

High-Precision, 5-Axis Control Horizontal Machining Center

NMH6300 DCG

NMH10000 DCG

NMH Series



NMH SERIES

The fusion of cutting-edge technologies has overturned conventional wisdom about parts machining.

Thanks to Mori Seiki's unique technology "DCG (Driven at the Center of Gravity)" and "DDM (Direct Drive Motor)" technology, the high-precision, 5-axis control horizontal machining center NMH Series offers the best parts machining in the world. By combining DCG for outstanding acceleration and low vibration on the 3 linear axes and DDM for the world's fastest rotary 2-axis control, we created this new-generation 5-axis machine which offers unparalleled performance.



NMH6300 DCG

Pallet working surface

630×630 mm (24.8×24.8 in.)
[500×500 mm (19.7×19.7 in.)]

Max. workpiece swing diameter

1,000 mm (39.3 in.)

● When the A-axis is -95° to -120°, the diameter is 750 mm (29.5 in.).

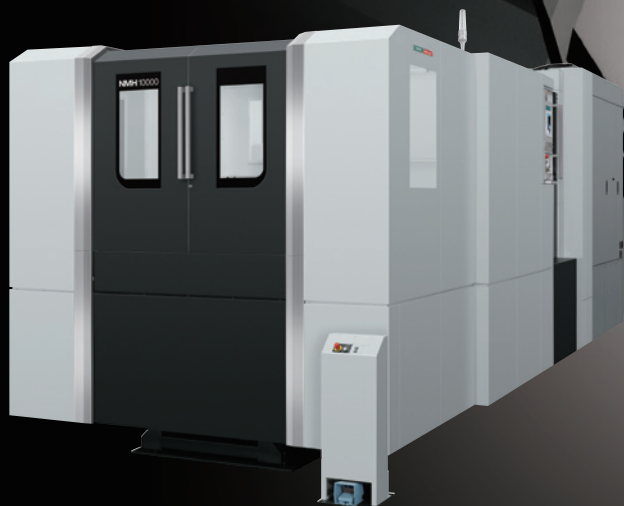
Max. workpiece height

850 mm (33.4 in.) [700 mm (27.5 in.)*]

* □ 500 mm (19.7 in.) pallet

[] Option

● Figures in inches were converted from metric measurements.



The Nikkan Kogyo Shimbun sponsored
"38th Machine Design Award (Nippon Brand Prize)"

NMH10000 DCG

Pallet working surface

1,000×1,000 mm (39.4×39.4 in.)

Max. workpiece swing diameter

1,500 mm (59.0 in.)

● When the A-axis is -95° to -120°, the diameter is 1,000 mm (39.3 in.).

Max. workpiece height

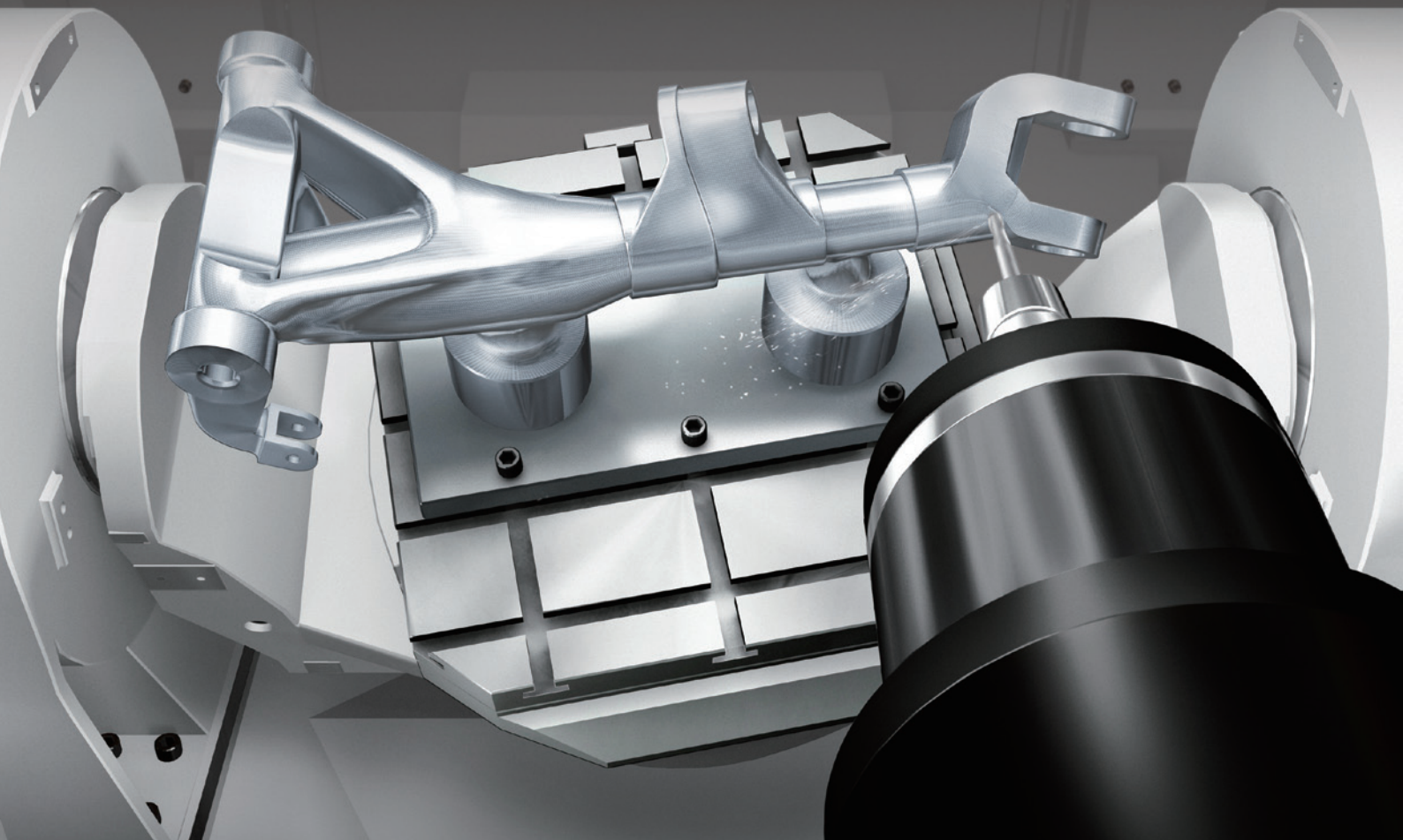
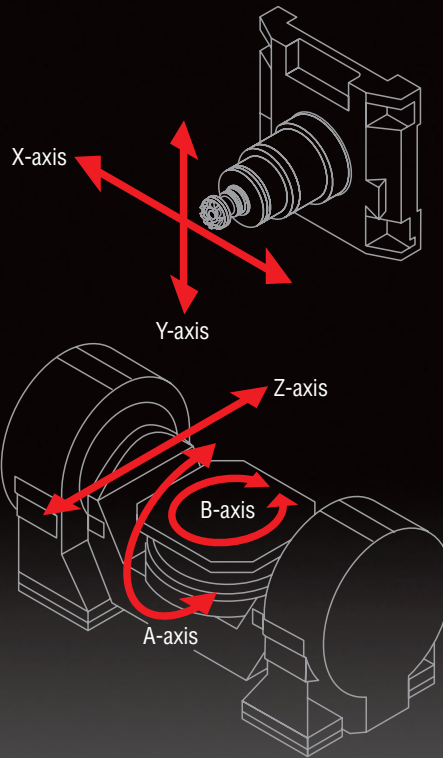
1,300 mm (51.1 in.)

Features of 5-axis machines

They offer high-efficiency machining which far surpasses that of 3- or 4-axis machines.

Benefits of 5-axis machines

- Outstanding high-efficiency machining
- Process integration
- Improved machining accuracy



Outstanding high-efficiency machining

5-axis machines achieve outstanding performance in all types of machining, from complex-shaped workpieces such as impellers and turbine blades to workpieces with 3D curves such as dies and molds.



Process integration

Since 5-axis machines offer multiple-face indexing, they can complete machining in one clamping. This reduces the number of setups and simplifies fixtures, achieving a significant reduction in processing time.

3-axis and 4-axis machines



5-axis machines



Reduction in processing time

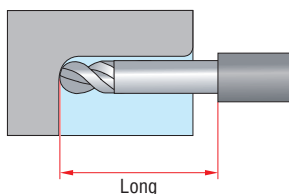
Improved machining accuracy

By making the tool approach from the optimal angle using the rotary axes, 5-axis machines offer high-precision machining which cannot be achieved with 3- or 4-axis machines.

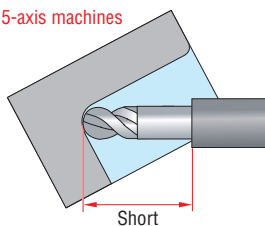
<High-quality machining thanks to higher tool rigidity>

Thanks to the rotary axes, the amount of tool overhang for 5-axis machines is smaller than for 3- or 4-axis machines, as shown in the diagram. The smaller the amount of tool overhang, the higher the tool rigidity becomes, allowing high-precision machining. The tool rigidity is inversely proportional to the cube of the tool length. In other words, when the amount of tool overhang doubles, the tool rigidity becomes 1/8. As a result, 5-axis machines achieve high-quality machining which surpasses that of 3- and 4-axis machines.

3-axis and 4-axis machines



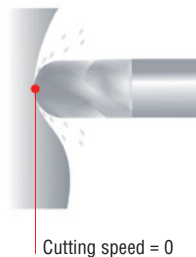
5-axis machines



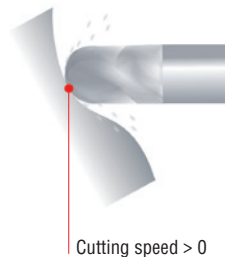
<High-precision, high-efficiency machining within the optimum cutting speed range>

Since 5-axis machines avoid machining with the center of the tool tip where cutting speed is zero even when the spindle speed increases, and machine at the optimal machining point to ensure cutting speed, they offer longer tool life, improved surface roughness and feedrate, and achieve high-precision, high-efficiency machining.

3-axis and 4-axis machines



5-axis machines





DCG®
Driven at the Center of Gravity

Minimizing vibration, the greatest enemy of machining, and maximizing acceleration.

Driven at the Center of Gravity

The 24th Technology Development Award
from the Japan Society for Precision Engineering

Vibration, which is caused by the movement of the machine's components, is a major cause of deterioration in surface quality and machining accuracy. DCG minimizes the residual tool tip vibration, optimizing not only accuracy but also machining time and tool life.

