HORKOS

Non-Bed Series

NJ50/NS70/NM100

Narrow-Space New Type Machining Center

HORKOS CORP

HORKOS CORP

Head Office & Plant	2-24-20 kusado-cho, Fukuyama City,Hiroshima 720-8650, Japan	Tel:+81-84-922-2835 Fax:+81-84-922-2609
Fukuyama North Plant	1613-50 Hojoji, Ekiya-cho, Fukuyama City, Hiroshima 720-2413, Japan	Tel:+81-84-949-3701 Fax:+81-84-949-3702
Kohriyama Plant	56-6, Aza Ishizuka, Kohriyama City, Hiroshima 720-2413. Jappan	Tel:+81-24-943-5501 Fax:+81-24-941-3602
Thailand Plant (HORKOS MANUFACTURING (THAILAND) CO.,LTD.)	84/2 Moo9, Tambol Bangwua, Amphur Bangpakong, Chachoengsao, 24180, Thailand.	Tel:+66-38-134-303 Fax:+66-38-134-304
Tokyo Branch	HORKOS Shibahashi Building, 1-13-16, Shiba, Minato-ku, Tokyo 105-0014 JAPAN	Tel:+81-3-6858-4420 Fax:+81-3-6858-4421
Ohmiya Business Office	3-586, Miyahara-cho, Kita-ku, Saitama-City, 331-0812, Japan	Tel:+81-48-615-0280 Fax:+81-48-615-0281
Shizuoka Business Office	3-10-26 Nakata Suruga-ku, Shizuoka-City, Shizuoka 422-8041, Japan	Tel:+81-54-203-5341 Fax:+81-54-203-5346
Hamamatsu Business Office	75-2 Wada-cho, Higashi-ku, Hamamatsu-City, Shizuoka 435-0016, Japan	Tel:+81-53-541-7500 Fax:+81-53-541-7501
Nagoya Branch	4-23 Harusato-cho, Chikusa-ku, Nagoya City, Aichi 464-0038, Japan	Tel:+81-52-764-3900 Fax:+81-52-764-3911
Kariya Business Office	2-14-10 Honbayashi, Yata-cho, Chiryu City, Aichi 472-0015, Japan	Tel:+81-566-83-2253 Fax:+81-566-83-2263
Osaka Branch	HORKOS Fushimiya Building, 2-6-11, Hirano-cho, Chuo-ku, Osaka-City, 541-0046, JAPAN	Tel:+81-6-7711-0620 Fax:+81-6-7711-0621
Hiroshima Branch	Hiroshima Office Center Building, 3-35 Higashikojin-cho,Minami-ku, Hiroshima 732-0805, Japan	Tel:+81-82-264-2527 Fax:+81-82-263-0385
Detroit Branch (HORKOS TECHNICAL CENTER OF AMERICA INC.)	8655 Ronda Drive, Canton, Michigan 48187 USA	Tel:+1-734-354-7940 Fax:+1-734-354-7939
Bangkok Branch (HORKOS(THAILAND) CO.,LTD)	7th Floor Unit B Zone B Sino-Thai Tower32/38 Sukhumvit 21 Road (Soi Asoke)Khwang Klogtoey Nua. Khet Wattana. Bangkok 10110	Tel:+66-2-665-7182 Fax:+66-2-665-7183
Korea Branch (HORKOS KOREA CO.,LTD)	Anyang6-Dong, Manan-Gu, Anyang-Si, Gyeonggi-Do 430-856	Tel:+82-31-465-2835 Fax:+82-31-465-2609
Dusseldorf Business Office	Ispingrade 12, 42477 Radevormwald.Germany	Tel:+49-2195-68 49 760 Fax:+49-2195-68 49 770

Sapporo Business Office, Morioka Business Office, Sendai Business Office, Kohriyama Business Office, Maebashi Business Office, Tama Business Office
Chiba Business Office, Yokohama Business Office, Kanazawa Business Office, Kyoto Business Office, Osaka Minami Business Office, Kobe Business Office,
Takamatsu Business Office, Okayama Business Office, Fukuoka Business Office, Kitakyusyu Business Office, Kagoshima Business Office

UKAS QUALITY MANAGEMENT 105 · UKAS ENVIRONMENTAL MANAGEMENT 105 · MS JAB CM025 · ANAB ACCREDITED · PERRY JOHNSON REGISTRARS, INC.

ISO 9001:2008 ISO14001:2004 Certificate Division
- Machine Tool Dept.
- Environment Improving Equipment Dept.

URL http://www.horkos.co.jp

NOTE: The specifications and drawings in this catalog are subject to change without notice.
The information in this catalog is as of April 2013.
"iMQL" are registered trademarks of HORKOS Corporation.
The export of products, which are controlled by Japanese Law, must be made under an export license issued by Japanese government.

Economy & Ecology

2115I.1304N
Printed in Japan
3 April 2013

From Machining Center to No-bed and Narrow Space New Type Machine

No-bed Series NJ50, NS70, NM100

New type machine with the features of both the horizontal machining center (multiple face machining/chip discharge) and the vertical machining center (ease of control and operation)!
Achieves high precision and high productivity when combined with a newly developed table unit for high efficiency machining or a highly reliable standard table unit based on actual results of long continuous operation.

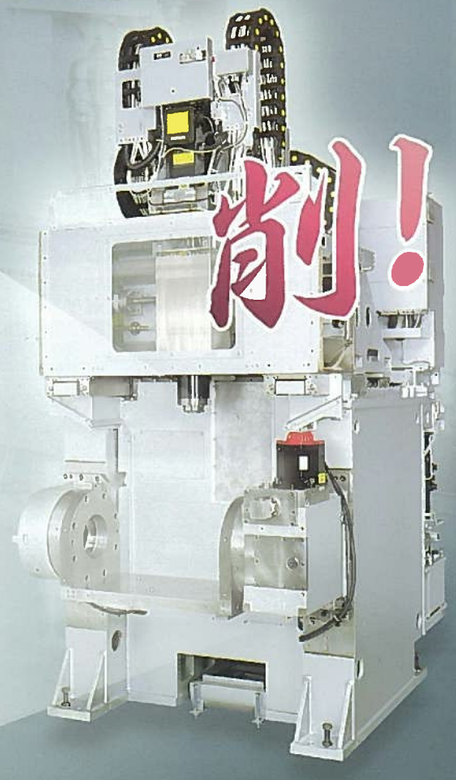
Newly developed NC direct drive rotary table

DD-320 Ultra high-speed index of 150 min^{-1}

At 150 min^{-1}, chips are blown off!

Newly developed rotary table

TTN-400 Large-size jig compatible High-speed and high torque



Newly Developed Narrow-space/No-bed New Type Machining Center N Series Has Just Arrived

NS70

Narrow-Space

New Development

Space-saving New Type Machining Center for Multiple Face Machining

Ultra High-speed　MAX. 1.0G　62m/min

Specifications

Max. rotation speed: 12,000min^{-1}
Spindle motor: 15/11/7.5kW
Spindle startup speed (time to achieve 85% of target speed):
12,000min^{-1} (0.96 sec) / 6,000min^{-1} (0.3 sec)
Spindle nose shape: BT40 (HSK-A63 Option)

Travel
X,Y,Z axes: 500mm x 450mm x 500mm

Rapid acceleration and deceleration
X, Y, Z axes: 62m/min (1.0G, 0.7G, 1.0G)

Tool storage capacity: 16 (24 Option)

Tool change time
T to T: 1.2 sec
C to C (1/2 stroke): 3.0 sec

Machine weight: 5,000kg

NC unit: FANUC 21i-MB

NJ50

Narrow-Space

New Development

Space-saving New Type Machining Center for Multiple Face Machining

Rapid acceleration and deceleration　MAX. 1.5G　50m/min

Specifications

Max. rotation speed: 12,000min^{-1}
Spindle motor: 5.5/3.7/2.2kW
Spindle startup speed (time to achieve 85% of target speed):
12,000min^{-1} (0.37 sec) / 6,000min^{-1} (0.2 sec)
Spindle nose shape: BT30 (HSK-A50 Option)

Travel
X,Y,Z axes: 350mm x 300mm x 350mm
(600mm x 450mm x 460mm Option)

Rapid acceleration and deceleration
X, Y, Z axes: 50m/min (1.2G, 1.0G, 1.5G)

Tool storage capacity: 20

Tool change time
T to T: 1.1 sec
C to C (1/2 stroke): 2.5 sec

Machine weight: 3,000kg

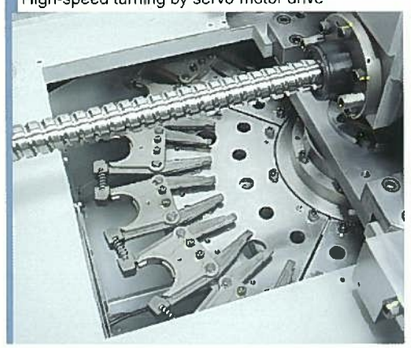
NC unit: FANUC 21i-MB

※ mark indicates the dimensions in case of X axis stroke 350mm, Y axis stroke 300mm, Z axis stroke 350mm.

