lower-right turning operation 2 Upper-right/ lower-left operation 3 Upper-left/ lower-right operation







4 Transfer operation 5 Upper/ lower simultaneous milling on the left hand side 6 Upper/ lower simultaneous milling on the right hand side

WT-150II Combining Turning and Milling Capabilities

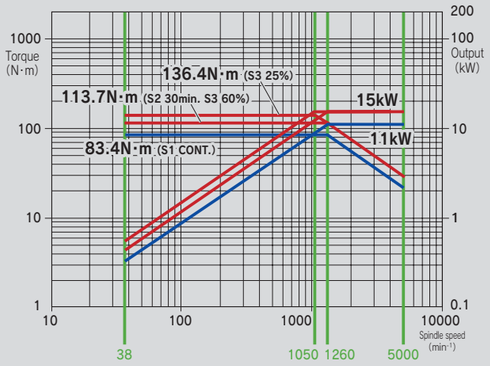
From simple to complex parts
One hit machining from raw material to finished part

S×2 Twin-Spindle

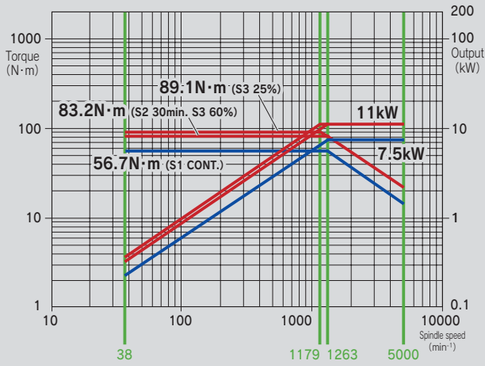
■ WT-150II

Simultaneous machining with synchronized
left and right spindles contribute to faster cycle times.

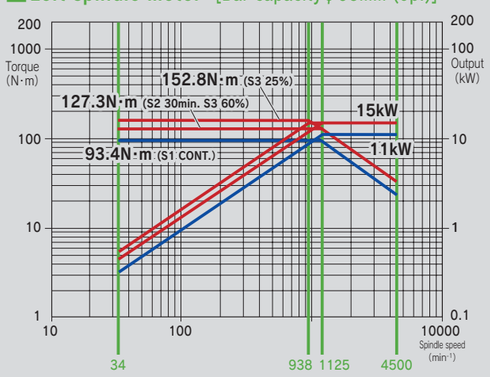
■ Left spindle motor [Bar capacity ϕ51mm (std.)]

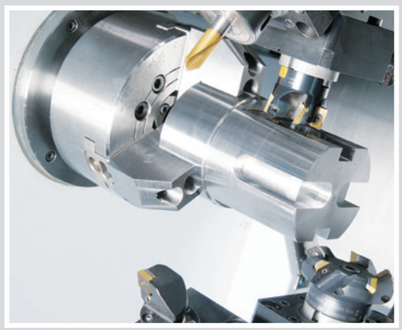


■ Right spindle motor [Bar capacity ϕ51mm (std.)]



■ Left spindle motor [Bar capacity ϕ65mm (op.)]



