SC-100X^2

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

Fast Machining, Fast Setup, Fast Programming for Simple Multitasking Production

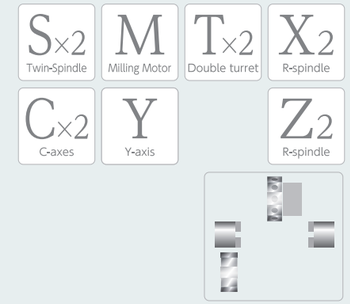
Born to be fast

Innovative Technology
～ Creating new values ～

SC-100X²

1. Two Tools in Cut
2. Lower turret + two-axes on R-spindle
3. Easy to use Superimposed Cycle

- L-spindle Bar Capacity dia.51mm / 6,000min^{-1}
- R-spindle Bar Capacity dia.42mm / 6,000min^{-1}
- Milling and Y-axis are Standard
- 11/7.5kW L-spindle motor
- 7.5/5.5kW R-spindle motor
- 7.1/2.2kW Milling motor / Max. speed 6,000min^{-1}
- Turret Hand Unloading Gripper on Lower Turret
- Recovery of lubrication oil (*Standard spec.)
- Environment-Friendly Inverter type hydraulic unit



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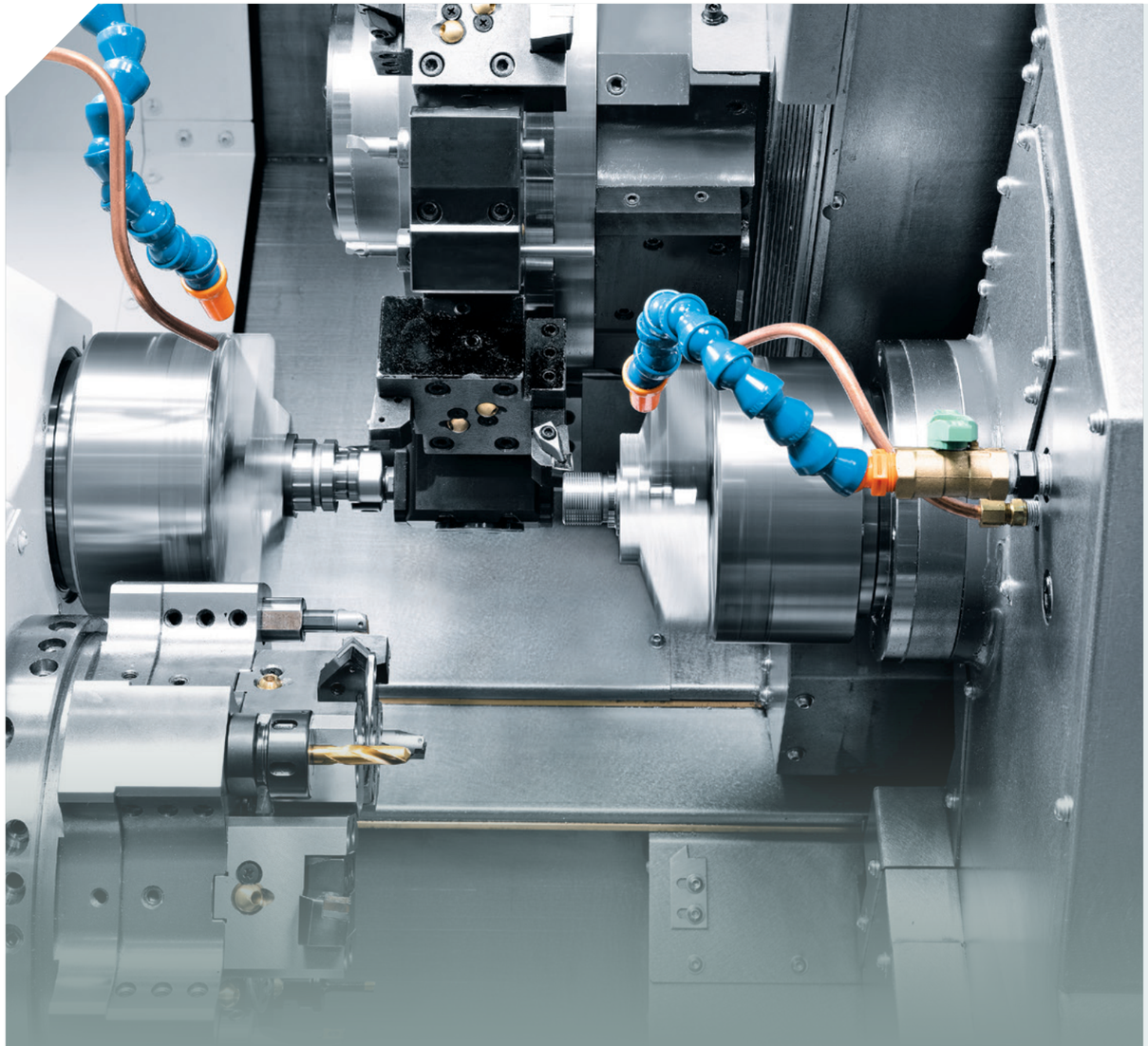


Make it Fast !!

