

[www.dmgmori.com](http://www.dmgmori.com)

**DMG MORI**

High-Precision Vertical Machining Center

NV4000 DCG

## NV4000 DCG



# Presenting the ideal vertical machining center.

High speed and high-quality—in order to combine these conflicting factors,

DMG MORI took a fresh look at the structure of machine tools.

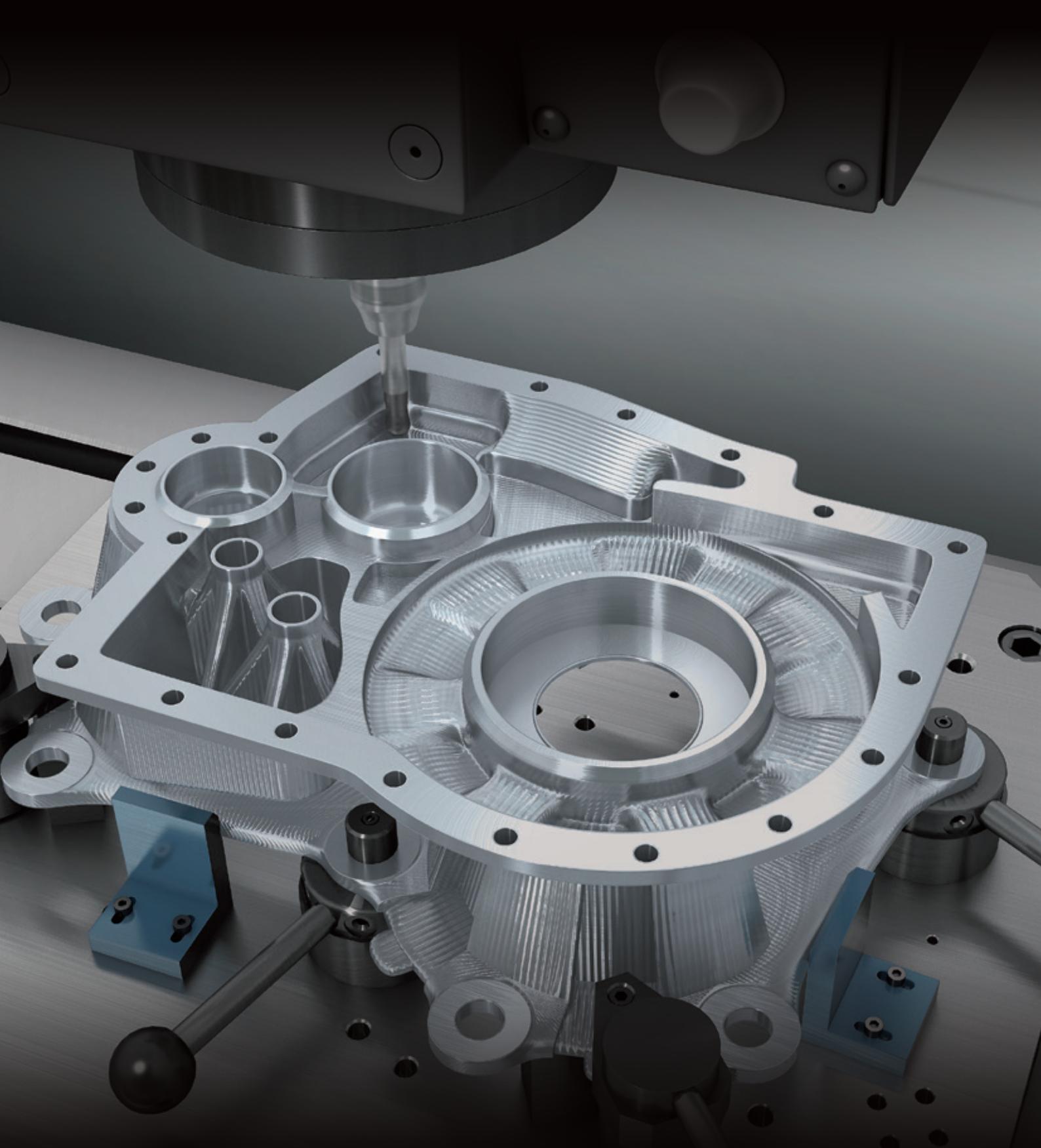
The best answer we came up with was the DCG (Driven at the Center of Gravity) technology,

which controls machine vibration.

The NV4000 DCG, a high-precision vertical machining center, achieves both high speed and

high quality thanks to the innovative technology.





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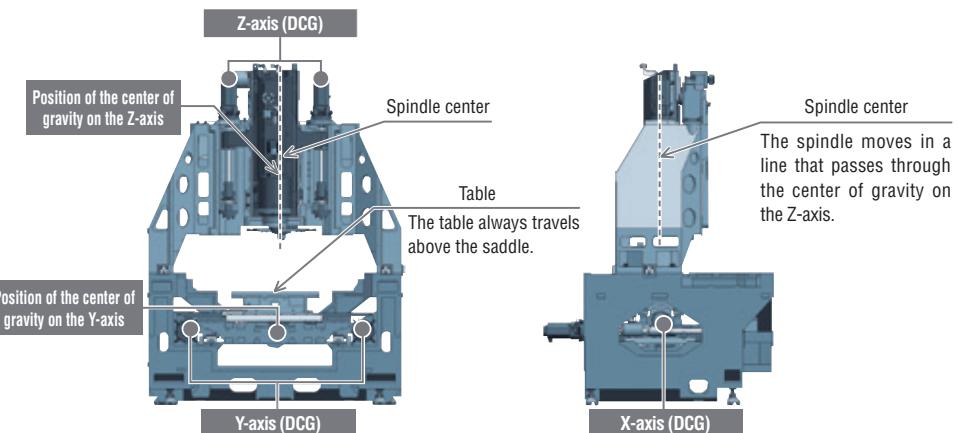
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# Principal mechanisms

## Basic structure

The NV4000 DCG incorporates the DCG on all axes. Also, DMG MORI's original structure made it possible to eliminate spindle and table overhang.



## Driven at the Center of Gravity



**DCG**

Driven at the Center of Gravity

Original technology

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.

## Features of DCG

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

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

**42 m/min (1,653.5 ipm)**

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

**42 m/min (1,653.5 ipm)** {for look-ahead control <theoretical value>}

### Max. acceleration

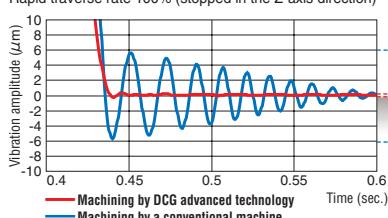
#### Standard

X and Y axes **0.60 G** { $5.88 \text{ m/s}^2$  ( $19.29 \text{ ft/s}^2$ )}

Z-axis **0.56 G** { $5.49 \text{ m/s}^2$  ( $18.01 \text{ ft/s}^2$ )}

## Residual vibration comparison

Rapid traverse rate 100% (stopped in the Z-axis direction)