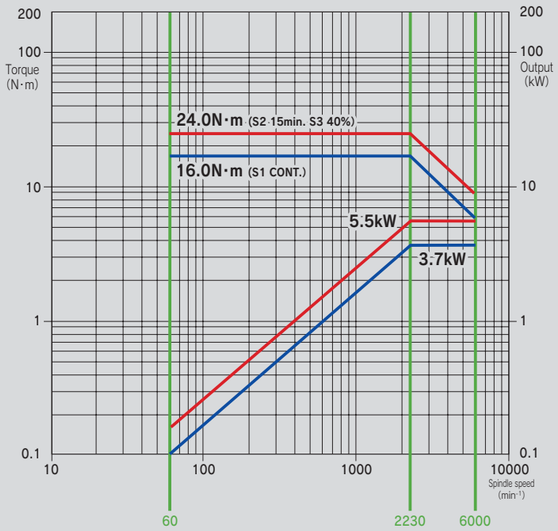


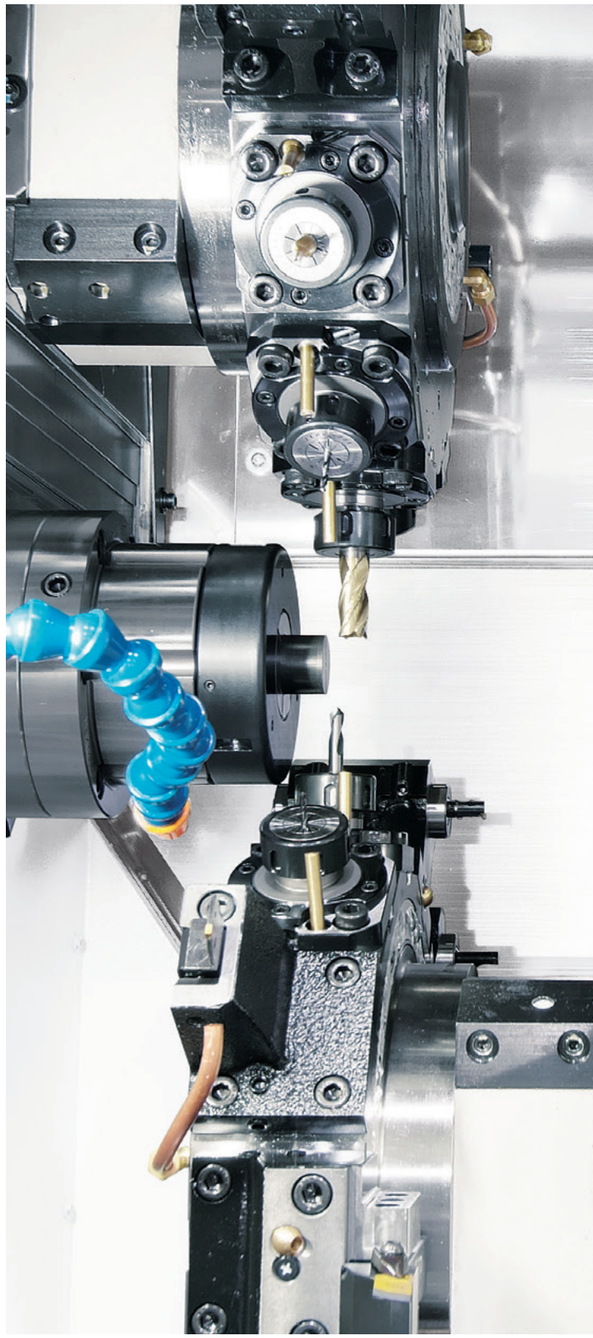
M×2 Double Milling Motor

■ WT-150II

5.5/3.7kW×2

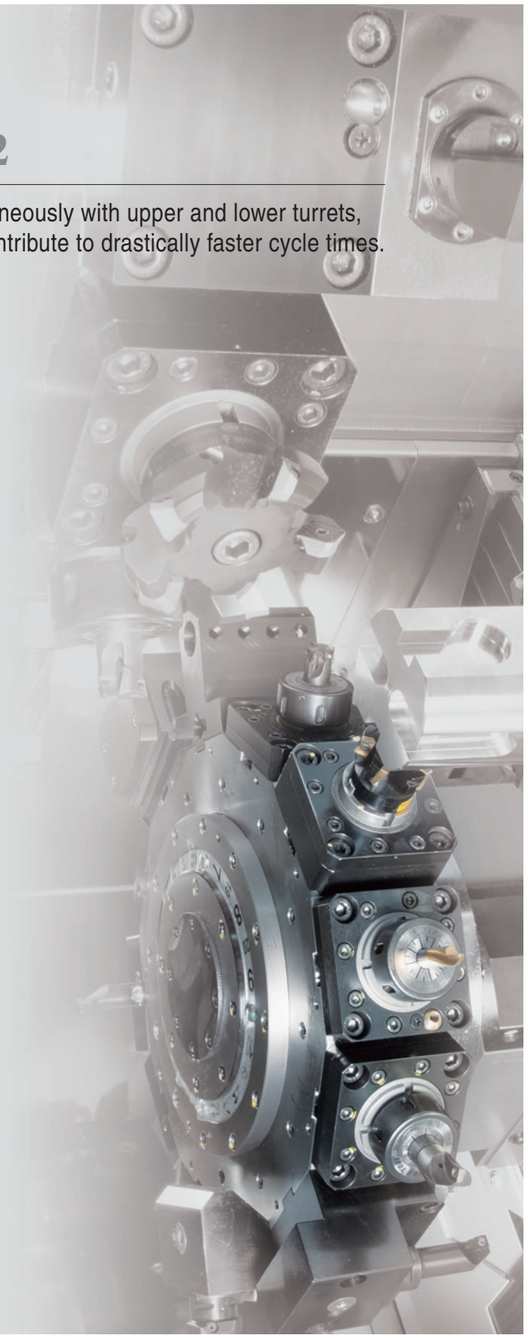
■ Upper & Lower Milling Motors (op.)





WT-150II Major improvement of the milling-unit, resulting in higher rigidity

From simple to complex parts
One hit machining from raw material to finished part

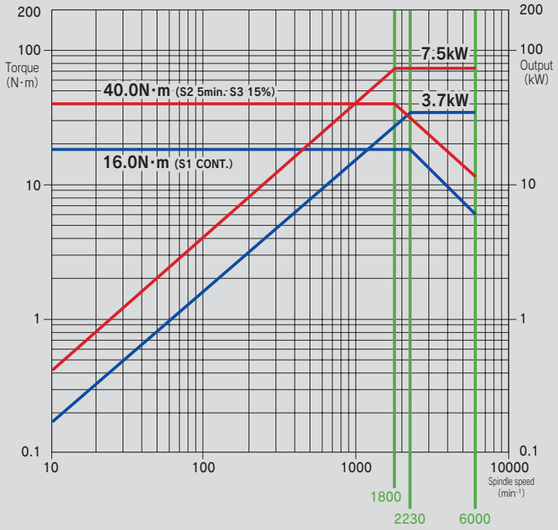


M×2 Double Milling Motor

■7.5/3.7kW (op.)×2

In addition to milling or drilling simultaneously with upper and lower turrets, improved chip-removal capabilities contribute to drastically faster cycle times.

■Upper & Lower Milling Motors



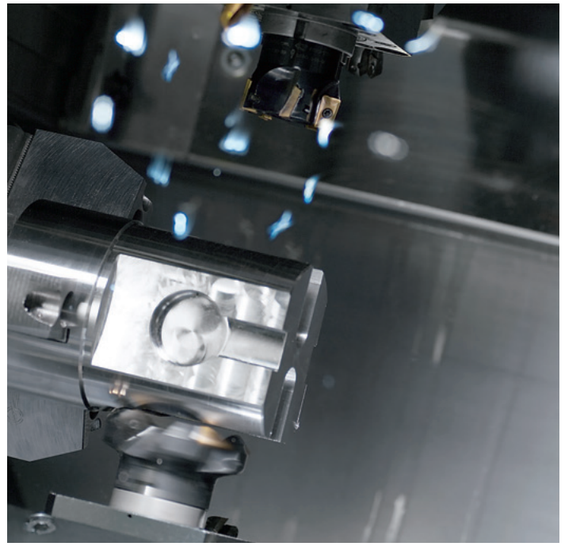
7.5kW 40N·m

High-power, High-torque Milling Motors
on Upper and Lower Turrets

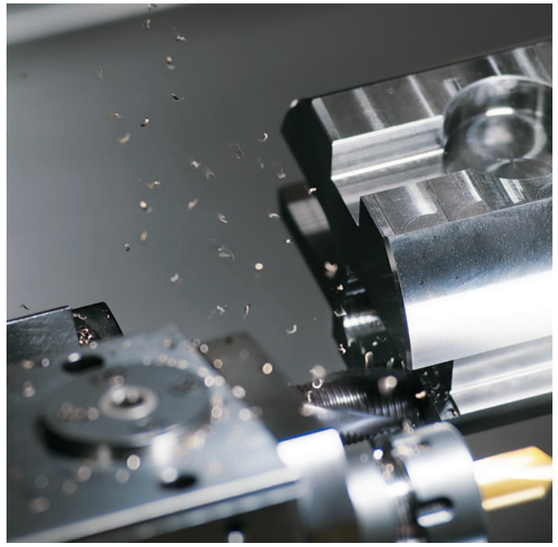
[Milling Tools]

