Multitasking

Super NTY^3

E V O L U T I O N

NAKAMURA-TOME
PRECISION INDUSTRY CO.,LTD.

Nakamura-Tome

Super NTY^3

High Productivity Multitasking Machine

Evolutionary Advance

World Premiere

Three High Rigidity Turrets
Y-axis for all three Turrets

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

A new and innovative machine is born. In addition to the advantages of simultaneous machining on the left or right hand spindles, introducing the Y-Axis on all three turrets, contributes to increased productivity.

By using the Y-Axis for simultaneous machining with the upper and lower turrets, machining process layout optimization becomes a reality. Whether machining with multiple tools simultaneously on one side, or on both the left and right hand sides, cycle time is dramatically reduced.

The Super NTY3 is a High Productivity Multitasking Turning Center that is at the cutting edge of speed.

Nakamura-Tome machines keep evolutionary advances.

Y3 Performance!

Y^3
Three Y-axes

M^3
Three Milling Motor

Machine construction

- High efficiency spindle motor
- Servo-controlled non-lift turret
- Servo-controlled tailstock function
- Thermal growth compensation
- Turning center function
- Machining center function

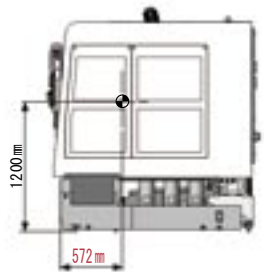
L, R spindle
- High efficiency spindle motor
- Motor power 11/ 7.5kW, 75.4 / 38.6Nm
- Max. rotation speed 6,000min^{-1}
- Bar capacity Φ42 (Φ26 op.)
- Spindle nose A2-5
- C-axis Least Input Command Increment 0.001 degree
- C-axis Rapid Rotation Speed 600min^{-1}

B-axis
Servo drive

Upper turret, lower turret
- Y-axis ±31mm
- 12 station 24-tool station
- Number of driven-tool stations 12
- Milling motor 7.1 / 2.2 kW, 16 / 8Nm
- Rotation speed 6,000 min^{-1}
- Non-lift, servo indexing

The latest High productivity multitasking machine

Y-axis (±31mm) on all three turrets



Operator friendly !
572mm to the spindle center

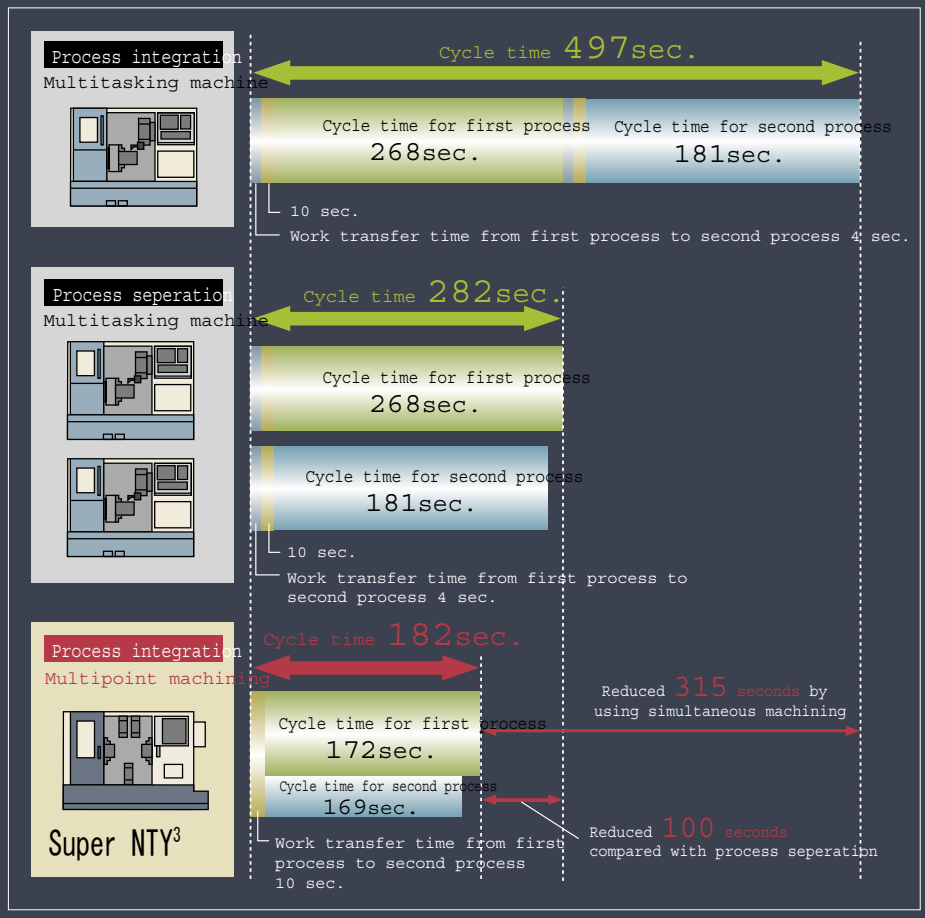
- Opposed two-spindle, three-turret construction! Cycle time reduced through simultaneous machining on Left and Right hand spindles.
- Y-axis on all 3 Turrets (±31mm) !!
- Three Turrets! 12-station 24-tool turrets
- Up to 72 tool stations for Turning and 36 tool stations for driven tools
- Up to 22 / 15 kW cutting power available for shaft-work turning with synchronized spindles (Motor power 11 / 7.5 kW per spindle)
- Three milling motors 7.1 / 2.2kW

Much faster than single-Tool multi-tasking machine!!