Machining by  
DCG advanced  
technology

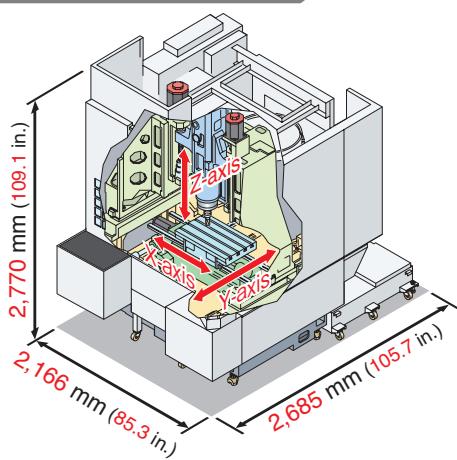
Machining by  
conventional  
machine

### High acceleration OP

X and Y axes **0.80 G** { $7.84 \text{ m/s}^2$  ( $25.72 \text{ ft/s}^2$ )}

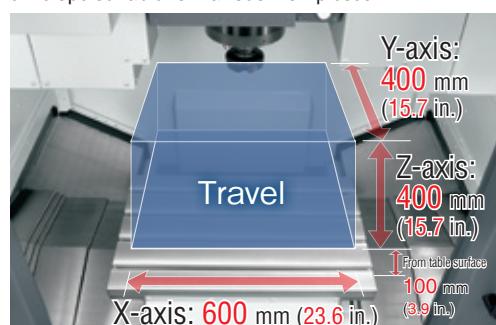
Z-axis **1.10 G** { $10.78 \text{ m/s}^2$  ( $35.36 \text{ ft/s}^2$ )}

## Axis configuration, machine size



## Working area

Despite its compact body, the NV4000 DCG ensures a large work envelope suitable for various workpieces.



### Table working surface

**700×450 mm (27.6×17.7 in.)**

## ATC, Magazine

By using the ATC, which allows high-speed tool change, non-cutting time is dramatically reduced.



### Tool changing time

Cut-to-cut (chip-to-chip)

20 tools

**5.5 sec.** (max.)

**3.6 sec.** (min.)

40 tools **OP**

**10.9 sec.** (max.)

**3.6 sec.** (min.)

- Without ATC shutter
- ISO 10791-9, JIS B6336-9
- The time differences are caused by the different conditions (travel distances, etc.) for each standard.
- Depending on the arrangement of tools in the magazine, the cut-to-cut (chip-to-chip) time may be longer.

Tool-to-tool **1.0 sec.**



### Tool storage capacity

**20 tools**

**40 tools** **OP**

**60 tools** **OP**

- For APC specifications, a dummy tool which is mounted on the spindle during APC operation is included.

We use a space-saving tool magazine that fits in the standard installation space even if options are selected.



ISO: International Organization for Standardization JIS: Japanese Industrial Standard

## Spindle



### Max. spindle speed

**12,000 min<sup>-1</sup>**

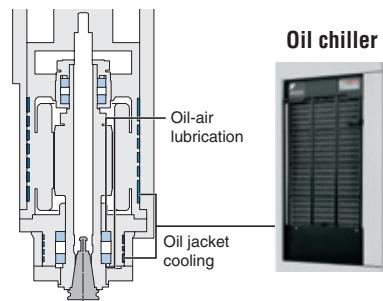
**20,000 min<sup>-1</sup>** **OP**

**30,000 min<sup>-1</sup>** **OP**

- Please use a flange tool when cutting at 15,000 min<sup>-1</sup> or higher.

## 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.



### Spindle acceleration time

**1.30 sec.** (0→12,000 min<sup>-1</sup>)

**2.43 sec.** (0→20,000 min<sup>-1</sup>) **OP**

### Spindle deceleration time

**1.17 sec.** (12,000 min<sup>-1</sup>→0)

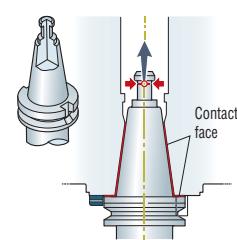
**2.20 sec.** (20,000 min<sup>-1</sup>→0) **OP**

## Two-face contact specifications

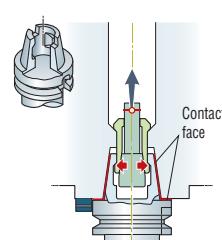
**OP**

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.

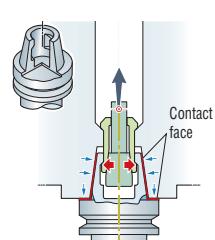
**BT40\***



**HSK-A63**



**HSK-F63** (30,000 min<sup>-1</sup> specifications only)



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

● All DMG MORI spindles are made in-house to better meet our customer needs. For details, please consult with our sales representative.

# High-precision equipment

## Direct scale feedback

[OP]



The absolute magnetic linear scale (full closed-loop control) made by Magnescale is effective for high-precision positioning, and is available as an option.

### Resolution

**0.01 μm**

### Magnescale

High accuracy absolute scale

- High accuracy, high resolution
- Greater accuracy than optical scale
- Highly resistant to condensation and oil
- Vibration and impact resistant characteristics

## Oil chiller (separate type)

[OP]

An energy-saving oil chiller is used that delivers very little temperature fluctuation.



## Coolant chiller (separate type)

[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.

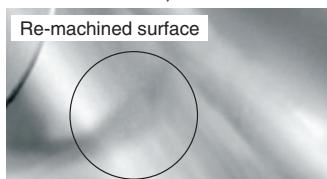
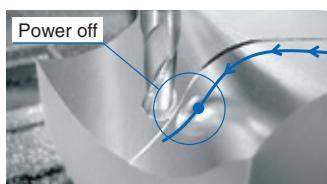


**When using oil-based coolant,  
please be sure to consult with our sales representative.**

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

## Z-axis drop prevention function ideal for blackouts

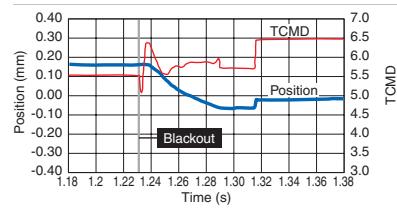
Raising the spindle slightly during blackouts prevents any contact between the tool and the workpiece caused by the spindle dropping.



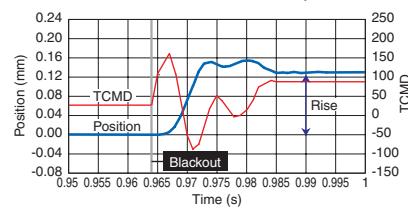
※ The Z-axis drop prevention function is not available in the following situations.

1. When the feed axis servo alarm has gone off.
2. When the power supply module alarm has gone off.
3. When the communication alarm between the CNC and the amp has gone off.

### Before blackout countermeasure



### After blackout countermeasure (Z-axis raised)



TCMD: Torque command

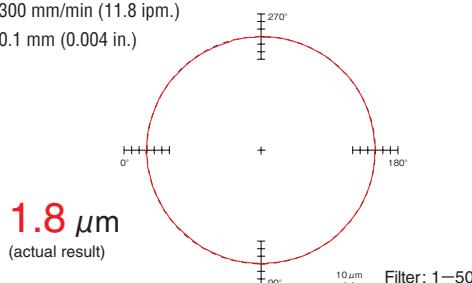
● Depending on how voltage drops (slowly or suddenly), it may not always be possible to detect a blackout.

