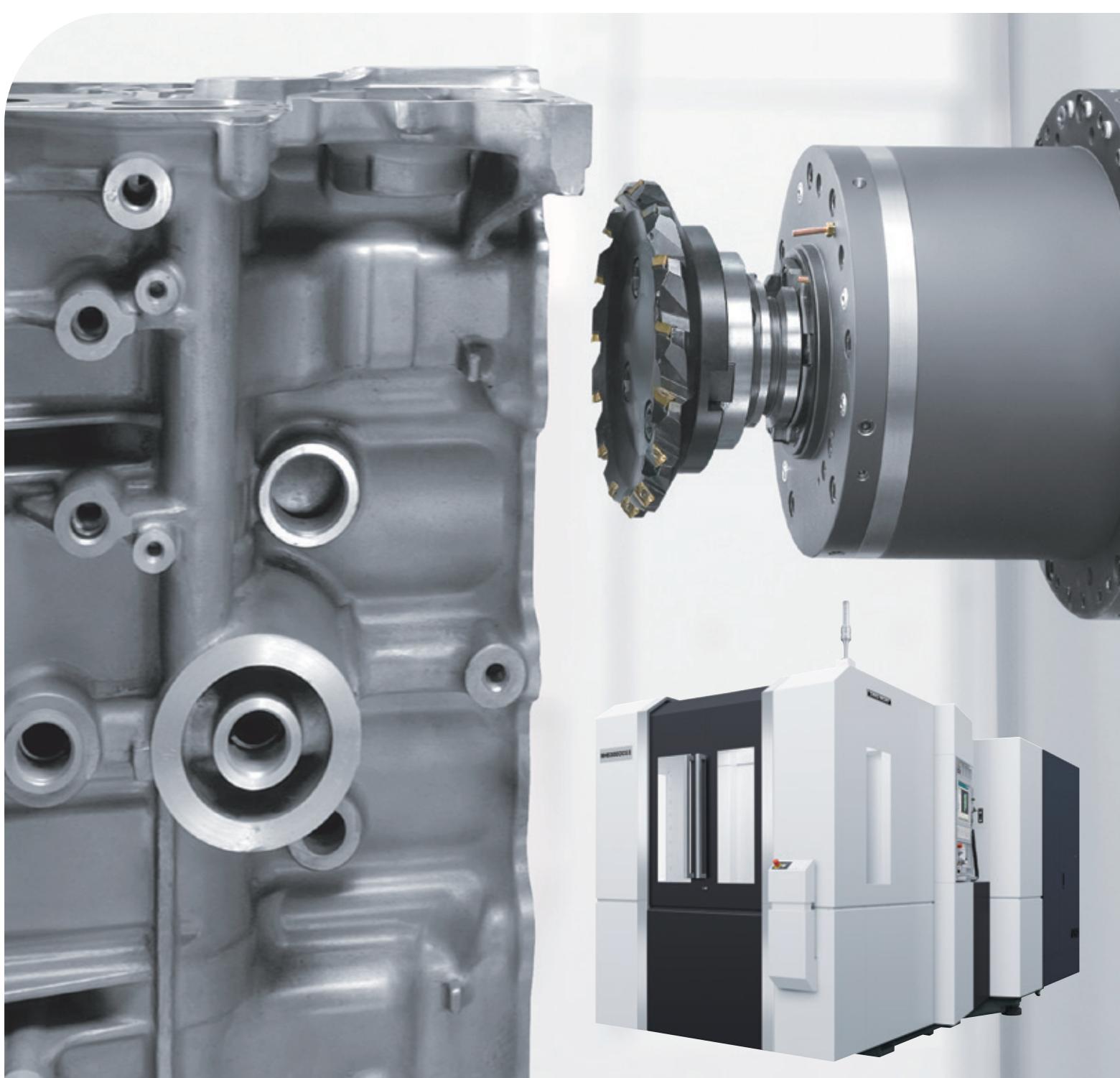


High-Precision Horizontal Machining Center

## NH6300 DCG II

NH6300 DCG II

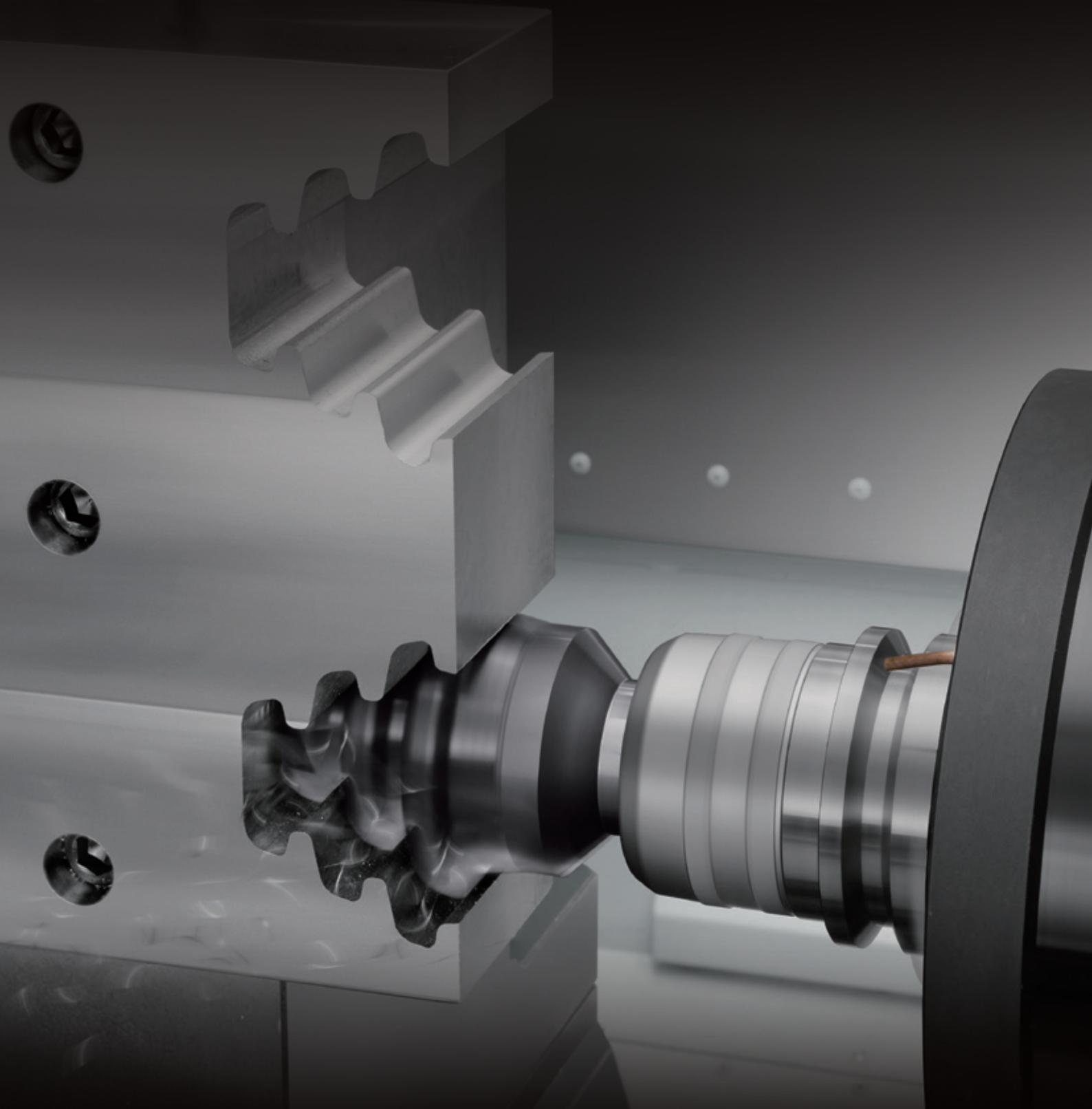


# Horizontal machining center answering a wide range of requirements from heavy-duty cutting to high-speed cutting

Equipped with 630-mm-square pallets, the NH6300 DCG II offers a generous work envelope of  $\phi$  1,050 mm  $\times$  1,300 mm ( $\phi$  41.3 in.  $\times$  51.1 in.) while achieving space savings.

The rate of acceleration on all axes has been increased by 30% or more, substantially shortening machining times and further increasing productivity. This is a high-speed, high-precision horizontal machining center perfect for machining medium and large sized workpieces and difficult-to-cut materials, for example in the automobile, construction machinery and aircraft fields.





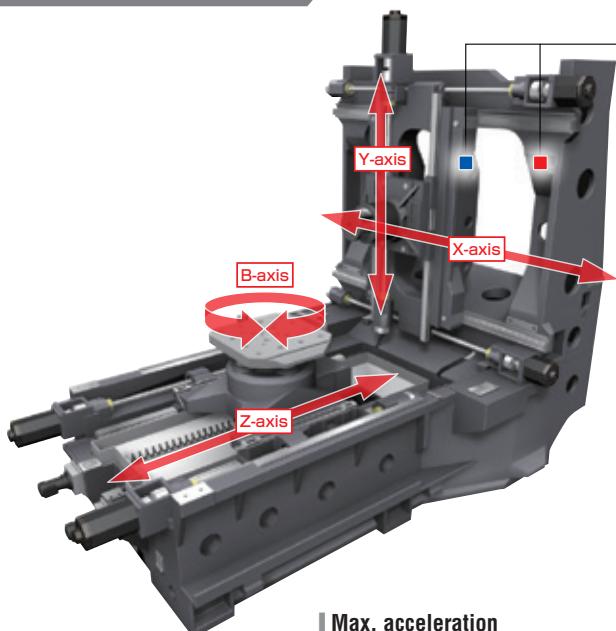
## CONTENTS

4 Principal mechanisms	11 Productivity	18 MAPPS IV
9 High precision	12 Improved workability/ Maintenance	22 Diagrams
10 Machining ability	13 Peripheral equipment	26 Specifications

MAPPS: Mori Advanced Programming Production System  
• Figures in inches were converted from metric measurements.

# Principal mechanisms

## Basic structure



### Max. acceleration

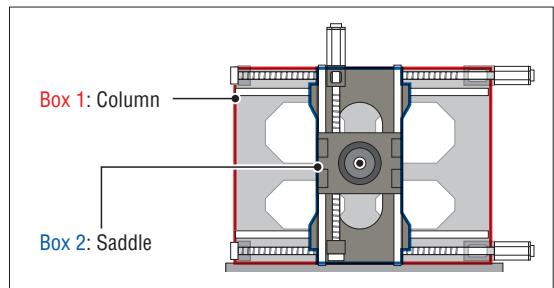
X-axis **0.71 G** { $7.0 \text{ m/s}^2$  ( $23.0 \text{ ft/s}^2$ )}

Y-axis **1.00 G** { $9.8 \text{ m/s}^2$  ( $32.2 \text{ ft/s}^2$ )}

Z-axis **0.76 G** { $7.5 \text{ m/s}^2$  ( $24.6 \text{ ft/s}^2$ )}

## 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.



### Rapid traverse rate <X, Y and Z axes>

**50 m/min (1,968.5 ipm)**

- The rapid traverse rate on the Y-axis is 40 m/min (1,574.8 ipm) when using the spindle with the 6,000 min<sup>1</sup>/8,000 min<sup>1</sup> specifications <option>.

### Feedrate <X, Y and Z axes>

**50 m/min (1,968.5 ipm)**

- Look-ahead control

## Driven at the Center of Gravity



**DCG**

Driven at the Center of Gravity

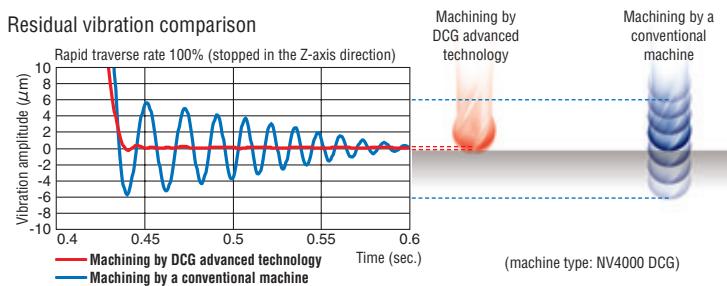
## Original technology

Our DCG (Driven at the Center of Gravity) 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.

### Vibration Controlled

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.



### Machining by DCG advanced technology



Machining by a conventional machine

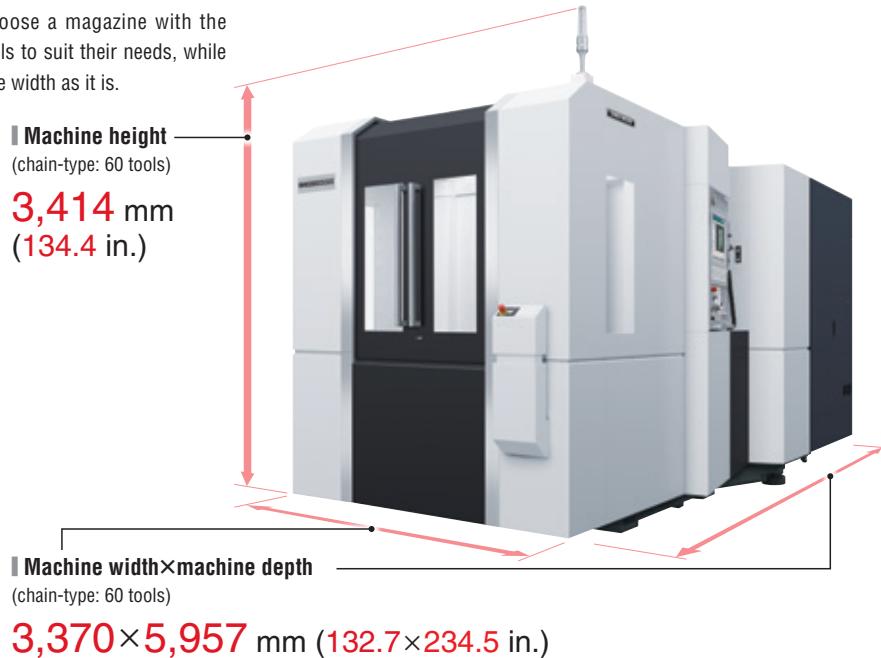


## ■ Features of DCG

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

## Space-saving design

Customers can choose a magazine with the ideal number of tools to suit their needs, while keeping the machine width as it is.