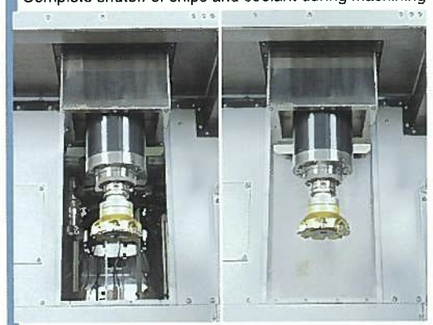
Highly reliable unit that achieves high durability, high precision and high efficiency in long continuous machining lines.

Simple structure: High-speed spindle direct type ATC

High-speed drum magazine
High-speed turning by servo-motor drive



ATC shutter
Complete shutoff of chips and coolant during machining

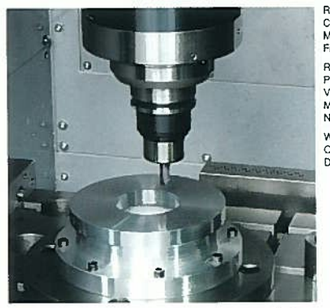


ATC shutter opened　ATC shutter closed

Employs a simple and direct high-speed tool change system for long continuous operation. Used with the air driving ACT shutter, this device prevents chips from entering tools and tool holders. No more chip entering problem with long-hour continuous operation.

With the spindle direct change system, there is no need for tool change devices or maintenance!
ATC movements are controlled by the installed program, which enables midway startup after a midway stop.

High-speed/high rigidity spindle

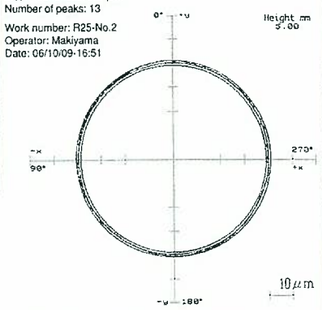


Roundness Profile
Calculation method: Least squares
Magnification: 1000
Filter: N50

Roundness: 2.0 μm
Peak roundness: 0.9 μm
Valley roundness: 1.1 μm
Mean roundness: 0.2 μm
Number of peaks: 13

Work number: R25-No.2
Operator: Makiyama
Date: 06/10/09-16:51

Roundness 2 μ



S8500 F=2000 iMQL®
Workpiece: A2017
Cutting tool: φ10 end milling
Internal diameter 60 mm　Depth 15 mm

High-speed contouring roundness machining

iMQL® high-speed drilling

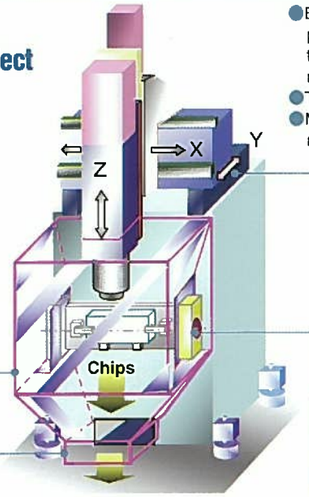
φ24.5 drilling

STRUCTURED FOR HIGH PRECISION

Innovative idea: No-bed structure is the solution to thermal deflection

No-bed (patent pending/registered design)

New development
Structured to minimize the effect of thermal deflection



- Because the X-, Y-, and Z-axis guides are closely positioned to the spindle, the pathway for power transfer between the spindle and jigs is short and high rigidity is attained!
- The location between fixture and spindle is same.
- Minimizes the effects of coolant and chips on the machining unit and jig base!

Box cover completely separates machining area from machine area!

All the devices on the base top are fitted with a slide base, while the steel cover maintains the same unit environment!

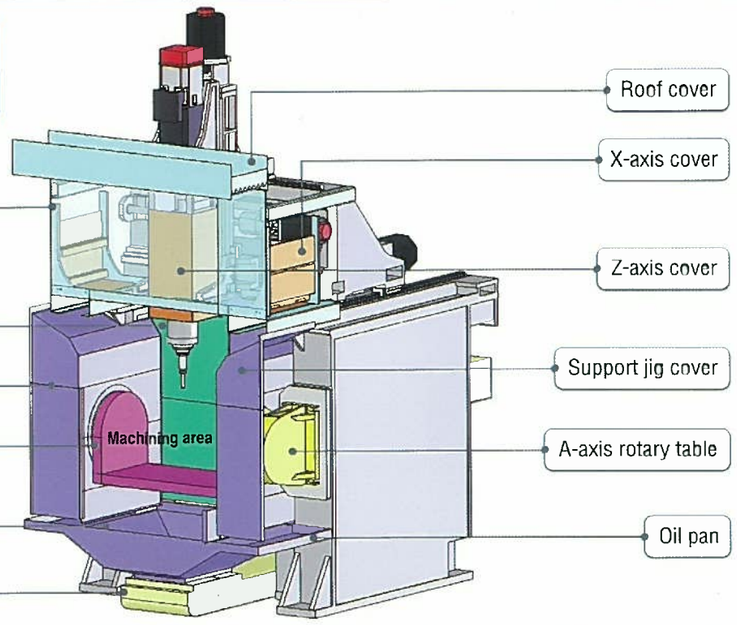
No-bed means that chips fall straight down to outside the machine!

Minimizes thermal deflection of jigs
Rotary table outside the box cover
Jig base is fitted to reduce the cutting impact to the smallest possible degree.

DURABILITY

Box cover wards off the adverse effect of chips and coolant on the main body, while completely separating the machine area and the machining area to maintain high precision in continuous operation!

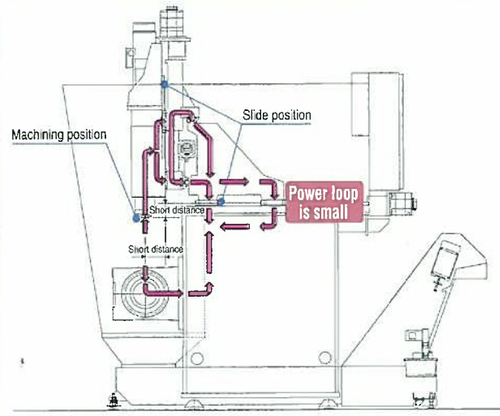
A axis specifications <NS70> box cover diagram

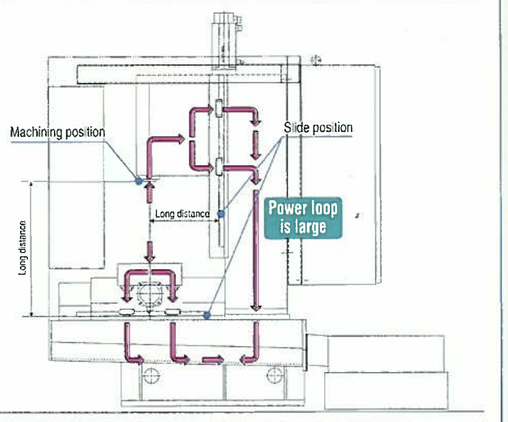


HIGH EFFICIENCY (energy saving)

Power loop: Comparison between the NS70 and a conventional table traverse type machining center

New type machining center NS70 VS **Conventional vertical machining center**





Because the distance from the machining position to each slide is short, the power loop is small, optimizing the power transfer to achieve highly efficient machining.