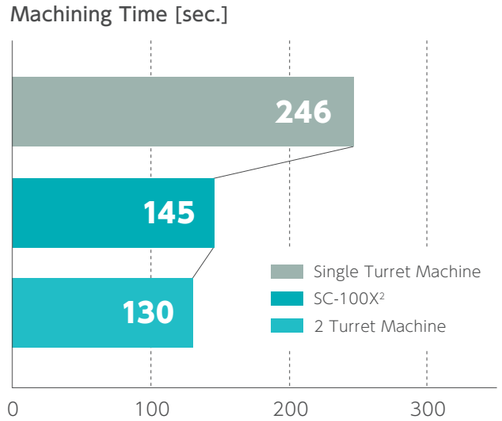
High speed one hit machining.
High efficiency manufacturing.

High Productivity

High value parts manufacturing with extra new features

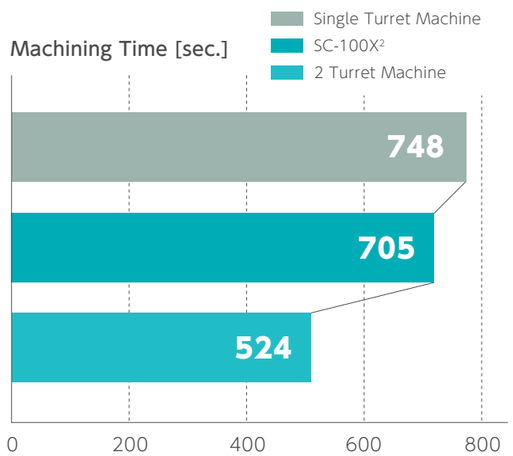
Parts Sample

Material	SCM415
Material Size	ϕ50mm×L80mm
Machining Time	145 sec.



Universal Joint

Material	SUS303
Material Size	ϕ40mm×L100mm
Machining Time	705 sec.

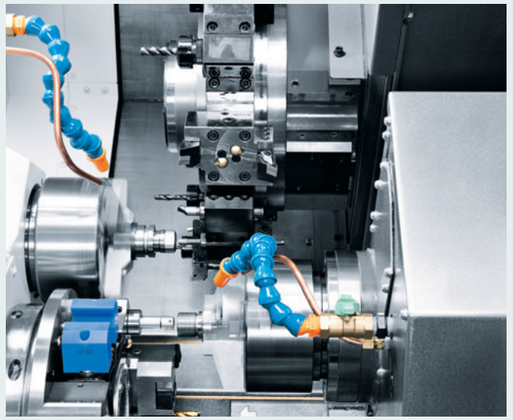


※Depending on changes in cutting conditions and/ or user environment, obtained results may be different.

Fast Machining, Fast Setup, Fast Programming for Simple Multitasking Production

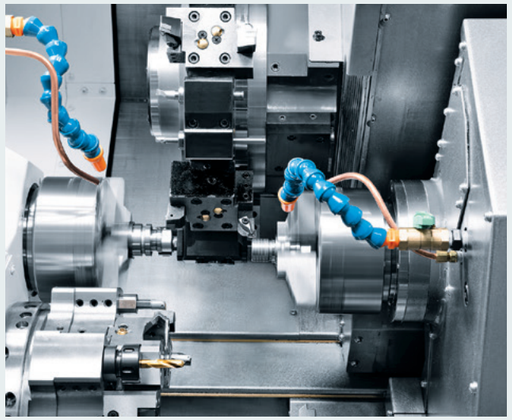
Fast Machining

2 Tools in Cut



Lower Turret
Max. 9 Stations without Milling function
+ Unloading Gripper

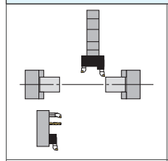
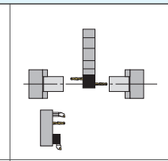
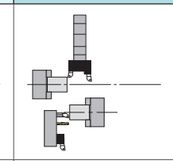
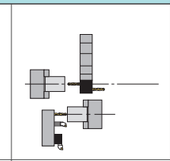
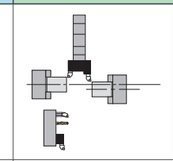
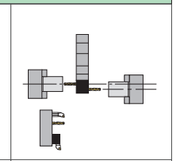
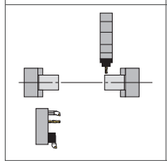
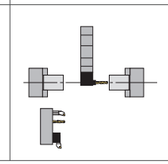
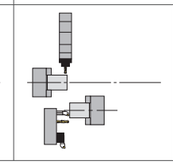
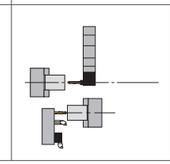
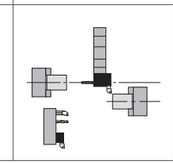
Superimposed Machining



Superimposed cycle is simultaneous machining through overlapping control between L-spindle and R-spindle.

Machining capability

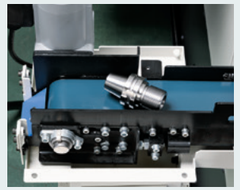
With the addition of new features such as the R-spindle and lower turret, the machine can perform various operations.

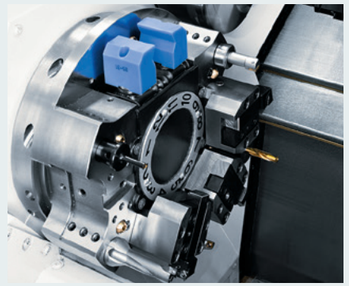
one-tool in cut	two-tools in cut	
Right spindle cutting with Upper Turret	Simultanious cutting	Superimposed cutting
		
		
		
		

Unloading Gripper with Built-in Parts Conveyor (Standard)

Unloading gripper is mounted on lower turret.
It is suitable for bar work automation.