### Machine width

60, 80, 100, 120 tools (chain-type)	180, 240, 330 tools (rack-type)
<b>3,370 mm (132.7 in.)</b>	<b>4,098 mm (161.3 in.)</b>

- The machine depth is for hinge type chip conveyor specifications.
- Chain-type magazines (60-, 80-, 100- or 120-tool capacity) incorporate a pot tilting mechanism and the tool capacity includes one tool at the spindle side.
- Rack-type magazines (180-, 240- or 330-tool capacity) incorporate a pot transfer mechanism and the tool capacity includes one tool at the spindle side.

### Machine depth

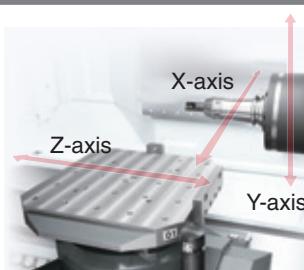
Chain-type

60 tools (standard)	80 tools	100, 120 tools
<b>4,850 mm (190.9 in.)</b>	<b>6,000 mm (236.2 in.)</b>	<b>6,400 mm (252.0 in.)</b>

Rack-type

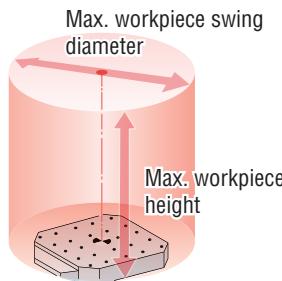
180 tools	240 tools	330 tools
<b>5,435 mm (214.0 in.)</b>	<b>6,155 mm (242.3 in.)</b>	<b>7,235 mm (284.8 in.)</b>

## Travel <X, Y and Z axes>



X-axis	Y-axis	Z-axis
<b>1,050 mm (41.3 in.)</b>	<b>900 mm (35.4 in.)</b>	<b>980 mm (38.6 in.)</b>

## Working area



Max. workpiece swing diameter	Max. workpiece height	Pallet loading capacity
<b>1,050 mm (41.3 in.)</b>	<b>1,300 mm (51.1 in.)</b>	<b>1,500 kg (3,300 lb.)</b>

# Principal mechanisms

## Spindle



### Max. spindle speed

**10,000 min<sup>-1</sup>**    **15,000 min<sup>-1</sup>** **OP**  
**8,000 min<sup>-1</sup>** **OP**  
**6,000 min<sup>-1</sup>** **OP**

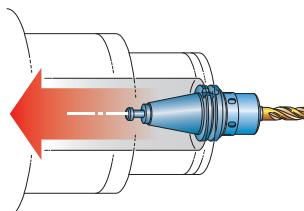
### Spindle acceleration time/Spindle deceleration time (0→10,000 min<sup>-1</sup>/10,000 min<sup>-1</sup>→0)

**2.90 sec.**/**2.90 sec.**

For the spindle drive, we use the high-efficiency DDS (Direct Drive Spindle) motor which extracts full power over a wide range, from high-speed machining to heavy-duty cutting. This machine handles all types of materials from steel to aluminum and other non-ferrous metals.

### 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.



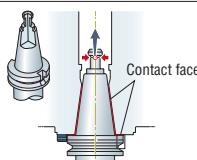
**24,000 N**  
**(5,395.1 lbf)**

- Please use a two-face contact tool when cutting at higher than 10,000 min<sup>-1</sup>.

## Two-face contact specification **OP**

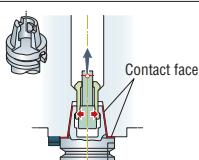
Tool rigidity has been improved by contact of both the spindle taper and the tool flange. This extends the useful life of a tool, raises cutting power and improves the machining precision.

### BT specifications



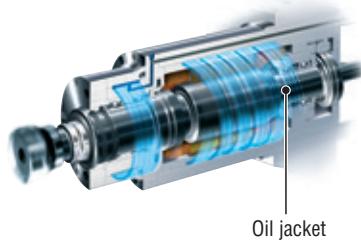
- All DMG MORI spindles are made in-house to better meet our customer needs. For details, please consult with our sales representative.
- When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

### HSK specifications



## Spindle cooling

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



## Tool, Boring



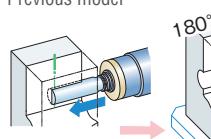
The maximum tool length is the same as the pallet size. Deep hole boring up to the maximum tool length can be done without turning the table around, reducing cutting time and achieving high-precision machining.

- Depending on condition, machining may not always be possible.

### Max. tool length

**630 mm (24.8 in.)**

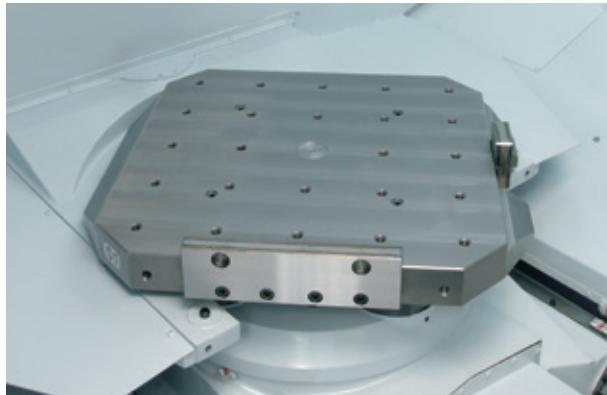
### Previous model



Concentric drilling can be done on both sides by flipping the table

### Pallet working surface

**630×630 mm (24.8×24.8 in.)**

**Table**

A one-degree indexing table is standard, and a full indexing table equipped with DDM is available as an option. These have significant advantages for machining of workpieces that require high speed and high positioning accuracy.

**Selection of tables**

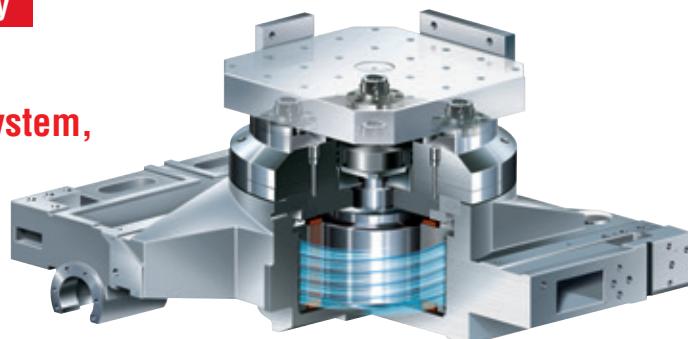
Table type	1° indexing table	Full 4th axis rotary table DDM [OP]
Minimum pallet indexing angle	1°	0.001°
Pallet indexing time (90°) <including clamping and unclamping time>	2.0 sec.	1.8 sec.

**Direct Drive Motor**

[OP]

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

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 outstanding transmission efficiency and high-speed feed. DDM also achieves zero backlash.

**Features of DDM**

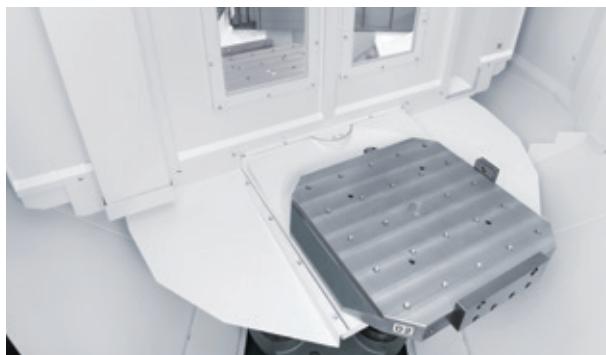
- High-speed rotation
- High-precision indexing
- Less maintenance
- Longer product life

**B-axis max. rotational speed**

Previous model  
(worm gear system)

16.7 min<sup>-1</sup> ► 100 min<sup>-1</sup>

Approx. 6.0 times faster

**APC**

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

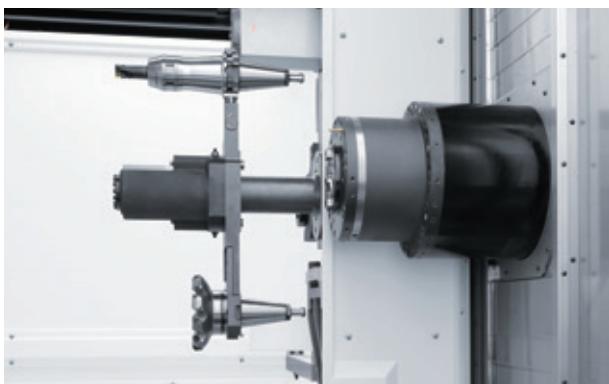
**Pallet changing time (2-station turn-type APC)\***

15.0 sec.

\* Excluding clamping and unclamping time.  
When equipped with the auto-coupler, time taken to shut off / supply hydraulic pressure to the fixture is not included.

# Principal mechanisms

## ATC



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

### Tool changing time

**Cut-to-cut (chip-to-chip) <60 tools>**

Max. <ISO>	Min. <ISO>
<b>16.6 sec.</b>	<b>4.5 sec.</b>

ISO 10791-9 JIS B6336-9 ISO: International Organization for Standardization

JIS: Japanese Industrial Standard

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

### Tool-to-tool

**1.7 sec.**

## Magazine



We prepared two types of magazine: a chain type and a rack type. Customers can choose either a chain type or rack type to suit their production needs.

### Chain-type magazine

#### Tool storage capacity

**60 tools**    **80 tools** OP    **100 tools** OP    **120 tools** OP

### Rack-type magazine

#### Tool storage capacity

**180 tools** OP

**240 tools** OP

**330 tools** OP

#### 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.

#### Reduction of tool preparation time

##### 2-axis servo drive

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

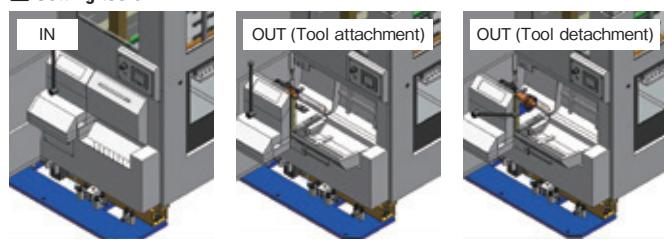
#### Unaffected by magazine vibration

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

## 180 tools

OP

### Setting tools



Max. tool length

Max. tool mass

Max. tool diameter

Max. tool mass moment <from spindle gauge line>

**630 mm**  
(24.8 in.)

**30 kg**  
(66 lb.)

**110 mm (4.3 in.)**

<with adjacent tools>

**320 mm (12.5 in.)**

<without adjacent tools>

**29.4 N · m (21.6 in.)\***

\* 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.

• The maximum tool diameter is limited to 255 mm (10.0 in.) or less when using the spindle at 10,000 min<sup>-1</sup> or higher.

# High-precision equipment

## Full closed loop control (Scale feedback)

OP



- Superior precision with full closed loop control (Scale feedback)
- Magnetic measuring system with a high resolution of 0.01 µm
- Resistance to oil and condensation due to a magnetic detection principle



- Impact resistance of 450 m/s² (17,716.5 in./s²)
- Vibration resistance of 250 m/s² (9,842.5 in./s²)
- High-accuracy machining is ensured by a scale with the same thermal expansion rate as the cast iron machine structure

## Coolant chiller (separate type) <option>

OP



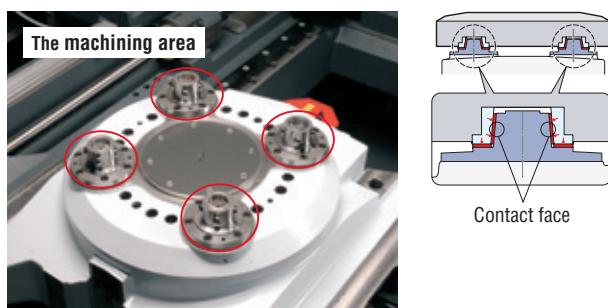
Increased coolant temperature causes thermal displacement in the fixtures and workpiece, affecting the machining accuracy of the workpiece. Use this unit to prevent the cutting coolant from heating up. When using oil-based coolant, the coolant temperature can become extremely high even with the standard coolant pump, so please be sure to select this unit.

**When using oil-based coolant or a high-pressure coolant system, please be sure to consult our sales representative.**

- We cannot guarantee that this unit will completely control the coolant temperature. It is designed to help prevent oil temperature increases.

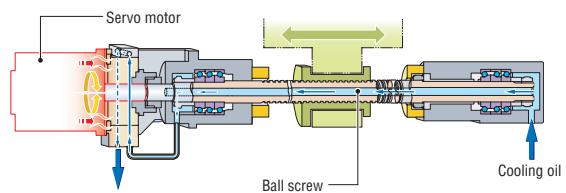
## Pallet clamp system

The two-face contact taper cone pallet stabilizes the pallet with its powerful clamping force, and improves the repeatability.



## Ball screw center cooling

In order to control thermal displacement and to keep high-accuracy positioning, the ball screw core cooling system in which cooling oil circulates through the support bearings is used.



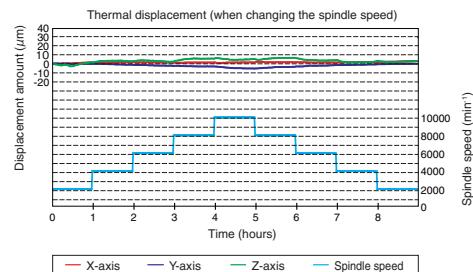
# High-accuracy data

## X, Y, Z-axes thermal displacement

We measured the thermal displacement on each axis when changing the spindle speed.

Displacement amount

7 µm  
(actual result)



● The cutting test results indicated in this catalog are provided as examples. The results indicated in this catalog may not be obtained due to differences in cutting conditions and environmental conditions during measurement.

## High-accuracy data

### Circularity

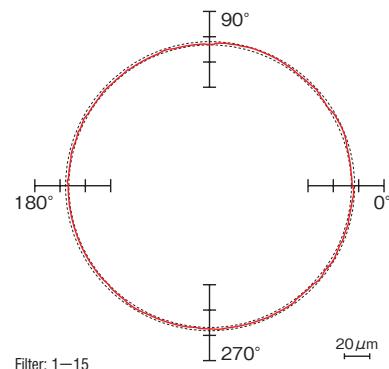
During circle cutting, the vibration is caused due to changes in direction at the time of moving from one quadrant to the next. By using DCG, the NH6300 DCG II minimizes the vibration, and improves contouring accuracy.