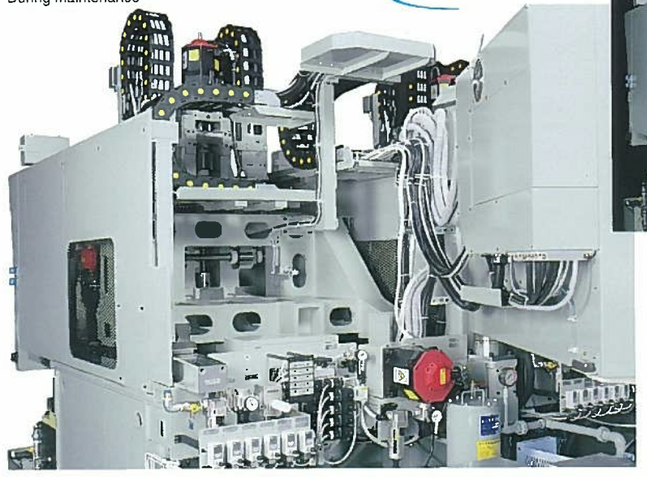
Because the machining position is distant from each slide, the power loop is bound to be large, i.e., its power transfer efficiency is lower than that of the

EASY MAINTENANCE

All the maintenance devices are positioned at the front and back of the machine, and maintenance work from the sides is no longer required.

Movable control panel
(registered design)

During maintenance



Because the control panel at the back of the machine is an open and close type, a large maintenance space can be secured for smooth maintenance.

Consolidated maintenance devices

Maintenance devices (e.g. air device and hydraulic valve) and coolant related devices are all positioned at the front and back of the machine, and maintenance work from the sides is no longer required. This also makes it possible to minimize the space between the machines.

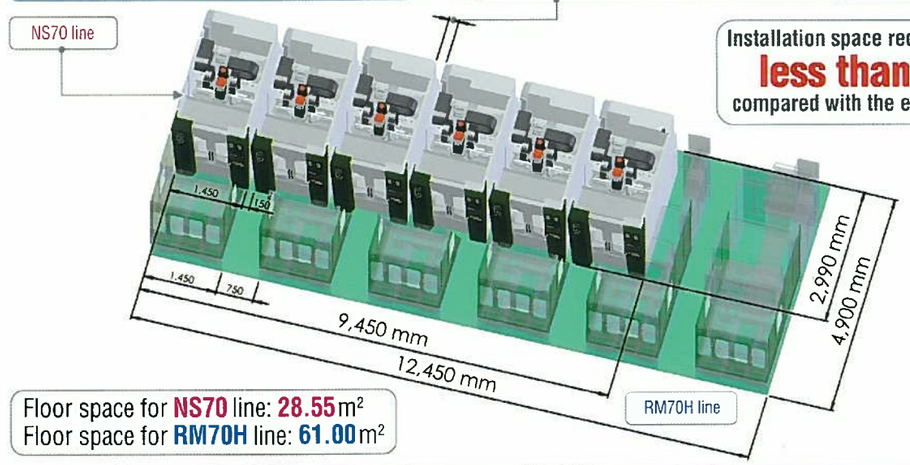
IDEA FOR SPACE SAVING

▼From horizontal machining center to the new type N series machining center.▼

Compared to the conventional type, the new type machining center needs less than half the installation space and achieves the same or better productivity.

New development: Comparison between the NS70 and our existing horizontal machining center RM70H (one unit consists of 6 machines)

No maintenance is required from the sides → Can be installed with the 150 mm pitch between the machines

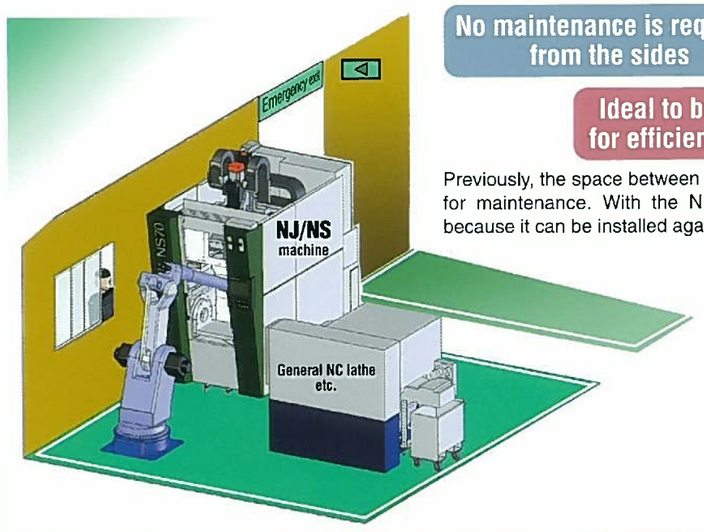


Installation space requirement is **less than half** compared with the existing type

Floor space for **NS70** line: **28.55**m²
Floor space for **RM70H** line: **61.00**m²

IDEA FOR EFFICIENT USE OF SPACE

▼The new type N series machining center can be installed against the wall to make the most of the available space.▼



No maintenance is required from the sides

Ideal to be installed against the wall for efficient use of the available space

Previously, the space between the machine and the wall was required for maintenance. With the N series, there is no waste of space because it can be installed against the wall.

No maintenance is required from the sides

IDEA FOR CREATING AN OPTIMAL UNIT

▼From horizontal machining center to the new type N series machining center.▼

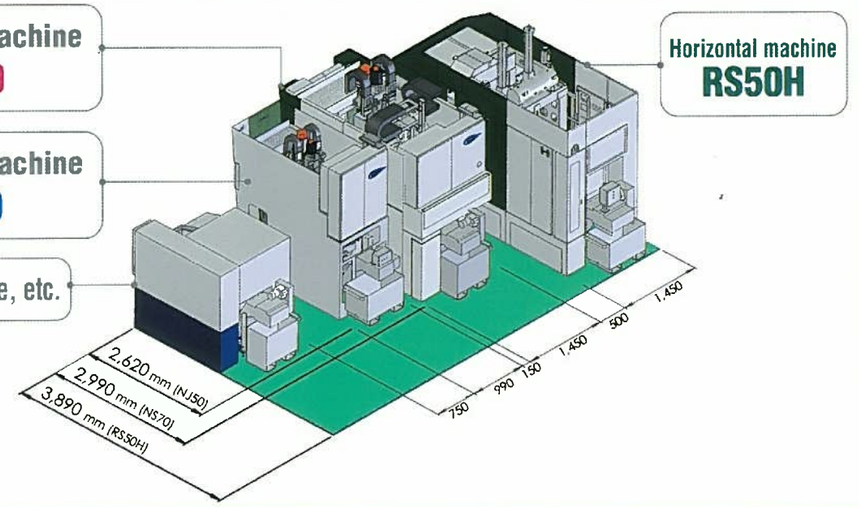
The N series can be installed with a minimum waste of space even in combination with a lathe machine

New development: Machine depth comparison of the NS70 and the NJ50 with our existing horizontal machining center RS50H.

New Type Machine **NS70**

New Type Machine **NJ50**

General NC lathe, etc.