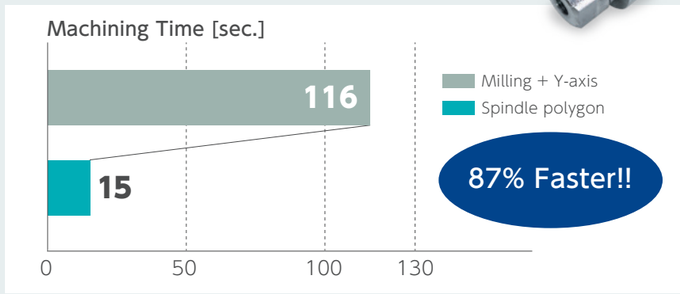
Workpiece size	Diameter	ϕ15mm～ϕ51mm
	Length	30mm～100mm
	Weight	0.1kg～1.5kg

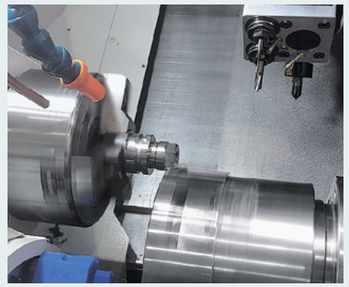




Spindle Polygon Turning Function

Faster than with milling and Y-axis

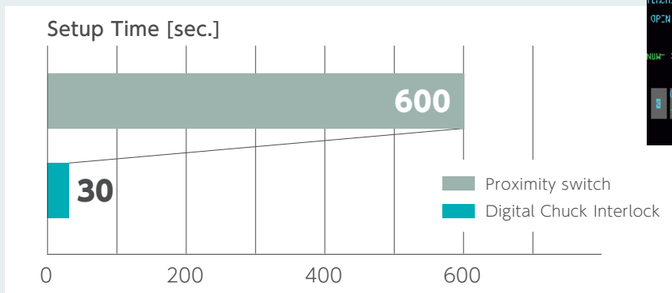


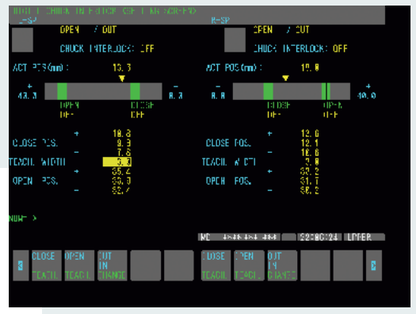


Fast & Easy Setup

Digital Chuck Interlock(Standard)

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





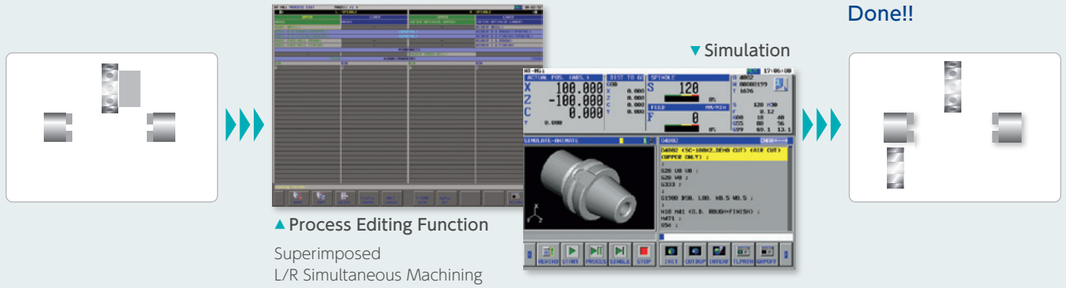
Fast Machining, Fast Setup, Fast Programming for Simple Multitasking Production

Fast & Easy Programming

Nakamura-Tome Original Unique Software featured as standard

Easy Process Edit (Standard)

Single Turret Program → Process Edit → Multi-Turret Program Done!!



▲Process Editing Function

Superimposed
L/R Simultaneous Machining

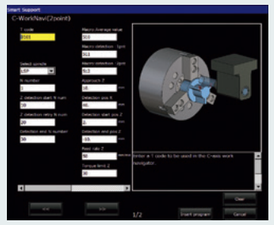
Nakamura-Tome Unique Software Technology is to support the programming.
Multi-Turret program can be programmed easily like a single turret program.
It can be converted from single-path program to multi-path program by drag-and-drop.

Nakamura-Tome Intelligent Software

NT Thermo Navigator AI

Thermal Compensation system using AI.
Time and measured dimension data are input into dedicated.
AI learning software, to build an optimized thermal growth compensation model.

※The screen image is from NT SmartX



Smart Support

Thermal Compensation system using AI.
Time and measured dimension data are input into dedicated.
AI learning software, to build an optimized thermal growth compensation model.

NT Smart Sign Connect with the factory, visualization of the site

■ 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.

■ Diagnostics

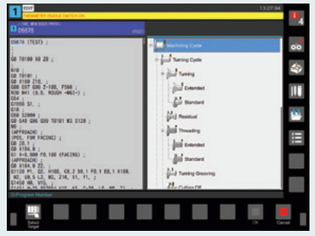
Diagnose problems with the machine servo drives and spindle drives, using dedicated program.