# High-accuracy data

## Circularity

### Aluminum

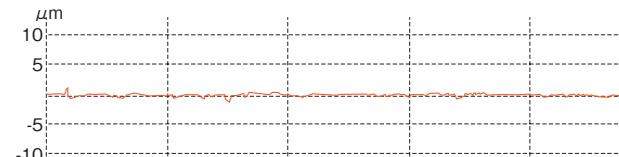
Material <JIS> : A5052<sup>\*1</sup> <outer diameter 96 mm (3.8 in.)>  
 Tool :  $\phi$  16 mm (0.6 in.) carbide end mill <4 flutes>  
 Spindle speed : 5,000 min<sup>-1</sup>  
 Cutting feedrate: 300 mm/min (11.8 ipm.)  
 Depth of cut : 0.1 mm (0.004 in.)



## Surface roughness

Material <JIS> : S45C<sup>\*2</sup>  
 Tool :  $\phi$  10 mm ( $\phi$  0.4 in.) End mill  
 Spindle speed : 10,000 min<sup>-1</sup>  
 Cutting feedrate: 5,000 mm/min (196.9 ipm)  
 Depth of cut : 0.2 mm (0.008 in.)

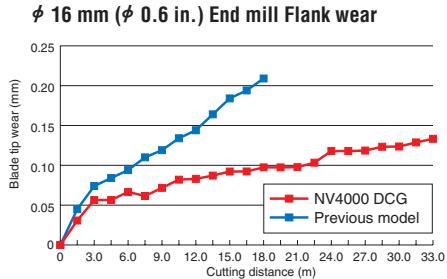
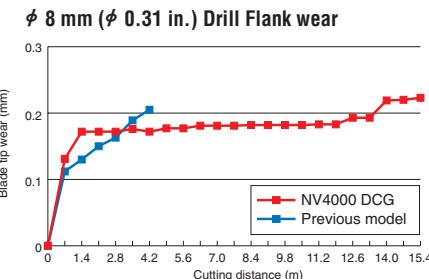
2.3  $\mu\text{m Ry}$  (actual result)



\*1 5052 (ANSI), NS4 (BS), AIMg2.5 (DIN), 5A02 (GB)  
 \*2 1045, 1046 (ANSI), C45, C45E, C45R (BS, DIN), 45 (GB)

## Comparison of tool wear

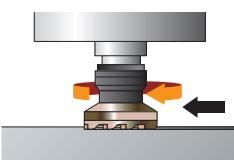
Minimizing tool tip vibration prevents wear and extends tool life.



● 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.  
 JIS: Japanese Industrial Standard A5052: Aluminum S45C: Carbon steel

## Cutting test

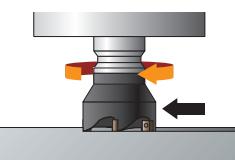
### $\phi$ 80 mm ( $\phi$ 3.1 in.) face mill <7 flutes>



Material <JIS> : A5052<sup>\*1</sup>

Material removal rate	1,536 mL/min (93.7 in <sup>3</sup> /min)
Width of out	64 mm (2.5 in.)
Depth of cut	1.5 mm (0.06 in.)
Spindle speed	12,000 min <sup>-1</sup>
Feedrate	16,000 mm/min (629.9 ipm)

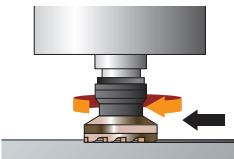
### $\phi$ 100 mm ( $\phi$ 3.9 in.) face mill <5 flutes>



Material <JIS> : S50C<sup>\*2</sup>

Material removal rate	115 mL/min (7.0 in <sup>3</sup> /min)
Width of out	80 mm (3.1 in.)
Depth of cut	3 mm (0.12 in.)
Spindle speed	480 min <sup>-1</sup>
Feedrate	480 mm/min (18.9 ipm)

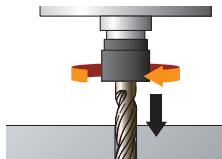
### $\phi$ 80 mm ( $\phi$ 3.1 in.) face mill <7 flutes>



Material <JIS> : S50C<sup>\*2</sup>

Material removal rate	269 mL/min (16.4 in <sup>3</sup> /min)
Width of out	64 mm (2.5 in.)
Depth of cut	2 mm (0.08 in.)
Spindle speed	1,000 min <sup>-1</sup>
Feedrate	2,100 mm/min (82.7 ipm)

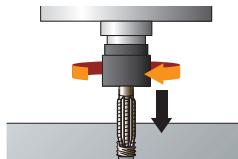
### $\phi$ 35 mm ( $\phi$ 1.4 in.) drill



Material <JIS> : S50C<sup>\*2</sup>

Material removal rate	54 mL/min (3.3 in <sup>3</sup> /min)
Spindle speed	227 min <sup>-1</sup>
Feedrate	56 mm/min (2.2 ipm)

### Tap



Material <JIS> : S50C<sup>\*2</sup>

Tool	M27×P3.0
Spindle speed	118 min <sup>-1</sup>
Feedrate	364 mm/min (14.3 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.  
 JIS: Japanese Industrial Standard A5052: Aluminum S50C: Carbon steel

# Productivity

The NV4000 DCG has realized even higher productivity by increasing the speed of each structure.

## Data for comparison

### NV4000 DCG



Max. spindle speed  
**12,000 min<sup>-1</sup>**

Rapid traverse rate <X, Y and Z axes>  
**42 m/min (1,653.5 ipm)**

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

### Previous model (1984–1992)



Max. spindle speed  
**4,000 min<sup>-1</sup>**

Rapid traverse rate <X, Y/Z axes>  
**15/12 m/min (590.6/472.4 ipm)**

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

## Workpiece

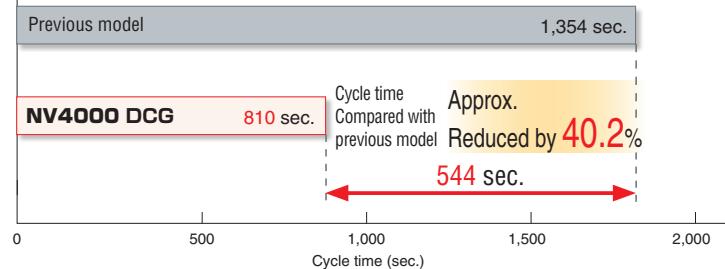


Number of tools used  
**10 tools**

Material <JIS>: S50C\* (Carbon steel)

\* 1049 (ANSI), C50, C50E, C50R (BS, DIN), 50 (GB)  
JIS: Japanese Industrial Standard