Quality that customers have long wanted became a reality.

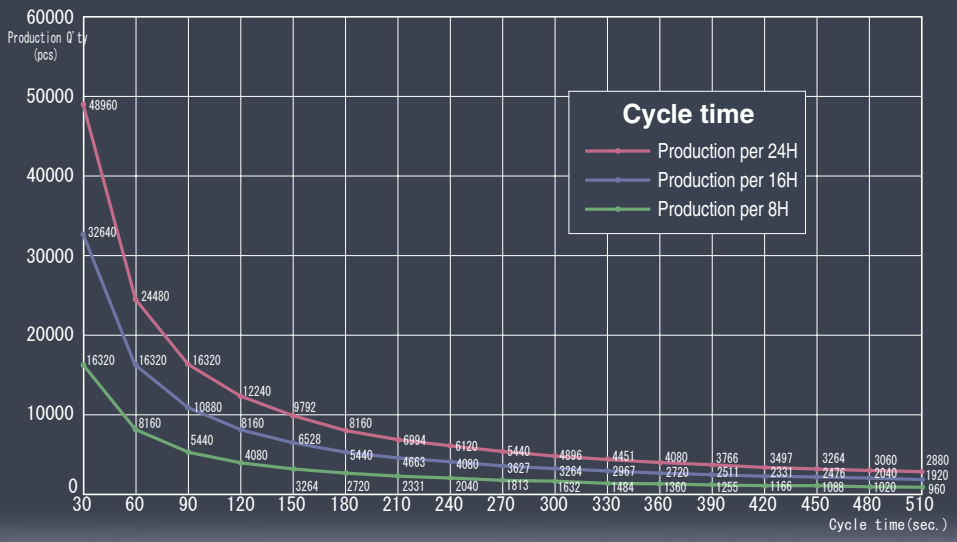
Fascinating quality !

In addition to high rigidity turrets with the capability of turning as well as milling, the Y-axis on all three turrets accelerates and boosts productivity.
When it comes to high productivity multitasking, the Super NTY^3 is a machine that is at the cutting edge of technology, featuring with the latest capabilities, all packed in a very compact space. The keyword is Multi-Point Machining



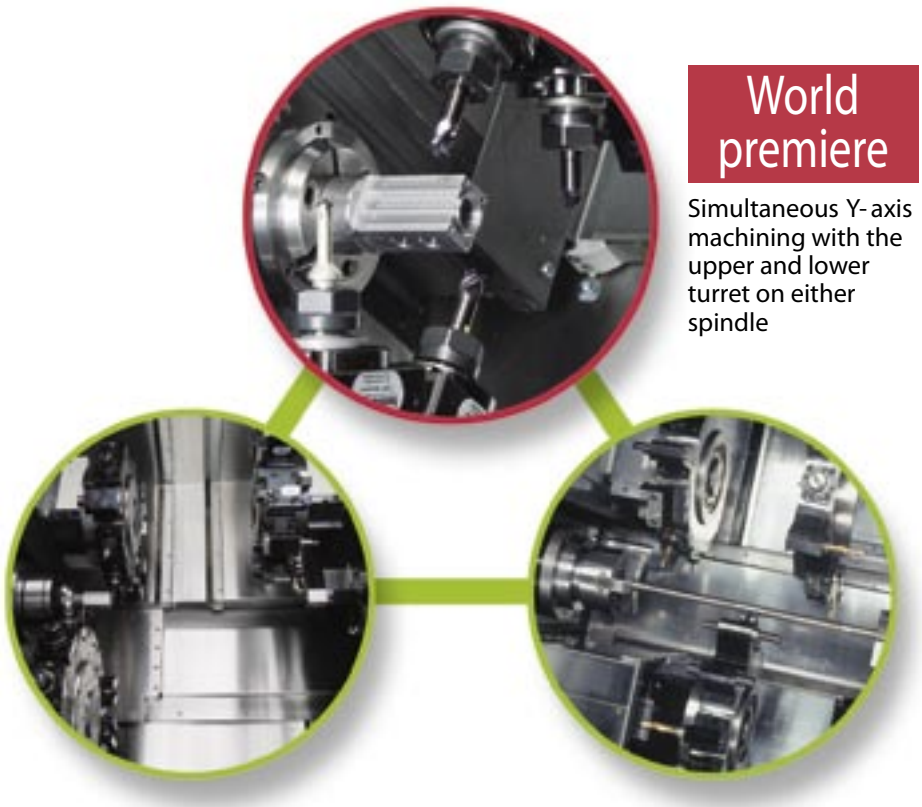
Nakamura-Tome Multitasking Machine for high production

This graph shows productivity (per month) and cycle time.
When cycle time is 120 sec., monthly production capacity is 4080 parts, 8160 parts or 12240 parts, respectively for one, two or three production shifts.
To achieve such requirements, the cycle time must cut in half, a task that can only be accomplished with a high productivity multitasking machine.