Effects of DCG

- Improved surface quality
- Outstanding acceleration
- Improved roundness
- Longer tool life

NMH6300 DCG

Rapid traverse rate

X, Y and Z axes **50** m/min (1,968.5 ipm)

Max. acceleration

X-axis **0.43** G {4.2 m/s² (13.8 ft/s²)}

Y-axis **0.76** G {7.4 m/s² (24.3 ft/s²)}

Z-axis **0.28** G {2.7 m/s² (8.9 ft/s²)}

NMH10000 DCG

Rapid traverse rate

X and Y axes **42** m/min (1,653.5 ipm)

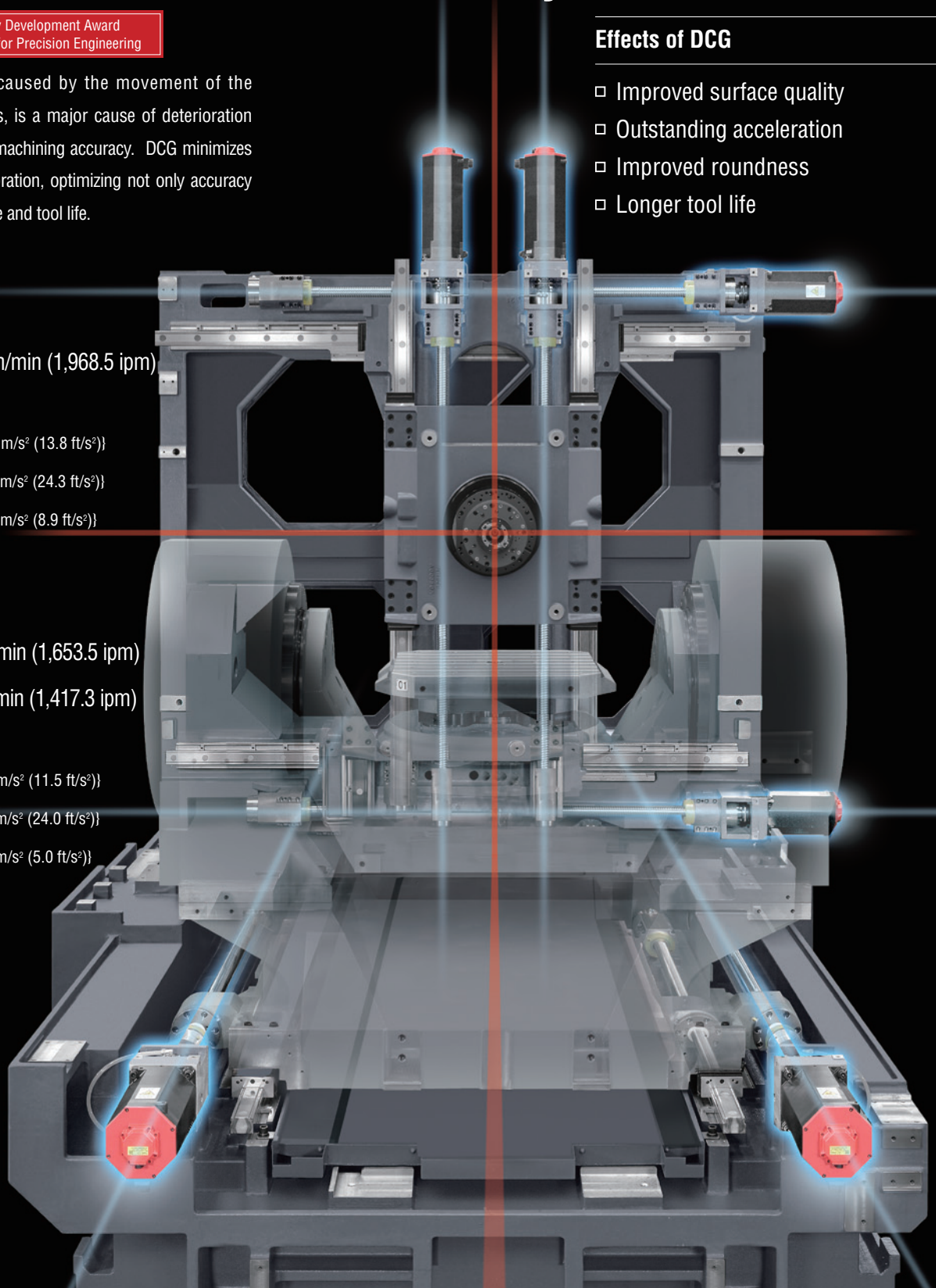
Z-axis **36** m/min (1,417.3 ipm)

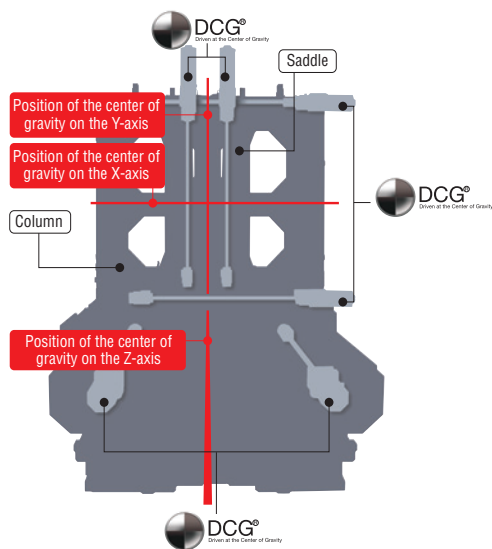
Max. acceleration

X-axis **0.36** G {3.5 m/s² (11.5 ft/s²)}

Y-axis **0.74** G {7.3 m/s² (24.0 ft/s²)}

Z-axis **0.15** G {1.5 m/s² (5.0 ft/s²)}





Our DCG technology controls vibration, which is one of the main enemies of high speed and high precision, by driving structural parts at their center of gravity.

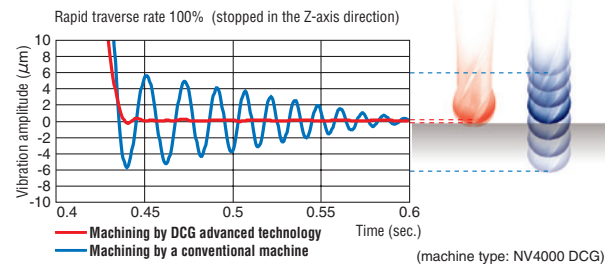
<Box-in-Box construction>

The Box-in-Box design, which supports the saddle from both sides, guides and drives the moving parts by its center of gravity in a more balanced manner.

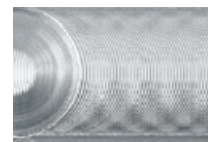
Controls vibration

For positioning, machines with DCG virtually eliminate vibration, while machines without DCG continue to vibrate for a long time. DCG controls the rotational vibration which appears at every acceleration start point, and which is proportional to the distance between the drive point and the center of gravity. This prevents deterioration of the quality of the machined surface.

■ Residual vibration comparison



Machining by DCG advanced technology



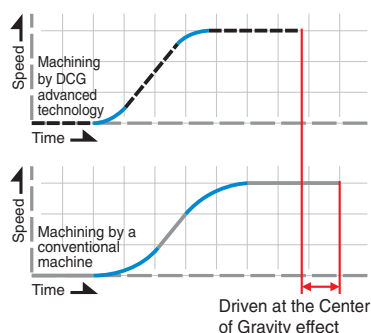
Machining by a conventional machine

Improved roundness

During circle cutting on conventional machines, vibration is generated by changes in direction when moving from one quadrant to the next (at the 0°, 90°, 180° and 270° positions). With DCG technology which minimizes vibration, roundness is significantly improved.

Outstanding acceleration performance

Machines that are built with the "Driven at the Center of Gravity" technology produce little vibration at the start of acceleration, which means that they can accelerate at full force right from the start. Machines not equipped with this innovative technology, however, must apply accelerating force gradually, for fear of creating too much vibration when starting to accelerate.



Improves surface quality

Curved machined surfaces are actually made up of many very short straight lines, which means the moving component has to change direction slightly at every angle. In order to do this without dropping speed requires very fast acceleration. The vibration caused by each revolution is proportional to the distance from the drive point to the center of gravity for all start points, but DCG controls this vibration and prevents a drop in surface quality.



Machining by DCG advanced technology



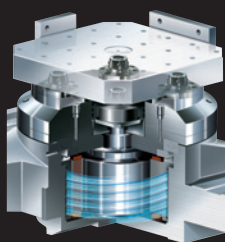
Machining by a conventional machine



The world's fastest rotary axis drive system,
which achieves zero backlash.

Direct Drive Motor

Until now, gears have been used to transmit the drive power to the rotary axes, but this drive system had a negative effect on drive speed and precision. By transmitting the drive power to the rotary axes directly without using gears, DDM offers greater transmission efficiency than conventional worm gears and allows high-speed feed. Also, it achieves zero backlash.



DDM effect

- High-speed rotation
- High-precision indexing
- Less maintenance
- Longer product life

Previous model
(The same class as the NMH6300 DCG)

Max. rotational speed

A-axis 5.5 min⁻¹

B-axis 11.1 min⁻¹

NMH6300 DCG

Max. rotational speed

A-axis 20 min⁻¹

B-axis 50 min⁻¹ 100 min⁻¹

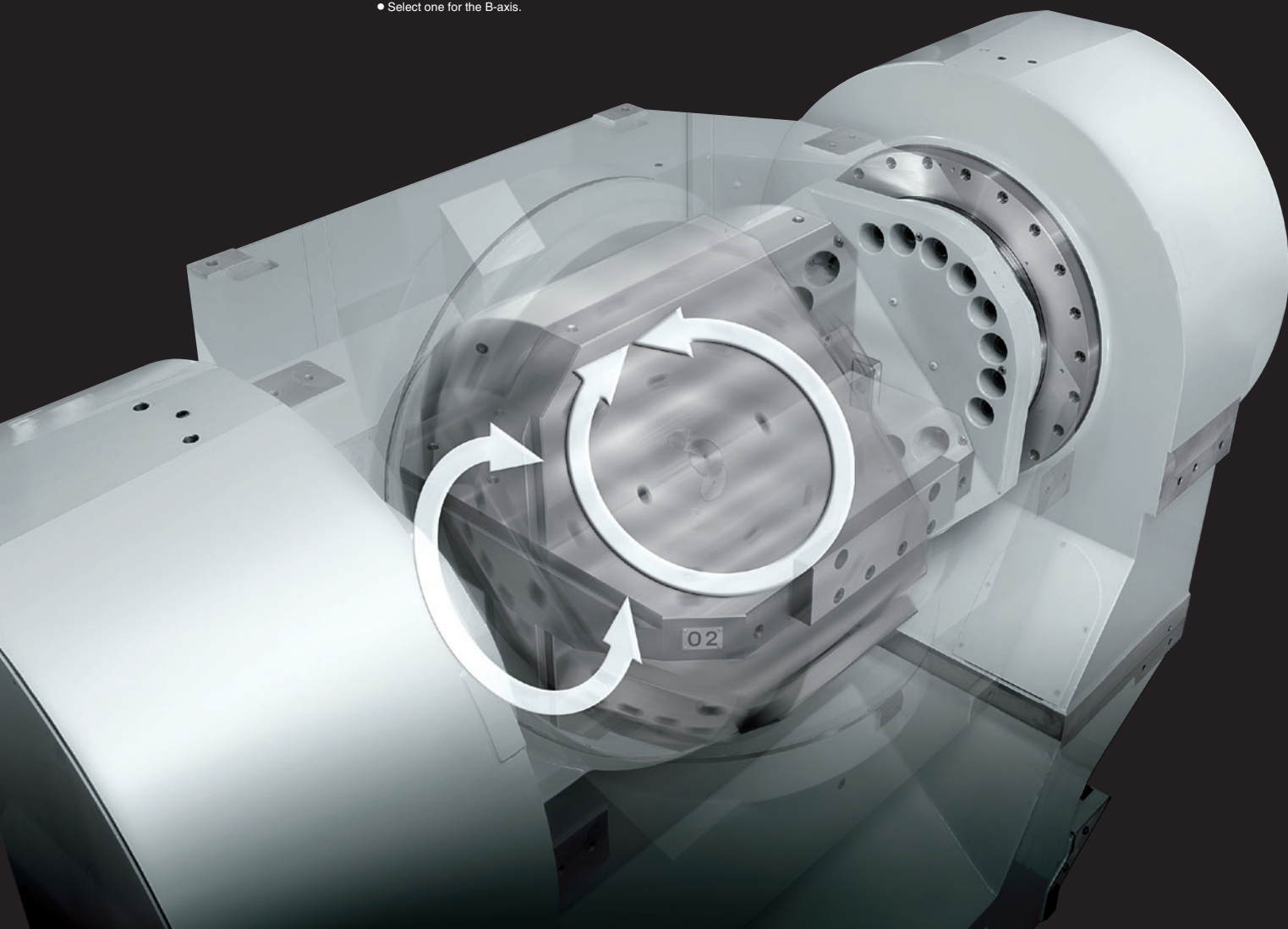
● Select one for the B-axis.