## Cycle time comparison



## Comparison of production volume and sales

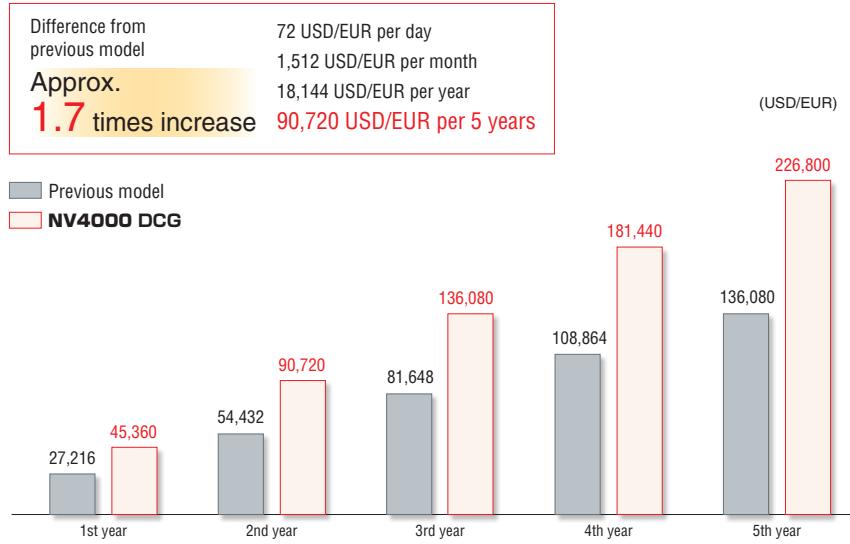
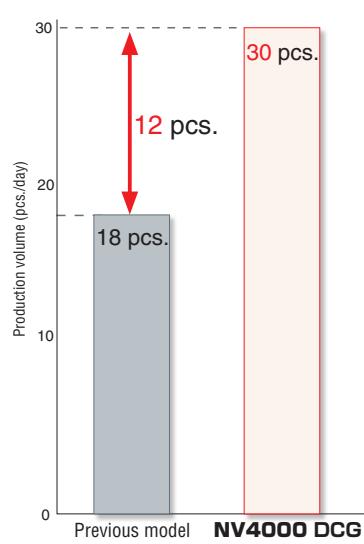
6 USD/EUR per work

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.)

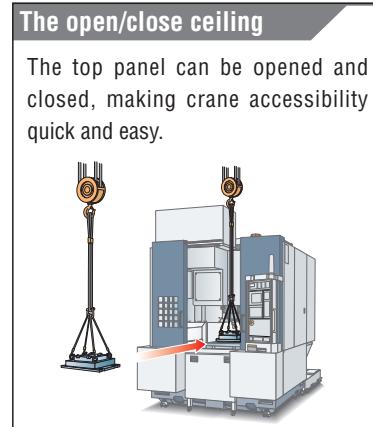
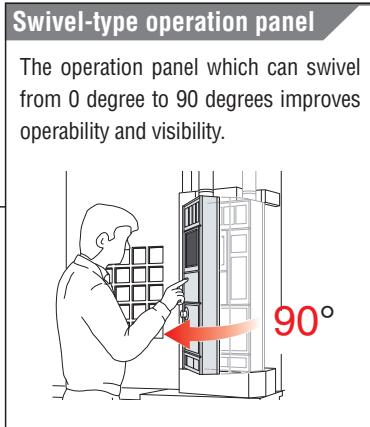
Number of days operating in 1 year  
: 21 days×12 months=252 days

## ■ 5-year sales simulation



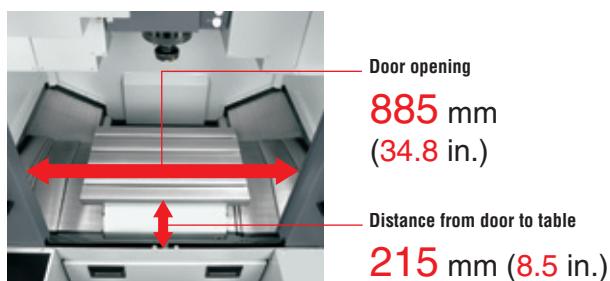
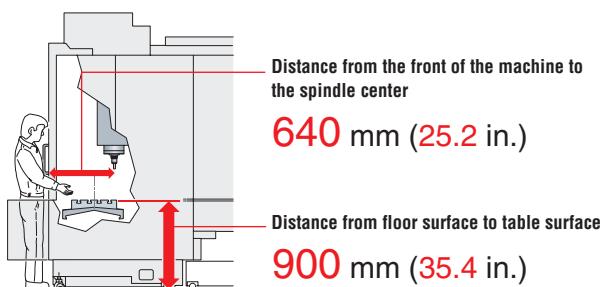
## Improved workability

Since the NV4000 DCG has been designed for ease of use, improvements have been made to the door width and distance from the workpiece, thereby enhancing overall convenience.



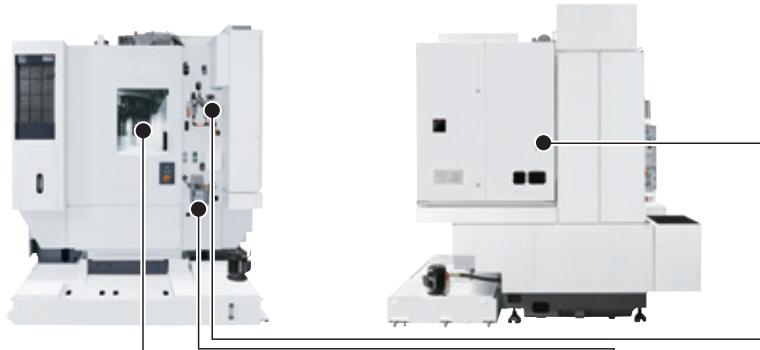
### Accessibility

With excellent access to the table and a wide door opening, setup operations such as fixture adjustment can be done smoothly.



## Maintenance

The NV4000 DCG is designed with features for ease of maintenance to increase the machine operating rate.

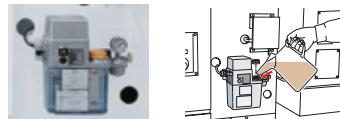


### Transparent magazine

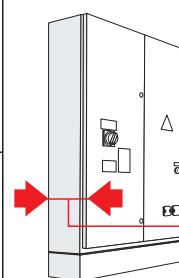
Visibility of the magazine has been improved with the addition of a door with a window.



### A closer lubrication tank



### Slimmer electrical cabinet



A slim electrical cabinet closes the proximity between you and the insides of the machine during maintenance.

**300 mm (11.8 in.)**  
<including doors>

### Centralized layout of devices

Controls are on the side panel to facilitate maintenance.

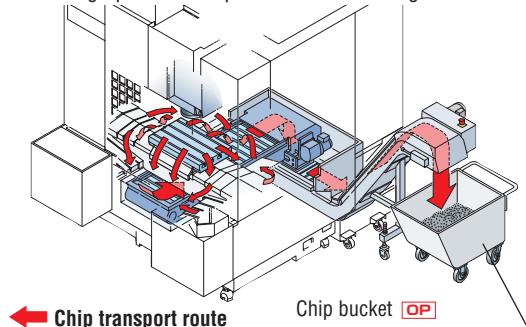


# Peripheral equipment

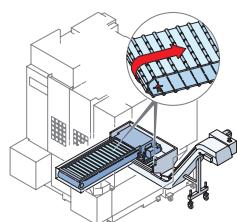
## Chip conveyor

OP

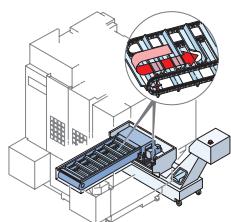
Chips that fall from the Y-axis tilted panel down into the center trough are automatically discharged out of the machine by the chip conveyor. This design prevents chips from accumulating.