This is based on a operation rate of 85%, and 20 days of production per month.

Multi Point Machining



Simultaneous Y-axis machining

Shaft work with synchronized spindle

World premiere

Simultaneous Y- axis machining with the upper and lower turret on either spindle

High rigidity! / Wide and Low

The housing of the indexing unit, on which turrets are built, has a low center of gravity, providing high rigidity and cutting stability whether in turning, drilling or milling.

3 way slide

The upper turret, lower turret as well as the right hand spindle have each its own independent slide, eliminating any limitations in the movement of slides.

Servo-driven turret

The highly rigid dodecagonal 24-station turrets, which feature non-lift servo indexing, are very compact, minimizing any tooling interference.

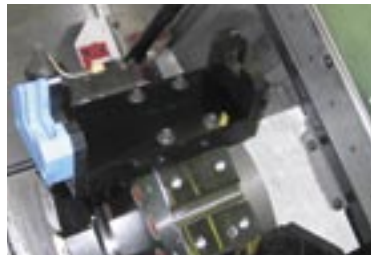
Wide working area

In addition to a distance of 820 mm between spindle centers, offered in very compact space, the distance of 305 mm from upper turret Z-axis origin to spindle nose and the lower Z-Axis stroke of 578 mm, provide for a wider machining range.

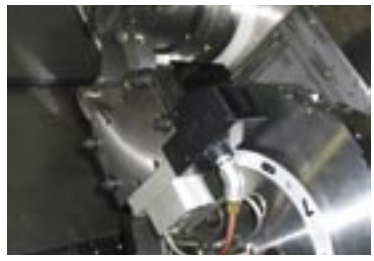
User friendly!

The 60 degree slant bed construction offers a closer distance from machine front to spindle center, in addition to better cutting chip evacuation. All moving units are equipped with top class stainless-steel covers and protective wipers, preventing cutting chip accumulation, and providing cover against cutting chips and coolant. Furthermore, machine door windows featuring large-sized tempered and laminated safety glass, offer a higher level of visibility.

Example of Lower turret



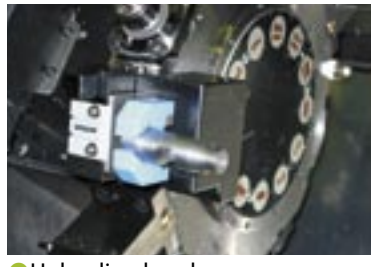
● Work rest



● Steady rest

● Simple steady rest

● 200,000min^{-1} pneumatic spindle



● Unloading hand

EVOLUTION

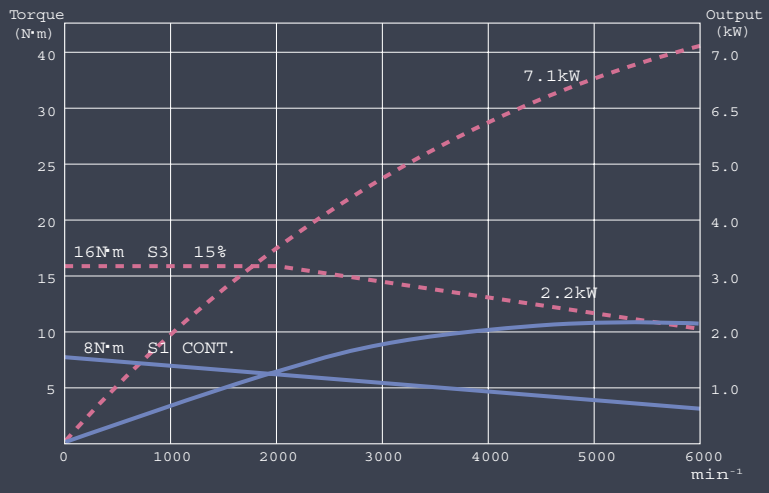
High rigidity turret

Y3 Performance!