NMH10000 DCG

Max. rotational speed

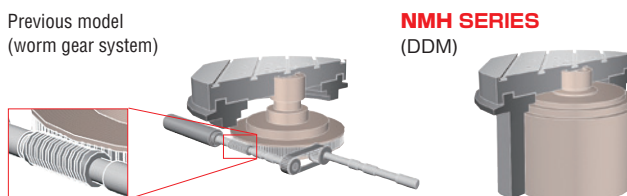
A-axis 10 min⁻¹

B-axis 50 min⁻¹



Comparison with conventional drive system

With a worm gear type, only about 50-70% of the motor output could be transmitted to the wheel, but with a DDM, it can all be used. And Mori Seiki makes them in-house, so if they ever do break down, we can fix them quickly, significantly reducing recovery time.

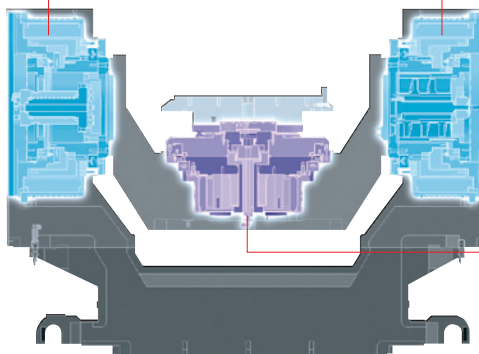
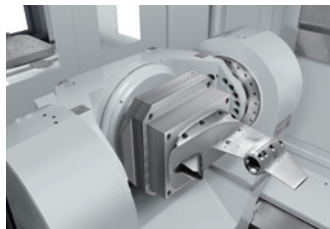


Equipped with three DDMs

By using DDM for control of the A and B axes, the NMH Series delivers the world's fastest and most precise dual rotating shaft control. Backlash is completely eliminated by removing the link gear.

A-axis Two DDMs

The powerful drive of the two DDMs maintains outstanding stability when machining large parts.

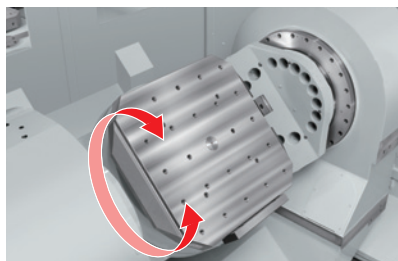


B-axis One DDM

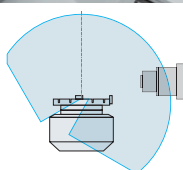
By using DDM, which allows high-speed turning, non-cutting time is greatly reduced.



A-axis control



Two DDMs which control the A-axis enable high-speed rotation in the vertical direction.

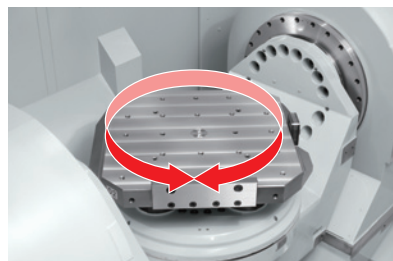


Range
+30° to -120°

Minimum pallet indexing angle
0.001°
(full indexing)

Pallet indexing time (90°)
NMH6300 DCG/50
0.91 sec.
NMH10000 DCG
1.9 sec.

B-axis control



The NMH Series has a minimum pallet indexing increment of 0.001° (full indexing) as standard specifications.

Minimum pallet indexing angle
0.001°
(full indexing)

Pallet indexing time (90°)
NMH6300 DCG/50
0.83 sec.

NMH10000 DCG
1.7 sec.

● Pallet indexing time: Not including clamping and unclamping time

Automatic operation support

We have prepared many variations which offer the ideal systems for all shapes of material.

Please select the equipment which is suitable for your workpieces.

<Material IN>

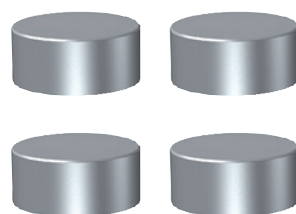
Shape

Square material



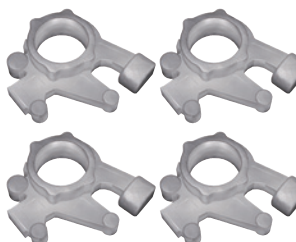
Shape

Round material



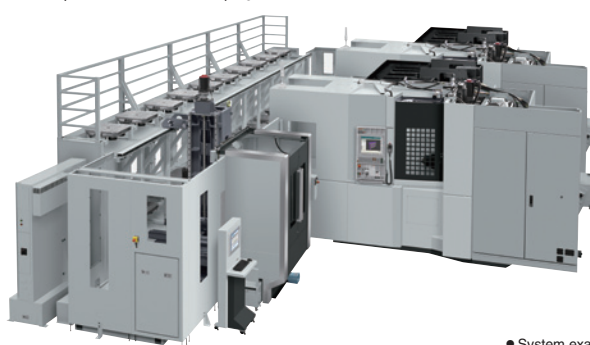
Shape

Unusually shaped workpieces



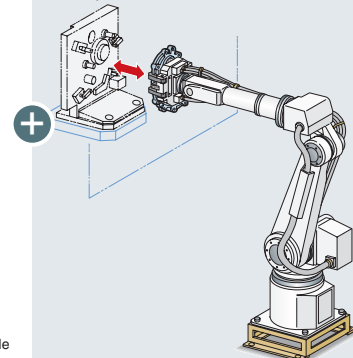
System

LPP (Linear Pallet Pool) systems



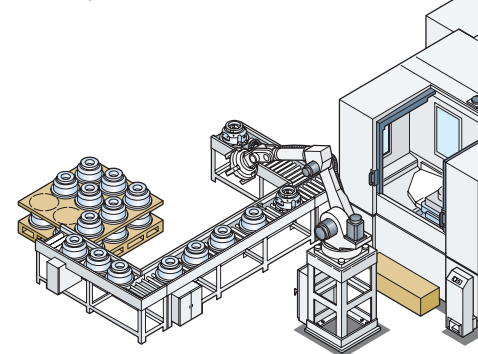
● System example

Workpiece transfer robot



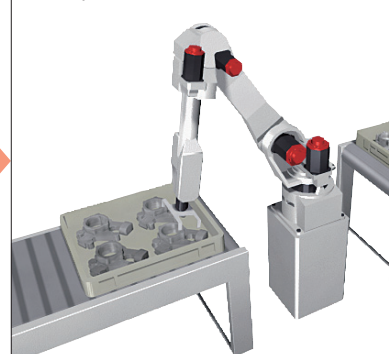
System

Robot specifications

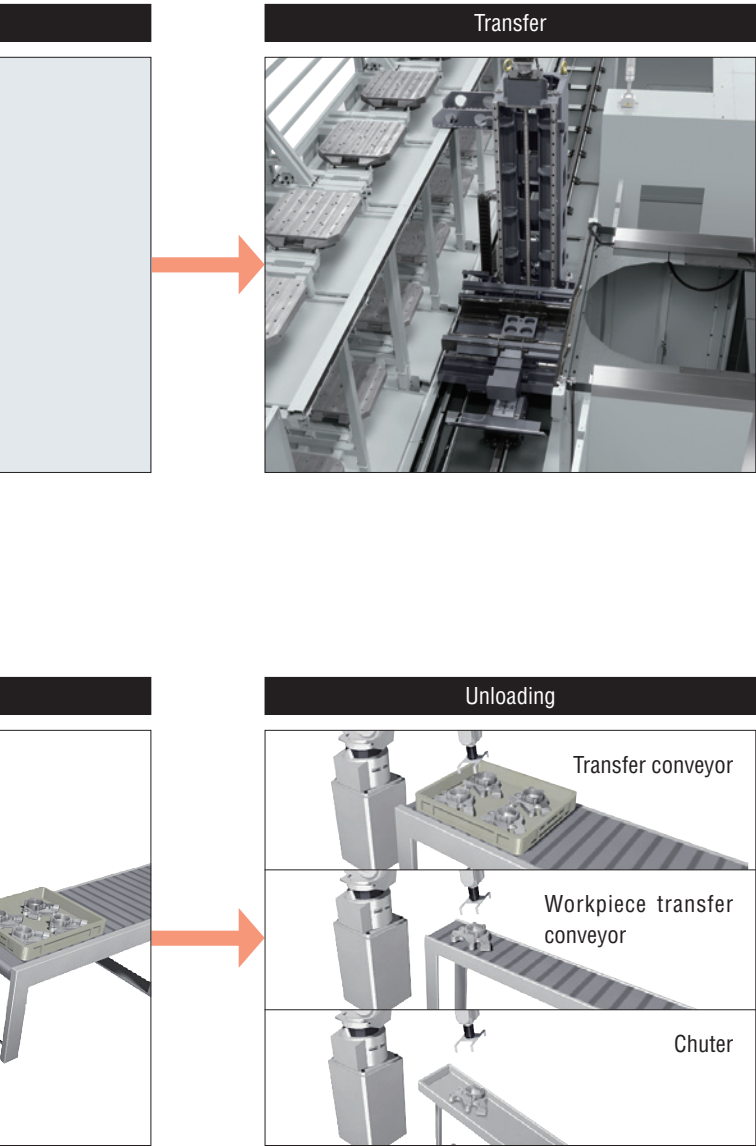


Transfer

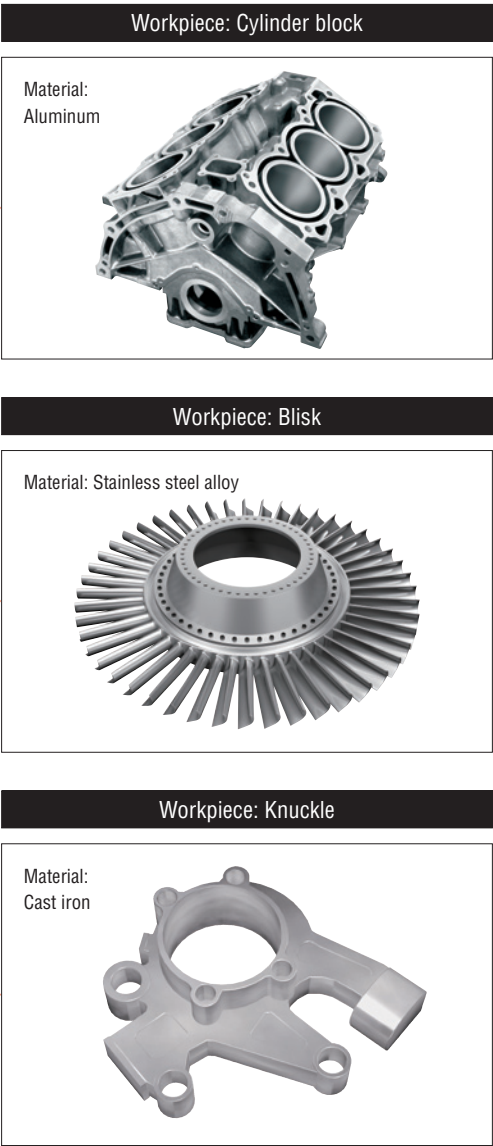
Workpiece transfer robot



<Finished product OUT>



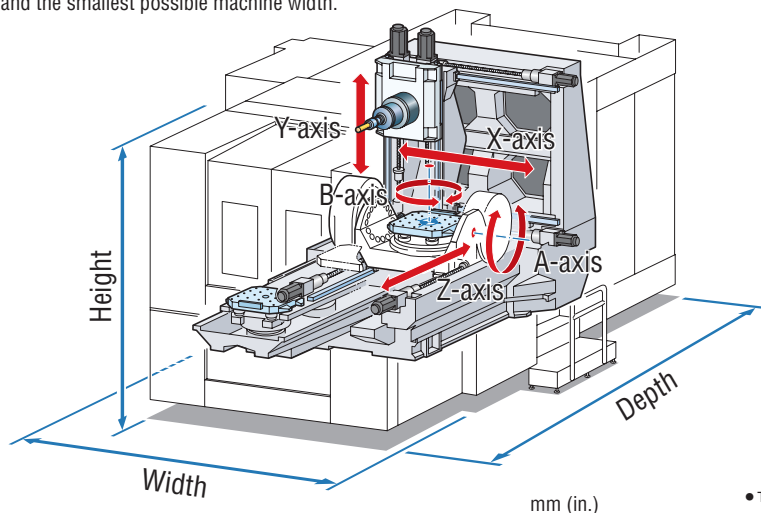
<Finished product>



Basic structure

Machine size

Since the rotary axes move in the Z-axis direction, the NMH Series is designed to ensure a large work envelope and the smallest possible machine width.