Max. collet size ϕ20mm/AR32
Max. face milling cutter diameter ϕ80mm

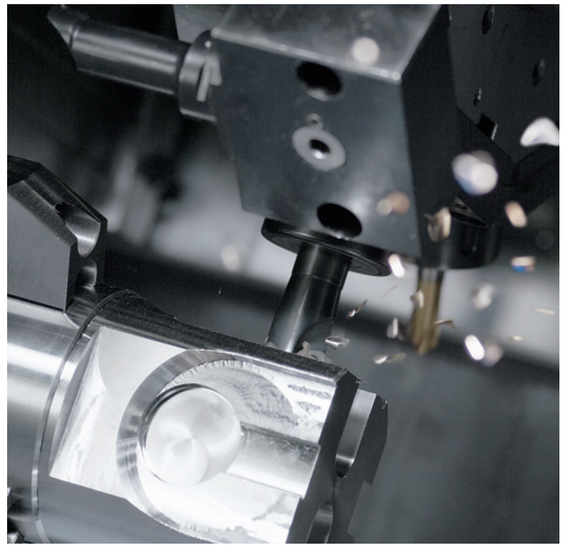
Phenomenal machining capabilities with the high-output (7.5KW) / high-torque (40Nm) motor



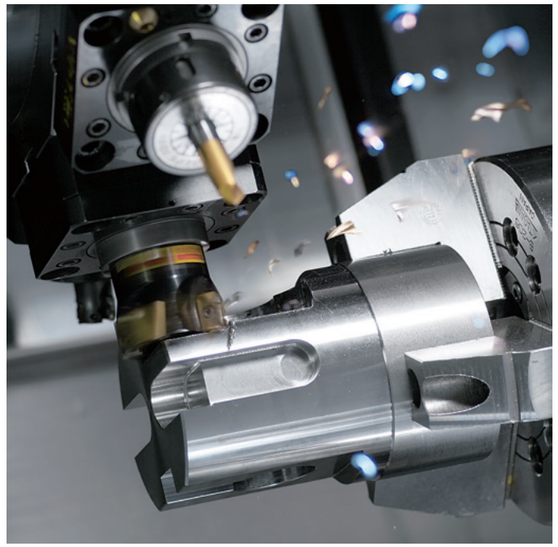
Dia. 63mm Face milling cutter
Metal Removal Rate **90mL/min**
- Surface speed : 235m/min (1200min^{-1})
- Depth : 2.5mm
- Feed : 0.7mm/rev



Dia. 20mm End mill
Metal Removal Rate **34mL/min**
- Surface speed : 35m/min (557min^{-1})
- Depth : 15mm
- Feed : 0.2mm/rev



Dia. 25mm High feed end mill
Metal Removal Rate **120mL/min**
- Surface speed : 235m/min (3000min^{-1})
- Depth : 0.8mm
- Feed : 2.0mm/rev



Dia. 50mm Face milling cutter
Metal Removal Rate **148mL/min**
- Surface speed : 235m/min (1500min^{-1})
- Depth : 4mm
- Feed : 0.7mm/rev

NT Smart X

Full Operator Support from
Ease of Use to Reliability.

3D Smart PRO
Original Menu screen
Voice Guidance
Multiple-Touch screen
Windows 8.1

Cut in check

- 19 inch color LCD touch panel
- PC memory 8 GB
- QWERTY keyboard
- Windows 8.1
- Touch pad
- USB 2.0 Port × 2

Main features of NT SmartX

Standard	
• NT Work Navigator	• Tool spindle loading Operation function
• Airbag (Overload detection)	• Parts Catcher G Operation Function
• NT Nurse function	• NT Machine Simulation
• Status Display Function	• NT Collision Guard
• Setup Display	• NT Multitasking Office (op.)
• Trouble Guidance	• NT Thermo Navigator AI
• Productivity Function	• NT Smart Sign
• Warm up Function	• Digital Chuck interlock
	• One touch MDI function

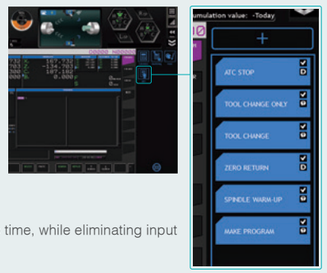
Digital Chuck Interlock

Set the detection position of open end and closed end of chuck arbitrarily.
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 in advance frequently used cycle programs such as home position return and tool exchange, and call 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

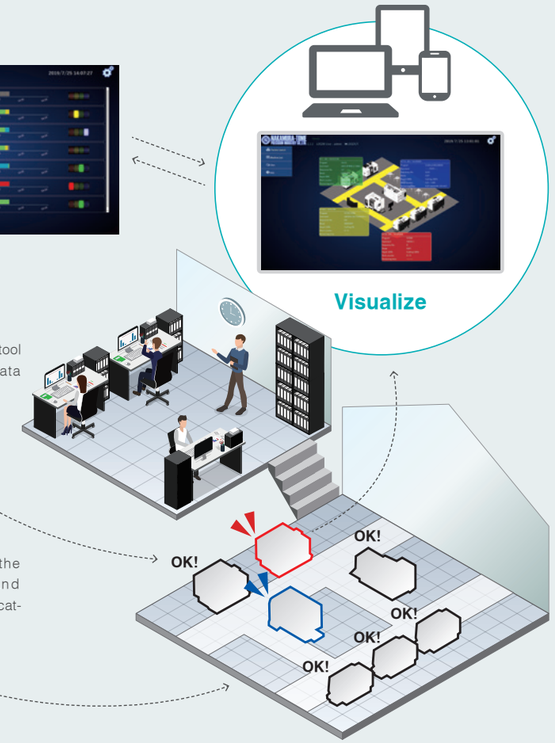
Real Time Monitoring of machine running conditions,
in addition to visualizing alarm history and past events.