Y^3
Three Y-axes

M^3
Three Milling Motor

7.1 / 2.2 kW Milling motors x 3

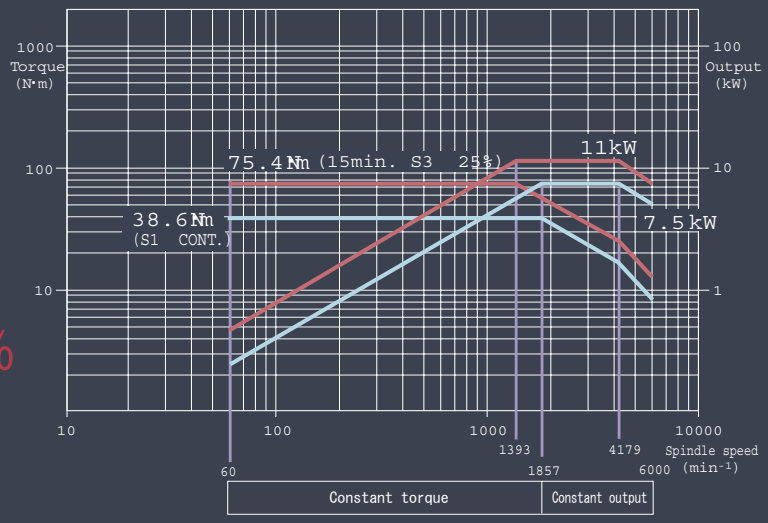


Turning and milling capabilites combined in one machine

S2 Twin-Spindle

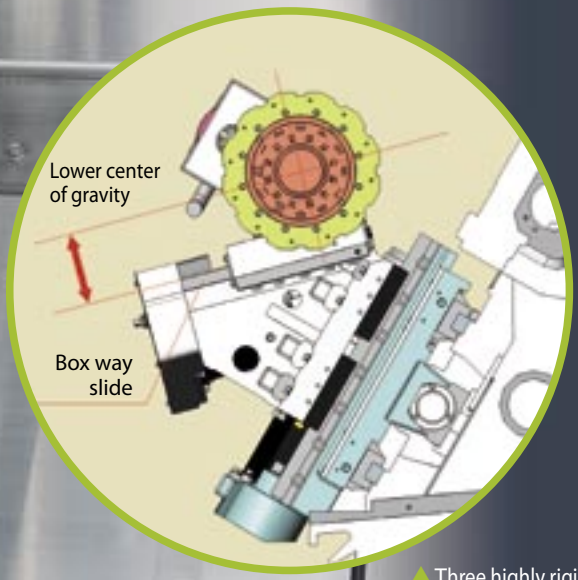
S2
Twin-Spindle

11 / 7.5kW Spindle motor x 2



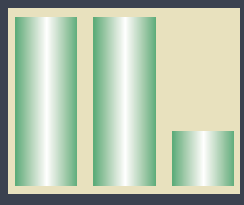
Rigidity increased by 150%

According to rigidity analysis, compared with true-type Y-axis



▲Three highly rigid turrets

The left and right hand side spindles feature 11/ 7.5 KW, with a maximum 75 Nm high-output motors. This means that a round part with Dia. 48 mm x Length 110 mm can be reduced into cutting chips within 26 Seconds, or 2.3 parts can be turned per minute.



Size : Φ48x110
Metal Volume : 199 cm_/ Part
Material : S45C
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.

EVOLUTION

Less Fixtures! Less Set-up! Less Skills!

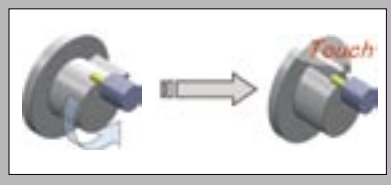
Requirements for multitasking are standard features

「If programming or set-up seems difficult...」,「if one machine in a cell stops...」,「if the cost of fixtures for complex parts is high...」, if any of the latter is causing worries, then the solution is the Nakamura-Tome big three: "NT Nurse II", "NT Work Navigator"and "Overload Detection / Airbag"

NT Work Navigator

●Less fixtures

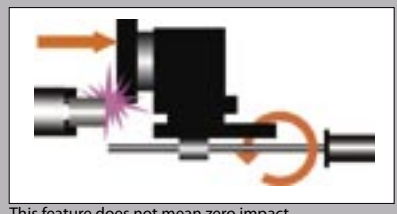
Machining parts with non-round shapes, such as forgings or castings, requires that raw part coordinates are recognizable by the control. In order to do this without spending money on extra options, just simply use the NT Work Navigator. It works just by touching the part with a simple inexpensive probe (in most cases a round bar mounted on a boring holder), and using the torque control feature of the servomotor to record wanted coordinates in the control.
The work Navigator is a cost cutting feature for multitasking operations. It eliminates the needs for expensive clamping devices and positioning fixtures.



Overload Detection

●When the worse happens, a security feature to rely on

When unavoidable human error results in a collision, the servo drive detects overload and reverses slide movement direction within less than 8 milliseconds. In addition to minimizing damage during the first impact, the chances that the program will move to the next block and cause a second impact are reduced to zero. This security feature is offered as standard. It is available for the X, Z, Y, C and B axes.
For two- spindle three turret machines, CAD/CAM and NC program simulation are offered as an option.

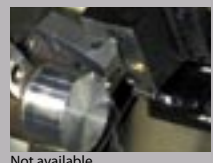


This feature does not mean zero impact.

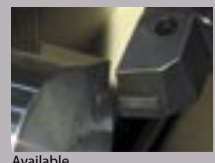
NT Nurse

●All in One Software

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



Not available



Available

1/1,000,000 N/m control / FANUC-31iA

CNC control with nanometer resolution providing smooth movement, resulting in improved machining accuracy.
Through high-precision servo, spindle and C-axis control, higher-accuracy machining results and a wider range of applications become within reach.