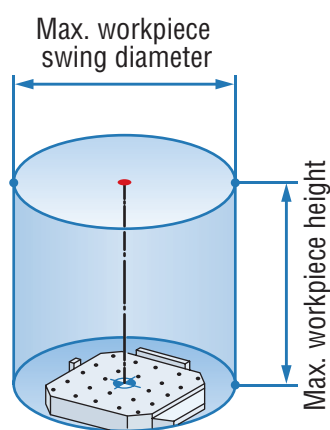


● The illustration shows the NMH6300 DCG

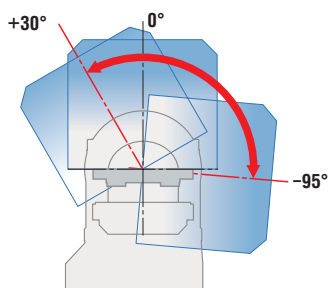
Machine type (standard)	Width	Depth	Height
NMH6300 DCG/40	5,464 (215.1)*	7,113 (280.0)*	3,836 (151.0)*
NMH6300 DCG/50	4,415 (173.8)	7,113 (280.0)	3,836 (151.0)
NMH1 0000 DCG	4,660 (183.5)	9,190 (361.8)	4,290 (168.9)

* 300-tool magazine (option)

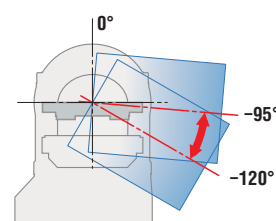
Working area



■ When the A-axis is +30° to -95°



■ When the A-axis is -95° to -120°



mm (in.)

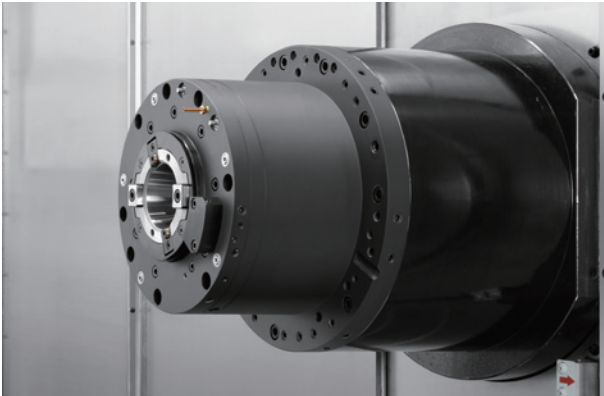
Machine type	Max. workpiece height	Max. workpiece swing diameter <when the A-axis is +30° to -95°>	Max. workpiece swing diameter <when the A-axis is -95° to -120°>
NMH6300 DCG	850 (33.4), 700 (27.5)* OP	1,000 (39.3)	750 (29.5)
NMH1 0000 DCG	1,300 (51.1)	1,500 (59.0)	1,000 (39.3)

* □500 mm (19.7 in.) pallet

Basic structure

Spindle

The spindle uses a high-efficiency DDS (Direct Drive Spindle) motor that can handle everything from high-speed machining to powerful cutting. This machine handles all types of materials from steel to aluminum and other non-ferrous metals.



• The photo shows the 10,000 min⁻¹

Max. spindle speed

NMH6300 DCG/40

14,000 min⁻¹

High speed **OP**

20,000 min⁻¹

NMH6300 DCG/50
NMH10000 DCG

10,000 min⁻¹

High output **OP**

10,000 min⁻¹

High speed **OP**

15,000 min⁻¹

High torque **OP**

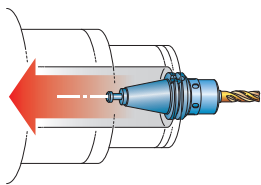
8,000 min⁻¹

• Please use a dual contact tool when cutting at higher than 10,000 min⁻¹.

Spindle acceleration/deceleration time

Machine type	Spindle acceleration time (0 → 10,000 min ⁻¹)	Spindle deceleration time (10,000 min ⁻¹ → 0)	Spindle acceleration time (0 → 14,000 min ⁻¹)	Spindle deceleration time (14,000 min ⁻¹ → 0)
NMH6300 DCG/40	—	—	2.1 sec.	1.7 sec.
NMH6300 DCG/50	3.2 sec.	3.4 sec.	—	—
NMH10000 DCG				

Tool clamp power



Using the newly developed collet, clamping power on the tool has been increased. The ability to control vibration during spindle rotation ensures high-accuracy machining.

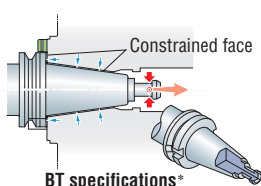
24,000 N*
(5,395.1 lbf)

* Standard specification with a No. 50 taper spindle

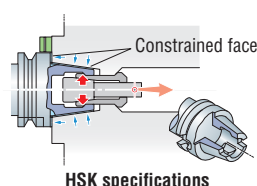
Tow-face contact specifications

OP

Tool rigidity has been improved by contact of both the spindle taper and the tool flange. This extends the useful life of a tool, raises cutting power and improves the machining precision.



BT specifications*



HSK specifications

* When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

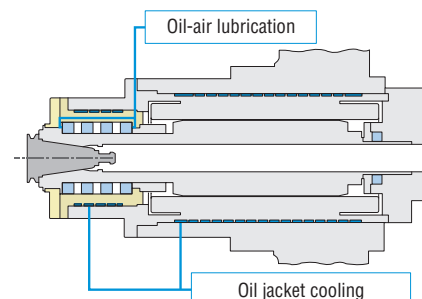
• All Mori Seiki spindles are made in-house to better meet our customer needs.
For details, please consult with our sales representative.

Spindle cooling

Stator coil in DDS motor: the coolant supplied by the oil cooler minimizes heat diffusion by circulating through an oil jacket, which is placed around the stator coil.

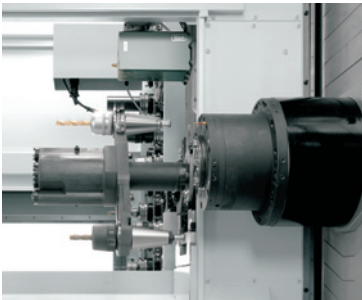


Oil cooler



ATC

By using a double arm, which offers high-speed tool change, non-cutting time is dramatically reduced.



Tool-to-tool
NMH6300 DCG/50
NMH10000 DCG
2.1 sec.

ISO: International Organization for Standardization JIS: Japanese Industrial Standard

Tool changing time

Cut-to-cut (chip-to-chip)
60-tool specifications:

NMH6300 DCG/50
NMH10000 DCG
15.9 sec. (max.)
5.0 sec. (min.)

ISO 10791-9 JIS B6336-9

• The time differences are caused by the different conditions (travel distances, etc) for each standard.

APC

It uses a front 2-pallet turn-type APC. This APC offers high-speed pallet change that reduces non-cutting time.

2-station turn-type APC

Pallet changing time

NMH6300 DCG

53 sec.

NMH10000 DCG

94 sec.

Pallet loading capacity

NMH6300 DCG

800 kg (1,760 lb.)

500 kg (1,100 lb.) **OP**

NMH10000 DCG

2,500 kg (5,500 lb.)



• The photo shows the NMH6300 DCG

Rack-type magazine

We have prepared a wide range of tool magazines for the NMH Series to suit the customer's level of automation.

Tool storage capacity

NMH6300 DCG/40

60 tools (chain-type)

300 tools (rack-type) **OP**

NMH6300 DCG/50 (rack-type)

60 tools

140 tools **OP**

180 tools **OP**

240 tools **OP**

330 tools **OP**

Space-saving type

230 tools **OP**

NMH10000 DCG (rack-type)

60 tools

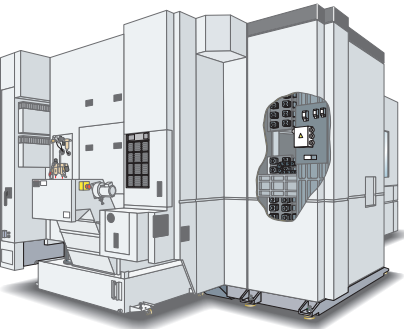
140 tools **OP**

180 tools **OP**

240 tools **OP**

330 tools **OP**

• Magazines incorporate a tool transfer mechanism and the tool capacity includes one tool at the spindle side.



• The illustration shows the NH8000 DCG



• The photo shows the rack-type, 140-tool magazine specifications.

Reduction of tool preparation time

2-axis servo drive

Improved tool transport speed thanks to the 2-axis servo drive.

No tilting arm is needed

The transport device moves directly to the location where the ATC is standing by.

Separation of magazine unit

The static precision of the main body is unaffected

Since the magazine is separated from the body of the machine, the weight of the magazine has no effect, ensuring stable static precision for the machine body.

Unaffected by magazine vibration

As a result of the magazine being separated from the body, vibration from the magazine does not create cutter marks in workpieces being machined.

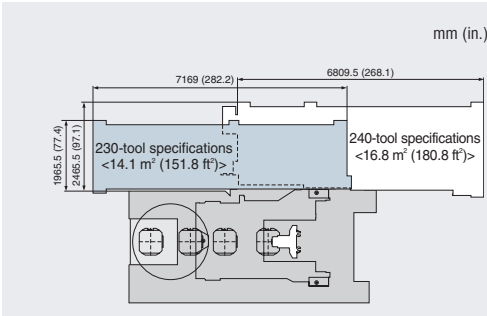
Space-saving type 230-tool specifications **OP**

NMH6300 DCG/50

Even with a tool storage capacity of 230 tools, this is a highly efficient machine which saves space.

With the space-saving 230-tool type, the maximum tool length will be shorter.

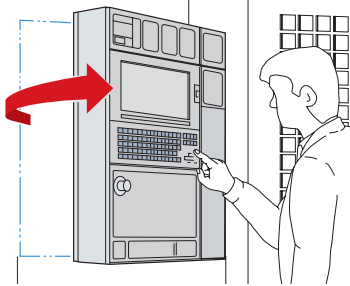
• For the specifications other than BT50, please consult with our sales representative.