IDEA FOR "ZERO" WASTED SPACE

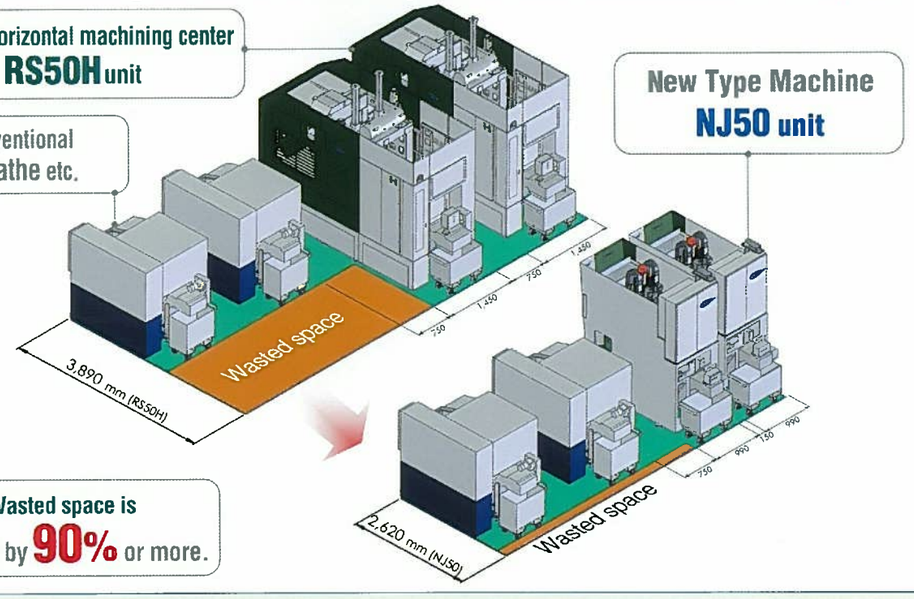
▼"Zero" wasted space with the new type N series machining center▼

Reduction of the wasted space for shaft machining when our existing horizontal machining center RS50H is switched to the NJ50.

Existing horizontal machining center **RS50H unit**

Conventional NC lathe etc.

New Type Machine **NJ50 unit**

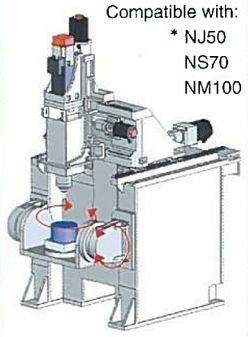
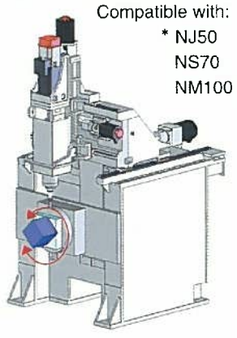
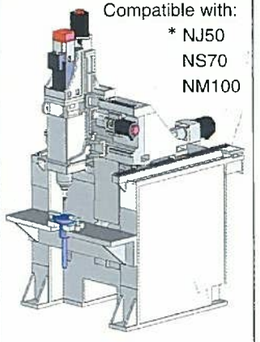


Wasted space is reduced by **90%** or more.

STANDARDIZED TABLE (option)

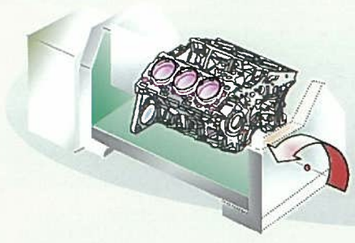
Standardized table gives form to possibilities

Achieves high efficiency and high precision machining by choosing an ideal table for a machining job!

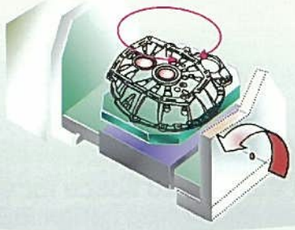
A-axis rotary table mount	A/C-axes rotary table mount	B-axis rotary table mount	Fixed table
Compatible with: * NJ50 NS70 NM100	Compatible with: * NJ50 NS70 NM100	Compatible with: * NJ50 NS70 NM100	Compatible with: * NJ50 NS70 NM100
			
* NJ50 uses a different specification rotary table.	* NJ50 uses a different specification rotary table.		

Example

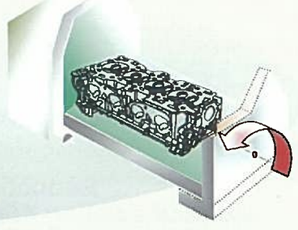
Cylinder block



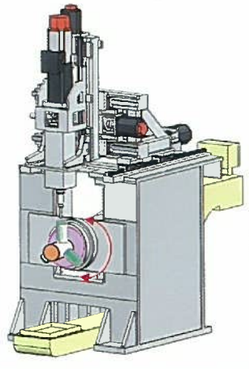
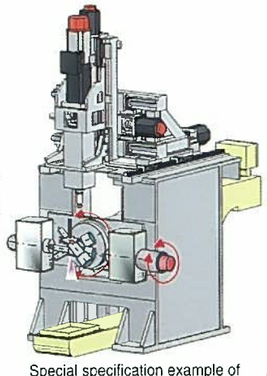
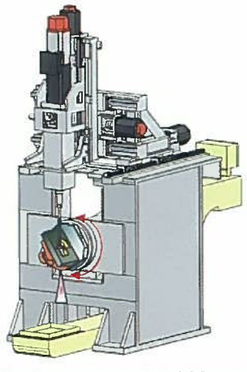
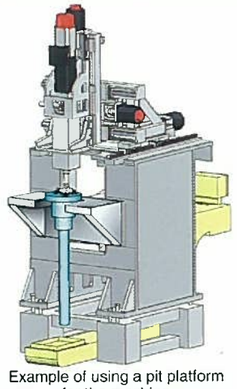
Mission case



Cylinder head



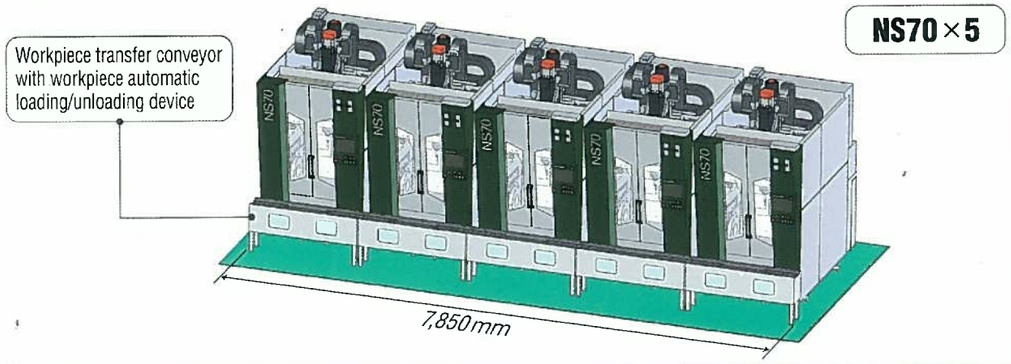
N series jig arrangement

Outside circumference machining by mounting chuck jig on the B axis	Slanted hole drilling at the both ends of the shaft with A/B-axes	Multiple face machining through angle plate with B-axis	Long workpiece machining with knee table specification
			
Mounting example of ø320 NC DD motor	Special specification example of ø320 NC DD motor and added A-axis	Mounting example of ø320 NC DD motor	Example of using a pit platform for the machine

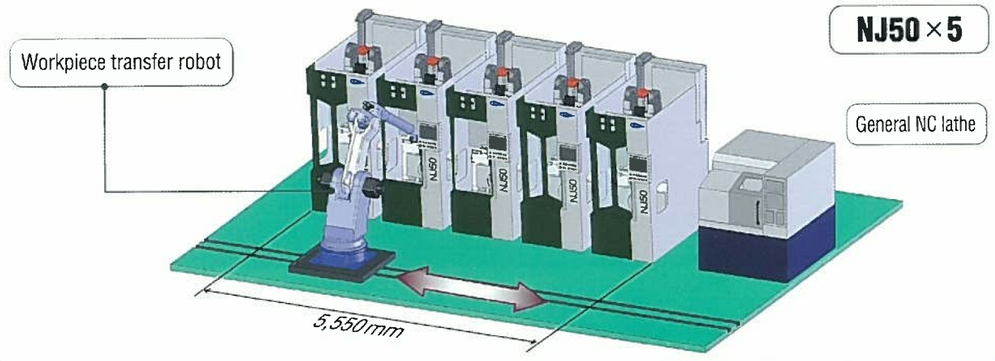
IDEAL FOR AUTOMATION

Support for long continuous operation/high durability, automation, high efficiency, and high precision machining, based on our know-how as a specialized machine manufacturer.