■ 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 Navi AI

Feedback

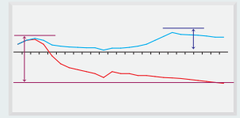
Standard for NT Smart X

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

Double safety features for maximum protection

NT Machine Simulation / NT Collision Guard + Airbag

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

NT Machine Simulation

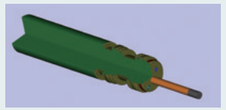
NT Machine Simulation is for Virtual Collision Checking of NC Programs without axis movement.

Image shown here is of a 2-turret machine

By checking in advance the chuck and the tool, the tool and the cover, etc. and checking the machining process etc., the risk of a machine collision when actually moving the machine can be reduced.

It can simulate while checking the remaining movement amount and modal information

It can override the settings for fast feed and cutting feed individually. Simulation by process, single feed is possible.



During part simulation, several display screens are available, such as tool view, turret view or machine view.

It can show or hide the machining program.
In addition, the display of the program is color-coded for each word, and this color scheme can be set arbitrarily from the option setting screen.

NT Collision Guard

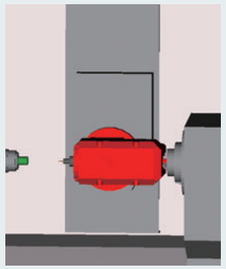
Preventive safety technology - Machine collisions are avoidable!

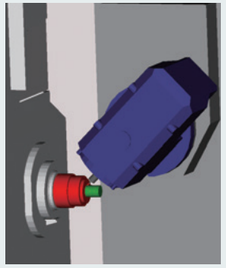
Image shown here is of a Tool spindle machine

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.

Tool 3D Model setup was simplified.

After turret rotation, the tool being indexed is read from the program, and the corresponding tool 3D model is automatically displayed, or can be changed from a pre-registered tool 3D Model list if necessary.





Airbag (Overload detection)

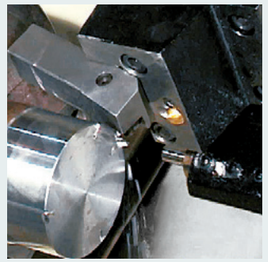
Compared to other machines, Nakamura-Tome machine will not break after the slightest collision. The "Airbag Function" minimizes the damage that may occur during a collision.

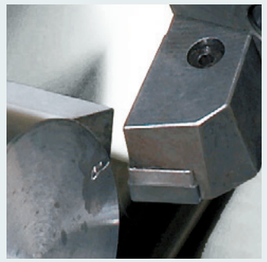
If a machine collision occurs, there is good reason to be assured: Airbag !

Barrier? Even with barrier function, machine collisions may occur

When the machine collision,there is no reason to panic. Nakamura-Tome is...

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





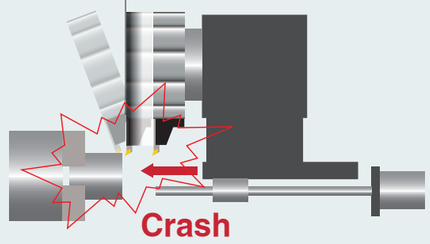
Without Airbag

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

With Airbag

Retraction within 0.001 sec

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



▲Video

* This feature does not mean zero impact

NT Work Navigator

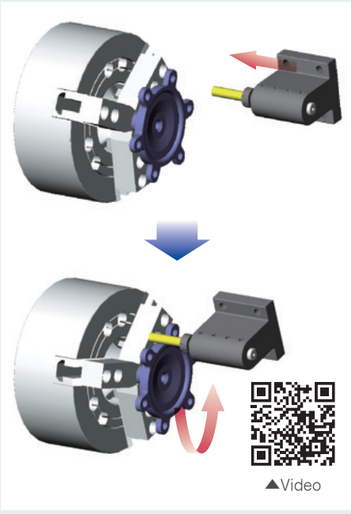
X Y Z B C

Advanced NT Work Navigator !

A new upgrade makes it possible to navigate with the X and Y-axes. Many parts with irregular outer surfaces, requiring coordinate recognition with X or Y-Axis, become within the range of NT Work Navigator.

No fi xtures required

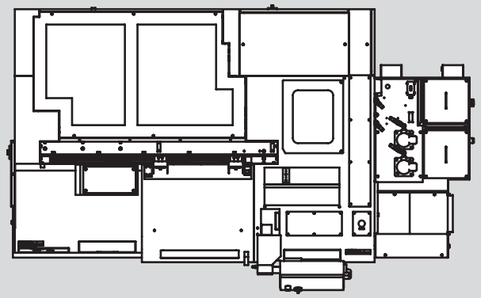
Machining parts with non-round shapes, such as forgings or castings requires that the raw part coordinates be recognized by the CNC control.
In order to achieve this without requiring extra cost or additional options, the NT Navigator is used.
It works just by touching the part with a simple inexpensive 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.