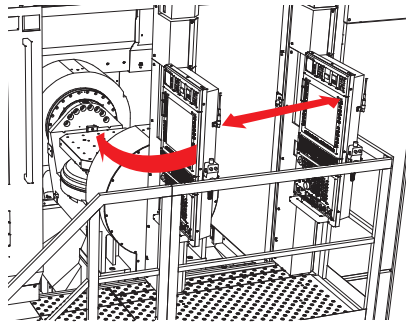
Operability, Maintenance

Swivel-type operation panel

The operation panel which can swivel from 0 degree to 90 degrees improves operability and visibility. The NMH6300 DCG also employs the operation panel that slides to the left and right to improve operability.



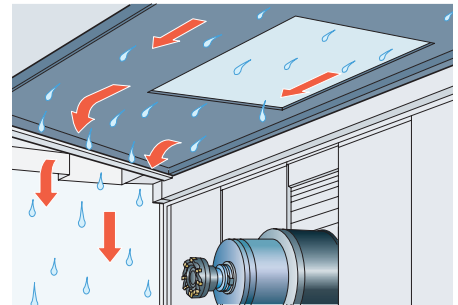
NMH10000 DCG



NMH6300 DCG

Ceiling tilt

A tilted ceiling prevents coolant from dripping onto the operator.



Setup station

The open/close ceiling for easier loading/unloading of large workpieces and the wide door opening offer excellent operability.

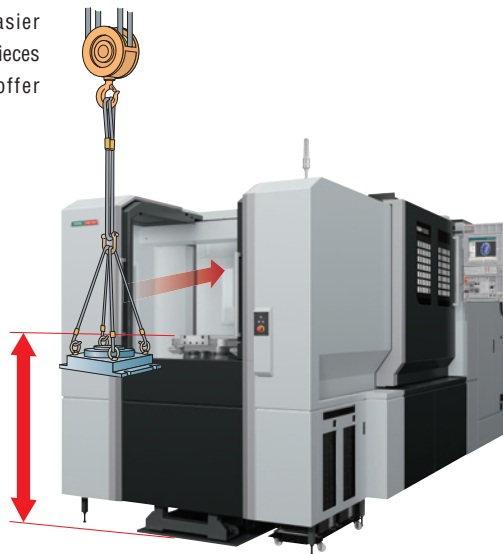
Height of pallet from floor

NMH6300 DCG

1,850 mm
(72.8 in.)

NMH10000 DCG

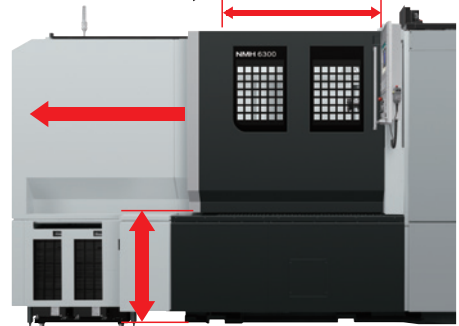
1,900 mm
(74.8 in.)



Operation door **NMH6300 DCG**

The NMH6300 DCG door slides open wide to the left, allowing better operability and visibility.

Operation door opening width **1,750 mm** (68.9 in.)



Height from the floor to the bottom of the door

1,326 mm (52.2 in.)

● The photo shows the NMH6300 DCG.

Operation door/Small window **NMH10000 DCG**

The NMH10000 DCG uses a double-door structure, with an operation door which opens wide and a small window for checking inside the machine.



Operation door opening width

1,030 mm
(40.6 in.)



Small window opening width

540 mm
(21.3 in.)

Height from the floor to the bottom of the door

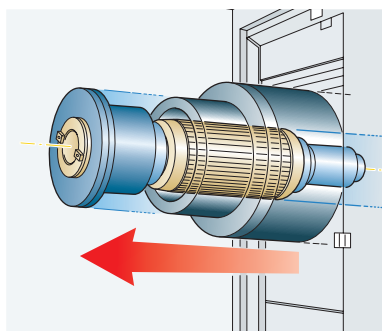
1,400 mm
(55.1 in.)



● The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.

Replacement of spindle unit

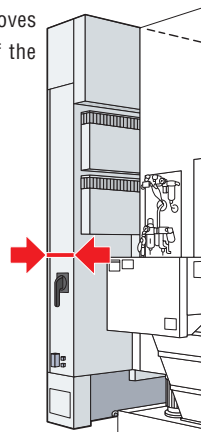
Spindle replacement time is dramatically reduced by the cartridge-type spindle unit, which also includes rear bearings.



Flat electrical cabinet

A flat electrical cabinet improves accessibility to the inside of the machine.

300 mm
(11.8 in.)
<including doors>



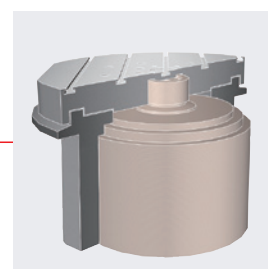
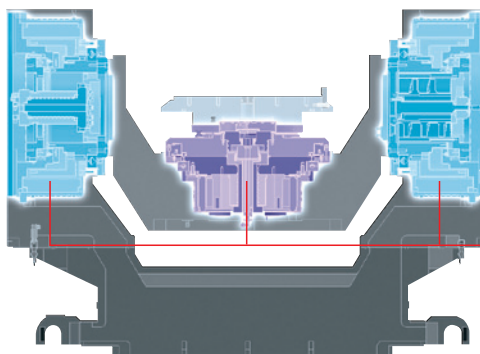
Centralized layout of devices

Controls are on the side panel to facilitate maintenance.



DDM (Direct Drive Motor)

Because Mori Seiki makes them in-house, if they ever do break down we can fix them quickly. MTTR (Mean Time To Repair) is greatly reduced.



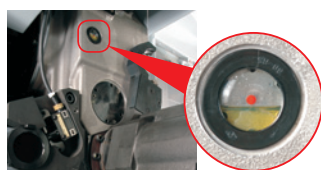
● The illustration shows the DDM for the B-axis.

Eco-friendly design

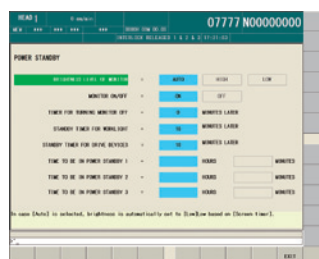
Reduced consumption of lubricating oil

Oil-bath ATC

An oil-bath design has been integrated into the ATC unit design. Compared with conventional oil drip designs, the amount of lubricating oil used has been radically reduced.



Reduced consumption of electricity



Energy-saving settings screen

Automatic sleep function

If the keyboard is not touched for a certain amount of time and NC operation is not being performed, power is cut off to the servo motor, the spindle, the coolant pump and the chip conveyor, thereby saving energy.

Automatic machine light function

If the operating panel is not touched for a certain amount of time, the interior light turns off. This saves energy and lengthens the life of the machine lights.

Transfer systems

LPP (Linear Pallet Pool) systems <Consultation is required>

OP

Allowing flexible customization to meet the customers' needs. They also offer superior expandability.

1 Customized system

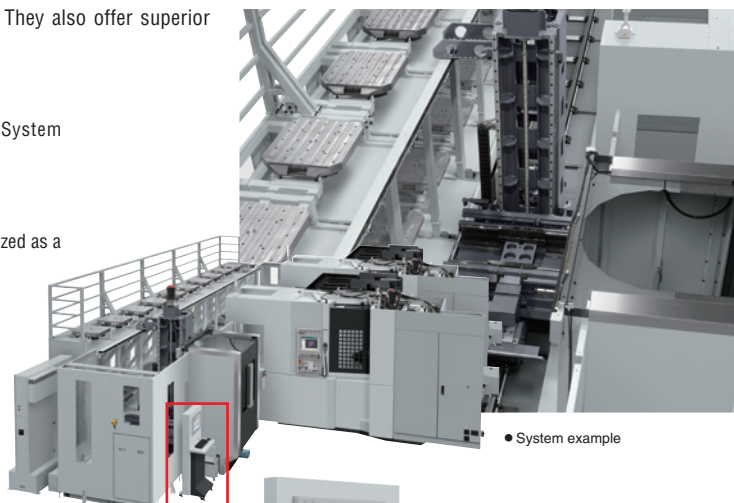
The system can be built flexibly to suit customers' production. System expansion and changes in layout can be made easily.

2 2-shelf solid type

The LPP's pallet shelf is a two-level type. This system, which can be utilized as a fixture stocker, is ideal for multi-item production.

3 Cell controller

The system is controlled by the MCC-LPS III application system. Schedule can be set easily and flexibly to respond to changes in the production plan.



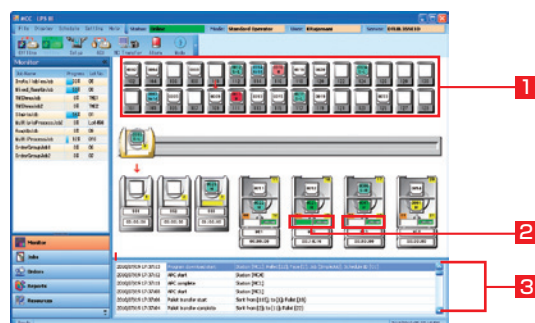
● System example

System control

Linear Pallet Pool System Control

MCC-LPS III

- ☐ Machining programs can be managed and automatically downloaded.
- ☐ Urgent production requests will be flexibly prioritized.
- ☐ Linked to the MCC-TMS tool management application system.



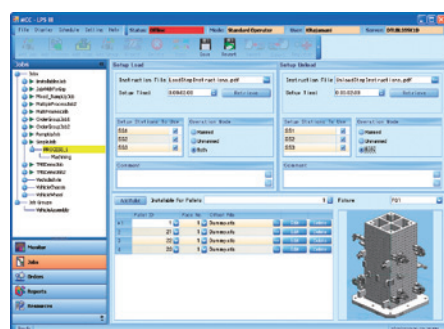
Monitor screen

This is the main window for displaying the system status in real time.

- 1 When you click on a pallet, detailed information for that pallet will be displayed.
- 2 You can check the machine's operating status by looking at the color of the machine's status bar.
- 3 This displays the system's operating history and pallet transfer history.

Job wizard screen

All settings can be done easily just by clicking.

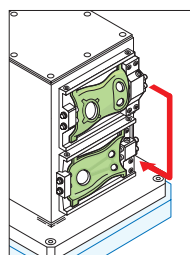


The easy-to-understand conversational-type wizard screen used for setting processes and production schedules requires 70% less time than before.

- For models and systems, please consult with our sales representative.
- MCC: Mori Cell Control

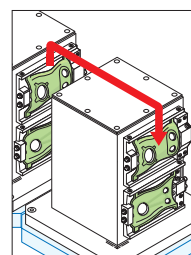
Ideal for highly efficient operation

Even machining which requires multiple fixtures, pallets and machines can be controlled with a single program. With this highly efficient operation there will be no unfinished parts.



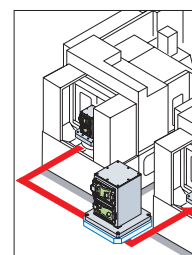
Face delivery

For machining which requires delivery to different faces (fixture attachment faces).



Pallet delivery

For machining which requires delivery of pallets with different fixtures within one process.

