WT-100

One Hit Machining

Suitable for Small to Large Batch Production

High productivity

Top leader of one-hit machining

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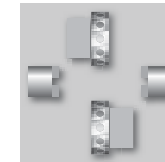One-hit machining
Less set up time

19″
Color LCD
Touch Panel

NT
Smart
X

$T_{\times 2}$ Double turret $M_{\times 2}$ Double Milling Motor Y Y-axis $S_{\times 2}$ Twin-Spindle $C_{\times 2}$ C-axes

Capacity

Max. turning diameter / Max. turning length	190mm / 503mm
Distance between spindles	max. 735mm / min. 210mm
Bar capacity	42mm
Chuck size	6" 165mm

Axis travel

Slide travel (X1 / X2)	135 / 135mm
Slide travel (Z1 / Z2 / B)	503 / 503 / 525mm
Slide travel (Y) upper turret	±31mm (op.)

Spindle L, R

spindle speed (max.)	6000min^{-1}
L spindle motor	11/7.5kW 75.4/38.6N·m
R spindle motor	11/7.5kW 75.4/38.6N·m

Upper turret

Number of turrets	1
Driven-tool speed	6000min^{-1}
Driven-tool motor	7.1/2.2kW 16/8N·m
Type of turret / Number of indexing pos.	Dodecagonal / 24
Drive type / Number of driven-tool stations	Individual rotation / 12

Lower turret

Number of turret	1
Driven-tool speed	6000min^{-1}
Driven-tool motor	7.1/2.2kW 16/8N·m
Type of turret / Number of indexing pos.	Dodecagonal / 24
Drive type / Number of driven-tool stations	Individual rotation / 12

General

Floor space	2,630mm × 1,623mm × 1,940mm
Machine Weight	5,700kg

WT-100

Machine Structure

48 stations
High-rigidity turret

Upper turret

Lower turret

Bar capacity   42mm

Spindle motor
11 / 7.5kW
75.4 / 38.6N·m
6,000min⁻¹

C-axis
C-axis synchronization control

Standard

Left Spindle
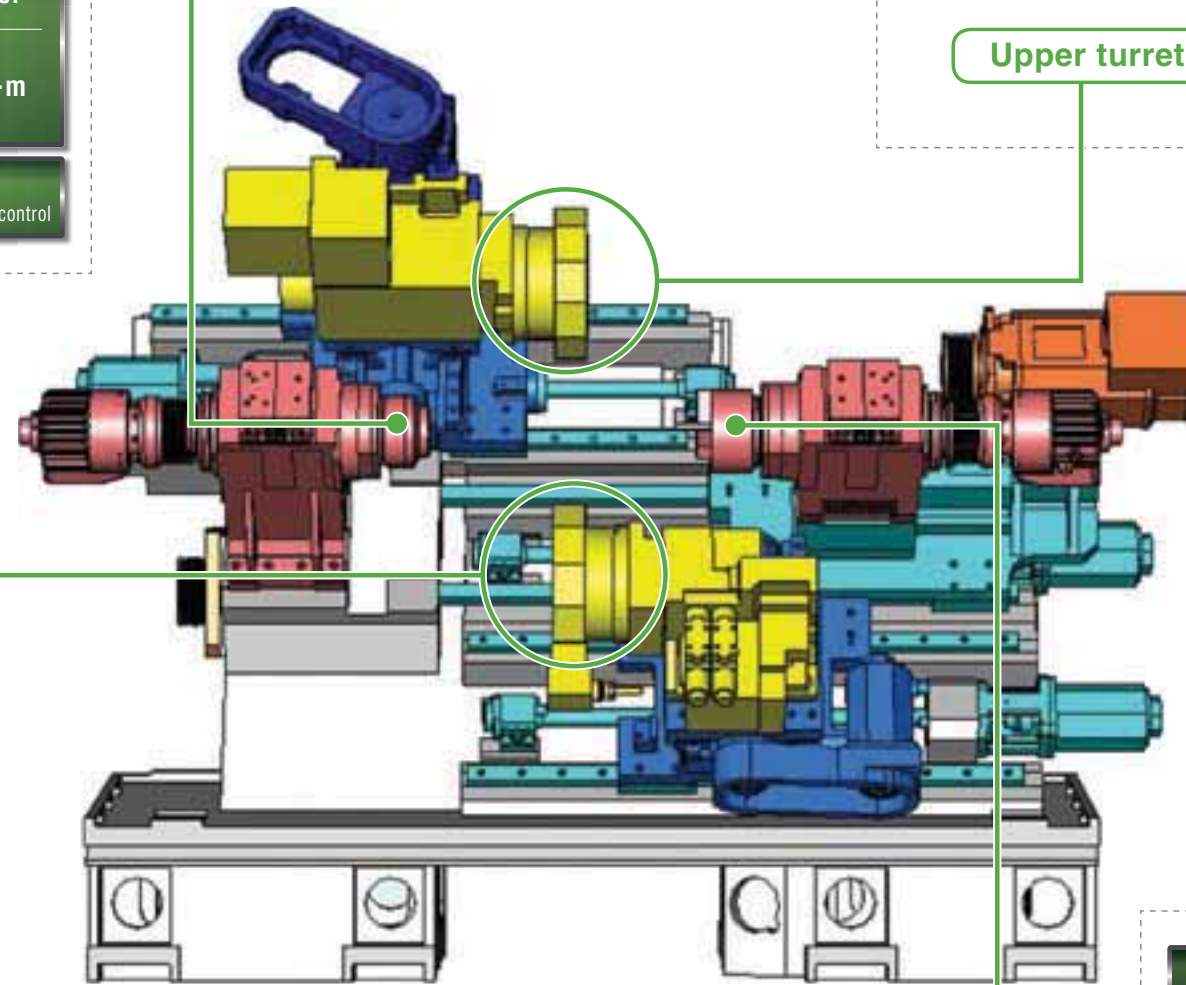
Dodecagonal / 24-station
Number of milling stations : 12
Servo-driven turret