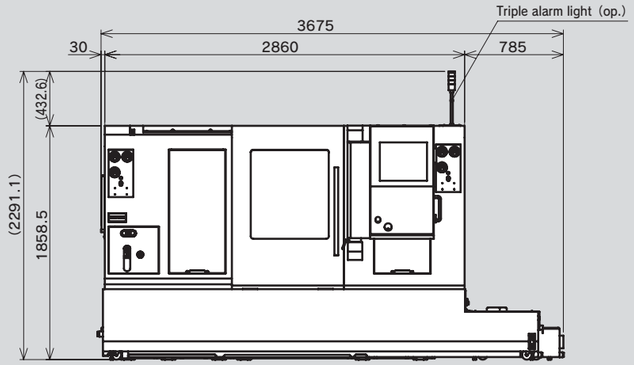


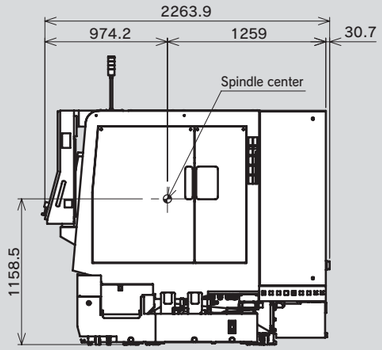
▲Video

WT-150II

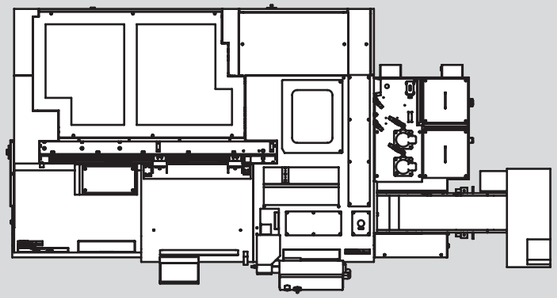
■ Standard

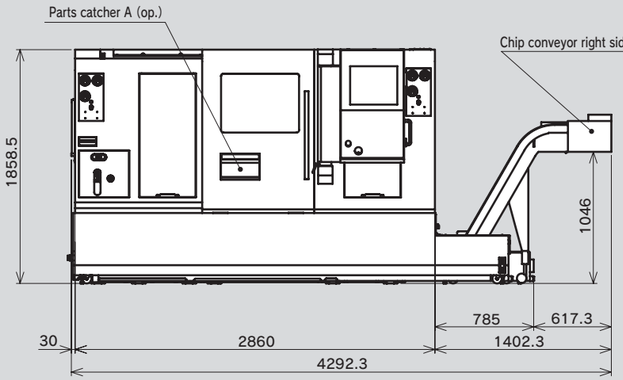


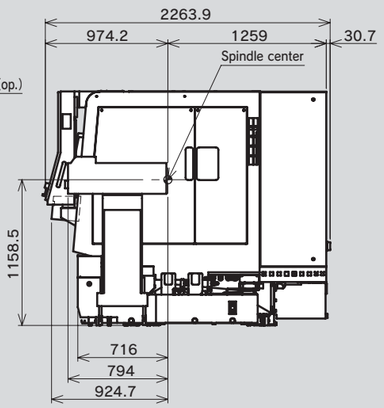




■ Chip conveyor right side outlet type







Multi-Turret Type Multi-Tasking Machine

WT Series

WT-100

WT-150II

WT-250II