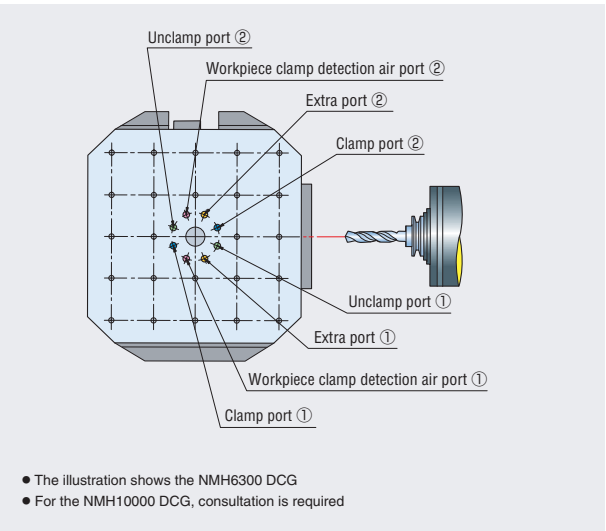
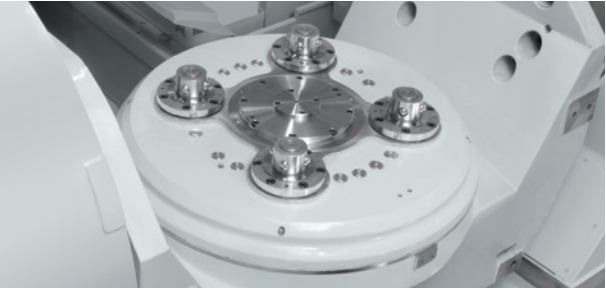


Delivery between machines

For machining which requires delivery to multiple machine tools.

Peripheral equipment

Fixtures

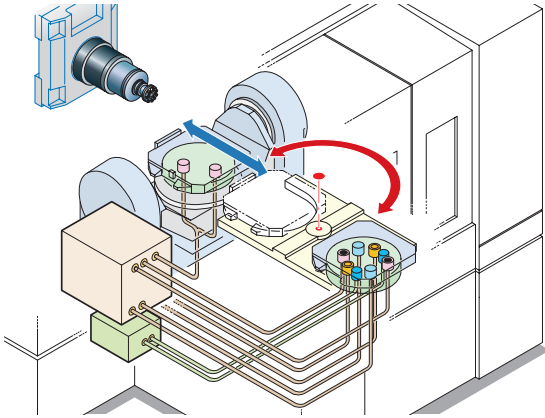


Compressed air is supplied to the setup station. Hydraulic fluid is supplied to both the setup station and the machining table.

● Hydraulic fluid is supplied to the machining table through two ports that diverge from one circuit.

Auto-coupler for fixture clamp <Consultation is required>

Easily transfer the pallets between the setup station and the work area and avoid external hoses and couplers.

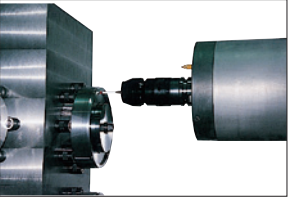
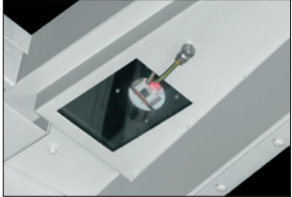


Check list (for hydraulic/pneumatic fixtures)

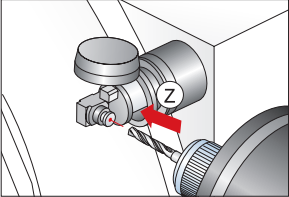
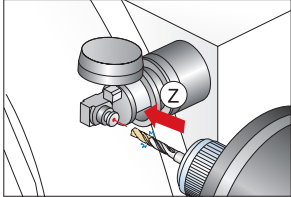
- Pressure source
 - ☐ Hydraulic
 - ☐ Pneumatic
- Supplied pressure _____ MPa
- No. of circuits
 - Hydraulic× _____
 - Pneumatic× _____
 - For workpiece holding detection× _____
- Others
 - ☐ Clamp check system
 - ☐ Fixture washing coolant system
 - ☐ Fixture air blow system

Automatic measurement

In-machine measuring system (spindle)

Optical type touch sensor	
	
Sensor	Receiver
Automatic	<input checked="" type="checkbox"/> Centering <input checked="" type="checkbox"/> Measurement
Manual	The workpiece setter function can be added
Workpiece zero point setting and centering are possible	

In-machine measuring system (table)

Touch sensor	
	
Tool length measurement	Tool breakage detection
Automatic	<input checked="" type="checkbox"/> Tool length measurement <input checked="" type="checkbox"/> Tool breakage detection
Manual	The tool setter function can be added
Tool length offset is possible	

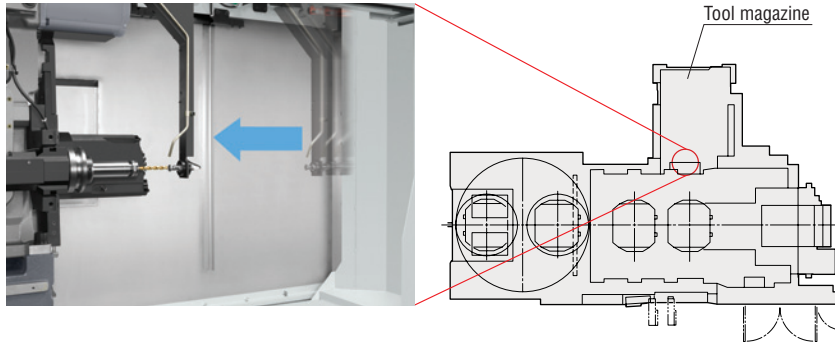
Automatic measurement + Manual measurement functions

Manual measurement applications can be added to the automatic measurement function.

Peripheral equipment

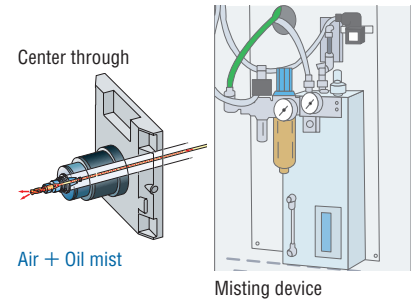
Tool breakage detection system (magazine) OP

The tool breakage detection unit at the waiting pot position will detect tool breakage in the magazine. Since tool breakage is detected outside the machine, the operating rate is not affected.



Semi dry unit OP <Consultation is required>

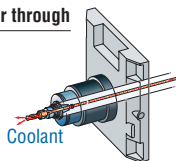
This unit supplies air and oil mist to the tool tip. This is also environmentally friendly with less oil consumption. We recommend using this unit together with a mist collector.



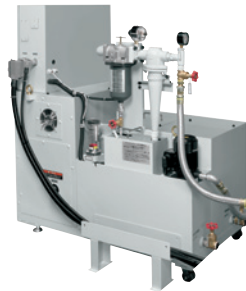
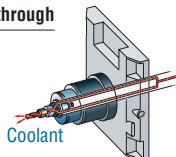
Through-spindle coolant system OP

The through-spindle coolant system effectively eliminates chips, cooling the machine point and lengthening the lives of your tools.

Center through



Side through



High-pressure coolant system (separate type)

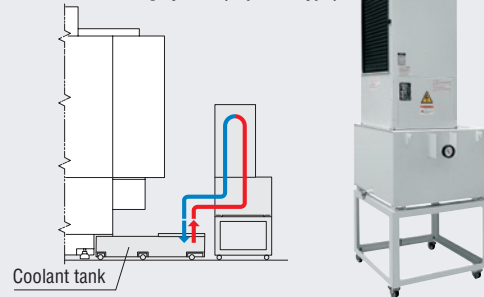
	Unit on coolant tank	Separate type
Discharge pressure	1.5 MPa (217.5 psi)	1.5/3.5/7.0 MPa (217.5/507.5/1,015 psi)
Installation space (width×depth)	—	780×1,085 mm (30.7×42.7 in.) <High-pressure coolant system>
Water-soluble coolant	○	○
Oil-based coolant	×	○*
Coolant filtration accuracy	40 μm	20 μm

* Oil-based coolant may not be filtered appropriately depending on its viscosity. In such cases it is advisable to select the high-pressure coolant unit (special option), which uses a ceramic backwashing filter in the filtration system instead of a regular cyclone filter. For details, please consult with our sales representative.

Recommended equipment

The high-pressure coolant system generates a lot of heat because it discharges coolant at high pressure. The coolant cooling system controls the temperature of the coolant and suppresses temperature increases in the workpiece, tools and table, ensuring stable machining accuracy. This is essential equipment when using high-pressure coolant. A unit with a heater will be customized.

Coolant cooling system (separate type)



⚠ Do not use a flammable coolant or oil-based coolant because it may ignite and cause fire or machine breakage. If you have to use a flammable coolant for any reason, please consult with our sales representative.

Through-spindle coolant/air (switching specifications) OP

It is possible to switch between coolant and air to suit the purpose.

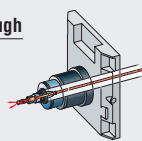
Main features

- Blows out coolant which has built up inside the tool.
- Clears coolant which is stuck to the workpiece.
- Uses air to clear chips while the spindle is turning.

- The through-spindle coolant system (interface) is required.

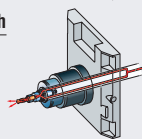
Center through

Coolant/air



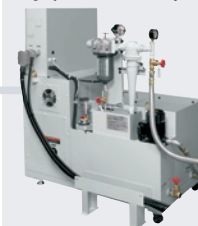
Side through

Coolant/air

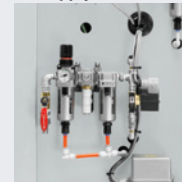


Coolant/air switching

High-pressure coolant system



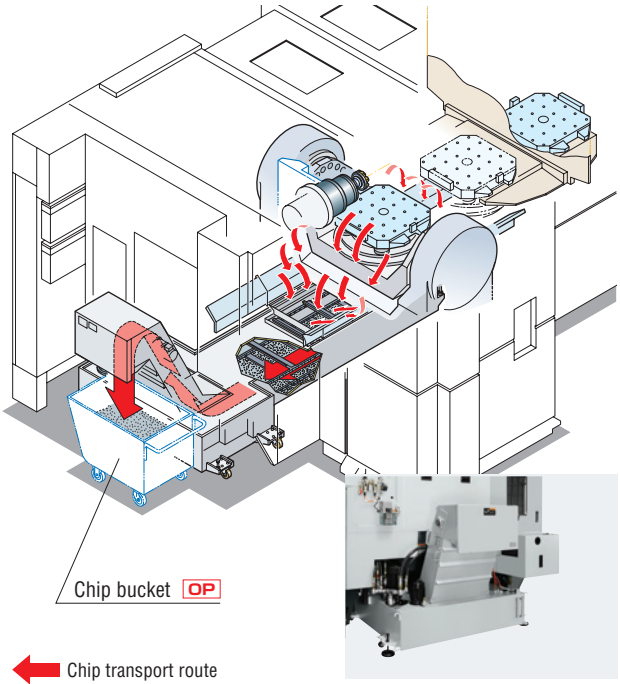
Air supply



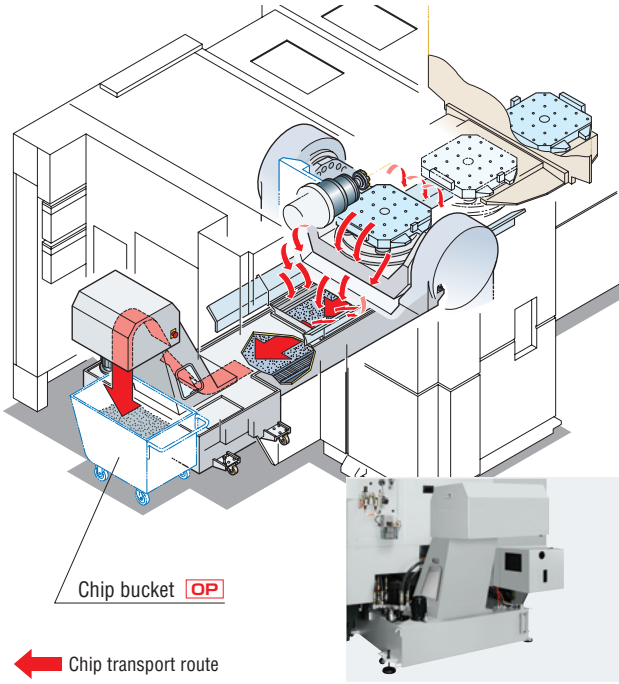
- The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.