#### Circularity

**1.90  $\mu\text{m}$**  (actual result)

Material <JIS>	A5052* <outer diameter 130 mm (5.1 in.)>
Tool	$\phi$ 16 mm ( $\phi$ 0.6 in.) Carbide end mill <4 flutes>
Spindle speed	8,000 $\text{min}^{-1}$
Cutting feedrate	2,000 $\text{mm/min}$ (78.7 ipm)

\* 5052 (ANSI), NS4 (BS), AIMg2.5 (DIN), 5A02 (GB)



Filter: 1–15

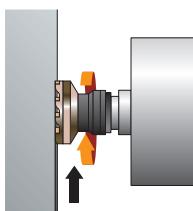
● The cutting test results indicated in this catalog are provided as examples. The results indicated in this catalog may not be obtained due to differences in cutting conditions and environmental conditions during measurement.  
A5052: Aluminum JIS: Japanese Industrial Standard

## Cutting test

The NH6300 DCG II dramatically improves the machining ability compared with the conventional machines. The NH6300 DCG II is ideal for heavy-duty cutting of cast iron workpieces for construction machinery parts and automobile parts as well as high-speed machining of aluminum workpieces for aircraft parts and automobile test parts.

### $\phi$ 100 mm ( $\phi$ 3.9 in.) Face mill <9 flutes>

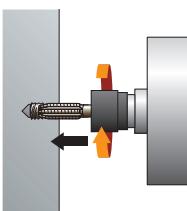
Material <JIS>: A5052\*



Material removal rate	<b>2,560 mL/min (156.2 in<sup>3</sup>/min)</b>
Width of cut	80 mm (3.1 in.)
Depth of cut	2.0 mm (0.08 in.)
Spindle speed	10,000 $\text{min}^{-1}$
Feedrate	16,000 $\text{mm/min}$ (629.9 ipm)

### Tap

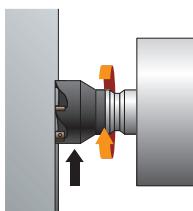
Material <JIS>: S50C\*



Tool	<b>M56×P5.5</b>
Spindle speed	58 $\text{min}^{-1}$
Feedrate	319 $\text{mm/min}$ (12.6 ipm)

### $\phi$ 125 mm ( $\phi$ 4.9 in.) Face mill <6 flutes>

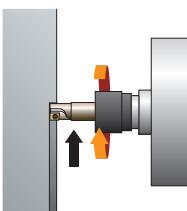
Material <JIS>: S50C\*



Material removal rate	<b>560 mL/min (34.2 in<sup>3</sup>/min)</b>
Width of cut	100 mm (3.9 in.)
Depth of cut	5 mm (0.2 in.)
Spindle speed	600 $\text{min}^{-1}$
Feedrate	1,120 $\text{mm/min}$ (44.1 ipm)

### $\phi$ 25 mm ( $\phi$ 1.0 in.) Throw-away end mill

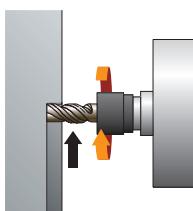
Material <JIS>: S50C\*



Material removal rate	<b>178.2 mL/min (10.9 in<sup>3</sup>/min)</b>
Width of cut	25 mm (1.0 in.)
Depth of cut	14 mm (0.6 in.)
Spindle speed	2,546 $\text{min}^{-1}$
Feedrate	509 $\text{mm/min}$ (20.0 ipm)

### $\phi$ 50 mm ( $\phi$ 2.0 in.) Roughing end mill <6 flutes>

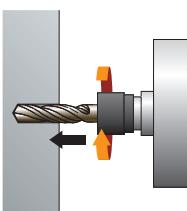
Material <JIS>: S50C\*



Material removal rate	<b>120.8 mL/min (7.4 in<sup>3</sup>/min)</b>
Width of cut	50 mm (2.0 in.)
Depth of cut	35 mm (1.4 in.)
Spindle speed	190 $\text{min}^{-1}$
Feedrate	69 $\text{mm/min}$ (2.7 ipm)

### $\phi$ 65 mm ( $\phi$ 2.6 in.) Drill

Material <JIS>: S50C\*



Material removal rate	<b>173 mL/min (10.6 in<sup>3</sup>/min)</b>
Spindle speed	227 $\text{min}^{-1}$
Feedrate	52 $\text{mm/min}$ (2.0 ipm)

\*1 5052 (ANSI), NS4 (BS), AIMg2.5 (DIN), 5A02 (GB)

\*2 1049 (ANSI), C50, C50E, C50R (BS, DIN), 50 (GB)

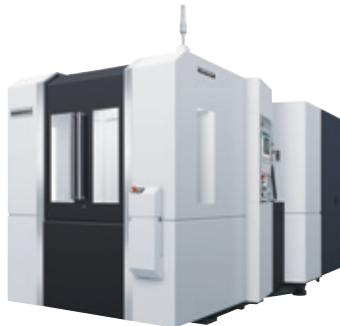
● The cutting test results indicated in this catalog are provided as examples. The results indicated in this catalog may not be obtained due to differences in cutting conditions and environmental conditions during measurement.  
A5052: Aluminum S50C: Carbon steel JIS: Japanese Industrial Standard

# Productivity

The NH6300 DCG II has realized even higher productivity by increasing the speed of each structure.

## Data for comparison

### NH6300 DCG II



**Max. spindle speed**  
10,000 min<sup>-1</sup>

**Max. acceleration**  
X-axis: 0.71 G {7.0 m/s<sup>2</sup> (23.0 ft/s<sup>2</sup>)}  
Y-axis: 1.00 G {9.8 m/s<sup>2</sup> (32.2 ft/s<sup>2</sup>)}  
Z-axis: 0.76 G {7.5 m/s<sup>2</sup> (24.6 ft/s<sup>2</sup>)}

**Rapid traverse rate <X, Y and Z axes>**  
50 m/min (1,968.5 ipm)

**Tool changing time**  
Cut-to-cut <chip-to-chip>  
4.4 sec. <MAS>

**Pallet changing time**  
15.0 sec.

**Pallet indexing time**  
<including clamping and unclamping time>  
2.0 sec. (90°)

### Previous model (1995 year—)



**Max. spindle speed**  
10,000 min<sup>-1</sup>

**Max. acceleration**  
X-axis: 0.39 G {3.8 m/s<sup>2</sup> (12.5 ft/s<sup>2</sup>)}  
Y-axis: 0.59 G {5.8 m/s<sup>2</sup> (19.0 ft/s<sup>2</sup>)}  
Z-axis: 0.46 G {4.5 m/s<sup>2</sup> (14.8 ft/s<sup>2</sup>)}

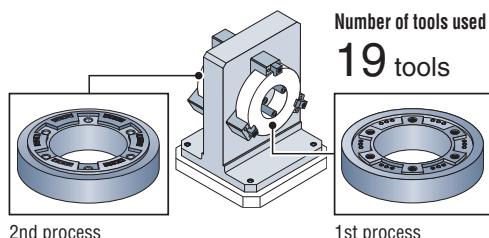
**Rapid traverse rate <X, Y and Z axes>**  
32 m/min (1,259.8 ipm)

**Tool changing time**  
Cut-to-cut <chip-to-chip>  
4.6 sec. <MAS>

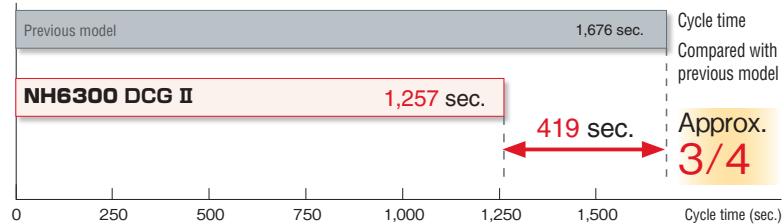
**Pallet changing time**  
15.0 sec.

**Pallet indexing time**  
<including clamping and unclamping time>  
3.1 sec. (90°)

## Workpiece



## Cycle time comparison



## Comparison of production volume and sales

30 USD/EUR per work

Running time (one day):

8 hours × 85% = 3,600 sec. × 8 × 0.85 = 24,480 sec.

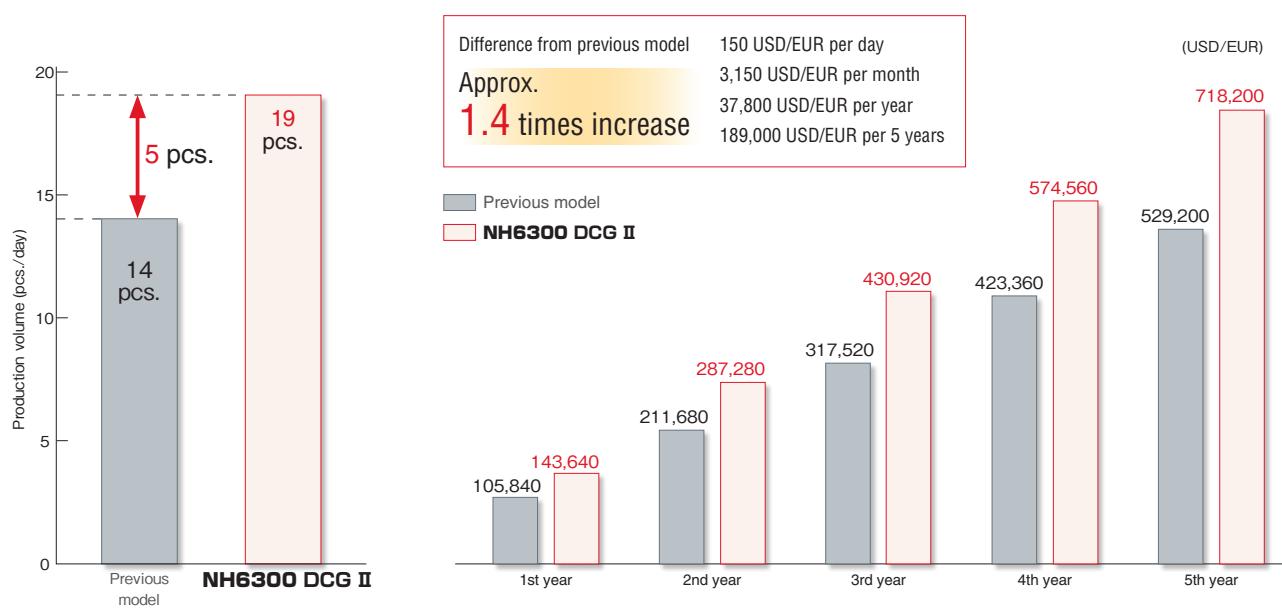
Production volume (pcs./day):

24,480 sec. ÷ Cycle time (sec.)

Number of days operating in 1 year:

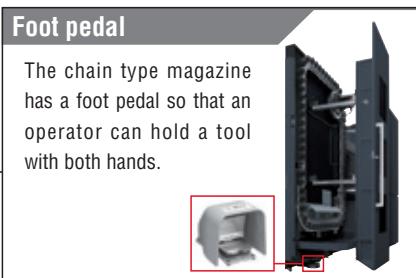
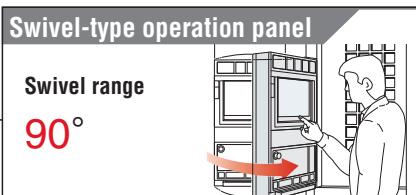
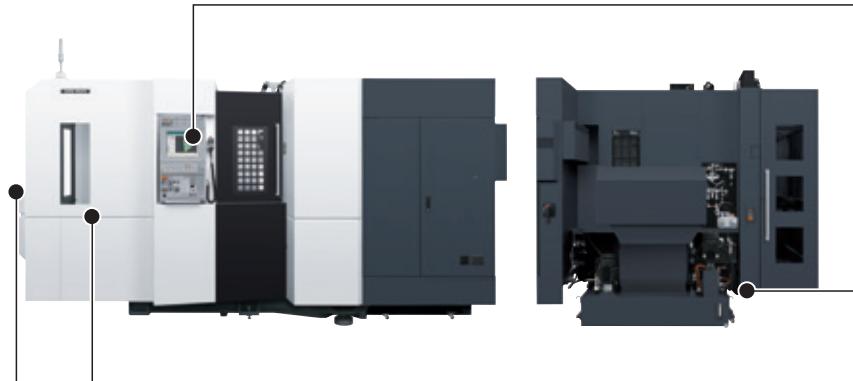
21 days × 12 months = 252 days

## 5-year sales simulation (30 USD/EUR per work)



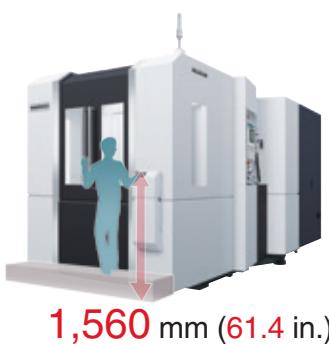
## Improved workability

For the NH6300 DCG II, we have installed features throughout the machines to improve the operability based on the complete operator-centered concept.



### Setup station button

Redesigning the machine, we have placed the setup button at the ideal height so that an operator can use the machine comfortably.

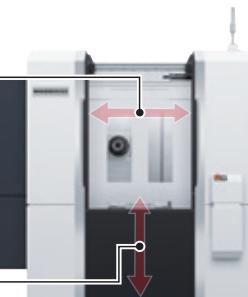


### Setup station

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

#### Door opening

**1,060 mm (41.7 in.)**



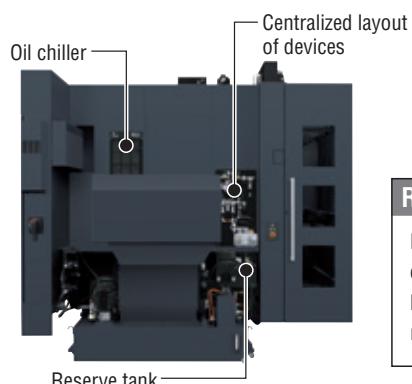
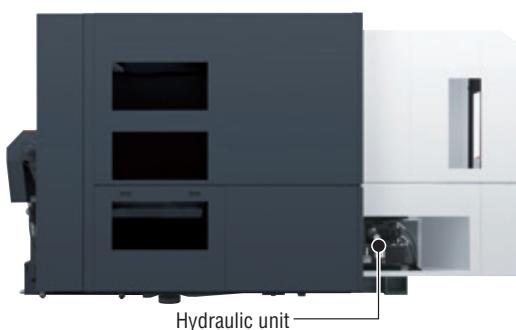
#### Distance from floor surface to pallet surface

**1,250 mm (49.2 in.)**

• A step is needed.

## Maintenance

For the NH6300 DCG II the maintenance is improved by placing the oil chiller, hydraulic unit, and pneumatic instruments all in one place and offering better accessibility for operators.