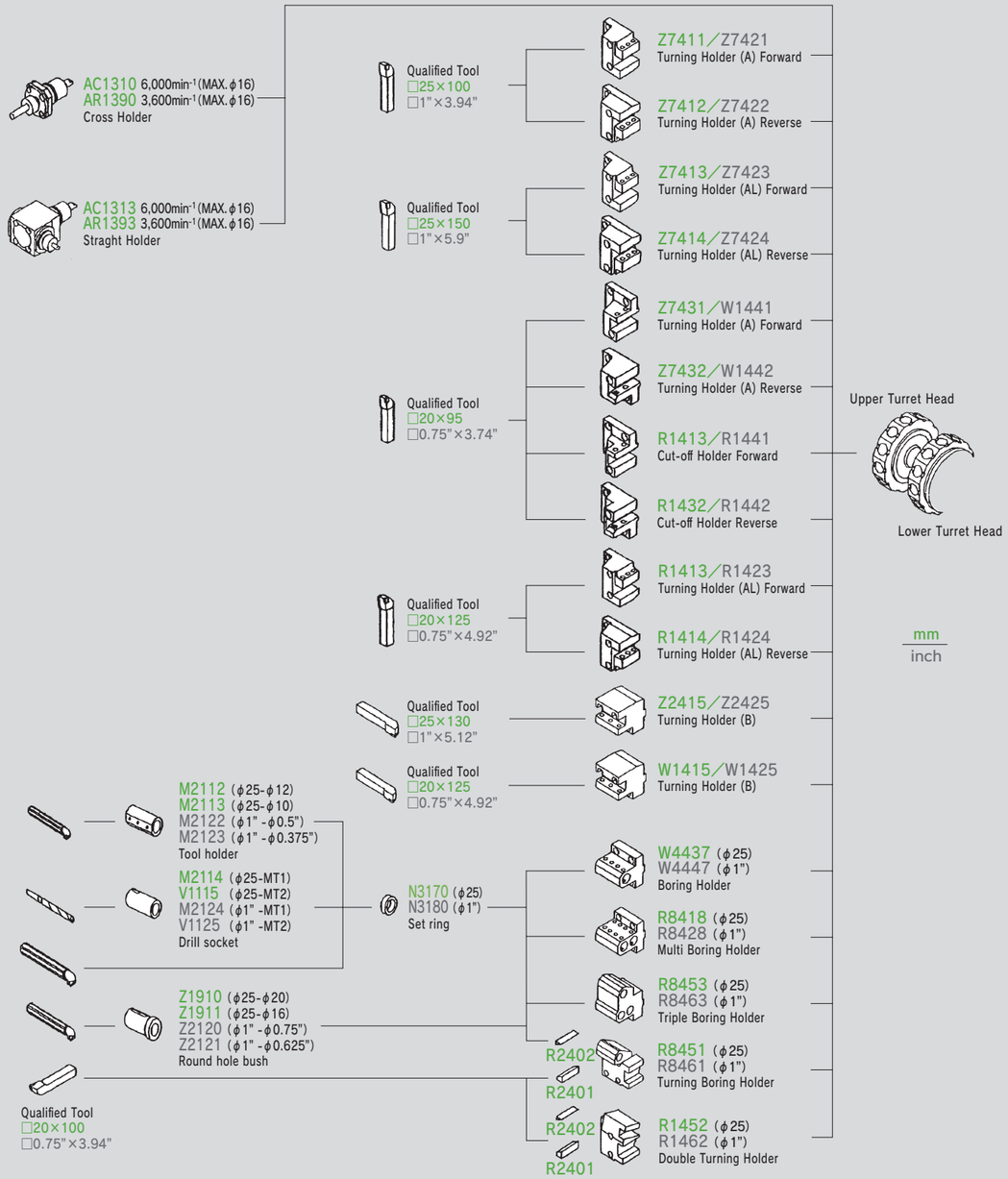
WT-300

ϕ42 ← Bar capacity → ϕ102

6” ← Standard Chuck size → 12”

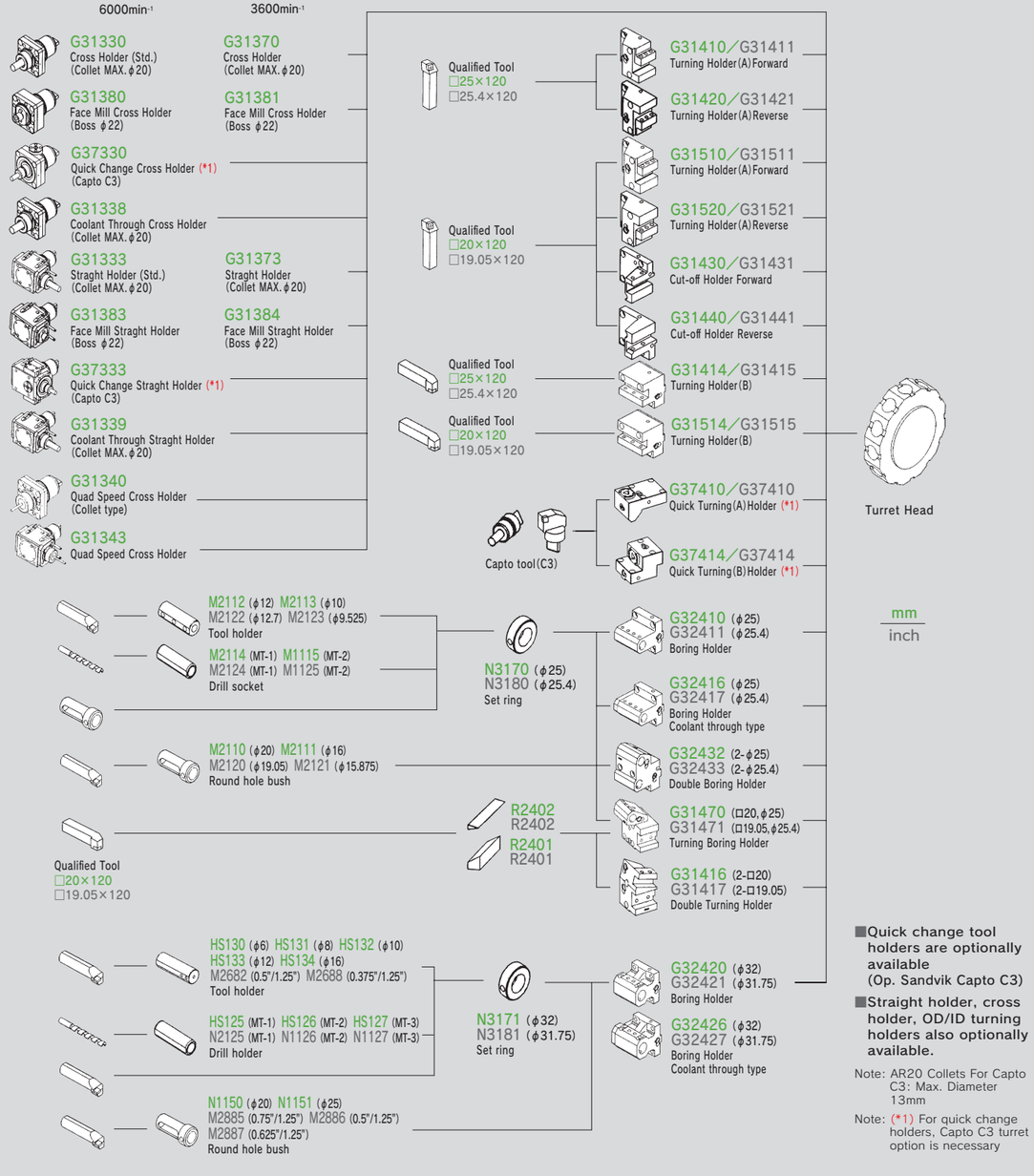
Tooling System Diagram

■ 5.5/3.7kW



Tooling System Diagram

■ 7.5/3.7kW



■Quick change tool holders are optionally available (Op. Sandvik Capto C3)

■Straight holder, cross holder, OD/ID turning holders also optionally available.