DNC operation from memory card
Programs can be executed from a memory card, mounted in the provided slot.

Various features are standard

- ●Part program storage length 2560m
- ●Up to 2000 registered programs
- ●Tool offset pairs 99 Pairs
- ●10.4 inch color LCD Display
- ●Direct drawing dimension input programming
- ●Fixed cycles (G90, G92, G94)
- ●Multiple repetitive cycles type I
- ●Multiple repetitive cycles type II
- ●Canned cycles for drilling
- ●Synchronized mixture control
- ●Custom macro
- ●Additional custom macro common system variables
- ●DNC operation through memory card (Card is not included)
- ●Rigid tapping / Spindle・Milling
- ●Spindle synchronization
- ●NT Work Navigator
- ●Overload Detection (Airbag)

Super NTY3

Air Cutting Mode

Air cutting mode is a mode for executing machining programs without actual machining. When programs are executed in active air cutting mode, bar-feed forward and chuck open/close commands are ignored. In addition, part unloading confirmation is disabled.

Index Speed SW

The turret speed can be adjusted with the feed override rotary switch from 0 to 100 % during indexing in automatic or manual mode. This can be used during fully automatic operation to reduce turret speed or even bring it to a halt when necessary.

Jump Programming (G411)

For machines equipped with a gantry loader or a bar feeder, restarting operation after an interruption is significantly improved. Even if the operator has to stop and reset the machine in the middle of automatic cycle, there is no need to remove all the parts from the chucks or gantry hands to restart operation. The part status displayed on the NT Nurse screen, is used to restart the program, which depending on the part machining condition (Raw, half-finished or finished part), jumps to the appropriate program block and starts from there.
Thanks to this feature, programming of machines with a gantry loader has become drastically simplified, eliminating the need to divide each machining program into several sub-programs.

Axis Torque Limit Function

This feature is to prevent overload servo alarms that may occur during part transfer or part cut-off. Such alarms are caused by load build up when the right chuck is closed, which is due to overshooting of the jaw in case of three-jaw chucks or pushing and pulling in case of collets chucks. The thrust of the B-Axis servomotor thrust is kept in the range of 20% to 100%, preventing the occurring of servo alarms and breakage of cut-off inserts.
In case a stopper is used on the right chuck, G131 is used.

Tool Nose Radius Compensation

Tool nose radius compensation (G41, G42) became available for stock removal cycle G71 after it used to be limited only to finishing cycle. In previous i-Series controls, tool nose radius compensation for Stock-removal turning cycle II (pocket turning) was not possible causing over-cutting or under-cutting, but since it became available, it has become possible to program the exact part dimensions, without the need for extra calculations.

Memory Sharing

The use of memory became more efficient. Previously, memory for each control path was separate and fixed, making it impossible to use memory space already available in another path; however, in the current model, available memory can be freely used from any path. The same applies for program numbers. In addition, standard memory became 1280m, and up to 1000 registered programs

Peck Rigid Tapping Cycle

During tapping of deep holes, the peck rigid tapping cycle can be useful to draw cutting chips during tool retraction, especially if long cutting chips are sticking to the tool.
In addition, it is possible to select between high-speed cycle, where the tool is retracted to the programmed position, and standard cycle, where the tool returns every time to the start point R. High-speed cycle is the default setting.

Spindle Rigid Tapping with Less Limitations

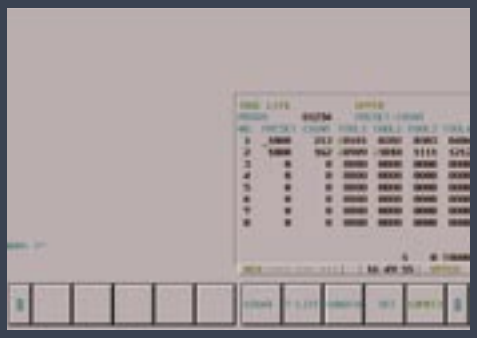
Previously, spindle rigid tapping and polygon cutting (op.) were limited to the upper turret / left hand spindle and lower turret / right hand spindle combinations, but this limitation no longer exists. Spindle rigid tapping and Driven-Tool rigid tapping are both standard.

The NT Nurse with its user-friendly features. Below are some its 24 features.