Milling	7.1 / 2.2kW 16 / 8N·m 6,000min⁻¹

Y-axis stroke ±31mm

Standard

Upper turret

Lower turret

Dodecagonal / 24-station
Number of milling stations : 12
Servo-driven turret

Milling	7.1 / 2.2kW 16 / 8N·m 6,000min⁻¹

Standard

Right spindle

Bar capacity   42mm

Spindle motor
11 / 7.5kW
75.4 / 38.6N·m
6,000min⁻¹

C-axis
C-axis synchronization control

Standard

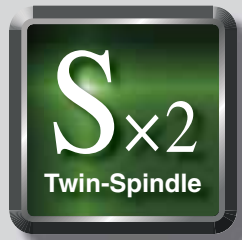| Parts catcher G		Option
Method		Swing / Hand
Workpiece size	Diameter [Dia.mm]	12 - 42
	Length [mm]	15 - 150
	Weight [kg]	1.5
Cycle time [sec.]		6.1
Ejecting method		Belt conveyor & Chute

Larger window ensures better visibility
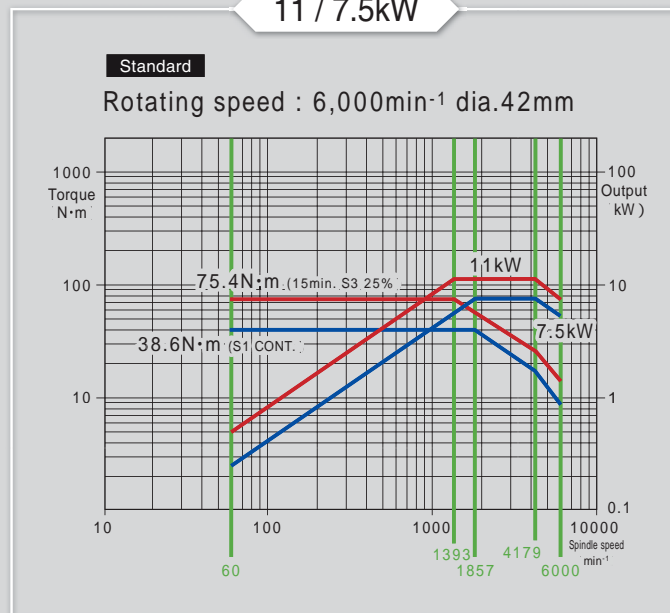
Reliable Covers

All moving units including the upper slide, lower slide and B-Axis unit, are equipped with top class stainless-steel covers and protective wipers, preventing cutting chip accumulation, and providing cover against cutting chips and coolant. The whole machining area is leakage-proof thanks to fully protective covering.

Machine Paint : Environment-friendly non-toxic high quality powder coating.
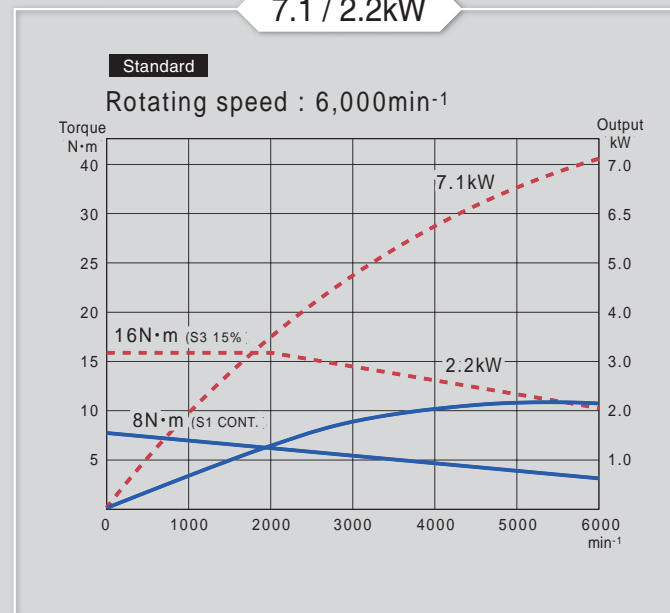
Combining Turning and　Milling