### Replacement of spindle unit

By changing the spindle unit to a cartridge, which even includes the rear bearings, we have dramatically reduced replacement time.

# Peripheral equipment

## Chip conveyor outside machine (Hinge type+drum filter type)

A high-performance external chip conveyor, which is used as standard, can discharge both long and short chips on one unit with its filter backwashing structure and excellent chip disposal capacity.

- Regardless of shapes or materials, any types of chips including long/short chips can be transferred on one conveyor.
- Suitable for discharging various types of chips on multi-axis machines.
- Regardless of water-soluble or water-insoluble, any types of coolant can be used.
- The built-in tank drum filter greatly reduces efforts and times for cleaning the inside of the tank.

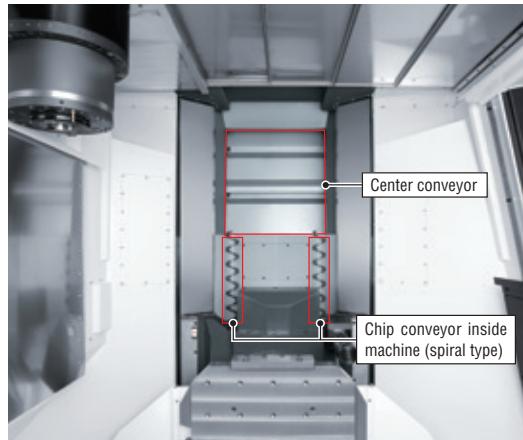
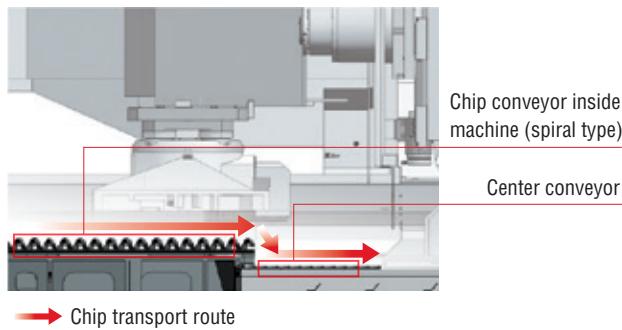


Specifications	Workpiece material and chip size							○: Suitable    ×: Not suitable	
	Steel			Cast iron	Aluminum/non-ferrous metal				
	Long	Short	Powdery	Short	Long	Short	Powdery		
Hinge type+drum filter type	○	○	○	○	○	○	○		
Scraper type+drum filter type [OP]	×	○	○	○	×	○	○		

- Chip size guidelines  
Short: chips 50 mm (2.0 in.) or less in length, bundles of chips  $\phi$  40 mm ( $\phi$  1.6 in.) or less  
Long: bigger than the above
- The options table shows 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 our sales representative.
- Please consult our sales representative if dry machining or carbon machining needs to be performed.
- Chip conveyors are available in various types for handling chips of different shape and material. For details, please consult our sales representative.

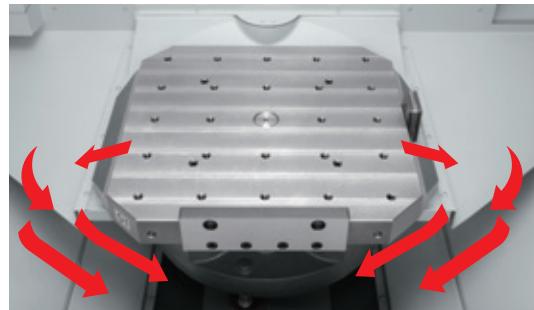
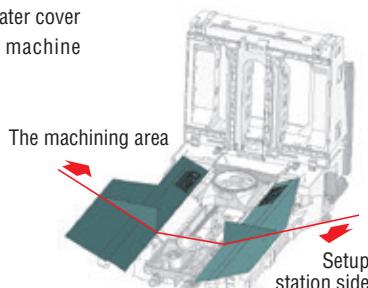
## Chip conveyor inside machine (spiral type)

Chips under the table, which cannot be completely eliminated by coolant, are forcibly discharged using a spiral conveyor. This contributes to long-term, unmanned operation. It is also suitable for dry machining, when coolant is not used.



## Slanted cover

The center trough structure with greater cover inclined angle than the previous machine improves the chip disposal capacity.



# Peripheral equipment

## Shower coolant

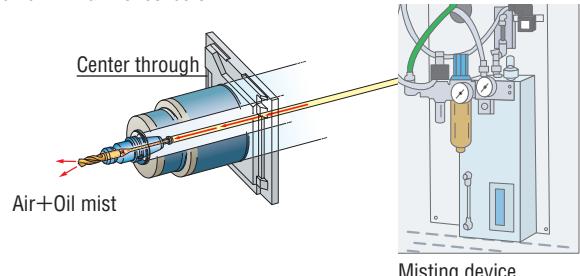
As well as preventing chips from scattering during machining, this allows them to fall smoothly into the center conveyor.



## Semi dry unit

**OP** Consultation is required

Supplies air and oil mist to the cutting tip. An environmentally friendly device which reduces oil consumption. We recommend using this unit together with a mist collector.



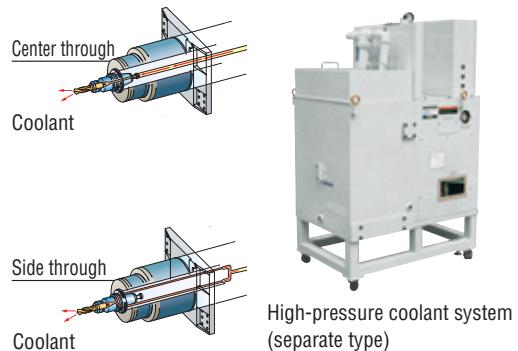
## Through-spindle coolant system

**OP**

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

	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)	—	820×1,120 mm (32.3×44.1 in.) <High-pressure coolant system>
Water-soluble coolant	○	○
Coolant filtration accuracy	40 µm	20 µm

**⚠** Flammable coolant such as oil-based coolant has a high risk of ignition, and will cause fire or machine breakage if ignited. If you have to use a flammable coolant for any reason, please be sure to consult our sales representative.

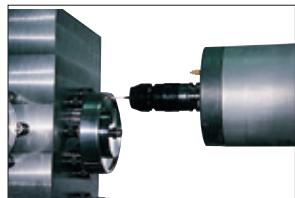


## Automatic measurement

**OP**

### In-machine measuring system (spindle)

Touch sensor (optical signal transmission type)



Sensor

Receiver

Automatic

- Centering
- Measurement

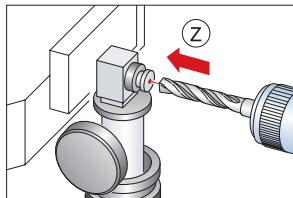
Manual

The workpiece setter function can be added

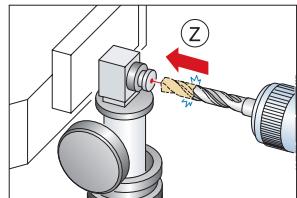
Workpiece zero point setting and centering are possible

### In-machine measuring system (table)

Touch sensor



Tool length measurement



Tool breakage detection

Automatic

- Tool length measurement
- Tool breakage detection

Manual

The tool setter function can be added

Tool length offset is possible

## Automatic measurement+Manual measurement functions

**OP**

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

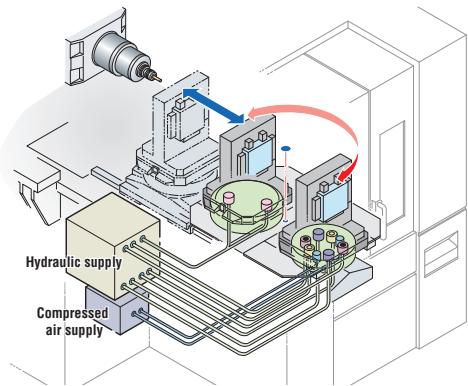
# Fixture interface

## Fixture interface

OP

### Auto-coupler fixture interface

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

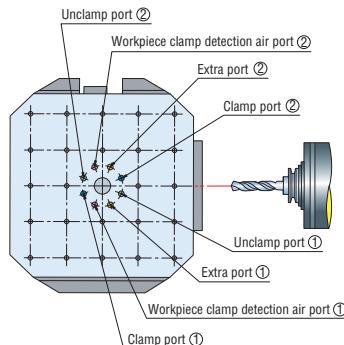


Compressed air is supplied to the setup station. Hydraulic fluid is supplied to both the setup station and the machining table.

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

### 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



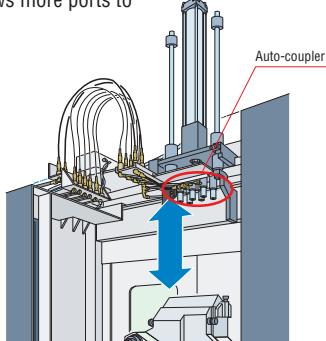
Separate hydraulic unit  
for the auto coupler



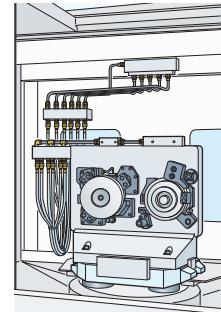
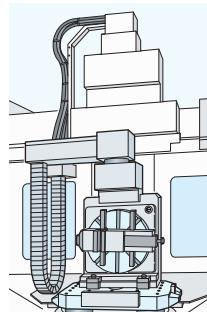
Fixture grip check

### Interface specified for supply on the upper part of the coupler

Supplying from above the machine allows more ports to be added as needed by your fixture.



### Custom fixture interfaces are available for connecting any fixture, either part time or full time



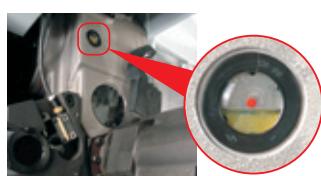
# Reduction in environmental burden

## 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.



### Power-saving function



Energy-saving settings screen

#### Automatic sleep function

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

# Transfer systems OP

## The versatile systems resolve production issues.

### CPP system (Carrier Pallet Pool System)

With its simple construction provided in predefined packages, this system is easy to introduce.

For the system configuration, the customer can select from 8 packages to provide the optimum specifications for their needs.

#### ■ Controller

Handy controller  
(Standard features)



- MCC-LPS III is available as an option.



• System example

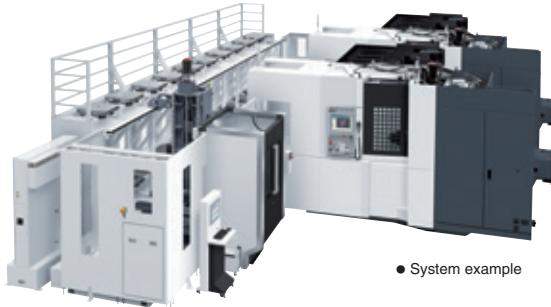
### LPP system (Linear Pallet Pool System)

This system can be equipped with multi-level pallet racks, providing a high level of automation.

The system construction can also be customized however you wish, achieving the optimum productivity and operation rate.

#### ■ Controller

MCC-LPS III (Standard features)



• System example

## Applications

### Linear Pallet Pool Control System

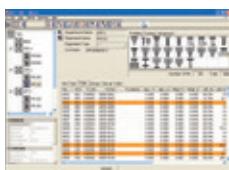
## MCC-LPS III



- Easy operation / management of the pallet transfer system.
- Machining programs can be managed and automatically downloaded.
- Able to flexibly change production priority in response to urgent requests.

### The Tool Management System

## MCC-TMS



- Improves the system operating rate through highly efficient, centralized tool management.
- Compatible with ID tags.
- Compatible with tool presetter interface.



• MCC-LPS III is installed in the specialized cell controller and MCC-TMS can be installed in the controller and your PC.

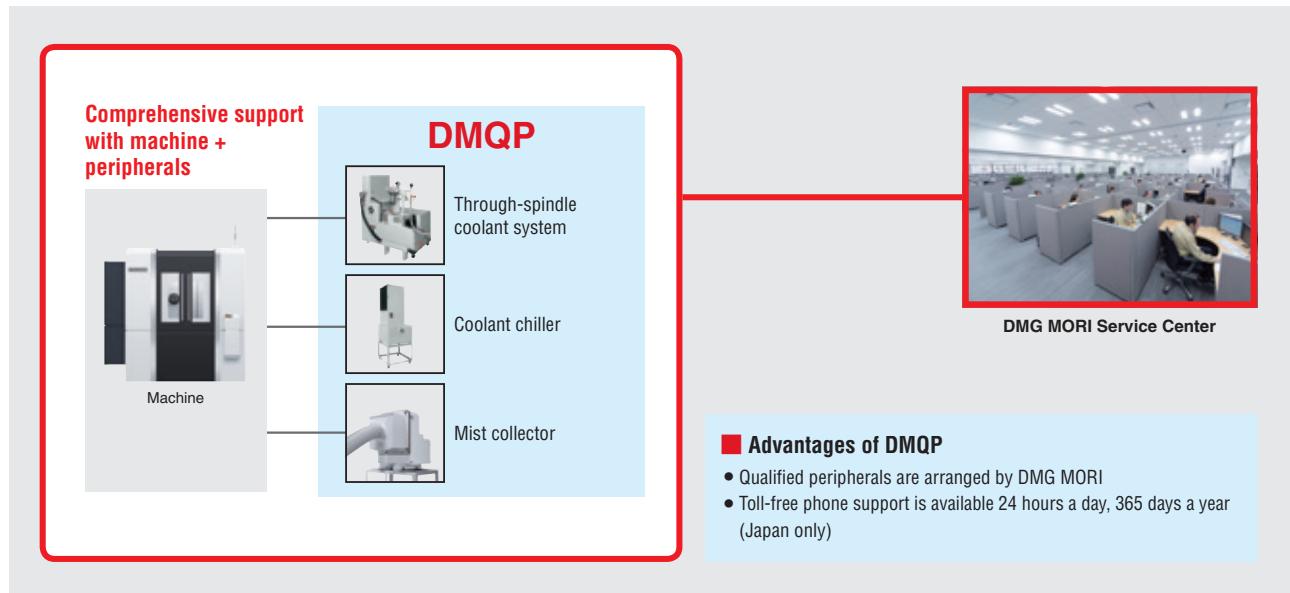
## DMQP (DMG MORI Qualified Products) OP

### Selected peripherals with superior quality, performance and maintainability.

The DMQP program is designed to certify peripherals that meet DMG MORI standards in quality, performance and maintainability. DMQP provides customers with even greater peace of mind.