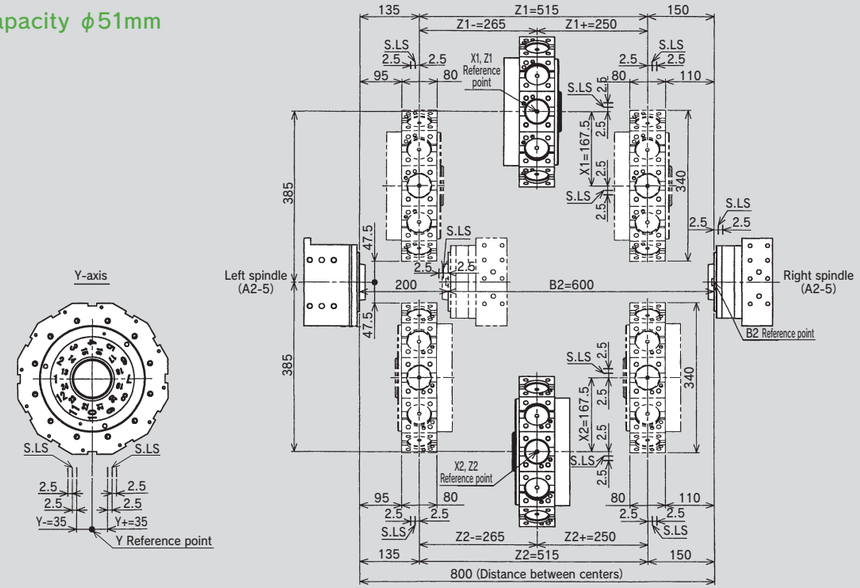
Note: AR20 Collets For Capto C3: Max. Diameter 13mm

Note: (*1) For quick change holders, Capto C3 turret option is necessary

Slide Travel Range

■ 5.5/3.7kW

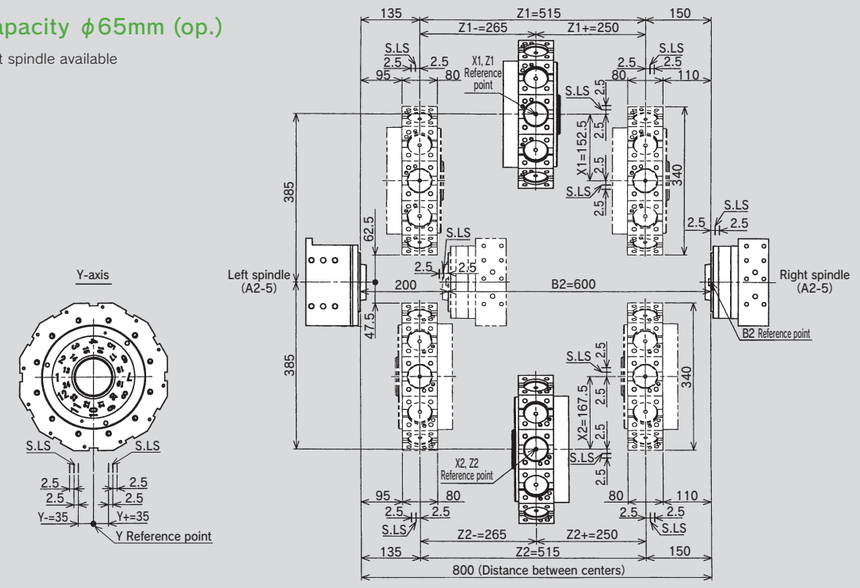
■ Bar capacity ϕ51mm



unit : mm

■ Bar capacity ϕ65mm (op.)

* ϕ65mm Left spindle available

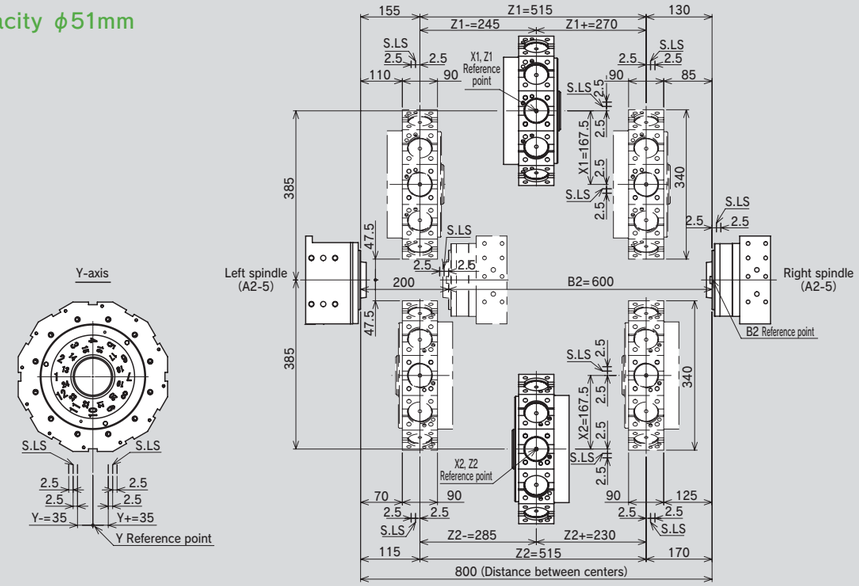


unit : mm

Slide Travel Range

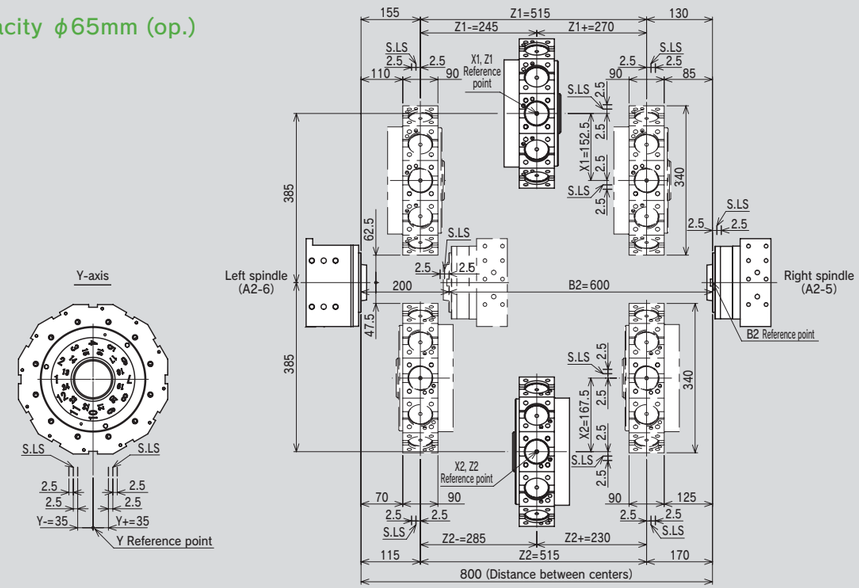
■ 7.5/3.7kW

■ Bar capacity ϕ51mm



unit : mm

■ Bar capacity ϕ65mm (op.)