S×2
Twin-Spindle

M×2
Doubie Milling Motor

L/R Spindle motors

11 / 7.5kW

Standard

Rotating speed : 6,000min⁻¹ dia.42mm

75.4N·m (15min. S3 25%)
38.6N·m (S1 CONT.)
1.1kW
7.5kW

1000 Torque N·m / 100 / 10

100 Output kW / 10 / 1 / 0.1

10 / 100 / 1000 / 10000 Spindle speed min⁻¹

60 / 1393 / 1857 / 4179 / 6000

Driven-tool motor

7.1 / 2.2kW

Standard

Rotating speed : 6,000min⁻¹

Torque N·m / 40 / 30 / 25 / 20 / 15 / 10 / 5

Output kW / 7.0 / 6.5 / 5.0 / 4.0 / 3.0 / 2.0 / 1.0

7.1kW
2.2kW
16N·m (S3 15%)
8N·m (S1 CONT.)

0 / 1000 / 2000 / 3000 / 4000 / 5000 / 6000 min⁻¹

The left and right hand side spindles feature 11/ 7.5 kW high-output motors with a max. 75 N·m torque. This means that a round part with Dia. 48 mm × Length 110 mm can be reduced into cutting chips within 26 Seconds, or 2.3 parts can be turned in one minute.

Part size	Dia. 48 × 110 mm
Metal volume	199ml / Part
Material	S45C (JIS)
Cutting depth	4mm
Feed rate	0.6mm/rev
Cutting Speed	250m/min

Shaft work clamped with both chucks, can be turned with synchronized spindles, with up to 22/15KW cutting power.

Flexibility

Whether it is shaft work, bar work, or chuck work, the most suitable machining for various types of materials can be done in one-chucking.
Get maximum productivity from a machine requiring a compact space