### Hinge type



### Scraper type+drum filter type



Specifications	Workpiece material and chip size				
	Steel		Cast iron	Aluminum/non-ferrous metal	
	Long	Short	Short	Long	Short
Hinge type+drum filter type <span style="color:red;">[Consultation is required]</span>	○	○	○	○	○
Hinge type	○	○	✗	○	✗
Scraper type+drum filter type	✗	○	○	✗	○
Magnet scraper type <span style="color:red;">[Consultation is required]</span>	✗	○	○	✗	✗

- 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 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.

## Through-spindle coolant system

OP

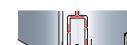
The through-spindle coolant system effectively eliminates chips, cooling the machine point, and lengthening the lives of your tools.

	Unit on coolant tank	Separate type
Discharge pressure MPa (psi)	1.5 (217.5)	1.5/3.5/7.0 (217.5/507.5/1,015)
Installation space <width×depth> mm (in.)	360×360 (14.2×14.2) (line filter unit)	820×1,120 (32.3×44.1) (high-pressure coolant system)
Water-soluble coolant	○	○
Oil-based coolant	✗	○*
Coolant filtration accuracy	40 $\mu\text{m}$	20 $\mu\text{m}$

\* 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. Please contact our sales representative for details.



Center through



Side through



High-pressure coolant system (separate type)

⚠ 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 consult with our sales representative.

## Rotary table DDRT Series

OP



### For models (4 axes)

DDRT-200X

It is possible to equip the machine with the high-speed, high-accuracy DDRT Series rotary table which incorporates the DDM (Direct Drive Motor). The high-efficiency machining using 4 axes and high-speed and high-precision indexing realize process integration.

(for details on the machining ranges, please consult with our sales representative.)

- Equipped with DDM
- Zero backlash
- Achieves high-precision indexing
- Offers stable machining through powerful clamping
- Allows high-efficiency machining using 4 axes

### Rotational speed of the table

Conventional machine

DDRT-200X

Compared with conventional machine  
Approx.**17 min<sup>-1</sup> ▶ 150 min<sup>-1</sup>****9 times greater**

### Positioning accuracy

Conventional machine

DDRT SERIES

Compared with conventional machine

**20 sec. ▶ 5 sec.****1/4**

### Features of DDM



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

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

# Measurement

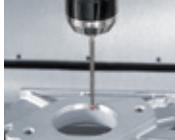
For the measuring devices, an automatic measuring function can be selected alone or in combination with manual measuring functions. Select the right devices for your use.

## Automatic measurement

OP

### In-machine measuring system (spindle)

- Automatic centering and automatic measurement are possible.
- Automatic measurement applications are included.



### In-machine measuring system (table)

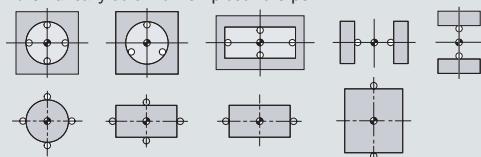
- Automatic tool length measurement and automatic breakage detection are possible.
- Automatic measurement applications are included.



## Automatic measurement applications

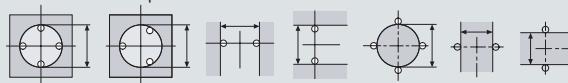
### Centering

Automatically sets the workpiece zero point.



### Measurement

Measures the workpiece dimensions.



## Automatic measurement applications

### Tool length measurement

Measures tool length automatically.



### Tool breakage detection

Prevent further damage with the automatic tool breakage detection.



## Automatic measurement



## Manual measurement functions

OP

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

## Workpiece measurement function

OP

### In-machine measuring system (spindle)

Touch sensor (optical signal transmission type)



### In-machine measuring system (spindle)

Inductive type touch sensor

### Work setter function (manual measurement application)

#### Reference plane measurement

The machining reference point can be calculated simply by applying the sensor from the Z, X and Y-axis directions.



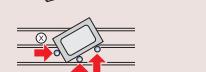
#### Reference hole measurement

Centering a boss, hole, groove or width can be done at any two or three points, simply by applying the sensor.



#### Coordinate rotation measurement

Machining can be done without changing the program even if the workpiece is attached crookedly, simply by performing this operation within the X-axis and Y-axis plane.



## Tool measurement function

OP

### In-machine measuring system (table)

Touch sensor (tool length)



### In-machine measuring system (table)

Touch sensor (tool length/tool diameter)

### Tool setter function (manual measurement application)

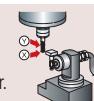
#### Tool length measurement

The tool length value can be registered automatically to the designated tool offset number.



#### Tool diameter measurement

The tool diameter value can be registered automatically to the designated tool offset number.



### Tool setter function (manual measurement application)

#### Tool length measurement

The tool length value can be registered automatically to the designated tool offset number.



# Transfer systems

## 2-station turn-type APC

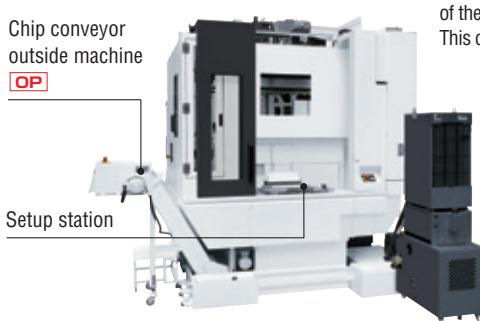
OP

- We have succeeded in equipping the machine with an APC in the same installation space as previous machines.
- The APC uses a 2-station turn-type design. Cycle time is shorter than that of a shuttle-type machine.
- The new design allows access from the back of the machine during APC setup.

### Machine front



### Machine rear



A new design allows access from the back of the machine when setting up the APC. This contributes to space savings.

- Separate space is needed for the oil chiller. Depth×width=843 mm×400 mm (28.5×15.7 in.) <on electrical cabinet side of machine rear>
- When APC is selected, raised column specifications <100 mm (3.9 in.) or 200 mm (7.9 in.)> are required.



### Pallet changing time

**13 sec.**

- To prevent APC interference, this specification includes time required for the spindle protection tool to be moved until after the APC turning is complete.

### Pallet size

**600×400 mm (23.6×15.7 in.)**



### Tool storage capacity

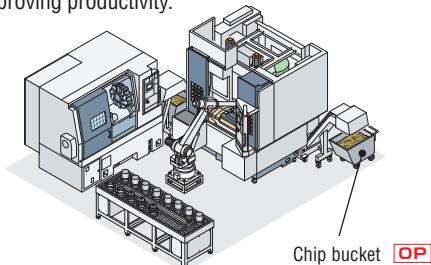
**40/60 tools**

- For APC specifications, a dummy tool which is mounted on the spindle during APC operation is included.

## Workpiece transfer robot

OP Consultation is required

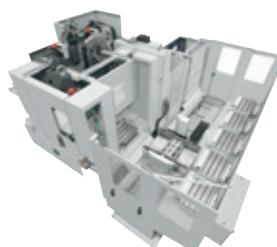
Robots make workpiece loading and unloading more efficient, improving productivity.



## CPP (Carrier Pallet Pool) systems

OP Consultation is required

The CPP is a simple and packaged system with a one-level pallet.



- When the number of machines or workpiece setup stations is two or more, the MCC-CPS or MCC-LPS III is required.
- For models and systems, please consult with our sales representative.
- The photo shows the NVD4000 DCG.