User Friendly Operation Panel

FANUC 0i-TF Plus with iHMI
15 inch touch screen control

User Friendly Interface for Easy Programming

Possible to make program faster by using convenient functions such as Copy & paste, Re-do, Font change, Color change, Calculation for cutting conditions etc.



Maintenance management

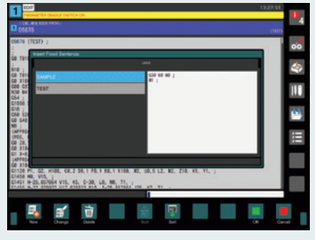
Easy to monitor the fans, Battery status. Customizable for regular maintenance management.

Servo viewer

Make more efficient cutting conditions by monitoring the spindle/servo motors.

Quick MDI

Short cut can be created for codes that are frequently used.



Manual in the control

All the manual can be checked through the control panel.

Calendar

Possible to do quick and easy scheduling in front of the machine.

■ L-spindle ϕ51

L-spindle motor	*11/7.5kW 6,000min⁻¹*

■ R-spindle ϕ42

R-spindle motor	*7.5/5.5kW 6,000min⁻¹*

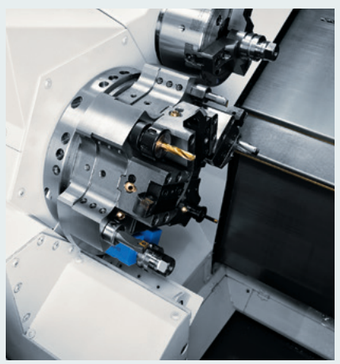
■ Upper Turret

Type of turret head	*Dodecagonal drum turret*
Number of indexing positions	*24*
Y-Axis slide travel	*±40mm*
Type of turret head	*7.1/2.2kW 6,000min⁻¹*

■ Lower Turret

Type of turret head	*Flexible special design turret*
Number of indexing positions	*12※*

※3 station used for gripper



15 inch touch screen control

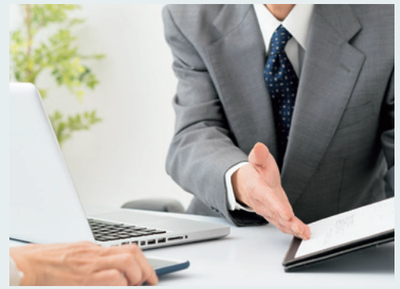
Nakamura-Tome FANUC(0i-TF PLUS)
Essential functions for multitasking machine is standard.

Unloading Gripper with Built-in Parts Conveyor (Standard)

Maintenance Friendly Cover Design

Various Options to Meet Customers Needs. Total Provider of Peripheral Equipment.

Whether it is machine set up, cutting chip management, higher efficiency or improved productivity, Nakamura-Tome offers top class peripheral equipment, which boosts the performance of our Multitasking Machines. As a total solution provider with a vast experience, Nakamura-Tome offers complete solutions, including Multitasking Machines complemented with a variety of peripheral equipment.



Tool setter

Liquid level detection

Duct for Oil Collector

Coolant pump

and many others ...
For not Listed Items, please contact your Nakamura-Tome representative.

Featuring Functions to Make Efficient Programs, Faster

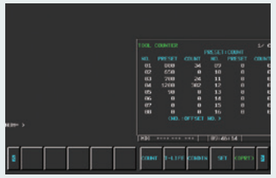
Advanced NT NURSE

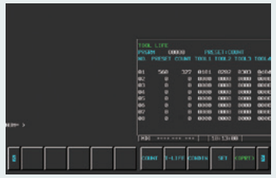
※Depending on machine specifications, some functions are not available.

All-in-one software!

NT Nurse is software that provides the operator with user-friendly support for operation, programming and production on the machine. Among vital features are phase recognition (a must for multitasking), direct chucking to prevent positioning error during transfer, and perfect synchronization of the left and right hand spindles. Among other features, are the load monitor for detecting tool wear and tool breakage, tool life management, operation condition monitoring, in addition to many other features to simplify programming, set up, operation and production, all offered in one single package.

Useful functions


Tool Counter


Tool Life

Operation Condition of each Tool

Energy Saving

* The screen image is from NT SmartX

Airbag (Overload detection)

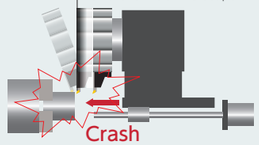
When the machine collides, there is no reason to panic.

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

Without Airbag
Machines will not stop immediately. The slide continues to move even after a collision.

With Airbag
Retraction within 0.001 sec
Crash ! Within 1 millisecond after the crash, servo motor-feeding direction is reversed and the machine stops in EMG mode.

Barrier?
Even with barrier function, machine collisions may occur



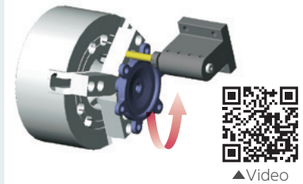
▲Video

* This feature does not mean zero impact

NT Work Navigator

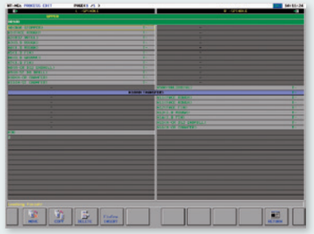
No fixtures required

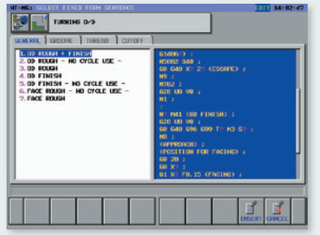
Machining parts with non-round shapes, such as forgings or castings require that the raw part coordinates be recognized by the CNC control.
In order to achieve this without requiring extra cost or additional options, the NT Navigator is used.
It works just by touching the part with a simple inexpensive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