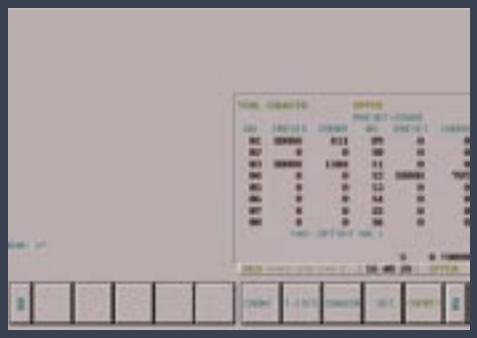
Menu display

Operation condition display

Detailed alarm display



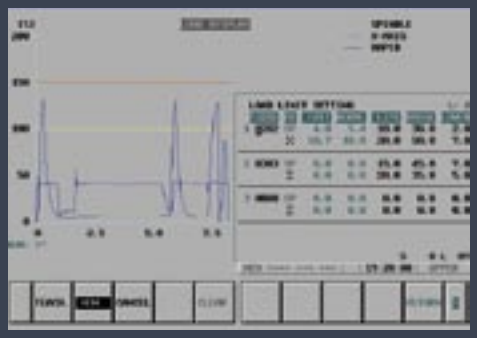
Tool life



Tool counter

Alarm history display

Offset history



Load monitor

Air cut

Power saving

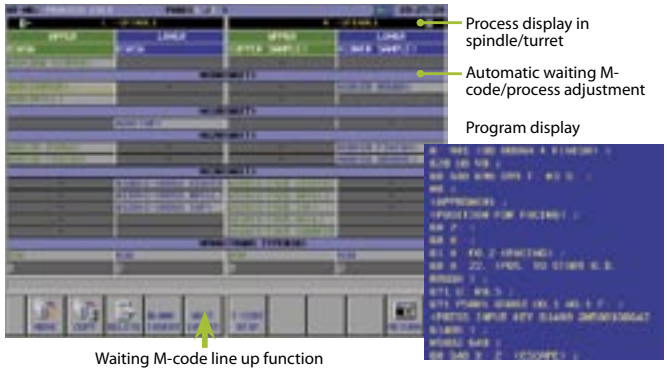
Quick offset input

Work-piece status display

Display for machines with Gantry Loader.

Luck bei Ⅱ NT Manual Guide

This function is for the easy creation of NC programs (ISO/EIA G-code programs). In addition to the creation of machining cycles (conversational), each process that was already made can be easily cut, copied, pasted or moved. Furthermore, waiting M-codes can also be easily inserted into the program. Simulation of the program using the tool path or a solid model, places an emphasis on programming support.



Waiting M-code line up function

Process editing function

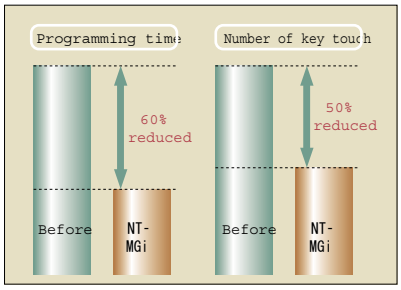
All processes in machining program, are displayed on process layout, within which it is possible to move, copy or delete one or several processes.

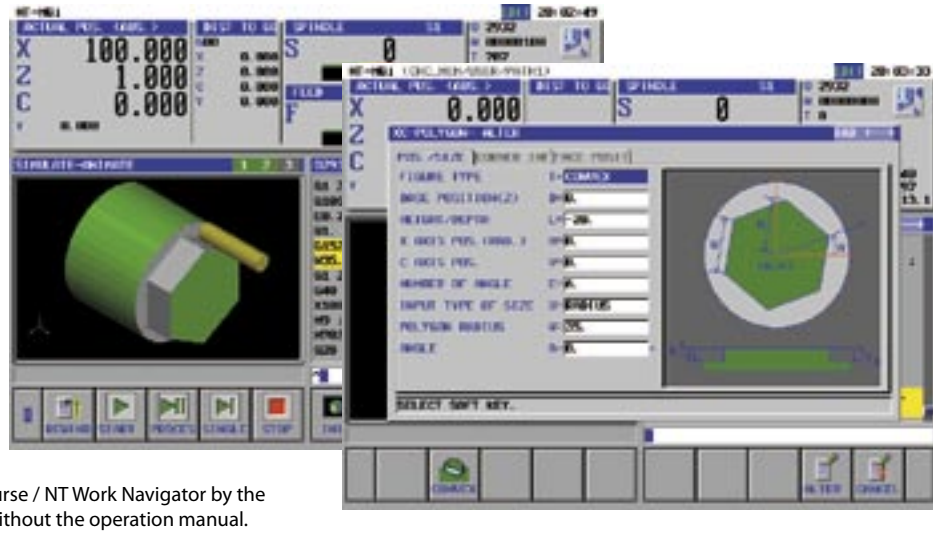
Fixed phrase function

- Rich fixed phrases over 600 patterns (10 times more than before) is standard
- Easy selecting of fixed phrase from the menu.
- Customer-made programs can be registered.

Machining process (discourse) function

- Complex machining completes with least input
- Best guidance for Nakamura-Tome multitasking machine
- Smooth inputting without being at a loss





It is possible to make the original G-code of NT Nurse / NT Work Navigator by the conversational function. Easy to make program without the operation manual.