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

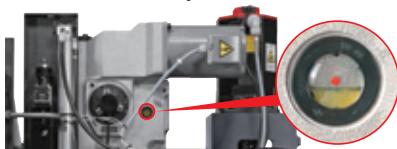
# Reduction in environmental burden

## 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.

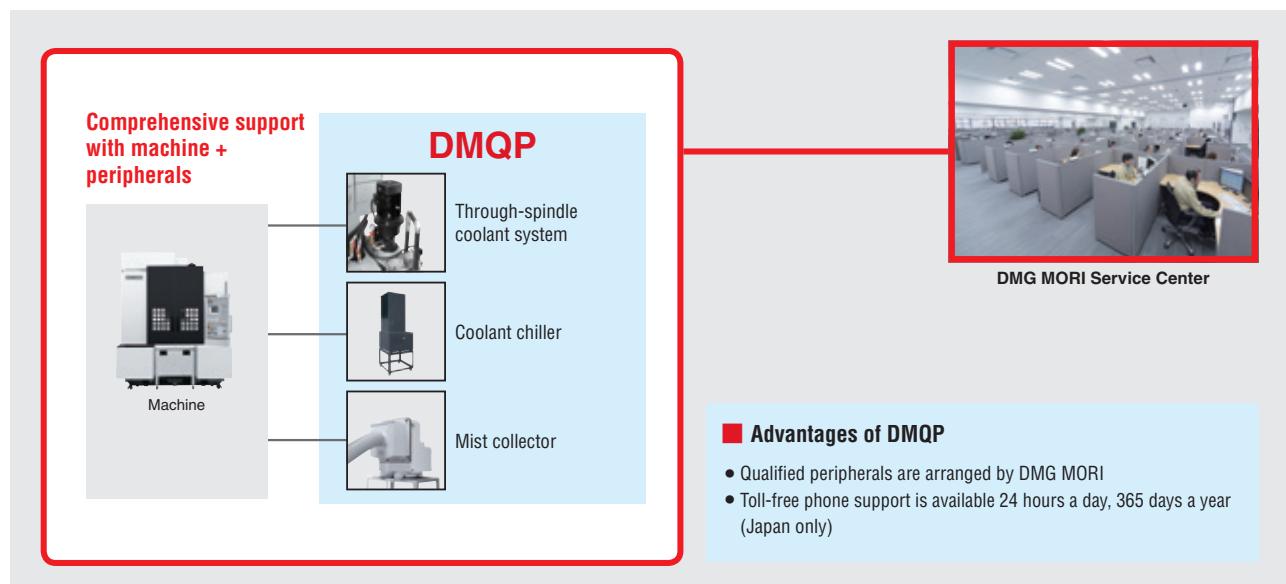
# DMQP (DMG MORI Qualified Products) OP

## 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 (NV4000 DCG)

#### Through-spindle coolant system

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

#### Coolant cooling system

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.

#### In-machine measuring system (laser sensor)

#### 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 contact our sales representative.

# MAPPS IV

High-Performance Operation System  
for Machining Centers



• 10.4-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

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>Approx.</b>
<b>MAPPS IV</b>	45 sec.	<b>Reduced by 33%</b>

\* The reduction rate differs depending on the program.

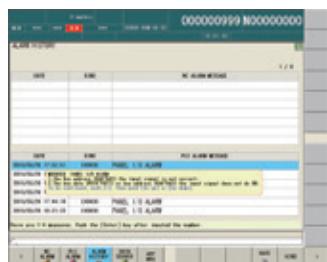
### Main specifications

Main memory	1 GB
User area	Standard: 50 MB Option: 6 GB
Interface	•USB 2.0 2 ports (Screen side: 2) •LAN 1 port (1000BASE-T) •RS-232-C port (option)
Soft-keys	Right 10 keys Bottom 12 keys

## Improved ease of maintenance

### Alarm help function

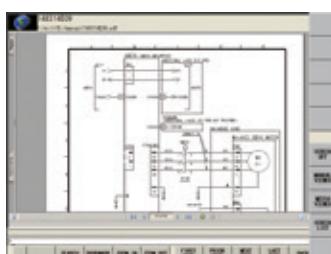
When an alarm occurs, MAPPS identifies the cause of the trouble and provides solutions.



## Improved 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.



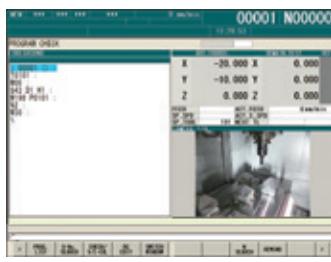
### Viewable file types

- 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.



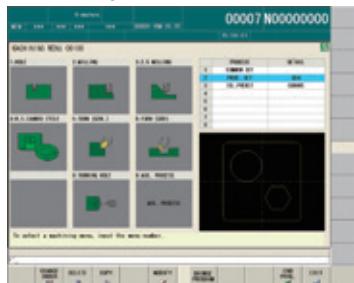
### Examples of camera locations

- 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.

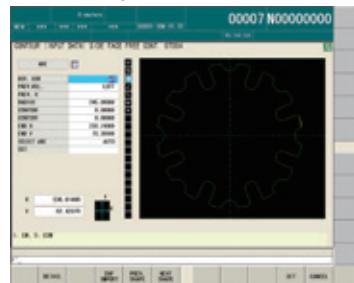
### Machining menu



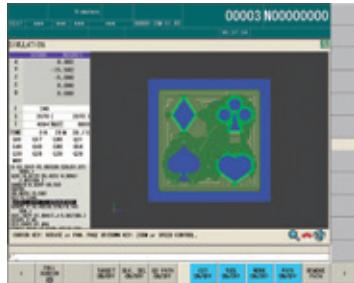
### List display function



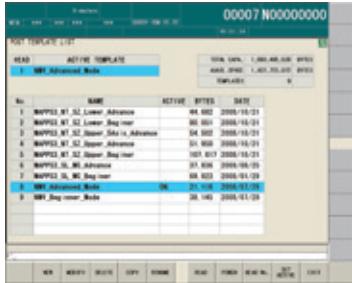
### Contour input



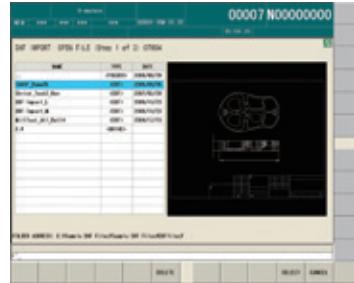
### Islands, open pockets\* OP



### MORI-POST advanced mode OP



### DXF import function OP



\* For Europe, this specification is provided as standard.

## 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.

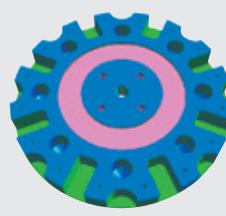
#### 1. Simple programming



##### [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 November 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.