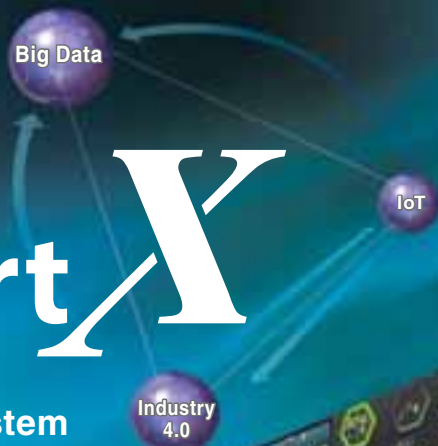Upper-Left / Lower-Right

Transfer

Upper-Right / Lower-Left

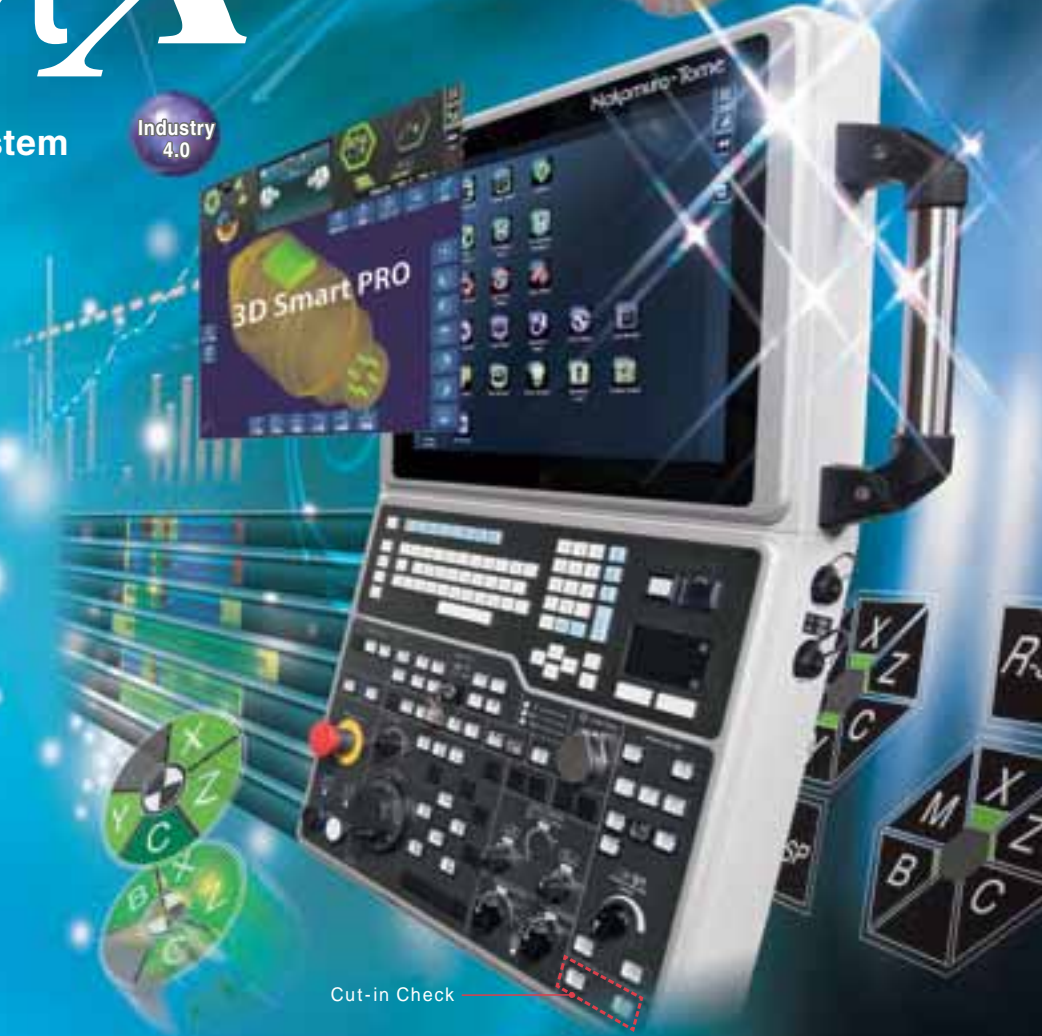Left hand side 4-axis turning

Right hand side 4-axis turning

Milling

NT Smart X

Big Data

IoT

Industry 4.0

Advanced Production System

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

3D Smart PRO

Cut-in Check

• 19 inch color LCD Touch panel • PC memory 8GB • QWERTY Key board • Windows 8.1 • Touch Pad • USB 2.0 port × 2

Program storage length	Total 256Kbyte (640m)	Total 512Kbyte (1,280m)	Total 1Mbyte (2,560m)	Total 2Mbyte (5,120m)	Total 24Mbyte (10,240m)	Total 28Mbyte (20,480m)
Program registered number	Total 500	Total 1,000	Total 1,000 or Total 2,000	Total 1,000 or Total 4,000		
Tool offset pairs	99 + 99					

Standard / Option

Start Up Conditions [UPPER]

W301 : FRONT DOOR IS NOT CLOSED.
W303 : RETURN THE Y-AXIS ZERO POS.
W304 : M0-SETTING OF PROGRAM NO SEARCH
W306 : TURRET IS NOT CLAMPED
W307 : INTERLOCK OF THE BAR-FEEDER
W331 : TOOL IS NOT CLAMPED(TOOL-SPINDLE)

Update   Close

Cycle start condition is popping up by pressing reference position LED.

Color of perimeter becomes white when override setting is 100%.

Driven-tool Rotating Speed

Waiting tool number for upper turret

Spindle Status
Selected head shown in blue color

Work counter
Remaining count
Value

Turret status display

Machine status display

Load status display

Reference position LED

→ Blue : Index ready
→ Green : Reference position return
→ Green Flashing : 2nd Reference position return
→ Blue : Cycle start ready

Spindle RPM

Waiting tool number for lower turret

Operating status display
• Green : Automatic operation
• White : Feed hold
• Yellow : Warning
• Red flashing : Alarm

Blank

Middle pf process

Part complete

Remnant

Quill

Tool number is displayed during automatic cycle.

T 0101

Auxiliary information display
Counter and Remaining counter information are displayed. Ticker can be stopped by touching the screen.

Shortcut bar
Most used Icons can be registered at right side of display.

Spindle load meter
• Red : 120% -
• Yellow : 100% -120%
• Green : 0 -100%

Load meter
• Red : 120% -
• Yellow : 100% -120%
• Green : 0 -100%

Coolant status

Automatic mode

Manual mode

Manual mode

Main features

- 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 (op.)
- Parts Catcher G Operation Function (op.)
- NT Machine Simulation
- NT Collision Guard
- NT Multitasking Office (op.)
- Net Monitor (op.)
- 3D Smart PRO

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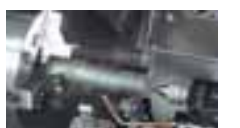
- It is available for Z axis and B2 axis.
- Quill thrust force can be changed in the program.
- It is possible to set OK/ NG range as well.