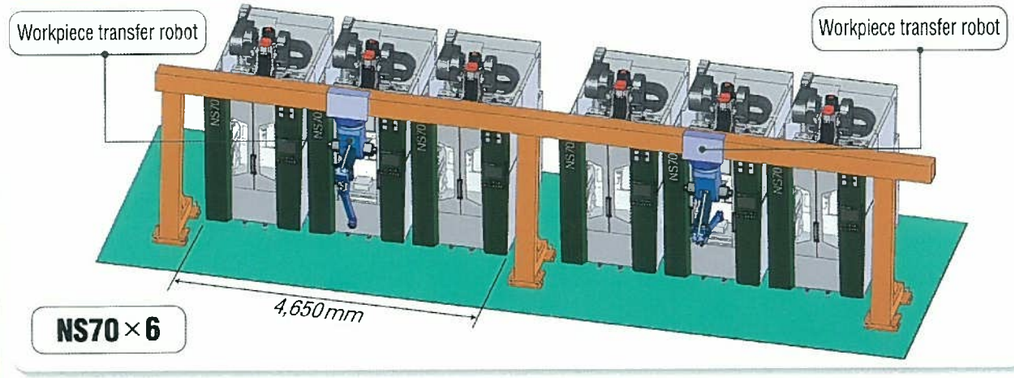
NS70 An example of case machining adaptor type workpiece automatic loading/unloading and automatic transfer conveyor line



NJ50 An example of robot transfer line



NS70 Example of ceiling-hanging type robot transfer line



Specifications

Item			NJ50		NS70		NS80	NM100
			Standard specifications	High torque specifications	Standard specifications	High torque specifications	Standard specifications	Standard specifications
Spindle	Drive system		Direct connection (coupling)		Direct connection (coupling)		Direct connection (coupling)	Direct connection (coupling)
	Diameter (mm)		φ50		φ70		φ80	φ100
	Bearing		Ball bearing		Ball bearing		Ball bearing	Ball bearing
	Bearing lubrication system		Grease		Mist		Grease	Mist
	Max. rotation speed (min^{-1})		12,000	12,000	12,000	12,000	8,000	6,000
	Base speed (min^{-1})		3,000	3,000	3,000	1,500	1,500	1,500
	Drive motor (kw)		See the graph on page16					35/26/22
	Tool holder		BT30 ★HSK-A50		BT40 ★HSK-A63 ★KM6350			BT50 ★HSK-A100 ★KM10080
	Cutting fluid through spindle		Without coolant through spindle (The motor has a lubrication hole which makes converting to coolant through spindle possible.)		Without coolant through spindle (The motor has a lubrication hole which makes converting to coolant through spindle possible.)			Without coolant through spindle (The motor has a lubrication hole which makes converting to coolant through spindle possible.)
			★iMQL®		★iMQL®			★iMQL®
			★Coolant through spindle		★Coolant through spindle			★Coolant through spindle
ATC	Tool change method		Direct		Direct			Direct
	Tool selection method		Fixed address, shortest path tool change method		Fixed address, shortest path tool change method			Fixed address, shortest path tool change method
	Tool storage capacity		20		16 ★24			16
	Max. tool diameter		φ80		φ125			φ165
	Max. tool length		200mm (BT30) ★230mm (HSK-A50)		280mm (BT40) ★345mm (HSK-A63、KM6350)			320mm (BT50) ★400mm (HSK-A100、KM10080)
	Max.tool weight		3 kg		10 kg			20 kg
	Tool change time	T to T	1.1 sec		1.3 sec			2.0 sec
		C to C (1/2 stroke)	2.5 sec		3.0 sec			6.0 sec
Feed unit	Rapid traverse rate	X axis	50m/min (1.2G)		62m/min (1.0G)			40m/min (0.4G)
		Y axis	50m/min (1.0G)		62m/min (0.7G)			40m/min (0.4G)
		Z axis	50m/min (1.5G)		62m/min (1.0G)			40m/min (0.4G)
	Drive motor	X axis	2.3 kw		2.7 kw			4.2 kw
		Y axis	2.7 kw		4.5 kw			4.2 kw x 2
		Z axis	2.7 kw		4.5 kw			4.2 kw
	Cutting feed rate		1-10,000mm/min		1-10,000mm/min			1-10,000mm/min
	Travel X,Y,Z axes		350mm x300mm x 350mm ★600mm x 450mm x 460mm		500mm x 450mm x 500mm			500mm x 500mm x 550mm
	Reference pad		X, Y, Z axes		X, Y, Z axes			X, Z axes
	Z axis thrust (cont. rating/90% duty cycle)		4.2kN		6.2kN			7.7kN
Sliding parts			Linear guide (X,Y,Z axes) with self lubrication system		Linear guide (X,Y,Z axes) with self lubrication system			Linear guide (X,Y,Z axes) with self lubrication system
Hydraulic unit	Tank capacity		20L		20L			20L
	Pump motor		2.2kw-4P		2.2kw-4P			2.2kw-4P
	Pump discharge rate/ set pressure		24, 28L/min (50, 60Hz) 5Mpa		24, 28L/min (50, 60Hz) 5Mpa			24, 28L/min (50, 60Hz) 5Mpa
Machine color			Silver		Silver			Silver
Footprint			990mm x 2,200mm x 2,732mm※		1,450mm x 2,835mm x 3,165mm			1,800mm x 3,752mm x 3,482mm
Machine weight			3,000kg		5,000kg			9,000kg
Power supply			AC200/220V10% 50/60Hz					
Power capacity			15 KVA	24 KVA	28 KVA			57 KVA

N.B. ★ refers to optional specifications.
※ mark indicates the dimensions in case of X axis stroke 350mm, Y axis stroke 300mm, Z axis stroke 350mm.