#### Comprehensive support with machine + peripherals

DMG MORI provides comprehensive support, from proposal to delivery and maintenance, for high-quality peripherals that offer superior performance and maintainability.



#### Examples of qualified products (NH6300 DCG II)

##### Through-spindle coolant system

Coolant is supplied to the tool tip through the center of the tool and spindle.

##### Coolant chiller

It cools down coolant to offer better cutting performance and minimize thermal displacement in the workpiece.

##### Mist collector

It removes mist, smoke, etc. generated inside the machine.

##### Chip bucket

Chips discharged from the chip conveyor are collected into this bucket.

##### Electrical cabinet chiller

This prevents temperature rise and dew condensation inside the electrical cabinet.

##### Rotary window

Coolant scattered on the machining chamber window is removed to check the inside of the machine during machining.

##### Refrigerating type air dryer

This unit removes moisture contained in the compressed air supplied by the compressor, preventing moisture-related problems in the pneumatic equipment.

##### Tool wagon

##### Tool cabinet

##### Basic tooling kit

● For more details on DMQP items, please consult our sales representative.

# MAPPS IV

High-Performance Operation System  
for Machining Centers



• 19-inch operation panel

High-performance operation 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
- ▶ Cutting-edge functions for easier setup and maintenance
- ▶ Various types of monitoring, including internal monitoring, are possible on the screen (option)
- ▶ In the event of trouble, DMG MORI'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.

## Advanced hardware

### Reduction of drawing time\*

Shorter drawing time was achieved thanks to increased CPU performance.

<b>MAPPS III</b>	68 sec.
<b>MAPPS IV</b>	<b>45 sec.</b>

\* The reduction rate differs depending on the program.

## Main specifications

Main memory	2 GB
User area	6 GB
Interface	• USB 2.0 3 ports (Screen side: 2, Bottom of operation panel: 1) • LAN 1 port (1000BASE-T) • RS-232-C port
Soft-keys	Left/right 12 keys Bottom 12 keys

## 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](#)

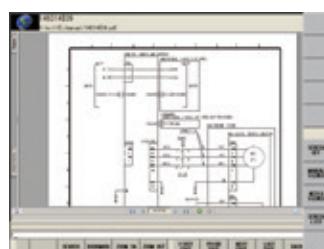
Operation schedule of the APC can be controlled through MAPPS. The ability to set various schedules supports unmanned continuous operation. This function can also handle changes to machining schedules flexibly.



## Improved ease of setup

### File display and Memo function

Data necessary for setups such as operating instructions, drawing data and text data can be viewed on MAPPS. Text data is editable.



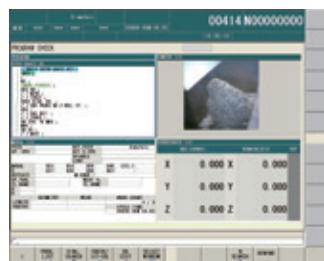
### Viewable file types

- PDF • TXT (Editable)
- Any file that can be displayed with Internet Explorer is available

## 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

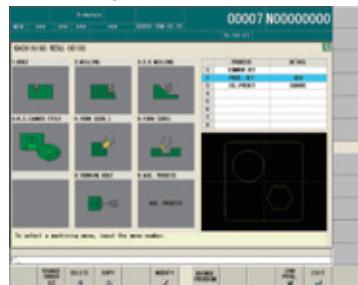
- Inside machine (to check machining)
- Tool magazine (to check cutting tools)
- Chip bucket (to check chip accumulation)

## Conversational automatic programming

This function allows users to create programs simply by following the guidance on the screen.

Much of the programming process has been simplified due to the minimal key entry required for even the most complex shapes.

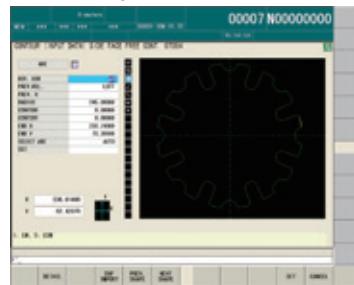
### Machining menu



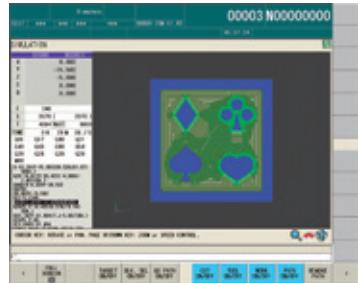
### List display function



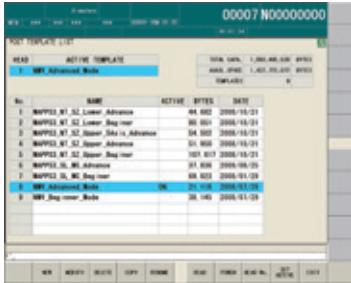
### Contour input



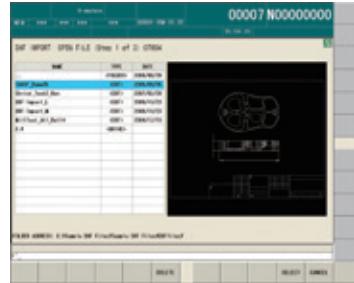
### Islands, open pockets OP



### MORI-POST advanced mode OP



### DXF import function OP



## Application System

### MORI Automatic Programming System for Machining Center

## MORI-APM OP

MORI-APM are application systems which let you create machining programs easily on your PC.

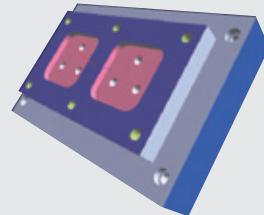


#### 1. Simple programming



**[Conversational automatic programming]**  
Easy operation by simply inputting product shapes according to the screen guidance.

#### 2. Reduce programming time



**[Supporting complicated programming]**  
Simply enter the machining shape using conversational automatic programming and the machine automatically selects the necessary tools and cutting conditions.

#### 3. Save costs



**[Compatibility with the MAPPS conversational function]**

Prepared conversational programs can be converted into NC programs with MAPPS. Cutting conditions can also be changed on MAPPS.

- The photo shown may differ from actual machine.
- Information about the screen is current as of September 2020.

# MORI-NETWORK

Network Application Systems

MORI-NET, MORI-SERVER, MORI-MONITOR, DMG MORI MESSENGER

## For shorter total production time for all our customers

### DMG MORI's software Line-up

This network system application achieves fast information sharing and increased production efficiency.

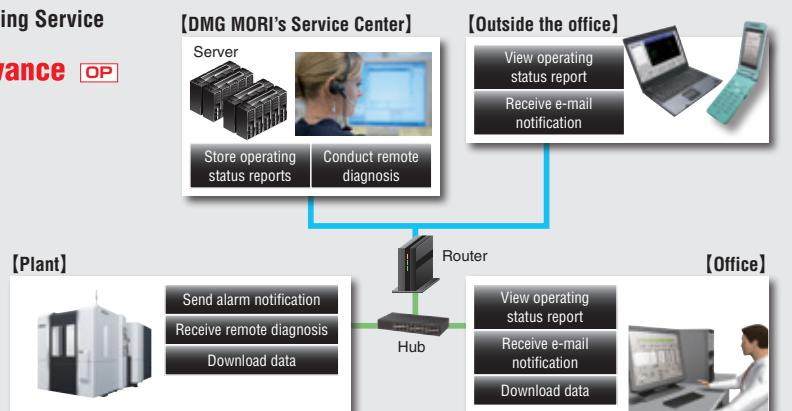
[Internet]  
 [LAN]

#### Remote Maintenance/Machine Operation Monitoring Service

### MORI-NET Global Edition Advance

#### ■ Features

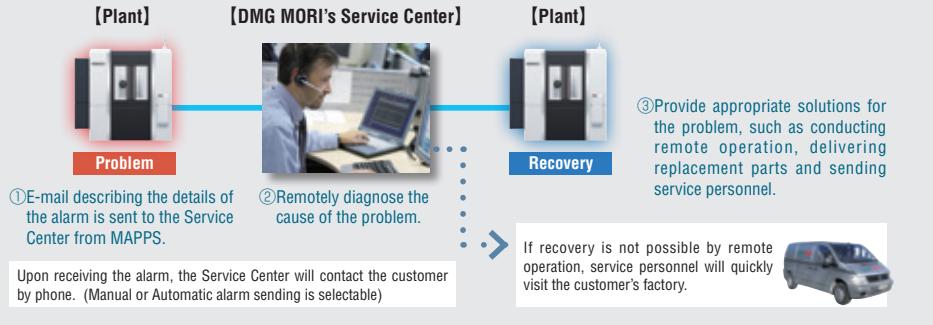
- Remote maintenance service by DMG MORI Service Center
- Internet-based, high speed (max. 1 Gbps), large capacity network
- No server installation is required — reduction in initial cost
- Download various data from the server located at DMG MORI



#### ■ Remote alarm support

When an alarm goes off, an alarm notification will be sent to the DMG MORI Service Center simply by pressing the "Send e-mail" button on MAPPS. DMG MORI service personnel will remotely diagnose the cause of the problem, and quickly provide solutions for machine recovery.

- This service may not be available in some areas. Please contact our sales representative for details.

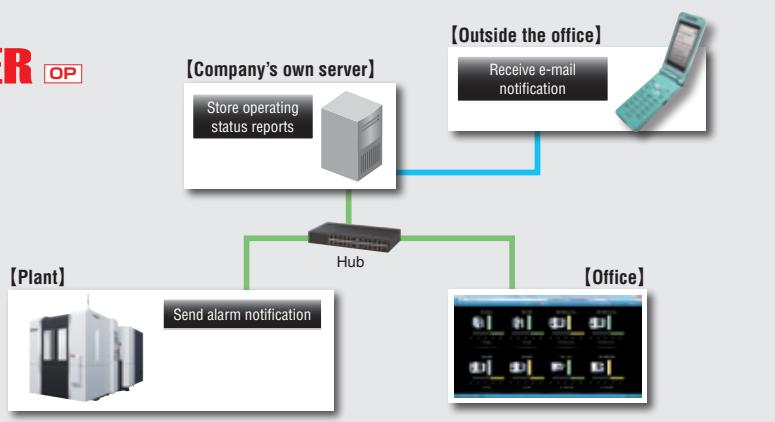


#### Machine Operation Monitoring System

### DMG MORI MESSENGER

#### ■ Features

- Intra-corporate network system
- Up to 30 machines can be connected with one server
- The operating status of your machines can be centrally managed in real time



#### Application for Data Transmission

### MORI-SERVER [Standard features]

This enables high-speed transfer of programming data between your office computer and machine, reducing the lead time of pre-machining processes.

#### MAPPs Screen Remote Control and Browsing Application

### MORI-MONITOR

This is an application which allows you to remotely operate and view the MAPPs screens from your office computer.

# ACT Advanced Communication Technology

Advanced  
Communication  
Technology

## Advanced Communication Technology (ACT) connects machine tool and peripheral devices

DMG MORI's new proposal, ACT, is designed to strengthen connections between machine tools and peripheral equipment by standardizing communication and software of the entire system. With ACT, standardization of interfaces of peripherals, simplified wiring, and labor saving can be achieved.

— [Internet]  
— [LAN]

### Industrial Network for Peripheral Equipment Control

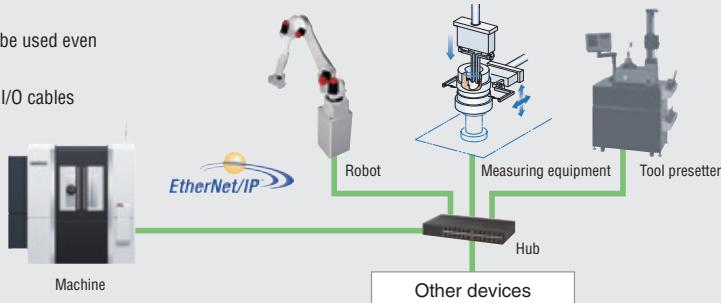
## MAPPs EtherNet/IP I/F OP

This industrial network using the standard Ethernet (TCP/IP) offers high speed and reliable connection. Simple Plug and Play connections, which are made available just by connecting to the hub through MAPPs, enable you to build a system easily. The use of standard cables also helps to reduce costs.

### ■ Features

- Connections between a machine and peripheral equipment become easy because standard LAN cables are used
- Thanks to increased versatility, your peripheral equipment can be used even when the machine tools are replaced by new ones
- Reliability is significantly increased by reducing the number of I/O cables

- Easy system construction
- Connection with existing devices
- Inexpensive devices



### Communication Interface for Monitoring Machine Operation

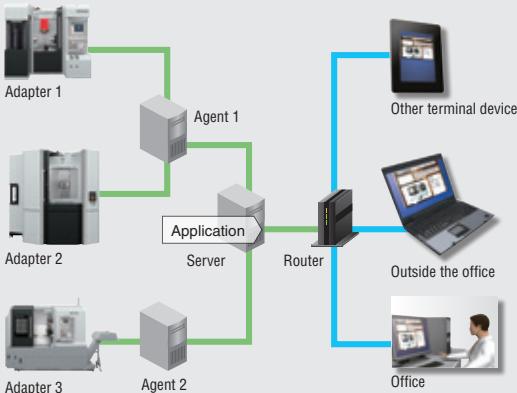
## MAPPs MTConnect I/F

MTConnect, which was introduced by the Association for Manufacturing Technology (AMT) in 2008, is a new XML (Extensible Markup Language) based communication protocol that offers an open interface. This interface allows you to build a system to monitor the operating status of your machines.

### ■ Features

- Open communication interface allows you to access to your company's system
- This makes it possible for you to build a system to monitor the operating status of your machines via the Internet

### ■ System examples



### ■ Application examples



Your machines are displayed all at once, allowing you to quickly call up the machine you wish to check.