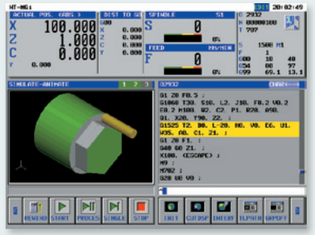

▲Video

NT Manual Guide i (LUCK-BEI II) — Option

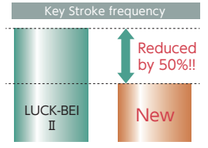
A programming guidance system with the ability to generate NC programs (ISO/EIA G-code programs) easily. Processes created in conversational mode can be cut, copied or moved ensuring flexibility. Additionally, several cycles such as part-transfer cycle, requiring waiting M-codes, are readily made with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

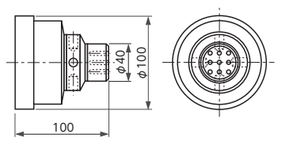

▲Simulation
Accurate simulation of turning and milling operations using a 3D solid model.

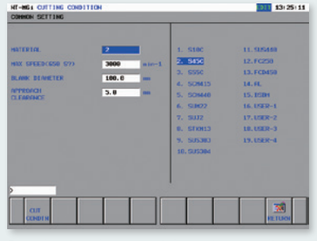
By introducing the “automatic cutting condition setting function”, the number of key strokes required to make a program were reduced by 50% reduced, compared with the previous NT-Manual guide version.



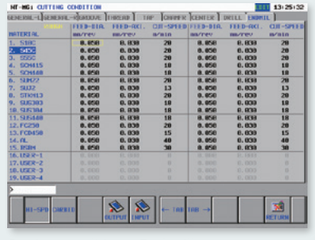
Automatic Cutting-Condition Setting Function

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



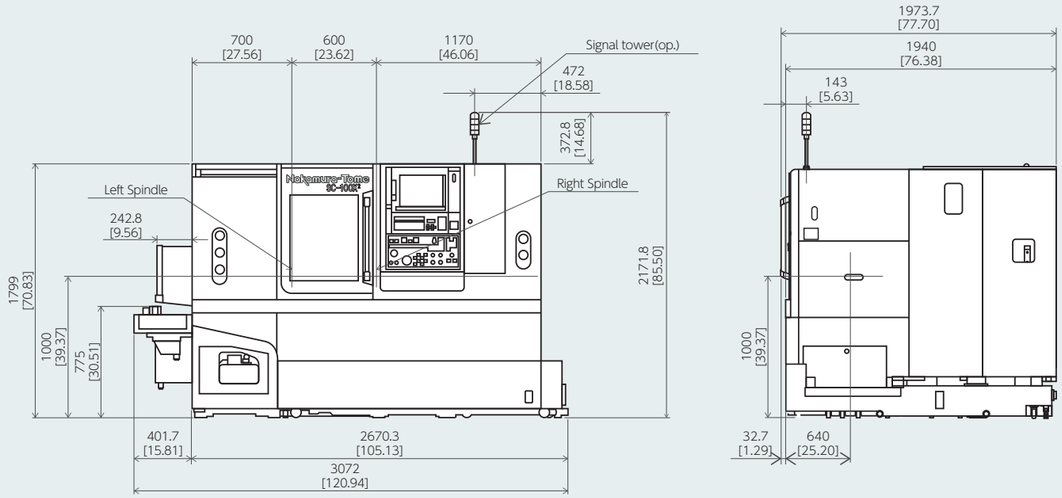

By selecting the material, cutting conditions B are automatically input.

By setting the surface roughness, machining conditions are automatically input


Cutting conditions. End mill

Machine Dimensions / Tool Interference / Travel Range

Machine Dimensions

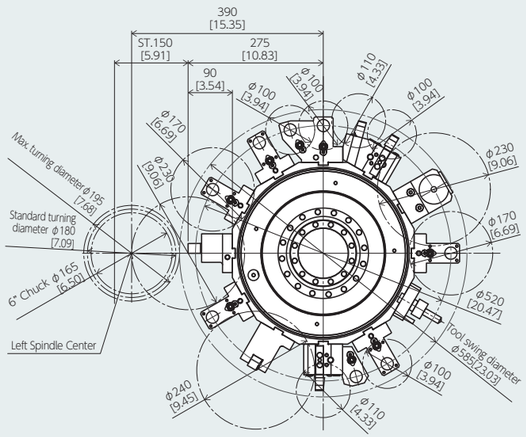


*The dimensions given here may change depending on machine specifications.