Chip conveyor outside machine

Scraper type + drum filter type



Rear discharge, hinge type + drum filter type OP



Specifications	Workpiece material and chip size						
	Long	Steel Short	Powdery	Cast iron Short	Aluminum/non-ferrous metal Long	Aluminum/non-ferrous metal Short	Powdery
Scraper type + drum filter type	×	○	○	○	×	○	○
Rear discharge, hinge type + drum filter type OP	○	○	○	○	○	○	○

- Chip size guidelines
Short: chips 50 mm (2.0 in.) or less in length, bundles of chips ϕ 40 mm (ϕ 1.6 in.) or less
Long: bigger than the above
- The options table below the general options when using coolant.
Changes may be necessary if you are not using coolant, or depending on the amount of coolant, compatibility with machines, or the specifications required.
- Please select a chip conveyor to suit the shape of your chips.
When using special or difficult-to-cut material (chip hardness HRC45 or higher), please consult with our sales representative.
- Chip conveyors are available in various types for handling chips of different shape and material. For details, please consult with our sales representative.

Shower coolant



As well as preventing chips from scattering during machining, this allows them to fall smoothly into the center conveyor.

- When using shower coolant, it is used at the same time as spindle coolant.
- LED light is used inside the machine.

Coolant system



Coolant float switch



- Upper limit detection is customized specifications.

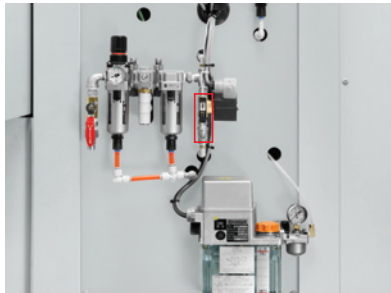
Peripheral equipment

Oil mist collector

OP

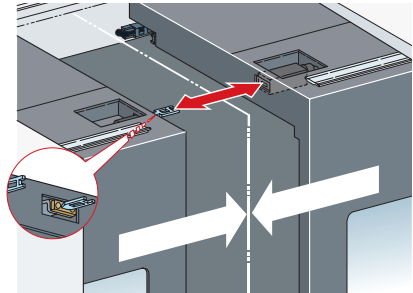


Low air pressure detecting switch



An alarm goes off if the air pressure drops while the spindle is turning.

Door interlock system



Coolant gun

OP

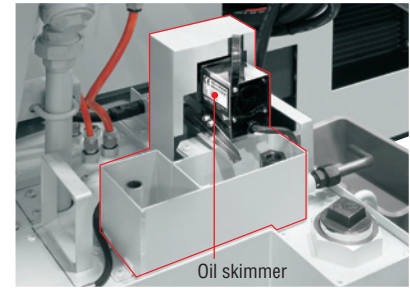
Use the high-pressure coolant gun to flush the chips from the machine and fixtures.



Oil skimmer

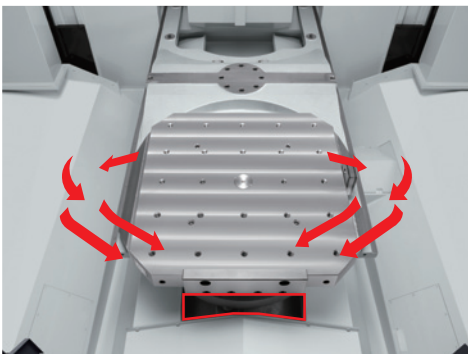
OP

Efficiently separates coolant and lubricating oils.



Chip disposal

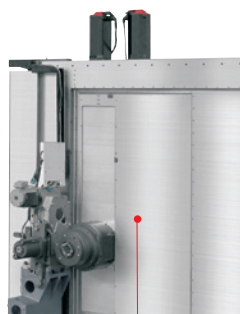
Chip flush groove (setup station)



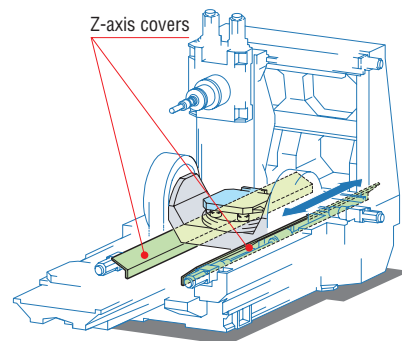
Chip flush groove

Protective cover

A highly reliable design that prevents chip clogging.

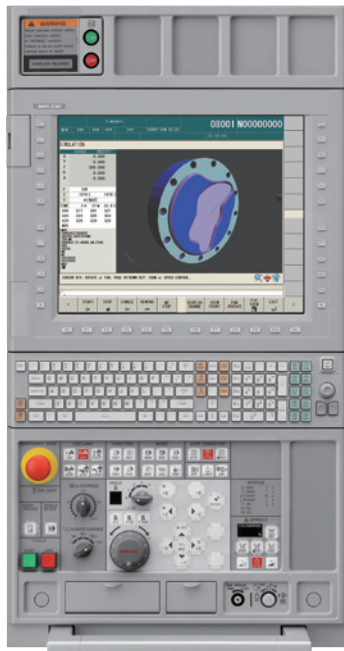


X- and Y-axis covers



MAPPS IV

A New High-Performance Operating System
for Machining Centers



● 19-inch operation panel

A new high-performance operating system that pursues ease of use, and combines the best hardware in the industry with the advanced application/network systems.

- ▶ **Outstanding operability thanks to upgraded hardware**
- ▶ **Enhanced functionality by using CAM software**
- ▶ **New functions for easier setup and maintenance**
- ▶ **Various types of monitoring, including internal monitoring, are possible on the screen (option)**
- ▶ **In the event of trouble, Mori Seiki's remote maintenance service solves it smoothly**
MORI-NET Global Edition Advance OP

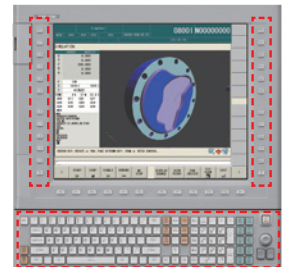
Outstanding operability

Vertical soft-keys

Vertical soft-keys are arranged on the left and right sides of the screen. The vertical soft-keys can be used as option buttons or shortcut keys to which you can assign your desired screens and functions, allowing you to quickly display the screen you want.

Keyboard

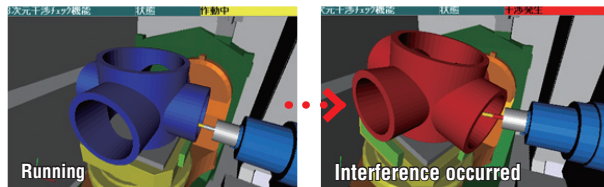
A PC-type keyboard is used as standard, making key input easy. A keyboard with a conventional key layout is also available as an option.



Functions for multi-axis machining

3D interference checking function

Checks for interference in 3D for spindles, workpieces, soft jaws, tools, holders and turrets. Since the machine will stop when interference is detected either in manual or in automatic mode, we have achieved the world's safest system against interference.



- The 3D interference checking function will check for interference accurately as long as the 3D model exactly matches the actual configuration of the spindles, workpieces, soft jaws, tools, holders and turrets.
- Customized design is required for special shape. For details, please refer to the description of "3D interference checking function" in the NC control unit specifications.
- A cutting simulation that shows how material is removed as machining proceeds cannot be carried out during a 3D interference check.

Improved ease of maintenance

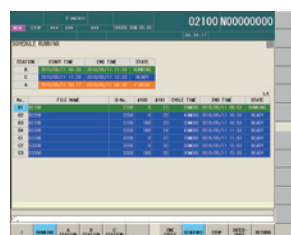
Alarm help function

When an alarm occurs, MAPPS identifies the cause of the trouble and provides solutions.

Improved productivity

APC schedule operation function OP

Operation schedule of the APC can be controlled through MAPPS. The ability to set various schedules supports unmanned continuous operation. This function can also handle changes to machining schedules flexibly.



Faster creation of programs

CAM software

ESPRIT® allows you to create complex 3D programming with high-added value. By just installing the software on your PC with connection to LAN, you will be able to use it. (Once the software is started on the computer, it can be used for up to 7 days without LAN connection.)



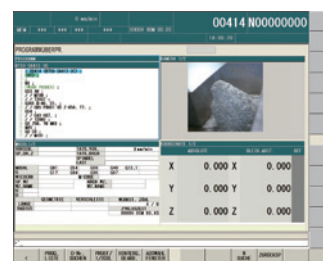
- Postprocessor as standard
- CAM software will be ready to use once your machine is installed
- Cost for introducing CAM software can be saved
- ESPRIT® data can be modified on the machine (through Remote Desktop connection*)
- The software can be installed on multiple PCs on the network (It cannot be simultaneously started up on more than one PC)
- 2-year warranty support (including free update)

* Applicable Operating Systems: Windows Vista Business/Ultimate, Windows 7 Professional/Ultimate
● A PC is required to use ESPRIT®. Please prepare PCs by yourself.

Improved work efficiency

Fixed-point in-machine camera OP Consultation is required

Images taken by cameras installed inside/outside the machine can be viewed on the programming screen. This function is useful for maintenance.



Examples of camera locations

- Inside machine (to check machining)
- Tool magazine (to check cutting tools)
- Chip bucket (to check chip accumulation)