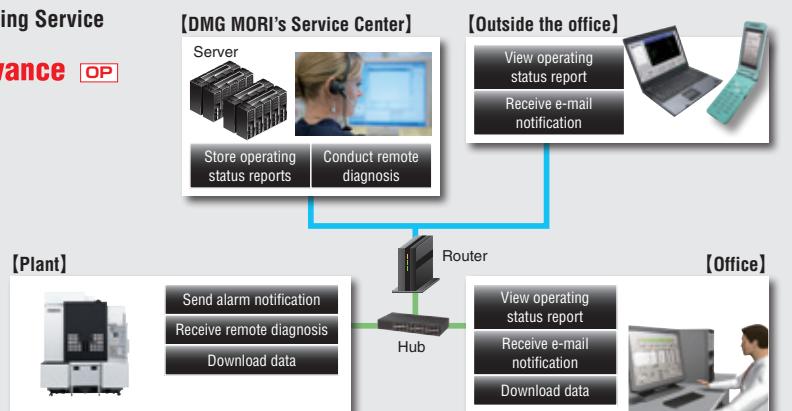
[Internet]  
 [LAN]

#### Remote Maintenance/Machine Operation Monitoring Service

### MORI-NET Global Edition Advance

#### ■ Features

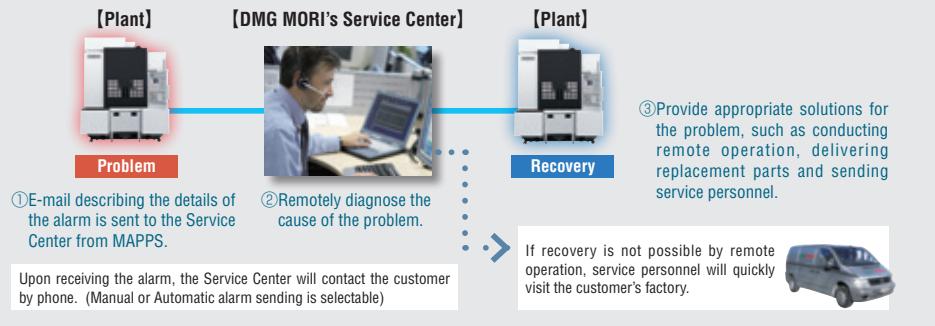
- Remote maintenance service by DMG MORI Service Center
- Internet-based, high speed (max. 1 Gbps), large capacity network
- No server installation is required — reduction in initial cost
- Download various data from the server located at DMG MORI



#### ■ 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.

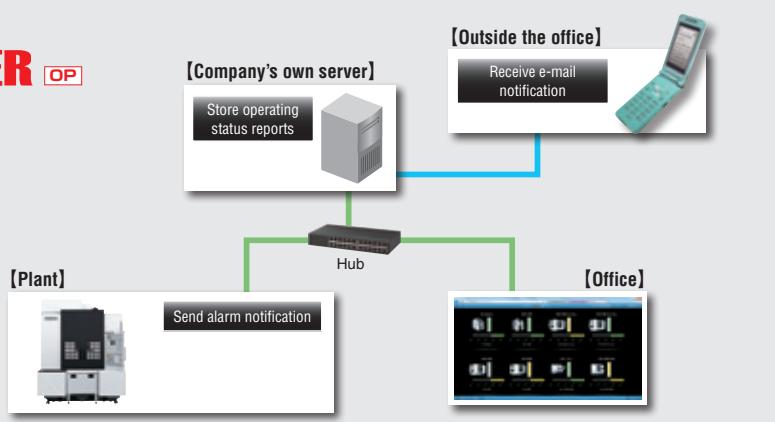


#### Machine Operation Monitoring System

### 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

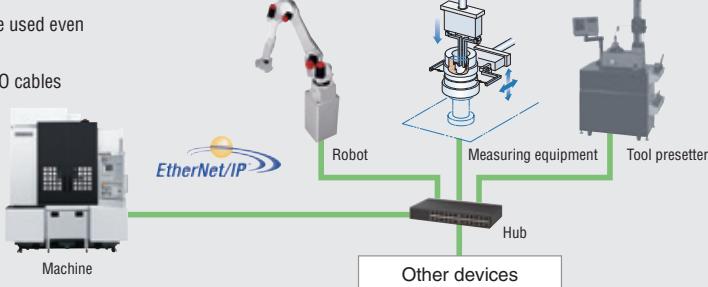
## MAPPs EtherNet/IP I/F OP

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

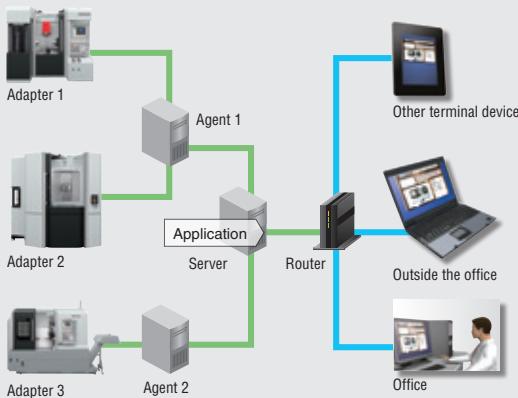
## MAPPs MTConnect I/F

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.



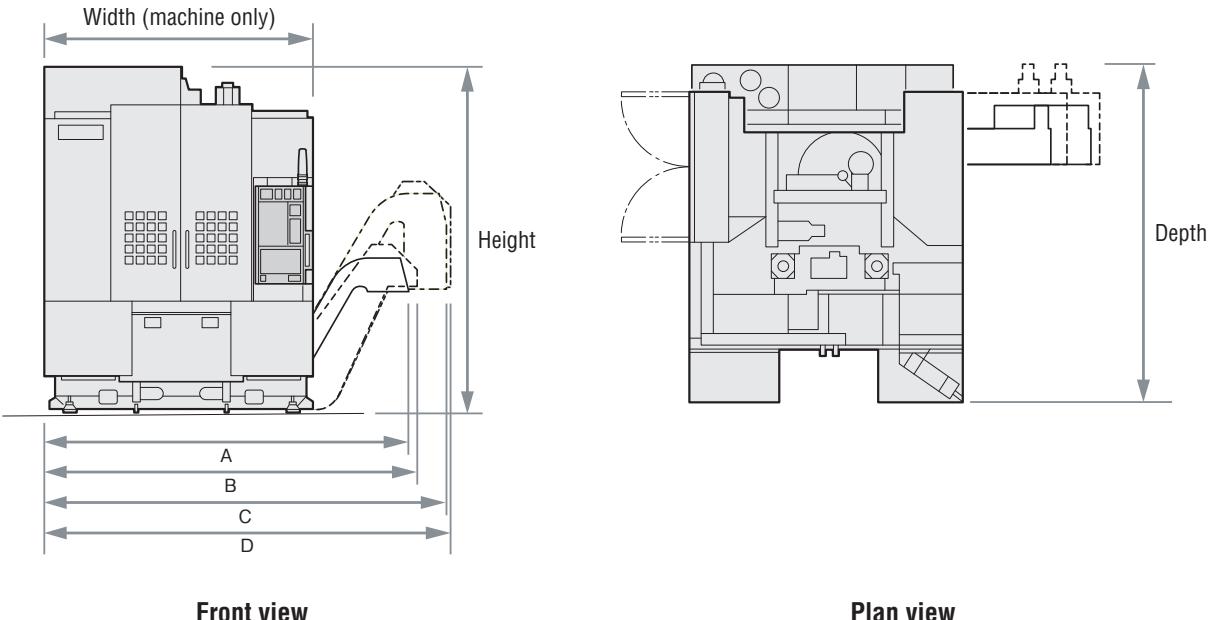
Operating status can be checked in real time.