■Work Navi program making screen

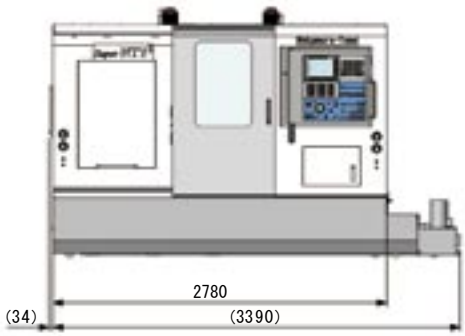
■Soft work pusher program making screen

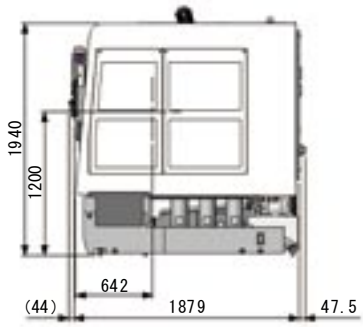
■Soft quill pusher program making screen

EVOLUTION

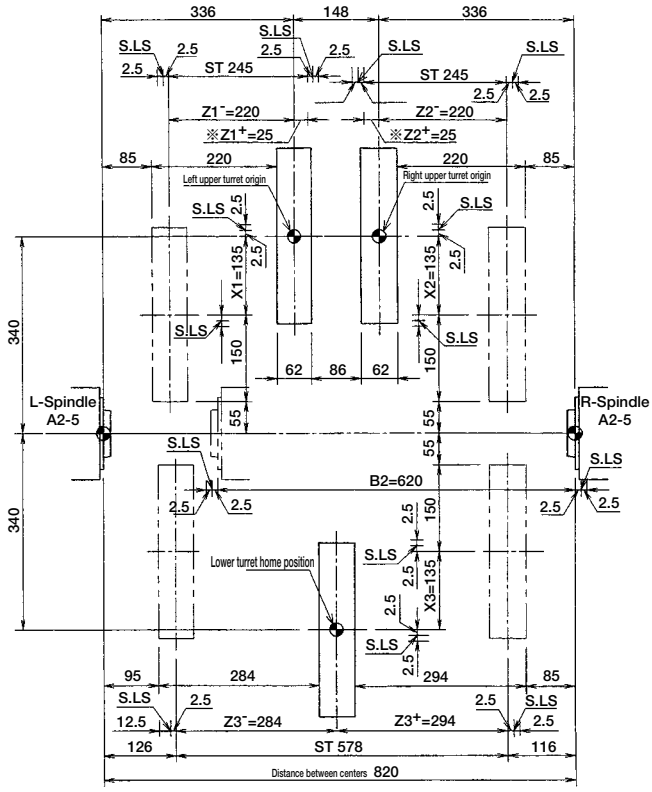
Super NTY3

Floor Space





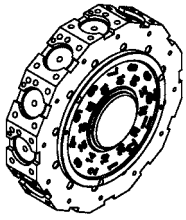
Stroke Related

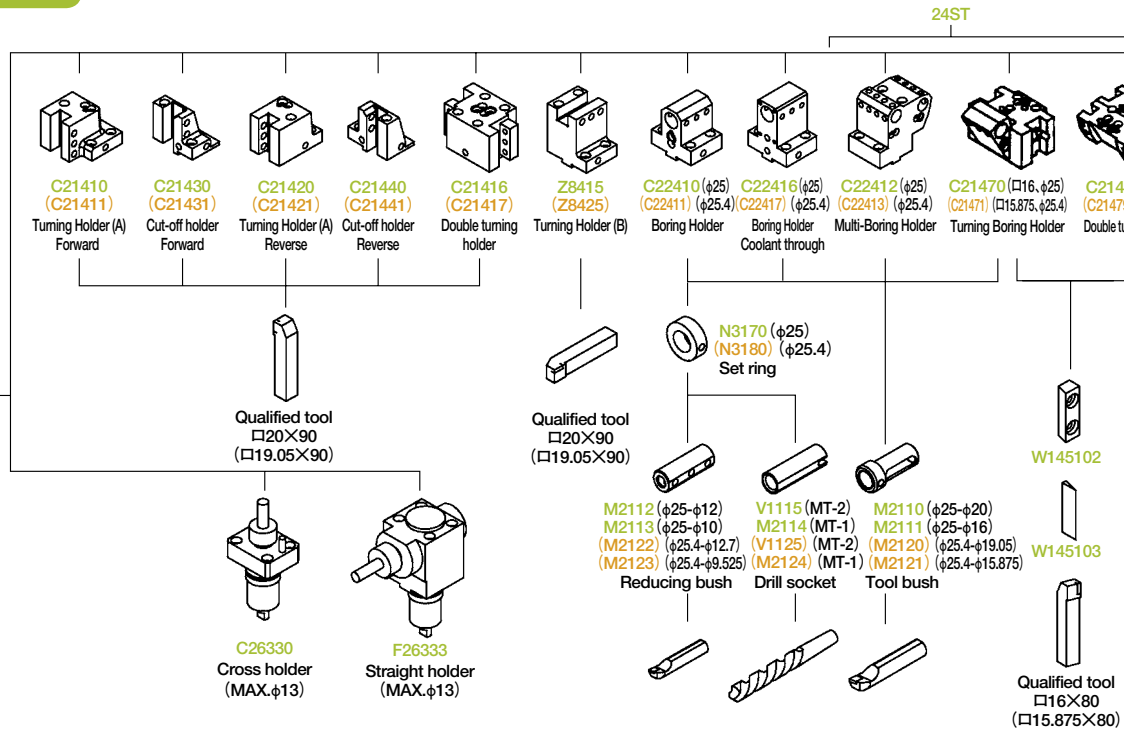


*Both turrets can not be moved +direction from its home position

unit(mm)