NC specifications

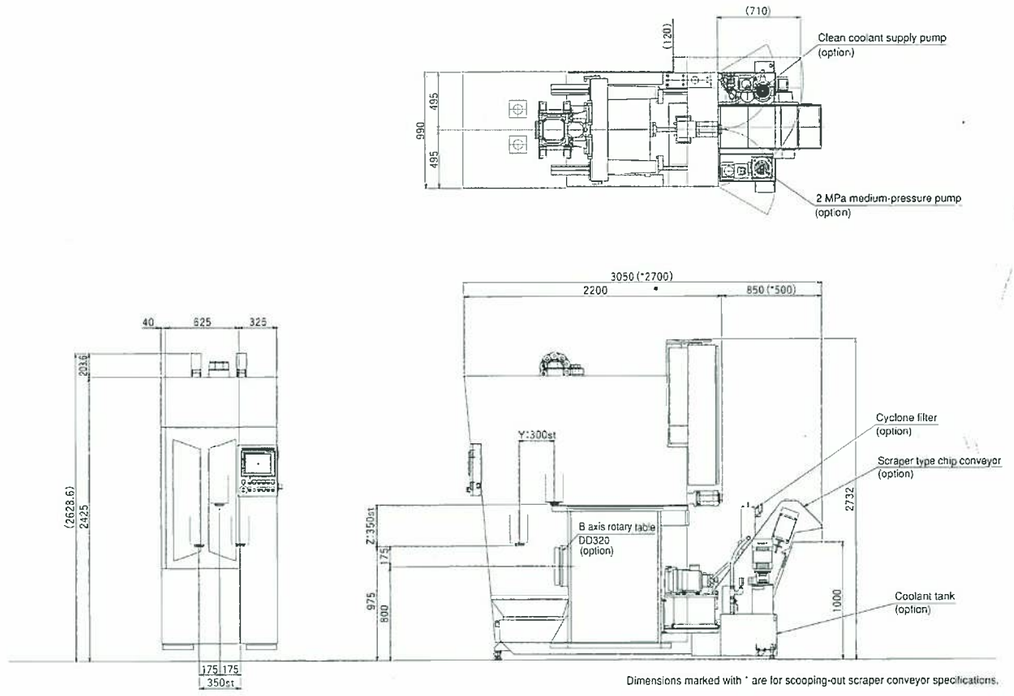
	Item	Specification	Standard	Option
Axis control	Number of controlled axes	4 axes (not included additional axis motor and amp)	●	
	Number of simultaneously controlled axes	4 axes	●	
	Min. input unit	0.001mm	●	
	Stored pitch error compensation		●	
	Simple synchronous control	—	●	
Operation	Single block, dry run, MDI operation		●	
	Program number search	2 digits	●	
	Program restart			☆
	Manual pulse hand-held control	1 unit (Option)	●	
	Reference position setting	Parameter setting	●	
	Zero position setting with mechanical stopper	By zero position setting program		●
Interpolation function	Linear/circular interpolation, dwell, skip function	G01 G02, G03 G04 G31	●	
	Helical interpolation	G02, G03		☆
	Exponential interpolation			☆
Feed function	Automatic acceleration/deceleration	Rapid traverse: Linear, Cutting feed: exponential	●	
	Rapid traverse override, Feed rate override	F0, 25, 50, 100% 0-150% (every 10%)	●	
	Rapid traverse bell-shaped acceleration/deceleration		●	
	Look-ahead control			☆
	Linear acceleration/deceleration after cutting feed interpolation		●	
Program input	Optional block skip, optional stop	1 per block, M01	●	
	Coordinate system setting	G92	●	
	Canned cycles for drilling		●	
	Workpiece coordinate systems	G52-G59	●	
	Programmable data input	G10	●	
	Custom macro B		●	
	Interruption type custom macro	(used for deep hole step drilling)		☆
	Increased custom macro common variables	#100-#199, #500-#999 *(necessary when touch sensor is used)		☆
	Polar coordinate command	G15, G16		☆
Editing operation	Part program storage length	80m	●	
		□160m □320m □640m □1280m		☆
	Number of registered programs	63	●	
		125		☆
	Background editing			☆
	Expanded part program editing			☆
MST function	Auxiliary, spindle, tool function	M code (3 digits), S code (5 digits), T code (2 digits)	●	
	High speed M/S/T interface		●	
	Auxiliary function complex command		●	
	Spindle orientation	M19	●	
	Spindle override	50-150%		☆
	Rigit tapping cycle	Max. 20 times return speed	●	
	Rigit tapping retraction		●	
	Tool length compensation	G43, G44, G49	●	
	Cutter compensation	G40-G42		☆
	Tool length measurement	G43		☆
	Tool position offset	G45-G48		☆
Setting/display	Clock function/Self-diagnosis function		●	
	Alarm history display/Operation history function		●	
	Operating time/number of parts display		●	
	Servo setting screen/spindle setting screen		●	
	Display language	English/Japanese	●	
		Others		☆
Others	Memory card interface		●	
	Memory card	CF card	●	
	Separate touch panel display	10.4 inch color display (virtual MDI)	●	
	Connectable servo motor	FANUC servo motor αi series, βi series (with serial interface/pulse coder)	●	
	Connectable servo/spindle amp	FANUC control motor amp αi series, βi series	●	
	Abnormal load detection			☆

NB: ● indicates standard option. ☆ indicates options
Some machine types may not be compatible with the above standards.

NJ50 outline drawing

* On the condition of X axis stroke 350mm, Y axis stroke 300mm, Z axis stroke 350mm.

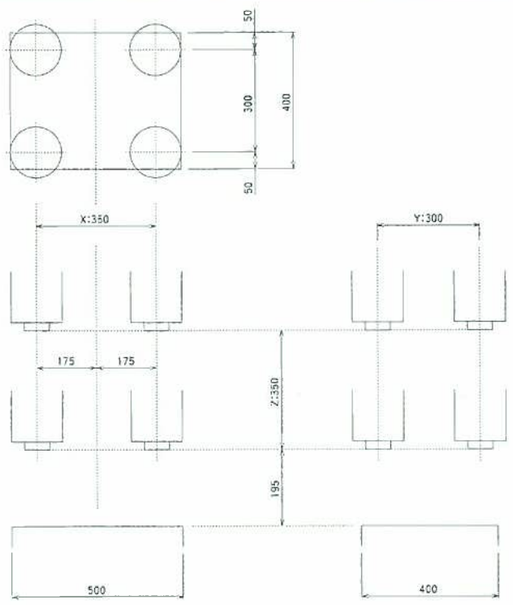
Unit: mm



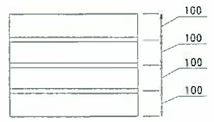
Dimensions marked with * are for scooping-out scraper conveyor specifications.

NJ50 standard fixed table diagram

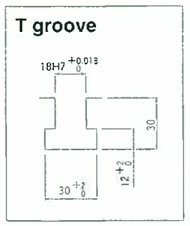
Unit: mm



Top surface of the standard table

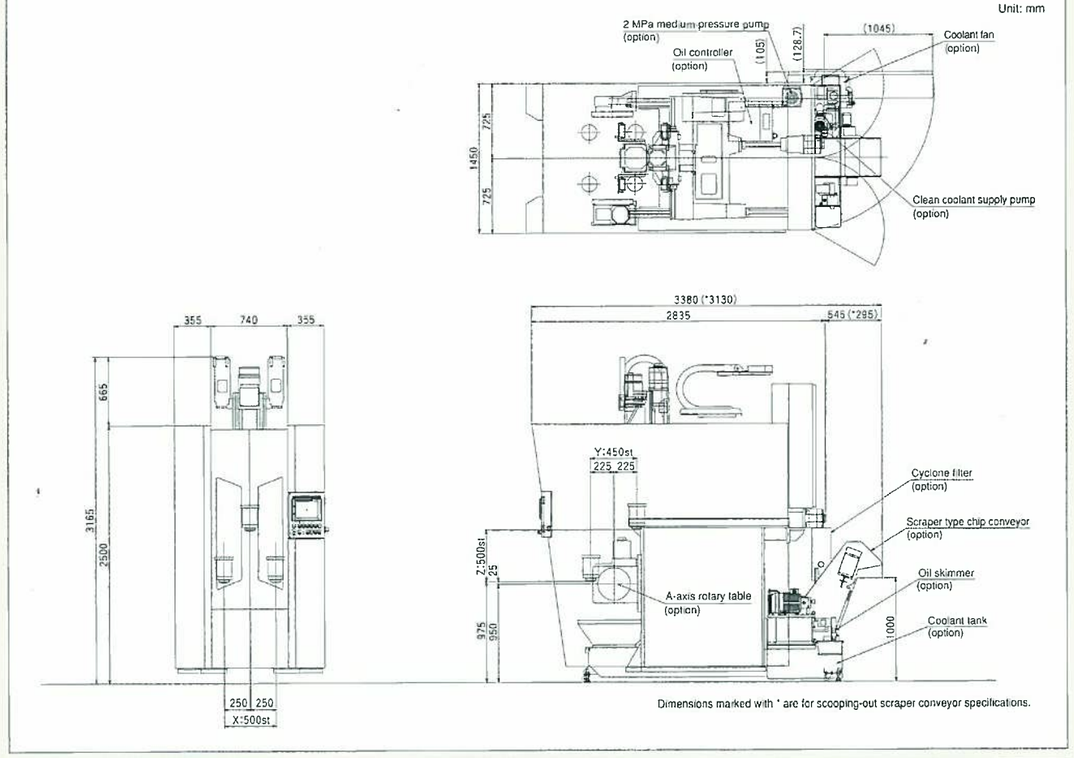


T groove



NS70 outline drawing

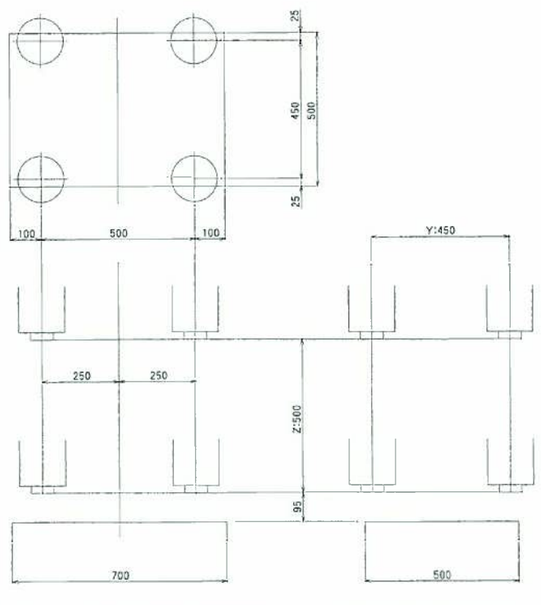
Unit: mm



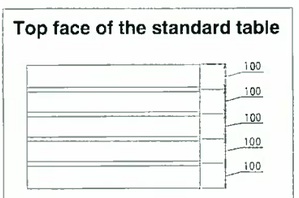
Dimensions marked with * are for scooping-out scraper conveyor specifications.