Dual safety

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.
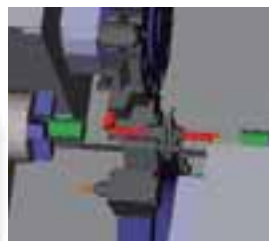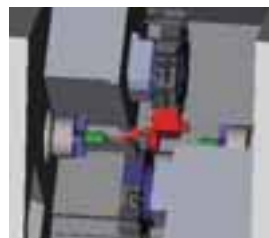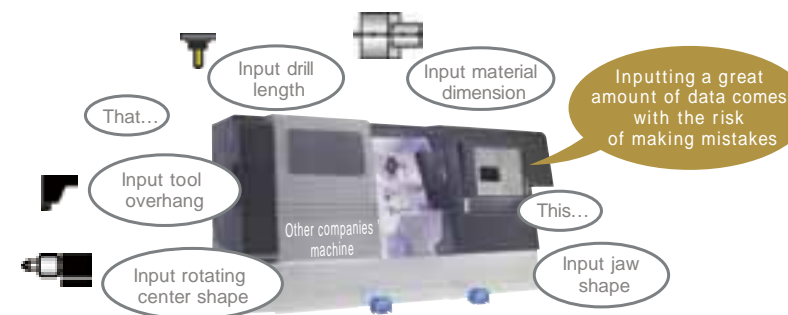
Airbag (Overload detection)

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.

Input drill length

Input material dimension

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

That...

Input tool overhang

This...

Other companies' machine

Input rotating center shape

Input jaw shape

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.
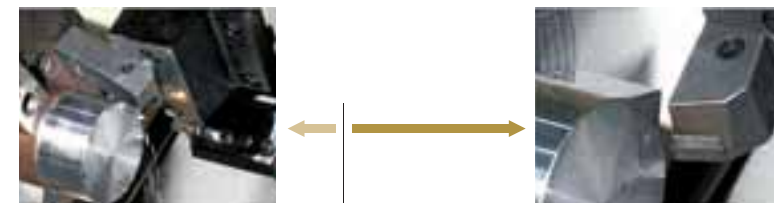
Without Airbag
Machine will not be stop immediately. The slide continues to move even after collision.

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.
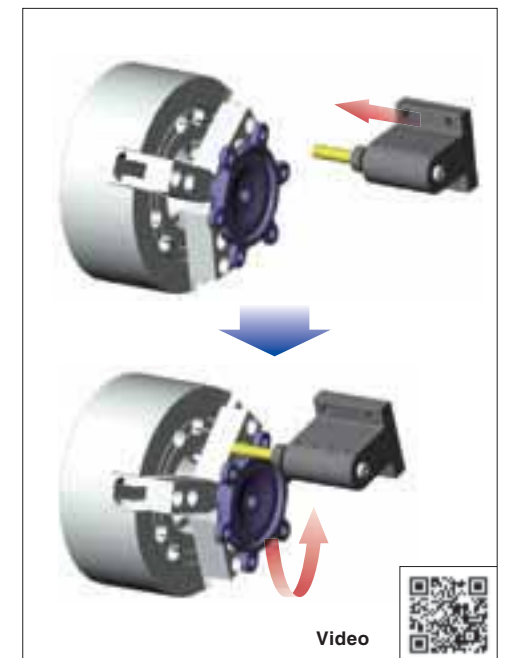
Video

Slide Travel Range

367.5
Z1-=251.5 Z1+=251.5
2.5 2.5 62 2.5 2.5
S.LS S.LS
Z1 Reference point
X1 Reference point
S.LS
X1=135
340
169
340
X2=135
2.5
Left spindle A2-5
B2 Reference point
Right spindle A2-5
X2 Reference point
Z2 Reference point
2.5 2.5
S.LS
B2=525
MAX.735
2.5 2.5
S.LS
2.5 2.5 62 2.5 2.5
S.LS S.LS
Z2-=251.5 Z2+=251.5
367.5