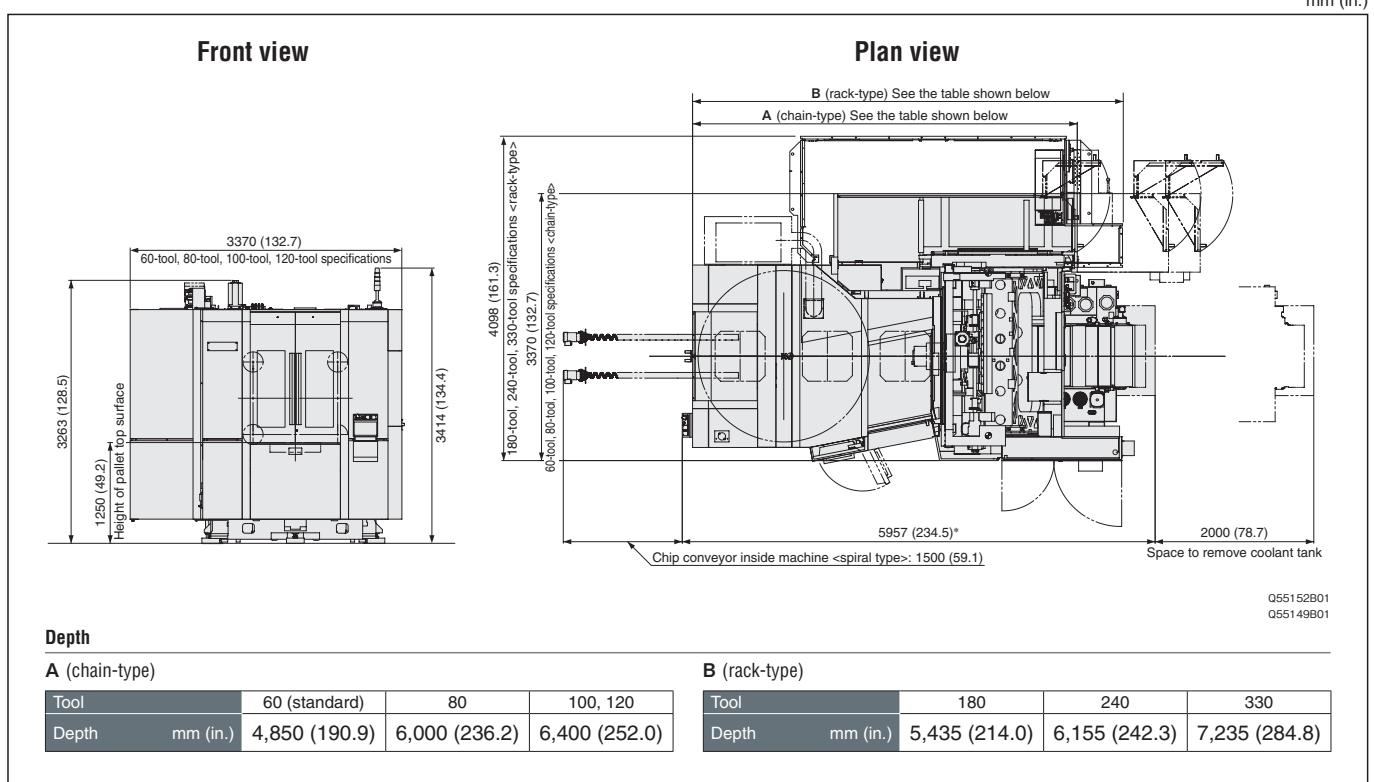
Operating status can be checked in real time.



You can check the operating history on the Gantt chart screen.

- A server and application must be prepared by the customer.
- For introduction of MTConnect, separate consultation is required.

# General view



## Depth

### A (chain-type)

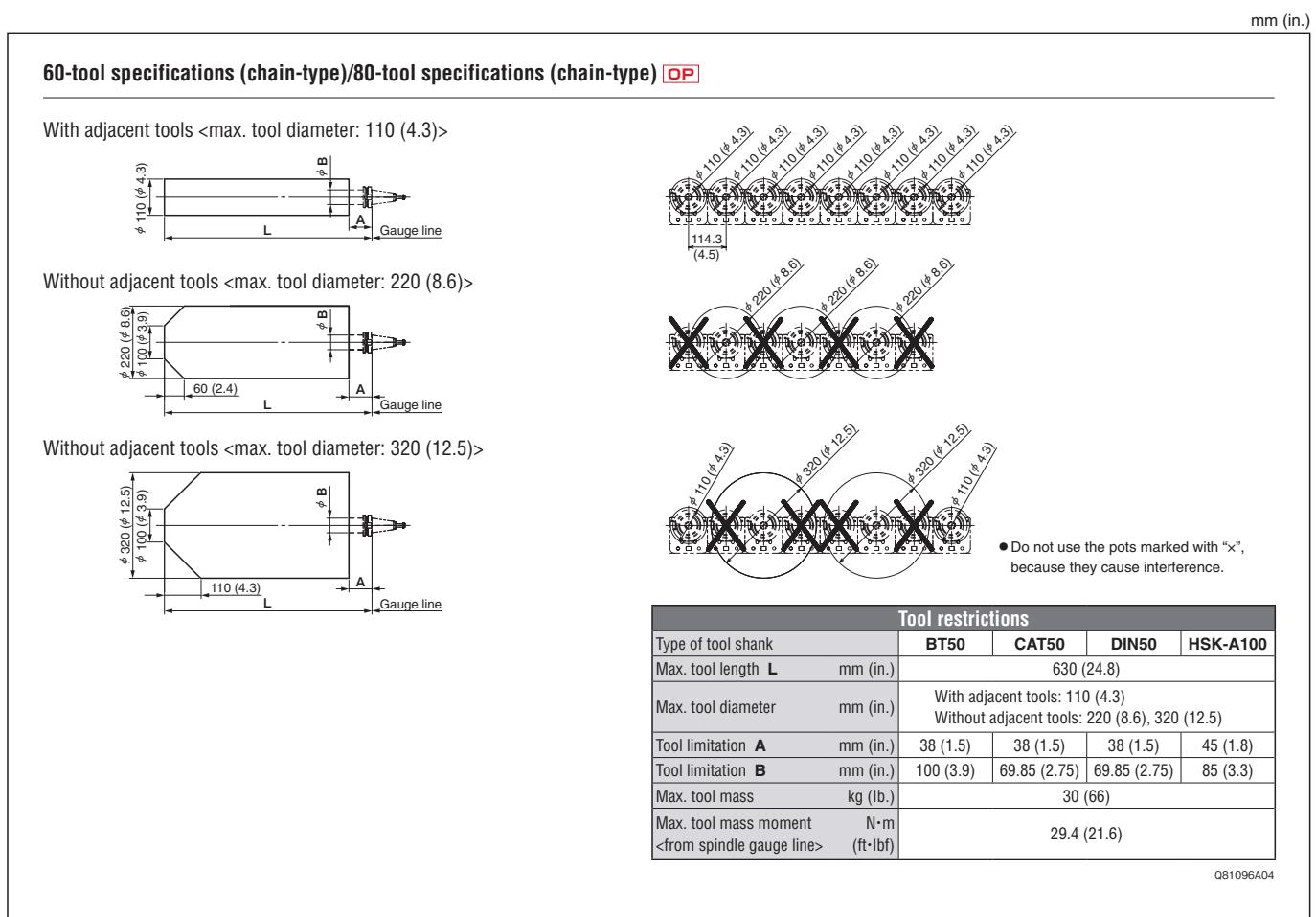
Tool	60 (standard)	80	100, 120
Depth mm (in.)	4,850 (190.9)	6,000 (236.2)	6,400 (252.0)

### B (rack-type)

Tool	180	240	330
Depth mm (in.)	5,435 (214.0)	6,155 (242.3)	7,235 (284.8)

\* The chip conveyor (hinge type+drum filter type) is equipped as standard.

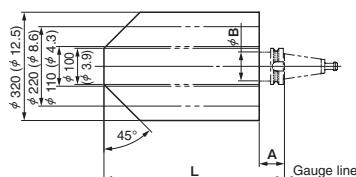
# Tool restrictions



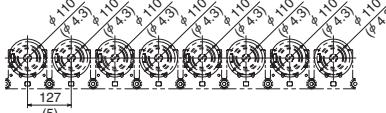
# Tool restrictions

mm (in.)

## 100-tool specifications (chain-type) OP / 120-tool specifications (chain-type) OP



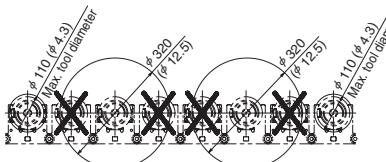
With adjacent tools &lt;max. tool diameter: 110 (4.3)&gt;



Without adjacent tools &lt;max. tool diameter: 220 (8.6)&gt;



Without adjacent tools &lt;max. tool diameter: 320 (12.5)&gt;



- Do not use the pots marked with "x", because they cause interference.

### Tool restrictions

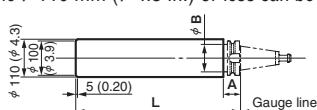
Type of tool shank	BT50	CAT50	DIN50	HSK-A100
Max. tool length <b>L</b> mm (in.)	630 (24.8)			
Max. tool diameter mm (in.)	With adjacent tools: 110 (4.3) Without adjacent tools: 220 (8.6), 320 (12.5)			
Tool limitation <b>A</b> mm (in.)	38 (1.5)	38 (1.5)	38 (1.5)	45 (1.8)
Tool limitation <b>B</b> mm (in.)	100 (3.9)	69.85 (2.75)	69.85 (2.75)	85 (3.3)
Max. tool mass kg (lb.)		30 (66)		
Max. tool mass moment N·m <from spindle gauge line>			29.4 (21.6)	
(ft·lbf)				

Q81097A04

## 180-tool specifications (rack-type) OP

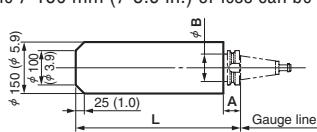
### Column 1-12

&lt;the tool of the φ 110 mm (φ 4.3 in.) or less can be stored&gt;



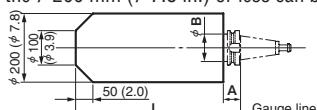
### Column 2

&lt;six tool of the φ 150 mm (φ 5.9 in.) or less can be stored&gt;



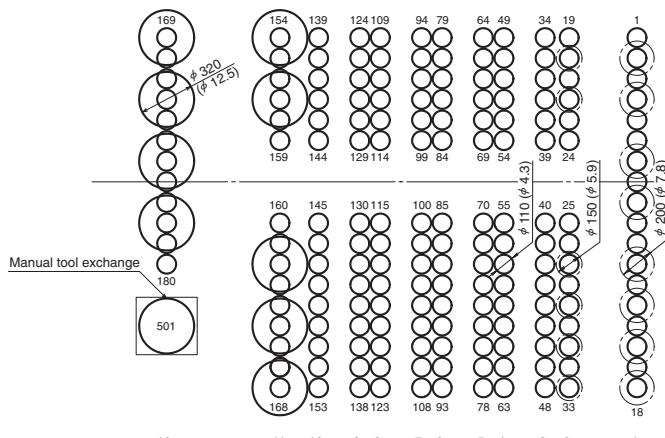
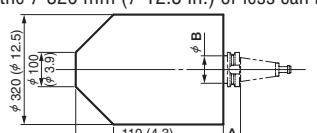
### Column 1

&lt;eight tool of the φ 200 mm (φ 7.8 in.) or less can be stored&gt;



### Column 11, 12

&lt;nine tool of the φ 320 mm (φ 12.5 in.) or less can be stored&gt;



### Tool restrictions

Type of tool shank	BT50	CAT50	DIN50	HSK-A100
Max. tool length <b>L</b> mm (in.)	630 (24.8)			
Max. tool diameter mm (in.)		320 (12.5)		
Tool limitation <b>A</b> mm (in.)	38 (1.5)	38 (1.5)	38 (1.5)	45 (1.8)
Tool limitation <b>B</b> mm (in.)	100 (3.9)	69.85 (2.75)	69.85 (2.75)	85 (3.3)
Max. tool mass kg (lb.)		30 (66)		
Max. tool mass moment N·m <from spindle gauge line>			29.4 (21.6)	
(ft·lbf)				

- If you attach a tool with a diameter larger than φ 110 mm (φ 4.3 in.) in the 1st, 2nd, 11th or 12th column in the rack, you may not be able to attach tools to the adjacent tool pots.

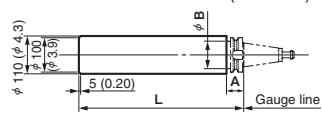
Q81099A03

# Tool restrictions

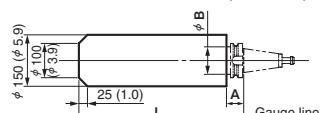
mm (in.)

## 240-tool specifications (rack-type) OP

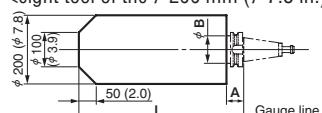
### Column 1–16

<the tool of the  $\phi 110$  mm ( $\phi 4.3$  in.) or less can be stored>

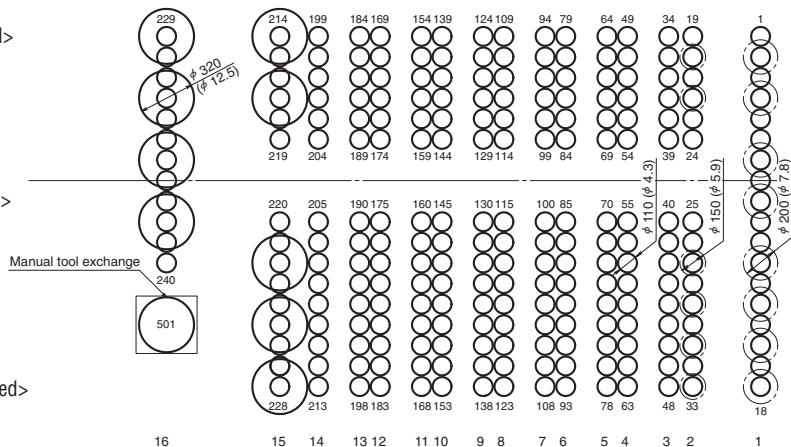
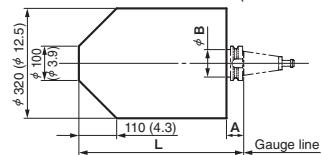
### Column 2

<six tool of the  $\phi 150$  mm ( $\phi 5.9$  in.) or less can be stored>

### Column 1

<eight tool of the  $\phi 200$  mm ( $\phi 7.8$  in.) or less can be stored>

### Column 15, 16

<nine tool of the  $\phi 320$  mm ( $\phi 12.5$  in.) or less can be stored>

16      15      14      13 12      11 10      9 8      7 6      5 4      3 2      1

## Tool restrictions

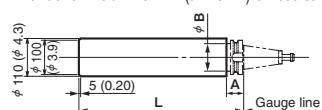
Type of tool shank	BT50	CAT50	DIN50	HSK-A100
Max. tool length <b>L</b>	mm (in.)		630 (24.8)	
Max. tool diameter	mm (in.)		320 (12.5)	
Tool limitation <b>A</b>	mm (in.)	38 (1.5)	38 (1.5)	38 (1.5)
Tool limitation <b>B</b>	mm (in.)	100 (3.9)	69.85 (2.75)	69.85 (2.75)
Max. tool mass	kg (lb.)		30 (66)	
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)		29.4 (21.6)	

● If you attach a tool with a diameter larger than  $\phi 110$  mm ( $\phi 4.3$  in.) in the 1st, 2nd, 15th or 16th column in the rack, you may not be able to attach tools to the adjacent tool pots.