Tooling System





metric
(inch)

Machine Specification

■Capacity

Max. turning diameter	175mm	
Standard turning diameter	170mm	
Distance between centers	max.820mm / min.200mm	
Max. turning length	588mm	
Bar capacity	42mm	26mm (op.)
Chuck size	165mm (6")	

■Axis travel

Slide travel (X1 / X2 / X3)	135mm
Slide travel (Z1 / Z2 / Z3)	245 / 245 / 578mm
Slide travel (Y)	±31mm (op.)
Slide travel (B-axis)	620mm
Rapid feed X1 / X 2 / X3	16m/min
Rapid feed Z1 / Z2 / Z3	40m/min
Rapid feed B axis	40m/min
Rapid feed Y1 / Y2 / Y3	6m/min

■Left and right spindles

Spindle speed	6000min^{-1}	8000min^{-1} (op.)
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	1～4800°/min
C-axis clamp	Disk clamp
C-axis connecting 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)	φ25mm

■Rotating tool

Rotary system	Indivisual rotation	
Spindle speed	6000min^{-1}	
Spindle speed range	Stepless	
Number of rotation tool station	12 × 3	
Tool shank	Straight holder	φ1mm～φ13mm
	Cross holder	φ1mm～φ13mm

■Drive motor

L-spindle	11/7.5kW 75.4/38.6N・m
R-spindle	11/7.5kW 75.4/38.6N・m
Driven tools	7.1/2.2kW Max16N・m

■General

Machine height	1940mm (76.4")
Floor space	2780mm × 1970.5mm (109.45"x77.6")
Floor space	4080mm × 1970.5mm (160.6"x77.6") *1
Machine weight	8000kg

■Power requirements

power supply	73.5kVA
Air supply	150～200NL/min, 0.5～0.7MPa

*1 Including chip conveyor

Safety quality specification

Safety devices such as various interlock, various safety fences, 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.

Control Specification

■items

Control type	FANUC 31i-A 3-PATH

■Controlled axes

Controlled axes	10axes
Least command increment	3axes (Upper L / R X, Z, C) + 4 axes (Lower X, Z, C, B)

■Input command

Least input increment	0.001mm/0.0001in (diameter for X-axis) ,0.001°
Least command increment	X : 0.0005mm, Z : 0.001mm, C : 0.001° , B : 0.001mm
Max.programmable dimension	±999999.999mm / ±39370.0787in, ±999999.999°
Absolute / incremental programming	X, Z, C, B (absolute only for B) / U, W, H
Decimal input	Available
Program code	EIA / ISO automatic recognition
Inch / Metric conversion	G20 / G21
Programmable 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	0.0001-4800.0000mm/rev,
		0.000001-50.000000in/rev
Dwel	G04	
Feed per minute / Feed per revolution	G98/G99	
Thread cutting	G32	
Thread cutting retract	Available	
Continuous thread cutting	Available	
Variable lead threading	G34	
Handle feed	Manual pulse generator 0.001/ 0.01/ 0.1mm,° (per pulse)	
Automatic acceleration / decelaration	Available	
Linear accel./ decel.After cutting feed interpolation	Available	
Rapidfeed override	F0 / 25 / 100% (changeable to every 10% by switch)	
Cutting feedrate override	0～150% (each 10%)	
AI contouring control I	G5.1	

■Program memory

Part program storage length	1280m
Part program editing	delete, insert, change
Program number search	Available
Sequence number search	Available
Address search	Available
Number of registerable programs	1000programs
Program storage memory	Backed up by battery
Multiple program simultaneous editing	Available
DNC operation through memory card	Available (Only one turret can access memory card at a time) (not including memory card)
Extended part program editing	Available

■Operation and display

Operation panel:Display	10.4"color LCD
:keyboard	Separate type MDI unit (standard keys)

■Programming assist function

circular interpolation R programming	Available
Direct drawing dimension programming or Chamfering/Corner R	Available (Direct drawing dimension programming is standard)
Canned cycle	G90,G92,G94
Multiple repetitive canned cycle	G70～G76
Multiple repetitive canned cycle Ⅱ	Available
Canned cycle for drilling	G80～G89
Axis recomposition	Availabe (used for C axis control from Lower)
Sub program	Available
Balance cut	G68,G69
Custom macro	Available
Addition to custom macro common variables	Available (After addition, #100-#199, #500-#999)
Luck-bei Ⅱ	Available
Abnormal load detection function	Available
NT Work Navigator (torque type)	Available (not including contact bar)
NT NURSE	Available

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