Y Reference point
2.5 2.5
2.5 2.5
S.LS S.LS
Y+=31 Y-=31
-axis Stroke (op.)
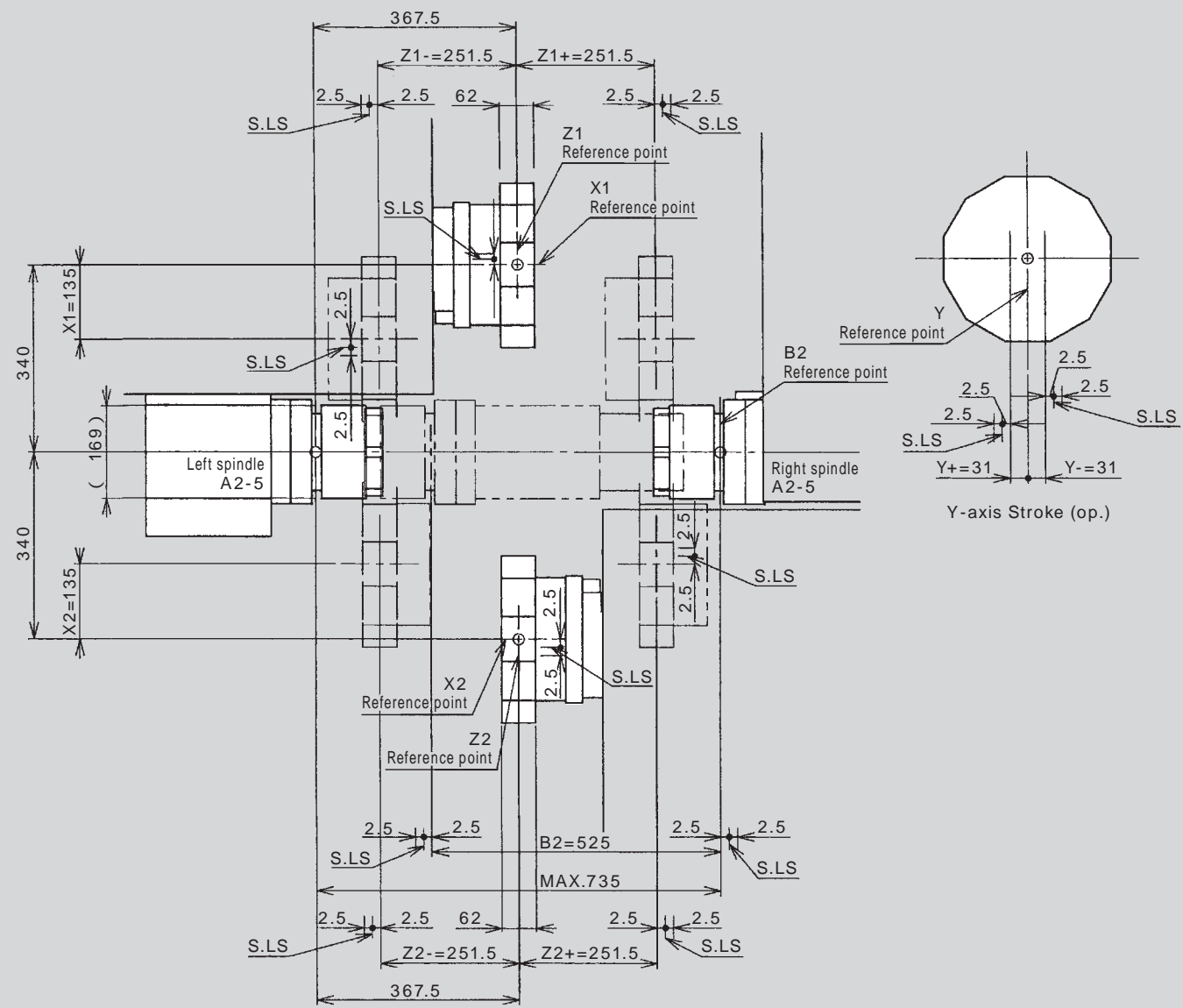
unit : mm

Tool Interference

485
Tool clearance
340
230
110
150
80
90
90
460
450
90
90
80
90
80
190
Max. turning diameter
165
6" chuck
135
5" chuck
ST135
120
190
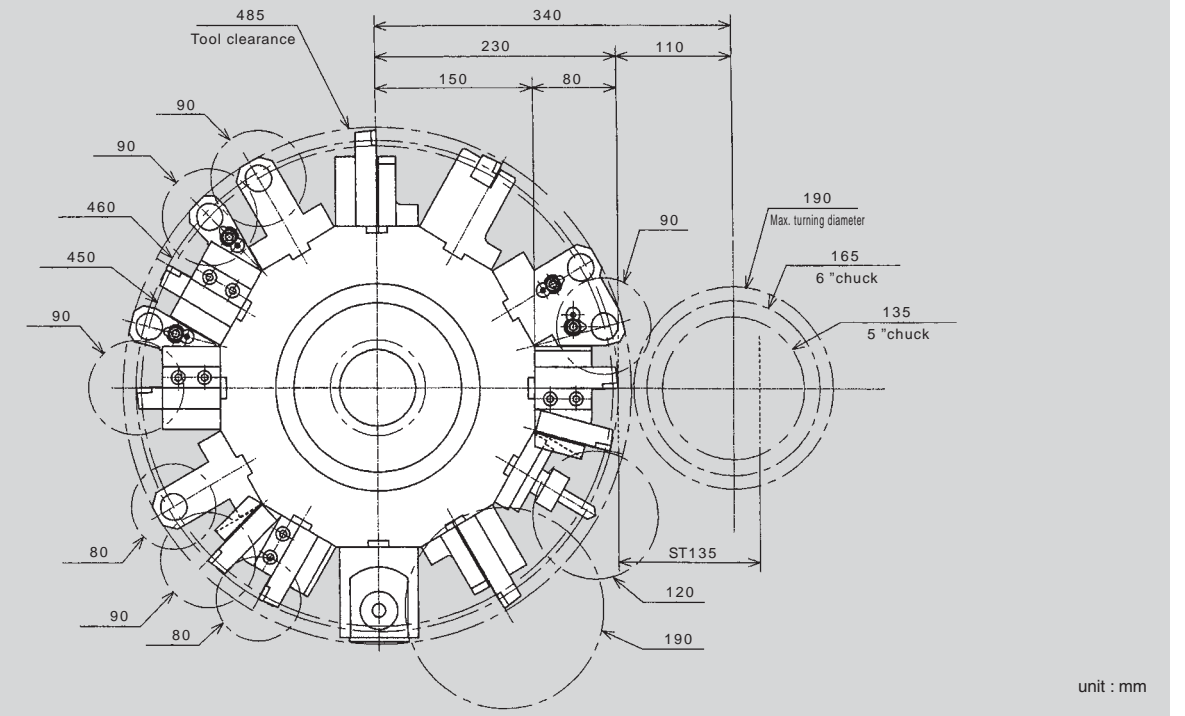
unit : mm