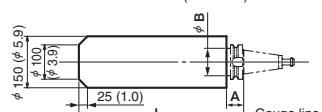
Q81101A04

## 330-tool specifications (rack-type) OP

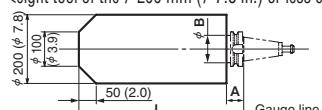
### Column 1–22

<the tool of the  $\phi 110$  mm ( $\phi 4.3$  in.) or less can be stored>

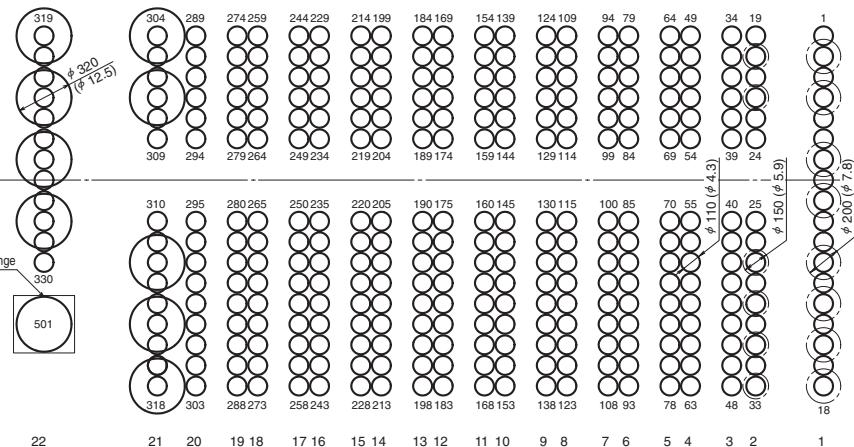
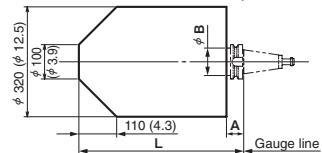
### Column 2

<six tool of the  $\phi 150$  mm ( $\phi 5.9$  in.) or less can be stored>

### Column 1

<eight tool of the  $\phi 200$  mm ( $\phi 7.8$  in.) or less can be stored>

### Column 21, 22

<nine tool of the  $\phi 320$  mm ( $\phi 12.5$  in.) or less can be stored>

22      21      20      19 18      17 16      15 14      13 12      11 10      9 8      7 6      5 4      3 2      1

## Tool restrictions

Type of tool shank	BT50	CAT50	DIN50	HSK-A100
Max. tool length <b>L</b>	mm (in.)		630 (24.8)	
Max. tool diameter	mm (in.)		320 (12.5)	
Tool limitation <b>A</b>	mm (in.)	38 (1.5)	38 (1.5)	38 (1.5)
Tool limitation <b>B</b>	mm (in.)	100 (3.9)	69.85 (2.75)	69.85 (2.75)
Max. tool mass	kg (lb.)		30 (66)	
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)		29.4 (21.6)	

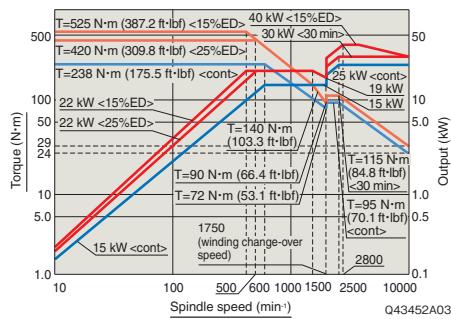
● If you attach a tool with a diameter larger than  $\phi 110$  mm ( $\phi 4.3$  in.) in the 1st, 2nd, 21st or 22nd column in the rack, you may not be able to attach tools to the adjacent tool pots.

Q81102A04

# Spindle speed torque/output diagrams

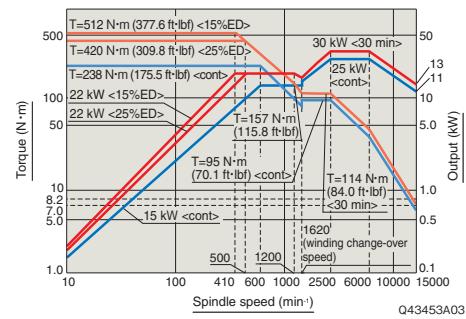
## 【 Standard 】

- Max. spindle speed: 10,000 min<sup>-1</sup>
- Spindle drive motor: 40/30/25 kW (53.3/40/33.3 HP) <15%ED/30 min/cont>
- Max. spindle torque: 525 N·m (387.2 ft·lbf) <15%ED>



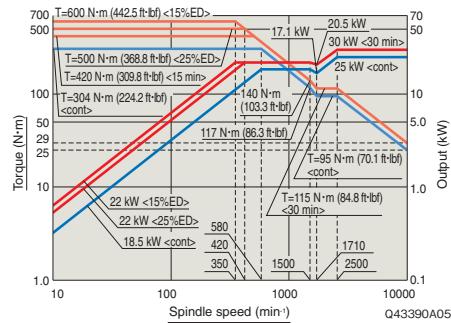
## 【 High speed OP 】

- Max. spindle speed: 15,000 min<sup>-1</sup>
- Spindle drive motor: 30/25 kW (40/33.3 HP) <30 min/cont>
- Max. spindle torque: 512 N·m (337.6 ft·lbf) <15%ED>



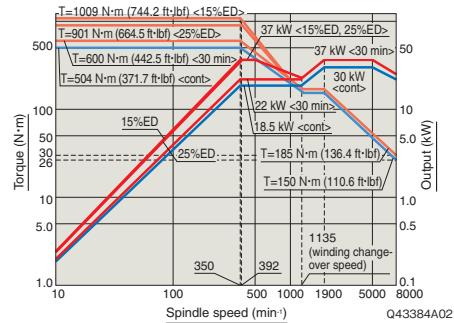
## 【 High output OP 】

- Max. spindle speed: 10,000 min<sup>-1</sup>
- Spindle drive motor: 30/25 kW (40/33.3 HP) <30 min/cont>
- Max. spindle torque: 600 N·m (442.5 ft·lbf) <15%ED>



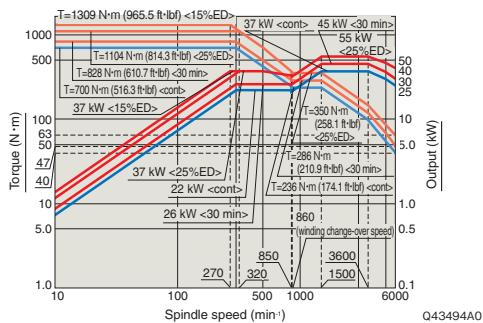
## 【 High torque OP 】

- Max. spindle speed: 8,000 min<sup>-1</sup>
- Spindle drive motor: 37/30 kW (50/40 HP) <30 min/cont>
- Max. spindle torque: 1,009 N·m (744.2 ft·lbf) <15%ED>



## 【 High torque OP 】

- Max. spindle speed: 6,000 min<sup>-1</sup>
- Spindle drive motor: 55/45/37 kW (75/60/50 HP) <25%ED/30 min/cont>
- Max. spindle torque: 1,309 N·m (965.5 ft·lbf) <15%ED>



# Standard & optional features

## Spindle

	BT50	●
Type of tool shank	CAT50	○
	DIN50	○
	HSK-A100	○
	DMG MORI 90° type	●
Type of retention knob	45°(MAS-I)	○
	60°(MAS-II)	○
	DIN	○
	HSK-A100	○
	Special (center)	○
BT50	Two-face contact	○
CAT50	Two-face contact	○
HSK-A100	Two-face contact	○
10,000 min <sup>-1</sup> : 40/30/25 kW (53.3/40/33.3 HP) <15%ED/30 min/cont> (standard)		●
10,000 min <sup>-1</sup> : 30/25 kW (40/33.3 HP) <>30 min/cont> (high output)		○
15,000 min <sup>-1</sup> : 30/25 kW (40/33.3 HP) <>30 min/cont> (high speed)		○
8,000 min <sup>-1</sup> : 37/30 kW (50/40 HP) <>30 min/cont> (high torque: 1,009 N·m (744.1 ft·lbf))		○
6,000 min <sup>-1</sup> : 55/45/37 kW (75/60/50 HP) <>25%ED/30 min/cont> (high torque: 1,309 N·m (965.4 ft·lbf))		○

- Please use a two-face contact tool when cutting at higher than 10,000 min<sup>-1</sup>.
- When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

## Table

Minimum table indexing angle	1° indexing	●
	0.001° <full 4th axis rotary table>	○
Sub table	Solid	☆
	T-slot	☆

## Pallet/APC

2-station turn-type APC		●
Pallet	Tap (metric, inch)	●
	T-slot	○
Changing to T-slot pallets	2 pallets	○
Automatic indexing setup station		○
Auto-coupler spec. (with pallets)	Hydraulic 2 circuits+workpiece seating detection 2 circuits	○
	Hydraulic 1 circuit+workpiece seating detection 1 circuit	○
Additional tapped pallet for auto-coupler spec.	Hydraulic 2 circuits+workpiece seating detection 2 circuits	○
	Hydraulic 1 circuit+workpiece seating detection 1 circuit	○
One additional pallet	Tap	○
	T-slot	○

## Fixture/Steady rest

4-sided tooling block		○
-----------------------	--	---

## Magazine

Tool storage capacity	60 tools (chain-type)	●
	80 tools (chain-type)	○
	100 tools (chain-type)	○
	120 tools (chain-type)	○
	180 tools (rack-type)	○
	240 tools (rack-type)	○
	330 tools (rack-type)	○

- Chain-type magazines (60-, 80-, 100- or 120-tool capacity) incorporate a pot tilting mechanism and the tool capacity includes one tool at the spindle side.
- Rack-type magazines (180-, 240- or 330-tool capacity) incorporate a pot transfer mechanism and the tool capacity includes one tool at the spindle side.

## Coolant

Coolant system		●
Shower coolant (used at the same time as spindle coolant)		●
Coolant flow switch for through-spindle coolant system		○
Coolant float switch	Lower limit detection	●
	Upper limit detection	☆
Coolant gun	Machining side	○
	Setup station side	○
	Setup station+machining side	○
Through-spindle coolant/air (switching specifications) <through-spindle coolant system is necessary required separating>		○
Oil shot system		○
Through-spindle coolant system (unit on coolant tank)* center through	1.5 MPa (217.5 psi)	○*
Oil-hole drill coolant system		☆
Oil mist system		○
Through-spindle coolant system (separate type)* Interface		○
Through-spindle coolant system* (center through)	Interface <7.0 MPa (1,015 psi), KNOLL>	○
	Interface <7.0 MPa (1,015 psi), Chip braster>	○
Through-spindle coolant system (unit on coolant tank)* side through	1.5 MPa (217.5 psi)	○*
Through-spindle coolant system* (side through)	Interface <7.0 MPa (1,015 psi), KNOLL>	○
	Interface <7.0 MPa (1,015 psi), Chip braster>	○

\*1 When using oil-based coolant, please consult our sales representative.

\* DMQP (DMG MORI Qualified Products)

● DMQP: Please see Page 17 for details.

● The information in this catalog is valid as of September 2020.

● Specifications, accessories, safety device and function are available upon request.

● Some options are not available in particular regions.

For details, please consult our sales representative.

●: Standard features ○: Options ☆: Consultation is required

## Coolant

Coolant chiller (separate type)	Optional when using water-soluble coolant	○*
	Essential when using oil-based coolant (please consult our sales representative)	○*
Coolant chiller (through-spindle coolant system)		○*
Mist collector HVS-300	Including stand (cannot be used in Europe)	○*
	Interface <duct φ 200 mm (φ 7.9 in.)+electric parts only>	○
Mist collector AFS-1600*	Including stand	○*
	Interface <duct φ 200 mm (φ 7.9 in.)+electric parts only>	○
Mist collector interface (duct only)	φ 200 mm	○
Oil skimmer		○
Semi dry unit		☆

\*2 Not compatible with oil-based coolant. If using oil-based coolant, select the HVS-300.

## Chip disposal

Chip conveyor <single construction>	Rear discharge, hinge type+drum filter type	●
	Rear discharge, scraper type+drum filter type	○
Air blow	Tool tip <when the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required>	●
Chip bucket	254 L (67.1 gal.)	○*

## Measurement

In-machine measuring system (table)	Touch sensor (R)	(M) ○
	Touch sensor+tool setter function (tool length+diameter)	(M) ○
	Touch sensor+tool setter function (tool length+diameter)	(R) ○
In-machine measuring system (spindle)	Touch sensor (optical signal transmission type)	(R) ○
	Touch sensor (optical signal transmission type)+ workpiece setter function	(R) ○
Tool breakage detection system (magazine)		○

● The specifications vary depending on the manufacturers.