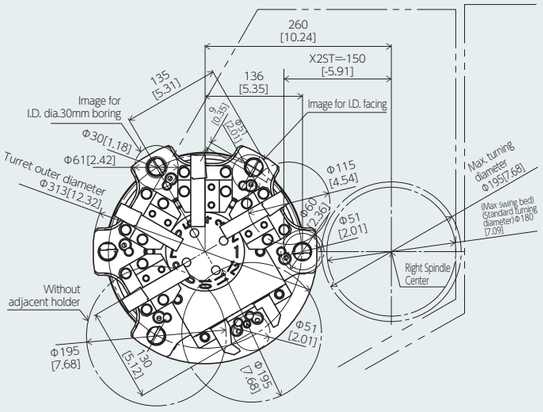
mm[inch]

Tool Interference

Upper Turret



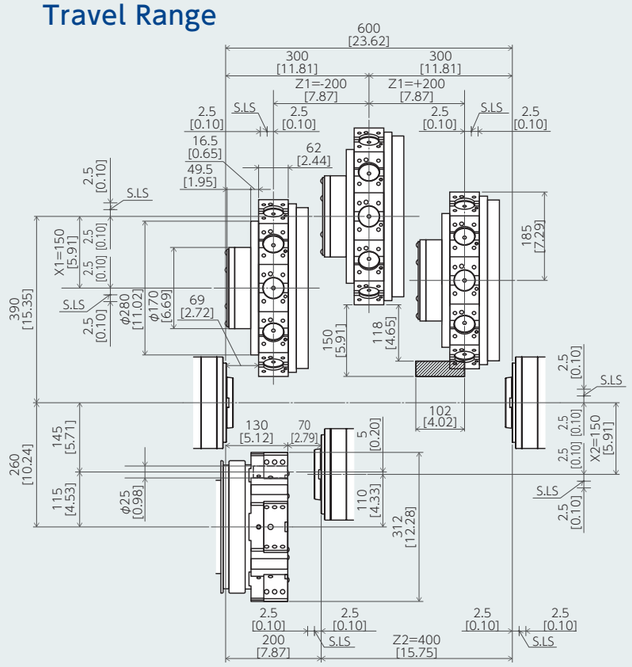
Lower Turret



*The dimensions given here may change depending on machine specifications.

mm[inch]

Travel Range

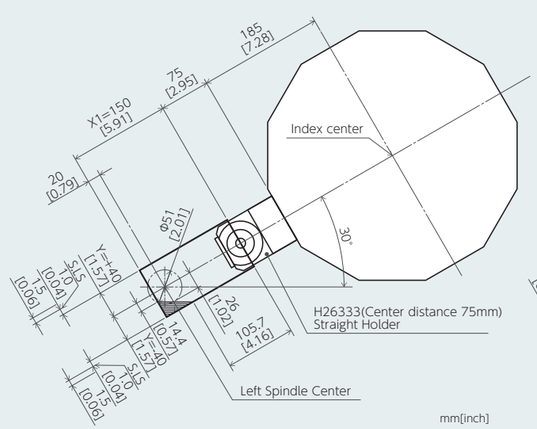


・The shaded area is an interlock area of X1/Z1-axis when X2 and Z2-axis are at zero point.
・Interlock area is set by the relative distance of X1/X2-axis and Z1/Z2-axis.

*The dimensions given here may change depending on machine specifications.

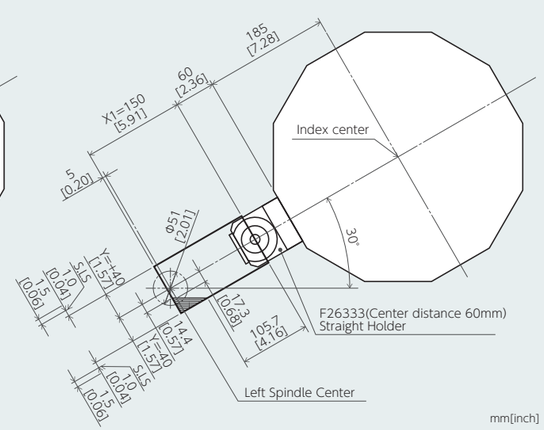
mm[inch]

Y-axis (for Tool holder H26333)



mm[inch]

Y-axis (for Tool holder F26333)



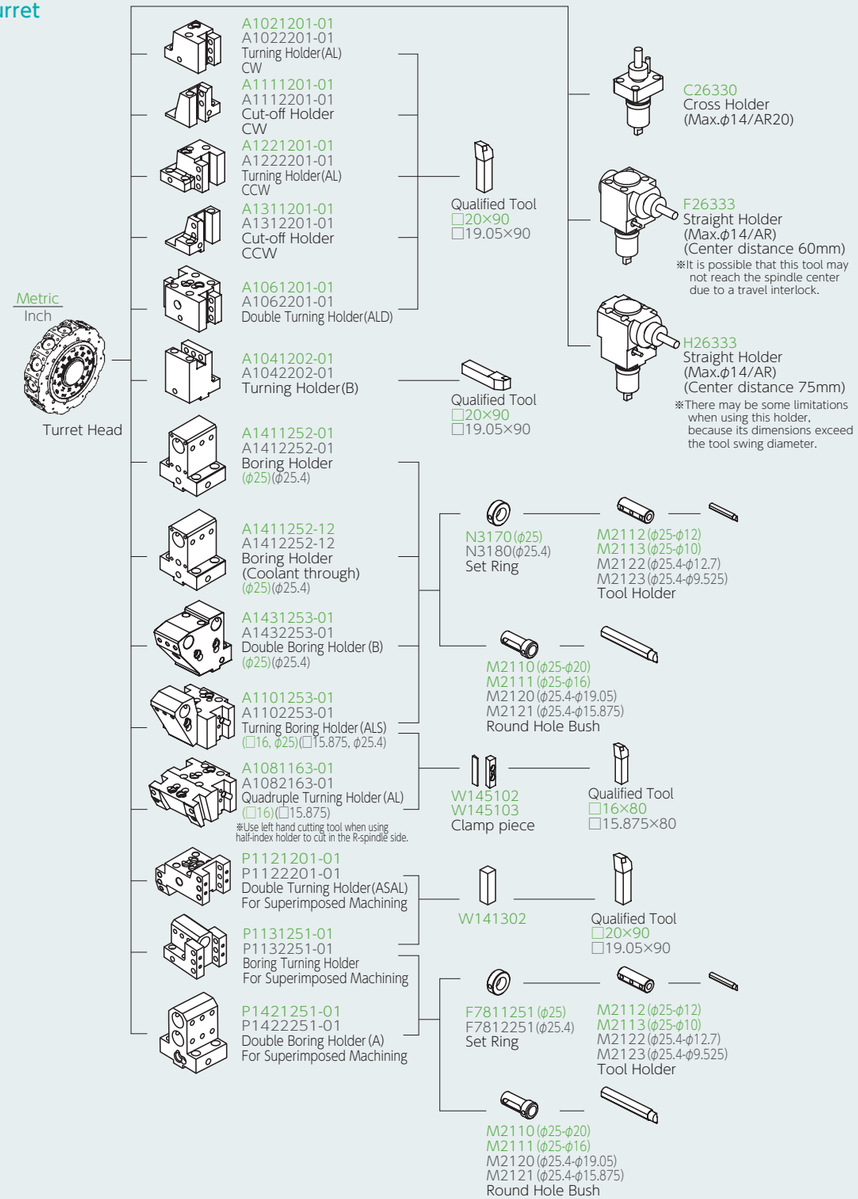
mm[inch]