Machine specifications

Item			NMH6300 DCG/40	NMH6300 DCG/50
Travel	X-axis travel <longitudinal movement of saddle>	mm (in.)	1,400 (55.1)	
	Y-axis travel <vertical movement of spindle head>	mm (in.)	1,200 (47.2)	
	Z-axis travel <cross movement of pallet>	mm (in.)	1,200 (47.2)	
	Distance from pallet surface to spindle center	mm (in.)	-400 to +800 (-15.7 to +31.5) <A-axis 0°>	
	Distance from pallet center to spindle gauge plane	mm (in.)	100—1,300 (3.9—51.2)	
Pallet	Distance from floor surface to pallet surface	mm (in.)	1,850 (72.8)	
	Pallet working surface	mm (in.)	630×630 (24.8×24.8) [500×500 (19.7×19.7)]	
	Pallet loading capacity	kg (lb.)	800 (1,760) [500] (1,100)	
	Max. workpiece swing diameter	mm (in.)	1,000 (39.3) <750 (29.5): A-axis -95° to -120°>	
	Max. workpiece height	mm (in.)	850 (33.4) [700] (27.6)	
	Pallet surface configuration		M16 (1/2-13 UNC) Tap: 24 Holes. Pitch 100 mm (3.9 in.)	M16 (1/2-13 UNC) Tap: 24 Holes. Pitch 125 mm (4.9 in.)
	Minimum pallet indexing angle <A-axis, B-axis>		0.001° <full indexing>	
	Pallet indexing range		A-axis: 150° <+30° to -120°>, B-axis: 360°	
	Pallet indexing time <not including clamping and unclamping time>	s	A-axis: 0.91 (90°), B-axis: 0.83 (90°)	
Spindle	Max. spindle speed	min ⁻¹	14,000 [20,000]	10,000 [10,000] [15,000] [8,000]
	Number of spindle speed ranges		1	
	Type of spindle taper hole		No. 40	No. 50
	Spindle bearing inner diameter	mm (in.)	65 (2.6) [65 <20,000 min ⁻¹ >]	100 (3.9) <10,000 min ⁻¹ > [100 (3.9) <10,000 min ⁻¹ >] [100 (3.9) <15,000 min ⁻¹ >] [120 (4.7) <8,000 min ⁻¹ >]
Feedrate	Rapid traverse rate	mm/min (ipm)	X, Y, Z: 50,000 (1,968.5)	
	Feedrate	mm/min (ipm)	X, Y, Z: 1—50,000 (0.01—1,968.5) <with AI contour control>	
	Jog feedrate	mm/min (ipm)	0—5,000 (0—196.9) <20 steps>	
ATC	Type of tool shank		BT40* [DIN40] [CAT40] [HSK-A63]	BT50* [DIN50] [CAT50] [HSK-A100]
	Type of retention knob		MORI SEIKI 90° type [45° <MAS-I>] [60° <MAS-II>] [DIN] [HSK-A63] [special <center>]	MORI SEIKI 90° type [45° <MAS-I>] [60° <MAS-II>] [DIN] [HSK-A100]
	Tool storage capacity <rack-type> (including one tool at the spindle side)		Chain-type: 60 [Rack-type: 300]	Rack-type: 60 [140] [180] [240] [330] [230 <space-saving type>]
	Max. tool diameter <with adjacent tools>	mm (in.)	70 (2.8)	110 (4.3) <60, 140, 180-tool specifications> 125 (4.9) <230, 240, 330-tool specifications>
	Max. tool diameter <without adjacent tools>	mm (in.)	140 (5.5)	320 (12.5)
	Max. tool length	mm (in.)	550 (21.6)	800 (31.4) <60, 140, 180, 240, 330-tool specifications> 500 (19.6) <230-tool specifications>
	Max. tool mass	kg (lb.)	12 (26.4)	30 (66)
	Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.8) <a tool with a mass moment greater than the maximum tool mass moment may cause problems during ATC operations even if it satisfies other conditions>	29.4 (21.7) <a tool with a mass moment greater than the maximum tool mass moment may cause problems during ATC operations even if it satisfies other conditions>
	Method of tool selection		Fixed address, shorter route access (chain-type) [Fixed address (rack-type)]	Fixed address
	Tool changing time	Tool-to-tool Cut-to-cut (chip-to-chip)	s s	2.1 60-tool specifications: 15.9 <max.>/5.0 <min.>
APC	Number of pallets		2	
	Method of pallet change		Turn-type	
	Pallet changing time	s	53	
Motor	Spindle drive motor <30 min/cont>	14,000 min ⁻¹ kW (HP)	22/18.5 (30/24.7) <15 min/cont>	—
		[20,000 min ⁻¹] <high speed> kW (HP)	18.5/15/11 (24.7/20.0/14.7) <10 min/30 min/cont>	—
		10,000 min ⁻¹ kW (HP)	—	30/25 (40/33.3) <30 min/cont>
		[10,000 min ⁻¹] <high output> kW (HP)	—	30/25 (40/33.3) <30 min/cont>
		[15,000 min ⁻¹] <high speed> kW (HP)	—	30/25 (40/33.3) <30 min/cont>
		[8,000 min ⁻¹] <high torque> kW (HP)	—	37/30 (50/40) <30 min/cont>
	Feed motor	X, Y, Z B A	X, Z: 7.0 (9.3)×2 Y: 6.0 (8)×2 6.5 (8.7) <100 min ⁻¹ > 6.3 (8.4)×2	
Power source (standard)	Coolant pump motor	kW (HP)	2.2 (3) <spindle, shower coolant>	
	Electrical power supply <cont>	I94070B01 kVA	71.4	87
Tank capacity	Compressed air supply	MPa (psi), L/min (gpm)	0.5 (72.5), 600 (158.4) <ANR>	
	Coolant tank capacity	L (gal.)	1,380 (364.3) <scraper type> [1,170 (308.9) <hinge type>]	
Machine size	Machine height <from floor> (for the standard specifications)	mm (in.)	3,836 (151.0) <When the APC shutter is open: Pallet size 630x630 (24.8x24.8): 4,800 (189.0) Pallet size 500x500 (19.7x19.7): 4,500 (177.2)>	
	Floor space <width×depth> (including external steps)	mm (in.)	6,204×7,113 (244.3×280.0) <30-tool specifications, scraper type> [6,204×7,355] (244.3×289.6) <30-tool specifications, hinge type>	5,155×7,113 (203.0×280.0) <60-tool specifications, scraper type> [5,155×7,355] (203.0×289.6) <60-tool specifications, hinge type>
	Mass of machine	kg (lb.)	34,000 (74,800)	34,100 (75,020)
	Mass of machine	kg (lb.)	34,000 (74,800)	34,100 (75,020)
Noise data	A-weighted, time-average radiated sound pressure level	dB	67.5—74.0 (Measurement uncertainty is 4 dB)	

[] Option ISO: International Organization for Standardization JIS: Japanese Industrial Standard

NMH6300 DCG (130604)

* When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

- Max. spindle speed: depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.
- Please use a dual contact tool when cutting at higher than 10,000 min⁻¹.
- ANR: ANR refers to a standard atmospheric state; i.e., temperature at 20 °C (68 °F), absolute pressure at 101.3 kPa (14.7 psi) and relative humidity at 65%.
- Power sources, machine size: the actual values may differ from those specified in the catalogue, depending on the optional features and peripheral equipment.
- Compressed air supply: please be sure to supply clean compressed air <air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10 °C (50 °F) or below>.
- A criterion capacity to select a compressor is 90 L/min (23.8 gpm) per 0.75 kW (1 HP). However, this figure may differ depending on the type of compressors and options attached. For details, please check the compressor specifications.
- When the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required.
- The information in this catalog is valid as of July 2013.

Machine specifications

Item			NMH10000 DCG
Travel	X-axis travel <longitudinal movement of saddle>	mm (in.)	1,550 (61.0)
	Y-axis travel <vertical movement of spindle head>	mm (in.)	1,600 (63.0)
	Z-axis travel <cross movement of pallet>	mm (in.)	1,300 (51.2)
	Distance from pallet surface to spindle center	mm (in.)	-500 to +1,100 (-19.7 to +43.3) <A-axis 0°>
	Distance from pallet center to spindle gauge plane	mm (in.)	250—1,550 (9.8—61.0)
Pallet	Distance from floor surface to pallet surface	mm (in.)	1,900 (74.8)
	Pallet working surface	mm (in.)	1,000×1,000 (39.4×39.4)
	Pallet loading capacity	kg (lb.)	2,500 (5,500)
	Max. workpiece swing diameter	mm (in.)	1,500 (59.0) <1,000 (39.3): A-axis -95° to -120°>
	Max. workpiece height	mm (in.)	1,300 (51.1)
	Pallet surface configuration		M20 (3/4-10 UNC) Tap: 80 Holes. Pitch 100 mm (4 in.)
	Minimum pallet indexing angle <A-axis, B-axis>		0.001° <full indexing>
	Pallet indexing range		A-axis: 150° <+30° to -120°>, B-axis: 360°
	Pallet indexing time <not including clamping and unclamping time>	s	A-axis: 1.9 (90°), B-axis: 1.7 (90°)
Spindle	Max. spindle speed	min ⁻¹	10,000 [10,000] [15,000] [8,000]
	Number of spindle speed ranges		1
	Type of spindle taper hole		No. 50
	Spindle bearing inner diameter	mm (in.)	100 (3.9) <10,000 min ⁻¹ > [100 (3.9) <10,000 min ⁻¹ >] [100 (3.9) <15,000 min ⁻¹ >] [120 (4.7) <8,000 min ⁻¹ >]
	Rapid traverse rate	mm/min (ipm)	X, Y: 42,000 (1,653.5), Z: 36,000 (1,417.3)
Feedrate	Feedrate	mm/min (ipm)	X, Y: 1—42,000 (0.01—1,653.5) <with AI contour control> Z: 1—36,000 (0.01—1,417.3)
	Jog feedrate	mm/min (ipm)	0—5,000 (0—196.9) <20 steps>
ATC	Type of tool shank		BT50* [DIN50] [CAT50] [HSK-A100]
	Type of retention knob		MORI SEIKI 90° type [45° <MAS-I>] [60° <MAS-II>] [DIN] [HSK-A100]
	Tool storage capacity <rack-type> (including one tool at the spindle side)		60 [140] [180] [240] [330]
	Max. tool diameter <with adjacent tools>	mm (in.)	110 (4.3) <60, 140, 180-tool specifications> 125 (4.9) <240, 330-tool specifications>
	Max. tool diameter <without adjacent tools>	mm (in.)	320 (12.5)
	Max. tool length	mm (in.)	800 (31.4)
	Max. tool mass	kg (lb.)	30 (66)
	Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	29.4 (21.7) <a tool with a mass moment greater than the maximum tool mass moment may cause problems during ATC operations even if it satisfies other conditions>
	Method of tool selection		Fixed address
	Tool changing time	Tool-to-tool s	2.1
APC	Number of pallets		2
	Method of pallet change		Turn-type
	Pallet changing time	s	94
Motor	Spindle drive motor <30 min/cont>	10,000 min ⁻¹ kW (HP)	30/25 (40/33.3)
		[10,000 min ⁻¹] <high output> kW (HP)	30/25 (40/33.3)
		[15,000 min ⁻¹] <high speed> kW (HP)	30/25 (40/33.3)
		[8,000 min ⁻¹] <high torque> kW (HP)	37/30 (50/40)
	Feed motor	X, Y, Z kW (HP)	X: 7.0 (9.3)×2 Y, Z: 6.0 (8)×2
		B kW (HP)	7.8 (10.4)
		A kW (HP)	11.9 (15.9)×2
	Coolant pump motor	kW (HP)	2.2 (3) <spindle, shower coolant>
Power source (standard)	Electrical power supply <cont>	I941 I0801 kVA	82.2
	Compressed air supply	MPa (psi), L/min (gpm)	0.5 (72.5), 600 (158.4) <ANR>
Tank capacity	Coolant tank capacity	L (gal.)	1,332 (351.6) <scraper type>
Machine size	Machine height <from floor> (for the standard specifications)	mm (in.)	4,290 (168.9) <4,750 (187.0): with APC shutter open>
	Floor space <width×depth>	mm (in.)	4,660×9,190 (183.5×361.8) <60-tool specifications>
	Mass of machine (for the standard specifications)	kg (lb.)	54,400 (119,600) (Including mass of 60-tool magazine unit <3,500 kg (7,700 lb.)>)
Noise data	A-weighted, time-average radiated sound pressure level	dB	—

[] Option ISO: International Organization for Standardization JIS: Japanese Industrial Standard

NMH10000 DCG (090716)

* When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

● Max. spindle speed: depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.

● Please use a dual contact tool when cutting at higher than 10,000 min⁻¹.

● ANR: ANR refers to a standard atmospheric state; i.e., temperature at 20°C (68°F), absolute pressure at 101.3 kPa (14.7 psi) and relative humidity at 65%.

● Power sources, machine size: the actual values may differ from those specified in the catalogue, depending on the optional features and peripheral equipment.

● Compressed air supply: please be sure to supply clean compressed air <air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10 °C (50 °F) or below>.

● A criterion capacity to select a compressor is 90 L/min (23.8 gpm) per 0.75 kW (1 HP). However, this figure may differ depending on the type of compressors and options attached. For details, please check the compressor specifications.

● When the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required.

● The information in this catalog is valid as of July 2013.



2-year warranty, twice the peace of mind.

For machines delivered outside of Japan, parts relating to machine breakdown will be guaranteed free for 2 years from the date of installation, and labor costs to repair will be free for 1 year. Please contact our sales representative for details.



<Precautions for Machine Relocation>

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