Machine Dimensions

Front and Side Views of WT-100 with Chip conveyor

Chip conveyor (op.) (Installed at the side of the machine)
1031.5
2300
3672
431
2371
1940
1100
Signal tower (op.) (3 indicators)
Spindle center
High pressure coolant pump (op.) (GRUNDFOS)
Parts Catcher A (op.) (Carrying workpieces outside machine)
563.6
1733
64
1672.6
1923
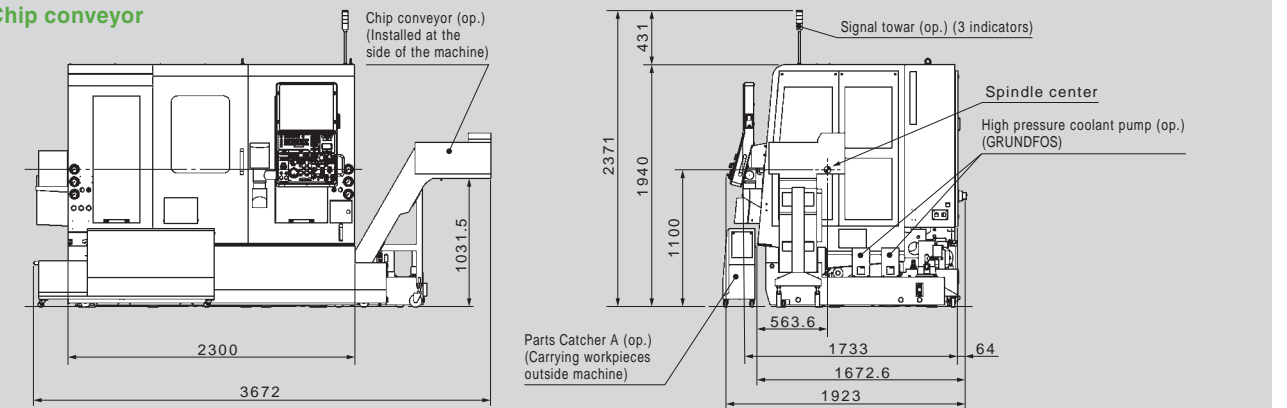
unit : mm

WT

2 Turret
2 Spindle

SERIES

WT-100   WT-150II   WT-250II   WT-300

42 Standard Bar Capacity 102

6" Standard Chuck Size 12"

C26330
Cross Holder
Max. 13)

F26333
Straight Holder
Max. 13)

Qualified Tool
20× 90
19.05× 90

Qualified Tool
20× 90
19.05× 90

M2112 25- 12
M2113 25- 10
M2122 25.4- 12.7
M2123 25.4- 9.525
Boring Bar Holder

N3170 25
N3180 25.4
Set Ring

M2110 25- 20
M2111 25- 16
M2120 25.4- 12.7
M2121 25.4- 15.875
Tool Bush

Qualified Tool
16× 80
15.875× 80

W145103

W145102

A1021201-01
A1022201-01
Turning Holder (AL) Forward

A1111201-01
A1112201-01
Cut-o Holder Forward

A1221201-01
A1222201-01
Turning Holder (AL) Reverse

A1311201-01
A1312201-01
Cut-o Holder Reverse

A1061201-01
A1062201-01
Double Turning Holder (ALD)

A1041202-01
A1042202-01
Turning Holder (B)

A1411252-01
A1412252-01
Boring Holder
(25)(25.4)

A1411252-12
A1412252-12
Boring Holder
(Coolant through)
(25)(25.4)

A1431251-01
A1432251-01
Double Boring Holder (B)
(25)(25.4)

A1101251-01
A1102251-01
Turning Boring Holder (ALS)
(16 25)(15.875 25.4)

A1081161-01
A1182161-01
Quadruple Turning Holder (AL)
(16)(15.875)