- The shaded area is interlock area.
  It is possible that this tool may not reach the spindle center due to a travel interlock.

*The dimensions given here may change depending on machine specifications.

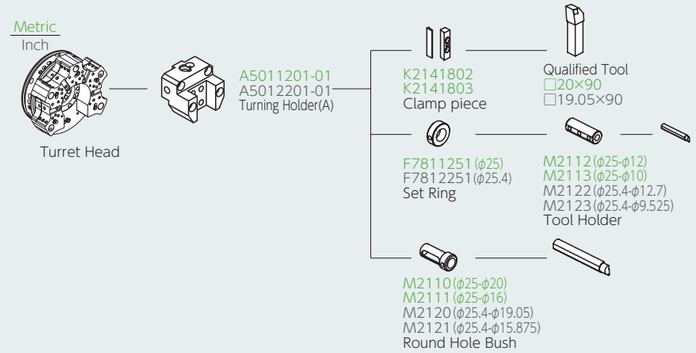
Tooling System

Upper Turret



Tooling System

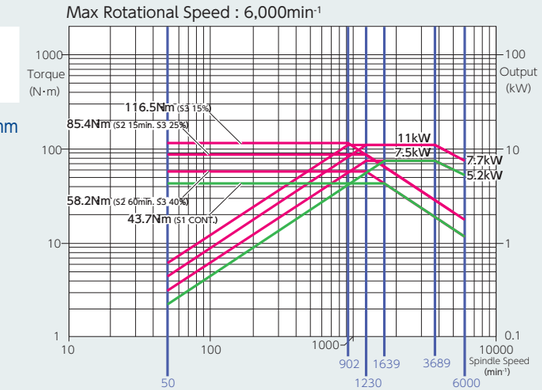
Lower Turret



Torque/Output Chart

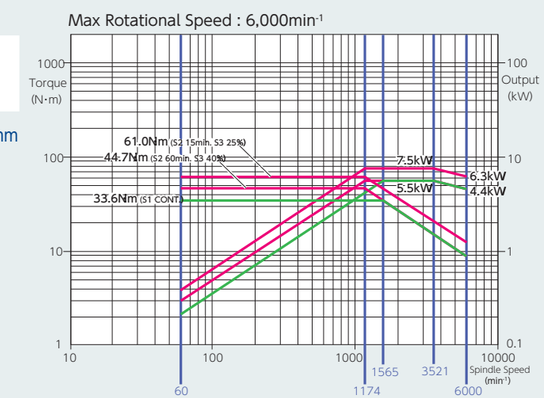
L-Spindle motor

Bar capacity ϕ51mm
11/7.5kW



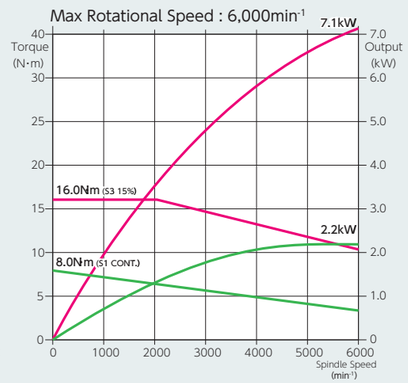
R-Spindle motor

Bar capacity ϕ42mm
7.5/5.5kW



Milling motor

7.1/2.2kW



■ Capacity

Max.turning diameter	195mm
Standard turning diameter	180mm
Max.turning length	400mm
Bar capacity(L/R)	ϕ51mm / ϕ42mm
Chuck size (L/R)	6" / 5"(6")

■ Axis Travel / Rapid Feed

X1 / X2-Axis slide travel	150mm / 150mm
Z1 / Z2-Axis slide travel	400mm / 400mm
Y1-Axis slide travel	±40mm
X1 / X2-Axis rapid feed rate	20m/min
Z1 / Z2-Axis rapid feed rate	36m/min
Y1-Axis rapid feed rate	6m/min

■ Left Spindle ϕ51mm

Spindle speed	6,000min^{-1}
Spindle speed range	Stepless
Spindle nose	A2-5
Hole through spindle	63mm
I.D. of front bearing	90mm
Hole through draw tube	52mm

■ Right Spindle ϕ42mm

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 index speed	600min^{-1}
Cutting feed rate	1～4,800° /min
C-axis clamp	Disk clamp
C-axis connecting time	1.5sec.