NS70 standard fixed table diagram

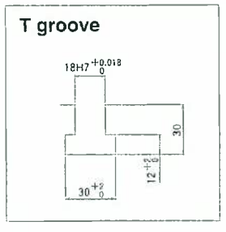
Unit: mm



Top face of the standard table

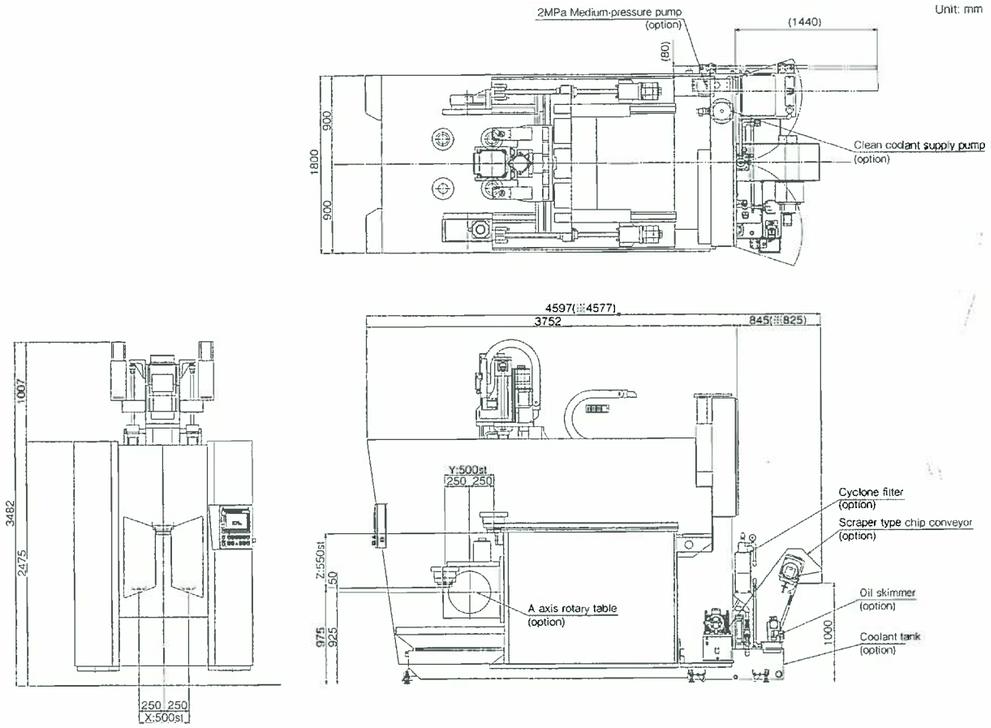


T groove



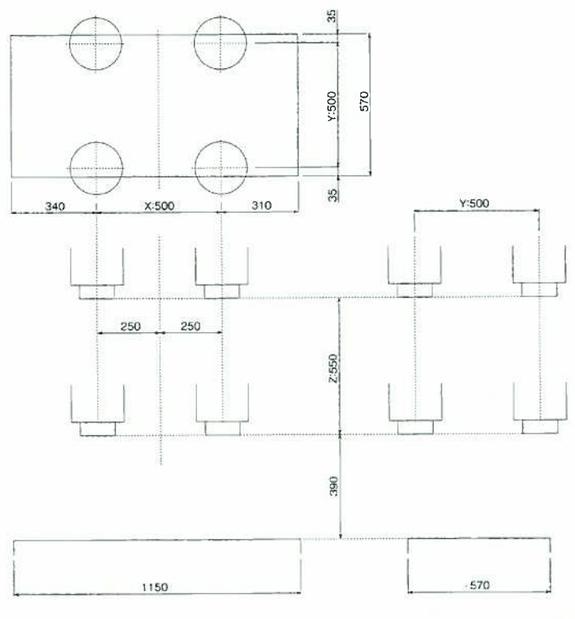
NM100 outline drawing

Unit: mm

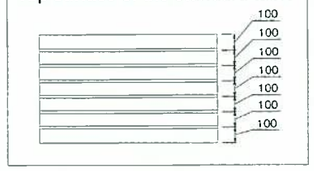


NM100 standard fixed table diagram

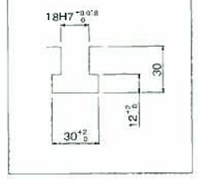
Unit: mm



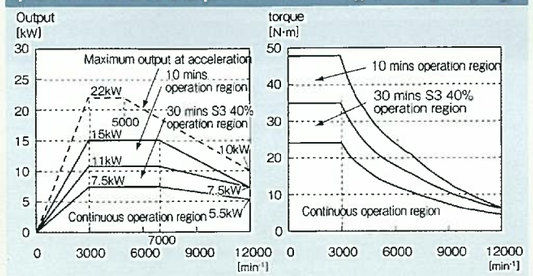
Top surface of the standard table



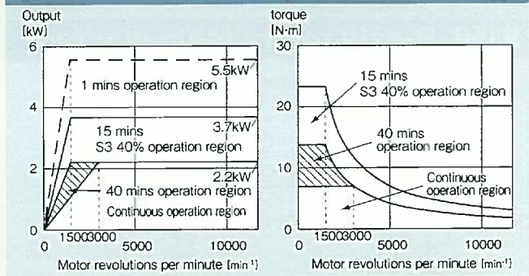
T groove



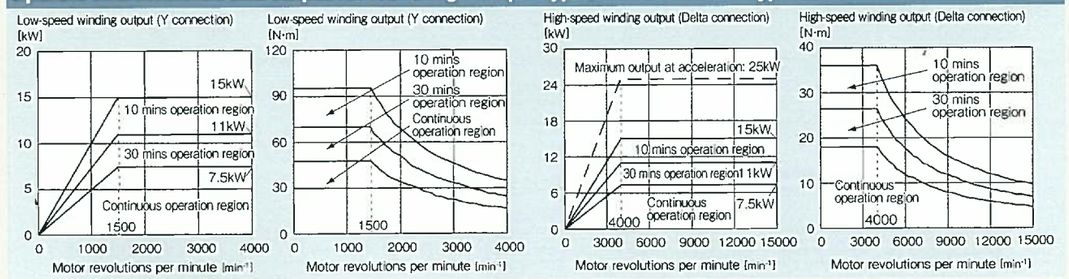
Spindle characteristic and output for NS70 standard type/NJ50 high torque type



Spindle characteristic and output for NJ50 standard type



Spindle characteristic and output for NS70 high torque type / NS80 standard type



Output at acceleration is not guaranteed but a target to calculate the time for acceleration/deceleration.