(R): Made by RENISHAW

(M): Made by MagneScale

## Improved accuracy

Full closed loop control (Scale feedback)	X, Y, Z-axis	○
Oil chiller		●

## Automation

Auto power off		●
Automatic door	Setup station	○
EtherNet/IP interface		○
Robot interface (EtherNet/IP)	<EtherNet/IP interface is necessary required separating>	○

## Pallet pools

CPP (Carrier Pallet Pool)	Vertical (5, 7, 9, 11 pallets)	○
<for details, please consult with our sales representative>	Horizontal (6, 8, 10, 12 pallets)	○
LPP (Linear Pallet Pool)		○
RPP (Round Pallet Pool)		☆

## Other

• Full cover		
• Door interlock system <incl. mechanical lock>	front door/setup station door/electrical cabinet door	●
• Door interlock system		
• Low air pressure detecting switch	(only detects the main spindle oil air circuit)	
• Low hydraulic pressure detecting switch		
• Built-in worklight	• Leveling block	●
	• Hand tools	●
	• Signal lamp 3 colors (red, yellow, green)	●
Manual pulse generator (separate type)		●
Dry anchor		○
Earth leakage breaker		○
Danger sensing device interface	(recommended when oil-based coolant is used or during unmanned operation)	○
Rotary window		○*
Additional residual pressure relief valve		☆
Refrigerating type air dryer		○*
Tool wagon		○*
Tool cabinet		○*
Basic tooling kit		○*
Weekly timer		○
Total counter		○
Workpiece counter		○
External M-code	5	○
	10	○
Electrical cabinet chiller		○*

## ■ Through-spindle coolant system (separate type) <high-pressure coolant system is attached>

Discharge pressure MPa (psi)	Side through	Center through (special retention knobs are required)
1.5 (217.5)	○*	○*
3.5 (507.5)	○*	○*
7.0 (1,015)	○*	○*

**⚠ Flammable coolant such as oil-based coolant has a high risk of ignition, and will cause fire or machine breakage if ignited. If you have to use a flammable coolant for any reason, please be sure to consult our sales representative.**

# Numerical control unit specifications F31iB, F31iB5

●: Standard ○: Option -: Not applicable

## Controlled axis

Controlled axis	X (X2), Y, Z (Z2), B	●
Simultaneously controlled axes	F31iB: 4 axes F31iB5: 5 axes	●
Least input increment	0.001 mm (0.0001 in.)	●
Max. command value	±999,999.999 mm (99,999.999 in.)	●
Stroke limit check before movement		●
Software damper	Abnormal load detection function	●
Load monitor function C	Soft key type	●
Programming resolution multiplied by 1/10	0.0001 mm (0.00001 in.)	○

## Operation

Sequence number comparison and stop	○
Program restart	○
Tool retract and recover	○
Manual handle interruption	○

## Interpolation functions

Nano interpolation	●
Single direction positioning	●
Helical interpolation	Optional 2 axes and other 1 axis
External high-speed skip (installation of high-speed skip terminal)	○
Polar coordinate interpolation	G12.1, G13.1
Cylindrical interpolation	G7.1
Involute interpolation	G2.2/G3.2
Spiral/conical interpolation	○
Smooth interpolation	○
Threading, synchronous cutting/Feed per revolution	○
3rd, 4th reference position return	○
Tool spindle Cs control (consultation is required if orbit machining or hole machining needs to be performed)	Includes Cs contour control and Normal direction control
NURBS interpolation	○

## Feed functions

Rapid traverse override	F0/1/10/25/100%	●
Tangential speed constant control	●	●
Feedrate override	0–200% (10% increments)	●
Override cancel	●	●
AI contour control I <sup>*1</sup>	●	●
AI contour control II <sup>*2</sup>	○	●
One-digit F code feed	F1 to F9	○
Small-hole peck drilling cycle (the arbor with the overload torque detection function must be attached)	○	○

\*1 Look-ahead blocks are up to 30 blocks.

\*2 1,000 look-ahead blocks+high-speed processing.

## Program input

Program number	4 digits	●
	8 digits	○
Absolute/incremental programming	G90/G91	●
	Decimal point programming or electronic calculator type decimal point programming can be set using parameters	●
Diameter/radius programming	●	●
Plane selection	G17, G18, G19	●
Programmable data input	G10	●
Sub-program call	Up to 10 nestings	●
Custom macro	●	●
Custom macro common variables	#100 to #149, #500 to #549	●
Hole machining canned cycle	G80–G89	●
FS15 format	●	●
Additional workpiece coordinate systems	48 sets 300 sets	○
Addition of optional block skip	Soft key type (2–9)	○
Polar coordinate command	●	●
Optional chamfering/corner R	●	●
Additional custom macro common variables	600 variables (#100 to #199, #500 to #999)	○
Interruption type custom macro	●	●
Automatic corner override	●	●
Scaling	●	●
Coordinate system rotation	●	●
3-D coordinate conversion	●	●
Programmable mirror image	●	●
Graphic copy	G72.1/G72.2	●
Islands, open pockets <MAPPS>	●	●
High-speed canned cycle <MAPPS>	●	●
DXF import function <MAPPS>	●	●
MORI-POST advanced mode <MAPPS>	●	●
Text engraving function <MAPPS>	●	●

## Miscellaneous function/Spindle speed function

Spindle speed override	50–150% (10% increments)	●
Spindle orientation	●	●
Synchronous tapping	●	●

Multiple M cords in single block (Multi M code function)  
<incl. M code group check>

## Tool function/Tool offset function

Tool function (T function)	8-digit T code	●
	64 sets (diameter+length=1 set, number of offsets indicates that diameter and length are displayed separately)	●
Number of tool offsets		●
Tool offset data memory C	D/H code, geometry/wear	●
Tool length compensation	G43, G44, G49	●
Cutter radius offset	G40–G42	●
Tool length measurement	●	●
3-D tool compensation	●	●
	99 sets	○
	200 sets	○
Additional number of tool offsets (the number of selectable tool offsets depends on the tool storage capacity)	400 sets 499 sets 999 sets	○
Tool position offset	G45–G48	○
Tool life management	●	●
Additional number of tools to be controlled by the tool life management function	1,024 sets	○
MAPPS Tool management system <sup>*1</sup>	●	●
MAPPS Tool management system <sup>*1</sup> +Tool IC (MAPPS software only) <sup>*2</sup>	●	●
MAPPS Tool management system <sup>*1</sup> +Tool ID (MAPPS software only) <sup>*2</sup>	●	●

Tool IC: made by BIG DAISHOWA Tool ID: made by BALLUFF

\*1 Includes common variable 600 for custom macro.

\*2 Separate consultation is required if hardware and software are customized.

## Editing

Expanded program editing	A limitation in the copy buffer (10 KB)	●
Background editing	●	●
Playback	●	○
Machining time stamp	●	●
Undo/Redo function <MAPPS>	●	●
Line number display <MAPPS>	●	●

## Operation and display

Status display	●
Clock function	●
Current position display	●
Program comment display	191 characters (4-digit O code), 187 characters (8-digit O code)
Parameter setting display	●
Alarm display	●
Alarm history display	●
Operator's message history display	●
Operation history display	●
Running time/Parts count display	●
Actual cutting feedrate display	●
Self-diagnosis	Includes alarm display, I/O signal diagnosis and ladder diagram
Operation panel: display section	19-inch TFT color LCD
Multi-counter display <MAPPS>	○

## Data input/output

I/O interface	USB	●
	10/100/1000BASE-T (access to user memory area by Ethernet function with MORI-SERVER Software)	●
Ethernet		●
Memory card for MAPPS	CF card (4 GB/2 GB/512 MB)+ATA adaptor	○
6 GB Program storage area (for MAPPS-DNC operation function, for data backup) <MAPPS>	Files up to 10 MB in size can be edited	●
DNC operation using external memory (front USB port)		○

i95107A01

## Registerable programs <in total>

Part program storage length <in total>	Registerable programs <in total>		
	Without expansion <programs>	Expansion 1 <programs>	Expansion 2 <programs>
128 KB <320 m (1,050 ft)>		63	●
128 KB <320 m (1,050 ft)>		250	—
256 KB <640 m (2,100 ft)>		500	—
512 KB <1,280 m (4,200 ft)>		1,000	—
1 MB <2,560 m (8,400 ft)>		1,000	2,000
2 MB <5,120 m (16,800 ft)>		1,000	4,000
4 MB <10,240 m (33,600 ft)>		1,000	4,000
8 MB <20,480 m (67,200 ft)>		1,000	4,000

## ■ Items suitable for each numerical control unit

		F31iB	F31iB5
Simultaneously controlled axes	4 axes 5 axes	●	●
Interpolation functions	Nano smoothing	○	●
Feed functions	AI contour control II	○	●
Program input	Tilted working plane command Cutting point command	○ —	●
	Tool center point control 3-D cutter compensation	○ ○	●
Tool function/Tool offset function	SVC function Workpiece position error compensation Rotary table dynamic fixture offset	— ○ ○	●
Data input/output	Fast data server Memory card for data server* Fast data server+Memory card for data server*	○ ○ ○	●

\* CF card 1 GB+ATA adaptor

● The information in this catalog is valid as of September 2020.

# Machine specifications

Item		NH6300 DCG II		
Travel	X-axis travel <longitudinal movement of saddle>	mm (in.)	1,050 (41.3)	
	Y-axis travel <vertical movement of spindle head>	mm (in.)	900 (35.4)	
	Z-axis travel <cross movement of pallet>	mm (in.)	980 (38.6)	
	Distance from pallet surface to spindle center	mm (in.)	100 – 1,000 (3.9 – 39.4)	
	Distance from pallet center to spindle gauge plane	mm (in.)	100 – 1,080 (3.9 – 42.5)	
Pallet	Distance from floor surface to pallet surface	mm (in.)	1,250 (49.2)	
	Pallet working surface	mm (in.)	630 × 630 (24.8 × 24.8)	
	Pallet loading capacity	kg (lb.)	1,500 (3,300)	
	Max. workpiece swing diameter	mm (in.)	1,050 (41.3)	
	Max. workpiece height	mm (in.)	1,300 (51.1)	
Spindle	Pallet surface configuration		M16 (1/2-13 UNC) Tap: 24 Holes. Pitch 125 mm (5 in.)	
	Minimum pallet indexing angle		1° [0.001° <full 4th axis rotary table>]	
	Pallet indexing time <including clamping and unclamping time>	s	2.0 [1.8 <full 4th axis rotary table>] <90°> 2.5 [2.3 <full 4th axis rotary table>] <180°>	
	Max. spindle speed	min⁻¹	10,000 [10,000 <high output>] [15,000] [8,000] [6,000]	
	Number of spindle speed ranges		1	
Feedrate	Type of spindle taper hole		No. 50 [HSK-A100]	
	Spindle bearing inner diameter	mm (in.)	100 (3.9) [120 (4.7) <6,000 min⁻¹/8,000 min⁻¹>]	
	Rapid traverse rate	mm/min (ipm)	X, Z: 50,000 (1,968.5) Y: 50,000 (1,968.5) [40,000 (1,574.8) <6,000 min⁻¹/8,000 min⁻¹>]	
	Cutting feedrate	mm/min (ipm)	X, Y, Z: 1 – 50,000 (0.04 – 1,968.5) <look-ahead control>	
	Max. rotational speed	min⁻¹	B: 38.5 [100 <full 4th axis rotary table>]	
ATC	Jog feedrate	mm/min (ipm)	0 – 5,000 (0 – 197.0) <20 steps>	
	Type of tool shank		BT50 [DIN50] [CAT50] [HSK-A100] <when the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together>	
	Type of retention knob		DMG MORI 90° type [45°(MAS-I)] [60°(MAS-II)] [HSK-A100] [DIN]	
	Tool storage capacity <including one tool at the spindle side>		Chain-type: 60 [80] [100] [120] Rack-type: [180] [240] [330] <with rack type 180-, 240- or 330-tool magazines, the number of tools with a diameter of 110 mm (4.3 in.) or greater that can be stored in the magazine is restricted. Up to nine of the tools with the maximum permissible diameter of 320 mm (12.5 in.) can be stored>	
	Max. tool diameter <with adjacent tools>	mm (in.)	110 (4.3)	
APC	Max. tool diameter <without adjacent tools>	mm (in.)	320 (12.5)	
	Max. tool length	mm (in.)	630 (24.8)	
	Max. tool mass	kg (lb.)	30 (66)	
	Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	29.4 (21.6) <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	
Motor	Tool-to-tool	s	1.7	
	Tool changing time	Cut-to-cut ● The time differences are caused by the different conditions (travel distances, etc) for each standard.	MAS ISO 10791-9 JIS B6336-9	4.4 16.6/4.5 (max./min.)
	Number of pallets		2	
	Method of pallet change		Turn-type	
	Pallet changing time* <excluding clamping and unclamping time>	s	15	
Power source <standard>	10,000 min⁻¹	kW (HP)	40/30/25 (53.3/40/33.3) <15%ED/30 min/cont> [30/25 (40/33.3) <30 min/cont>]	
	15,000 min⁻¹	kW (HP)	[30/25 (40/33.3) <30 min/cont>]	
	8,000 min⁻¹	kW (HP)	[37/30 (50/40) <30 min/cont>]	
	6,000 min⁻¹	kW (HP)	[55/45/37 (75/60/50) <25%ED/30 min/cont>]	
	Feed motor	X/Y/Z axes B axis	4.5 × 2 (6 × 2)/5.5 (7.5)/5.5 × 2 (7.5 × 2) 3.0 (4) [8.3/6.5 (11.1/8.7) <max./cont> (full 4th axis rotary table)]	
Tank capacity	Coolant pump motor	kW (HP)	1.1 (1.5) <spindle>/1.1 (1.5) <chip removal>/2.2 (3) <shower coolant>	
	Electrical power supply <cont>	I94128C01 kVA	66.0	
	Compressed air supply	MPa (psi), L/min (gpm)	0.5 (72.5), 600 (158.4) (when the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required) <ANR>	
Machine size	Coolant tank capacity	L (gal.)	930 (245.5)	
	Machine height <from floor> <60-tool specifications>	mm (in.)	3,414 (134.4)	
	Floor space (width×depth) <60-tool specifications>	mm (in.)	3,370 × 5,957 (132.7 × 234.5)	
Noise data	Mass of machine <60-tool specifications>	kg (lb.)	19,000 (41,800)	
	A-weighted, time-average radiated sound pressure level	dB	60 – 75 (Measurement uncertainty is 4 dB)	

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

\* When equipped with the auto-coupler, time taken to shut off / supply hydraulic pressure to the fixture is not included.

● 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 two-face contact tool when cutting at higher than 10,000 min⁻¹.

● Max. tool diameter: the maximum tool diameter is limited to 255 mm (10.0 in.) or less when using the spindle at 10,000 min⁻¹ or higher.

● 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 &lt;air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10 °C (50 °F) or below&gt;.

● 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.

● Machine size: please see the machine diagram on page 22 for a machine with an optional tool storage capacity.

● Noise data: the measurement was performed at the front of the machine with a maximum spindle speed of 15,000 min⁻¹. Please contact our sales representative for details.

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This product is deemed regulated cargo when exported under the Japanese government's Foreign Exchange and Foreign Control Trade Law. Government authorization is required when exporting this product. The product shipped to you (the machine and accessory equipment) has been manufactured in accordance with the laws and standards that prevail in the relevant country or region. If it is exported, sold, or relocated to a destination in a country with different laws or standards, it may be subject to export restrictions of that country.

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- + The information in this catalog is valid as of September 2020. Designs and specifications are subject to changes without notice.
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