■ Parts Catcher (Unloading Gripper)

Workpiece size	Diameter	ϕ15mm～ϕ51mm
	Length	30mm～100mm
	Weight	0.1kg～1.5kg

■ Upper Turret

Type of turret head	Dodecagonal drum turret
Number of tool stations	12 (max.24)
Number of indexing positions	24
Tool size (square shank)	□20mm (12st) / □16mm (24st)
Tool size (round shank)	ϕ25mm

■ Lower Turret

Type of turret head	Flexible special design turret
Number of tool stations	9
Number of indexing positions	12 (3 station used for gripper)
Tool size (square shank)	□20
Tool size (round shank)	ϕ25mm

■ Milling (Upper Turret)

Driven system	Individual rotation
Milling spindle speed	6,000min^{-1}
Spindle speed range	Stepless
Number of milling stations	12
Holder type and Tool size	Straight holder ϕ1mm～ϕ14mm
	Cross Holder ϕ1mm～ϕ14mm

■ Drive motor power

L-spindle	11/7.5kW
R-spindle	7.5/5.5kW
Milling Spindle	7.1/2.2kW

■ General

Height	1,799mm
Floor space(L × W)	3,072mm ×1,973.7mm
Machine weight (incl.control)	6,500kg

●Safety quality specifications

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

① Safety devices include electromagnetic door lock, chuck interlock, hydraulic pressure switch, air pressure switch, short circuit breaker and quill interlock. (Door interlock and chuck interlock are standard equipment.)

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	Nakamura-Tome FANUC (0i-TF Plus)

■ Controlled axes

Controlled axes	7 axes
Simultaneously Controlled axes	Upper : 4 axes (X1, Z1, C1(C2), Y1 axis)
	Lower : 3 axes (X2, Z2, C2(C1) axis)

■ Input command

Least input increment	0.001mm/0.0001inch (X in diameter) , 0.001°
Least command increment	X : 0.0005mm / Z, Y : 0.001mm / C : 0.001°
Max. programmable dimension	±999999.999mm/ ±39370.0787in, ±999999.999°
Absolute / incremental programming	X, Z, C, Y / U, W, H, V
Decimal input	Standard
Inch / Metric conversion	G20 / G21
programmable date input	G10

■ Feed function

Cutting feed	feed/min X,Z: 0.001～8000mm/min, 0.0001～315inch/min (0.001～4800mm/min, 0.0001～188inch/min) Y: 0.001～6000mm/min, 0.0001～236inch/min (0.001～4800mm/min, 0.0001～188inch/min) C: 0.001～4800° /min Feed/rev X,Z: 0.001～8000mm/rev (0.001～4800mm/rev) Y: 0.001～6000mm/rev (0.001～4800mm/rev) 0.0001～50.0000inch/rev The maximum cutting feed rate is the value in AI contour control mode. Also activated with G316. The values in parentheses are nomal values.
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 accel. decel. after cutting feed interpolation	Standard
Rapid feed override	Low /25/50/100% (can be set from 0~100 in 10% intervals on NT Setting screen)
Cutting feed rate override	0～150% (each 10%)
AI Contouring control I	G5.1
spindle override	50%～120% Set every 10%

■ Program memory

Part program storage length	2Mbyte (Total 5120m) (Upper / Lower : Each 2560m)
Parts program editing	delete, insert, change
Program number search	Standard
Sequence number search	Standard
Address search	Standard
Number of registerable programs	Total 1000 programs (Upper / Lower : Each 500 programs)
Program storage memory	Backed up by battery
Multiple program simultaneous editing	Standard
DNC operation through memory card	Standard (not including memory card)
Extended parts program editing	Standard

■ Operation and display

Display	15-Inch color LCD
Keyboard	QWERTY keyboard

■ Programming assist function

Circular interpolation R programming	Standard
Direct drawing dimension programming or Chamfering/Corner R	Standard (switched by setting parameter)
Canned cycle	G90, G92, G94
Multiple repetitive canned cycle	G70～G76
Multiple repetitive canned cycle II	G71,G72
Canned cycle for drilling	G80～G89
Sub program	Standard
Custom macro	Standard (#100～#149, #500～#549)
Addition to custom macro common variables	Standard (After addition #100～#199, #500～#999)
FS10/11 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

■ Mechanical support

Rigid tap	Standard
Spindle orientation	Standard (any angle is available within 360° ,Control unit: 0.088°)
Driven-Tool rigid tapping	Standard
Polygon function	Standard

■ ECO function

Servo motor off	Standard (selected on energy saving setting screen)
Control of motor output during acceleration and deceleration	Standard (selected on energy saving setting screen)
G code for servo motor energy-saving acceleration and deceleration	G356/G357
Fan motor stop	Standard(Fan motor on/off is controlled by detecting temperature of spindle motor)
Auto machine-light off	Standard (selected on energy saving setting screen)
Auto monitor off	Standard (selected on energy saving setting screen)

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