Special specification option

- Specified paint color
- iMQL® device
- Spindle cooler (with oil control unit)
- Ø 400 rotary table (TTN-400): NS70/NM100
- Ø 320 rotary table (DD motor specification): NJ50/NS70
- Chip conveyor for MQL
- Coolant tank unit (for AL) with chip conveyor
- Coolant tank unit (for iron and grey iron) with chip conveyor
- Mid pressure coolant unit (2Mpa)
- High pressure coolant unit (7Mpa)
- Oil skimmer
- Coolant thermal control
- Coolant gun
- Air gun
- Chip box
- Tool breakage detection
- Positioning block
- Low pressure coolant float switch
- Clean coolant float switch
- Low-pressure coolant pressure switch
- Medium/high-pressure coolant pressure switch
- Through coolant float switch
- Operator door power lock
- Operator side safety area sensor
- Electric leakage breaker
- Heat exchanger inside control panel
- Calendar timer for warming-up cycle
- Automatic measurement device (optical touch sensor)
- Tool length measuring unit
- Light inside machine
- Signal tower
- Deep-hole step cycle

Options for dedicated specifications (consultation required)

- Jig washing coolant pipes
- Jig datum face washing coolant pipes
- Dedicated specification cover
- One-face/two-face/four-face standard angle plate jig
- Hydraulic/air pressure interface for jigs
- Fixtures
- Mist collector
- Machine-side solenoid valve for coolant system
- Coolant shooter for coolant system
- Tool length input interlock
- Upper-position production information feedback signal
- Previous and following process interlock
- Customized operation screen
- Electric control for jigs
- Automatic measuring device
- Handy start switch
- Loader compatible interface
- Work automatic measurement
- NC unit (MELDAS C64)
- Cooler inside control panel

SPECIAL OPTION

High performance filter type mist collector

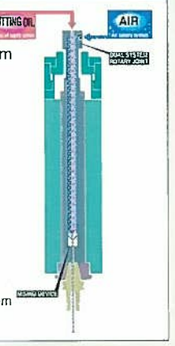
High performance electric dust collector

iMQL®

Dry cutting system

Uses a patented lubrication system which creates a very fine mist by mixing cutting oil and air inside the spindle

Small amounts of the cutting oil and air separately just before the spindle nose where they are mixed and then sprayed from the tip of the cutting tool

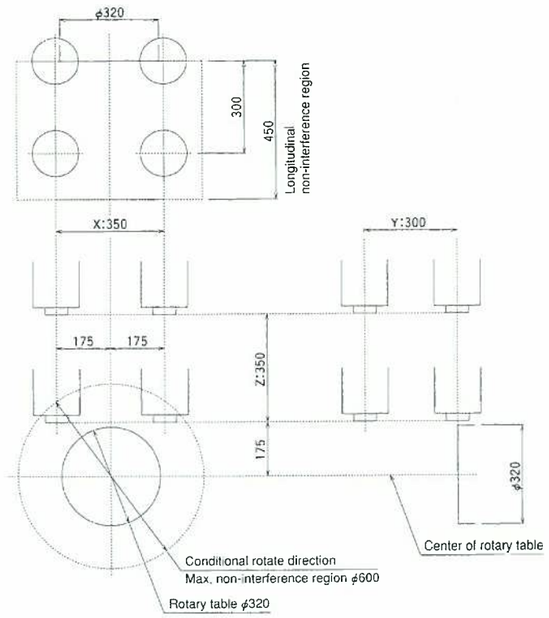


Minimum quantity lubrication system (internal spindle mixing)

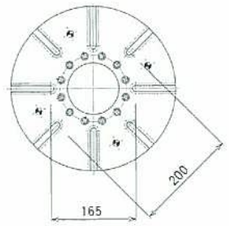
OPTION TABLE

NJ50 B-axis rotary table diagram

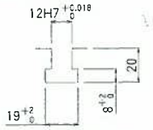
Unit: mm



Top face of the standard table
DD320



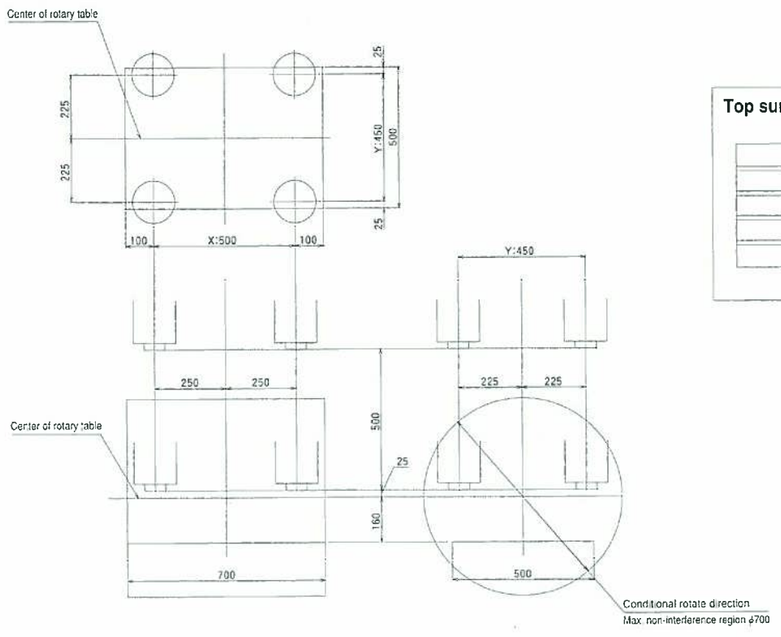
T groove



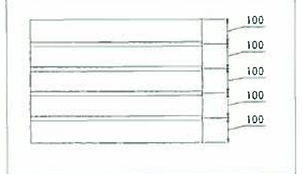
T groove tolerance applies to the four standard grooves of the cross shape.

NS70 A-axis rotary table diagram

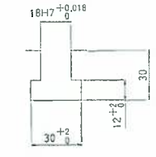
Unit: mm



Top surface of the standard table

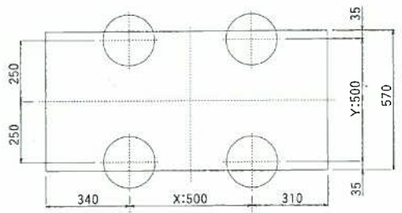


T groove

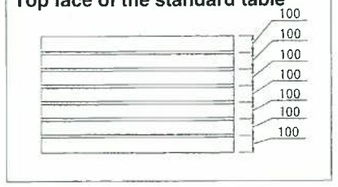


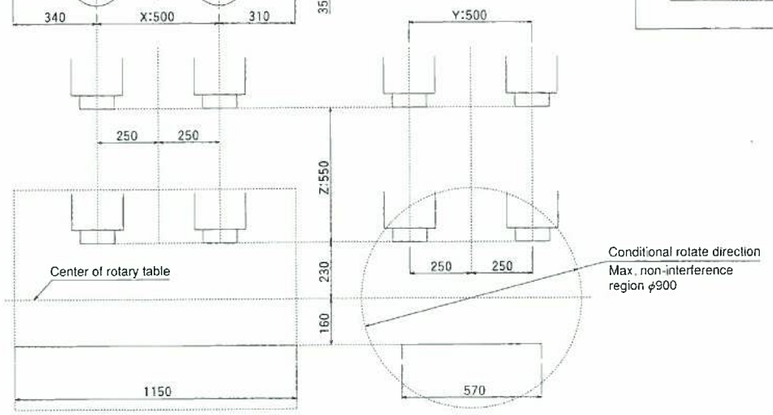
NM100 A-axis rotary table diagram

Unit: mm

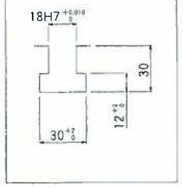


Top face of the standard table



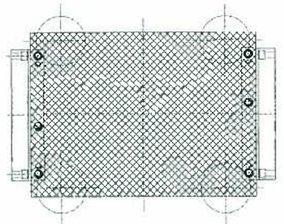


T groove



NS70 flexible table diagram

CNC401



The work table is designed to be mounted on the support table, which makes its setup change very easy.
The work table can be easily fabricated and mounted as a dedicated fixture by matching its size with the support table.
If a cylinder is fitted to the work table, automation can be easily achieved by supplying hydraulic pressure and air from the support table. (option)
When the rotary table is in use, automation can be easily achieved by supplying hydraulic pressure and air via the rotary valves. (option)

Unit: mm