Turret Hoad

Metric
Inch

24ST

Capacity

Max. turning diameter	190mm
Standard turning doameter	170mm
Distance between spindle noses	max.735mm / min.210mm
Max. turning length	503mm
Bar capacity	42mm
Chuck size	165mm (6")

Axis travel

Slide travel (X1/X2)	135mm
Slide travel (Z1/Z2)	503mm
Slide travel (Y)	±31mm (op.)
Slide travel (B)	525mm
Rapid feed X1/X2	16m/min
Rapid feed Z1/Z2	40m/min
Rapid feed B axis	40m/min
Rapid feed Y axis	6m/min

Left spindle Right spindle

Spindle speed	6,000min⁻¹
Spindle speed range	Stepless
Spindle nose	A2-5
Hole through spindle	56mm
Front bearing I.D.	80mm
Hole through draw tube	43mm

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 & Lower turrets

Type of turret head	Dodecagonal drum turret
Number of tool stations	12 station
Number of index positions	24
Tool size (square shank)	20mm
Tool size (round shank)	25mm

Rotating tool

Rotary system	Individual rotation	
Spindle speed	6,000min⁻¹	
Spindle speed range	Stepless	
Number of rotation tool station	12 × 2	
Tool shank	Straight holder	1mm - 13mm
	Cross holder	1mm - 13mm

Drive motor

Left spindle	11/7.5kW 75.4/38.6N·m
Right spindle	11/7.5kW 75.4/38.6N·m
Driven tools	7.1/2.2kW Max16N·m

General

Machine height	1,940mm
Floor space	2,630mm × 1,923mm
Floor space	3,672mm × 1,923mm *1
Machine weight	5,700kg

Power requirements

Power supply	32.7kVA
Air supply	150 - 200NL/min, 0.5 - 0.7MPa

*1) including right side chip conveyor

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.

items

Control type	FANUC 31i-B 2CPU 2-PATH

Controlled axes

Controlled axes	7axes
Simultaneously controlled axes	Upper turret : 3axes / X1, Z1, C1 (C2)
	Lower turret : 4axes / X2, Z2, C2 (C1), B2

Input command

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

Feed function

Cutting feed	feed/min X : 1 - 4800mm/min , 0.01 - 188inch/min
	Z : 1 - 4800mm/min , 0.01 - 188inch/min
	C : 1 - 4800degree/min
	B : 1 - 4800mm/min , 0.01 - 188inch/min
	feed/rev : 0.0001mm/rev - 4800mm/min approx.
	0.000001inch/rev - 188inch/min approx.
Dwel	G04
Feed per minute / Feed per revolution	G98 / G99 (feed per rev. for rotating tool will be available from end of December, 2004)
Thread cutting	G32 + F (for rotating tool will be available from end of December, 2004)
Thread cutting retract	Standard
Continuous thread cutting	Standard (for rotating tool will be available from end of December, 2004)
Variable lead threading	G34 (for rotating tool will be available from end of December, 2004)
Handle feed	Manual pulse generator 0.001 / 0.01 / 0.1mm (per pulse)
Automatic acceleration/decelaration	Standard
Linear accel./decel. After cutting feed interpolation	Standard
Rapid override	F0, 25%, 50%,100% (changeable to every 10% by switch)
Cutting feed override	0 - 150% (each 10%)
AI contouring control I	G5.1

Programming functions

Part program storage length	640m (for each turret)
Part program editing	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of registerable programs	500programs (for each turret)
Program storage memory	Backed up by battery
Malutiple 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	Available

Operation&display

HMI (Human Machine Interface)	NT Smart X
Operation panel: Display	19" color SXGA LCD touch panel
Operation panel: Keyboard	QWERTY keyboard

Programming assist function

Circular interpolation R programming	Standard
Direct drawing dimension programmingor Chamfering/Corner R	Standard (Direct drawing dimension programming is standard)
Canned cycle	G90, G92, G94
Maltiple repeatitive canned cycle	G70 - G76
Maltiple repeatitive canned cycle II	Standard (G71, G72)
Canned cycle for drilling	G80 - G89
Axis recomposition	Standard (for L side C-axis control from lower side)
Sub program	Standard
Balance cut	G68, G69
Custom macro	Standard (common variable#100 - #149, #500 - #549)
Addition to custom macro common variables	Standard (After addition, #100 - #199, #500 - #999)
FS15 tape format	Standard
Luck-bei II / NT Manual Guide i	Standard
NT Machine Simulation Function	Standard
Mechanical error compensation	Standard
NT work navigator (torque type)	Standard (not including contact bar)
NT Nurse	Standard
NT Collision Guard	Standard

Machine Assist Function

Rigid type	Standard
Spindle synchronised control	Standard
C axis synchronised control	Standard
Spindle orientation	Standard

NT Smart X

O/S	Windows Embedded 8.1 Industry Pro
Pointing device	Touch pad
Memory	8GB

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