unit : mm

Machine Specification

WT-150II

Capacity

	ϕ51	ϕ65 L spindie only
Max. turning diameter	190mm	
Standard turning diameter	170mm	
Distance between centers	max.800mm ／ min.200mm	
Max. turning length	515mm	
Bar capacity	51mm	65mm (op.)
Chuck size	165mm (6")	

Axis travel

Slide travel X1/X2	167.5mm/167.5mm	152.5mm/167.5mm
Slide travel Z1/Z2	515mm	
Slide travel Y (op.)	±35mm	
Slide travel B	600mm	
Rapid feed X1/X2	20m/min	
Rapid feed Z1/Z2	40m/min	
Rapid feed B axis	40m/min	
Rapid feed Y axis (op.)	6m/min	

Left and Right spindles

Spindle speed	5,000min^{-1}	4,500min^{-1}
Spindle speed range	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 index speed	600min^{-1}
Cutting feed rate	1 - 4800° /min
C-axis clamp	Disk clamp
C-axis engage time	1.5sec.

Upper and Lower Turrets

Type of turret head	Dodecagonal drum turret × 2
Number of tool stations	24station × 2
Number of indexing positions	24
Tool size (square shank)	□25mm
Tool size (round shank)	ϕ32mm

Rotating tools

Rotary system	Individual rotation
Spindle speed	6,000min^{-1} (Super Mill 6,000min^{-1} 3,600min^{-1})
Spindle speed range	Stepless
Number of driven-tool stations	12 × 2
Collet size	AR25, AR32
Holder type and tool size	Straight holder ϕ1mm - ϕ16mm ϕ1mm - ϕ20mm* Cross holder ϕ1mm - ϕ16mm ϕ1mm - ϕ20mm*

Drive motor power and torque

L-spindle	15/11kW 113.4/113.7/83.1N·m
R-spindle	11/7.5kW 89.1/83.2/56.7N·m
Rotating tools spindle (op.)	5.5/3.7kW 24/16N·m ×2 (Super Mill 7.5/3.7kW 40/16N·m)

General

Machine height	1,885.2mm
Floor space	3,674mm × 2,264mm
Machine weight	8,900kg

Power source

Power supply	51.0kVA (Depending on optional features)
Air supply	200NL/min, 0.5 - 0.7MPa
Hydraulic pump motor	2.2kW *
Oil temperature control motor	1.3/1.4kW *

* Super Mill only

- 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 purchase package. Please contact our local distributor and dealer for your specific requirements.

- **Precautions about the use of cutting coolant**

  Synthetic Coolants are Damaging to Machine Components
  Concerning the use of cutting fluids, cautions have to be taken on the type of coolant being used. Among coolants available in the market, some types are damaging to machine components and should be avoided. Typical damages are 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.

Control Specification

WT-150II

Items

Control Type	FANUC 31i-B 2-PATH

Controlled axes

Controlled axes Standard / Milling / Y-axes	5-axis / 7-axis / 8-axis
Simultaneously controlled axes (Standard)	2-axis (Upper X1, Z1) + 3-axis (Lower X2, Z2, B2)
Simultaneously controlled axes (Milling)	3-axis (Upper X1, Z1, C1) + 4-axis (Lower X2, Z2, C2, B2)
Simultaneously controlled axes (Y-axes)	4-axis (Upper X1, Z1, C1, Y1) + 4-axis (Lower X2, Z2, C2, B2)

Input command

Least input increment	0.001mm/0.0001inch (diameter for X-axis), 0.001°
Least command increment	X : 0.0005mm, Z : 0.001mm, C : 0.001° , B : 0.001mm
Max. programmable dimension dimension	±999999.999mm / ±39370.0787inch, ±999999.999°
Absolute / incremental programming	X, Z, C, B (absolute only) /U, W, 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 Z : 1 ～ 8000mm/min,0.01 ～ 314inch/min C : 1 ～ 4800° /min B : 1 ～ 8000mm/min,0.01 ～ 314inch/min feed / rev 0.0001 ～ 8000mm/rev 0.000001 ～ 50in/rev
Dwell	G04
Feed per minute / Feed per revolution	G98/G99
Thread cutting	G32F
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 acceleration/ deceleration after cutting feed interpolation	Standard
Rapid feed override	F0/25/50/100% (changeable to every 10% by switch)
Cutting feed-rate override	0 - 150% (each 10%)

NT-IPS

O/S	Windows XP Embedded
Pointing device	Touch pad

Program memory

Part program storage length	320m (for each turret)
Part program edit	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of registrable programs	500pcs (1 path 250 pcs each)
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)
Extended part program editing	Standard

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 re-composition	Standard
Sub program	Standard
Balance cut	G68, G69
Custom macro	Standard
Addition to custom macro common variables	Available (After addition, #100 - #199, #500 - #999)
FS15 tape format	Standard
Luck-bei II / NT Manual Guide i	Standard
Abnormal Load detection	Standard (Z-axes)
NT Work Navigator	Standard (not including contact bar)
NT NURSE	Standard

Machining support

Rigid tapping	Standard
Spindle synchronization	Standard
C-axis synchronization	Standard
Spindle orientation	Standard
NT Collision Guard	Standard

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Cat.No.0115E04011909N-1106