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

**Front view****Plan view**

### ■ Standard specifications

	Width				Depth	Height	mm (in.)
	A	B	C (EN Standards)	D (EN Standards)			
Machine only	Hinge type (right discharge) OP	Scraper type + drum filter type (right discharge) OP	Hinge type (right discharge) OP	Scraper type + drum filter type (right discharge) OP	2,685 (105.7)	2,770 (109.1) 2,870 (113.0) <raised column 100 (3.9)> OP 2,970 (116.9) <raised column 200 (7.9)> OP	
	2,166 (85.3)	2,934 (115.5)	3,001 (118.1)	3,234 (127.3)	3,244 (127.7)		

Q50615B27

### ■ APC specifications OP

	Width				Depth	Height	mm (in.)
	A	B	C (EN Standards)	D (EN Standards)			
Machine only	Hinge type (right discharge) OP	Scraper type + drum filter type (right discharge) OP	Hinge type (right discharge) OP	Scraper type + drum filter type (right discharge) OP	2,715 (106.9)	2,870 (113.0) 2,970 (116.9) <raised column 200 (7.9)> OP	
	2,571 (101.2) <including magazine footstool 405 mm (15.9 in.)>	2,934 (115.5)	3,001 (118.1)	3,234 (127.3)	3,244 (127.7)		

Q50624A19

- Separate space is needed for the oil chiller. Depth×width=843 mm×400 mm (28.5×15.7 in.) <on electrical cabinet side of machine rear>
- When APC is selected, raised column specifications <100 mm (3.9 in.) or 200 mm (7.9 in.)> are required.

## Tool restrictions

Type of tool shank	Tool restrictions			
	BT40*1	CAT40	DIN40	HSK-A63 HSK-F63
Max. tool length	mm (in.)	250 (9.8)		
Max. tool diameter <with adjacent tools> A	mm (in.)	70 (2.7)*2, 80 (3.1)		
Max. tool diameter <without adjacent tools> A	mm (in.)	125 (4.9)		
Tool limitation B	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)
Tool limitation C	mm (in.)	63 (2.5)	44.45 (1.75)	50 (2.0)
Max. tool mass	kg (lb.)	3 (6.6)*3, 8 (17.6)		
Max. tool mass moment <from spindle gage line>	N·m (ft·lbf)	11 (8.1)		

Q81093A01

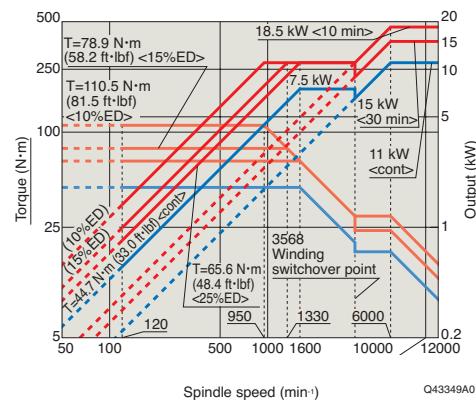
\*1 When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.  
 \*2 40-tool, 60-tool  
 \*3 30,000 min<sup>-1</sup>

## Spindle speed torque/output diagrams

### NV4000 DCG

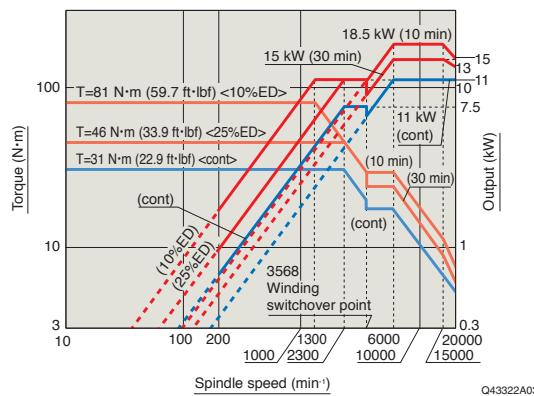
#### [Standard]

- Max. spindle speed: 12,000 min<sup>-1</sup>
- Spindle drive motor: 18.5/15/11 kW (24.7/20/15 HP) <10 min/30 min/cont> {high-speed winding side}
- Max. spindle torque: 110.5 N·m (81.5 ft·lbf) <10%ED>



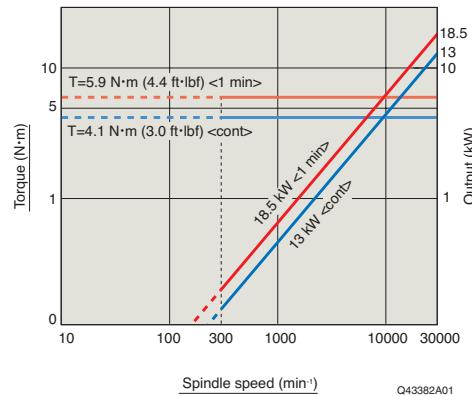
#### [High speed OP ]

- Max. spindle speed: 20,000 min<sup>-1</sup>
- Spindle drive motor: 18.5/15/11 kW (24.7/20/15 HP) <10 min/30 min/cont> {high-speed winding side}
- Max. spindle torque: 81 N·m (59.7 ft·lbf) <10%ED>



#### [High speed OP ]

- Max. spindle speed: 30,000 min<sup>-1</sup>
- Spindle drive motor: 18.5/13 kW (24.7/17.3 HP) <1 min/cont>
- Max. spindle torque: 5.9 N·m (4.4 ft·lbf) <1 min>



● Please use a two-face contact tool when cutting at 15,000 min<sup>-1</sup> or higher.

# Standard & optional features

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

## Spindle

	BT40*1	●
Type of tool shank	CAT40	○
	DIN40	○
	HSK-A63	○
	HSK-F63 (30,000 min <sup>-1</sup> specifications)	○
Type of retention knob	DMG MORI 90° type	●
	45° (MAS-I)	○
	60° (MAS-II)	○
	HSK-A63	○
	HSK-F63 (30,000 min <sup>-1</sup> specifications)	○
BT40*1	12,000 min <sup>-1</sup> : not two-face contact	●
	12,000 min <sup>-1</sup> : two-face contact	○
	20,000 min <sup>-1</sup> : two-face contact	○
HSK-A63	12,000 min <sup>-1</sup> : two-face contact	○
	20,000 min <sup>-1</sup> : two-face contact	○
HSK-F63	30,000 min <sup>-1</sup> : two-face contact	○
	12,000 min <sup>-1</sup> : 18.5/15/11 kW (24.7/20/15 HP) <10 min/30 min/cont>	●
	20,000 min <sup>-1</sup> : 18.5/15/11 kW (24.7/20/15 HP) <10 min/30 min/cont> (high speed)	○
	30,000 min <sup>-1</sup> : 18.5/13 kW (24.7/17.3 HP) <1 min/cont> (high speed)	○
	Carbon specifications (oil/air lubrication) <this is only available for BT40 (12,000/20,000 min <sup>-1</sup> )>	☆
	Positioning block for angle head tool	○

\*1 When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

## Table

Table	T-slot	●
Sub-table	T-slot	○
	Solid	○

## Pallet/APC

Auto-coupler spec. (with pallets)	Hydraulic 1 circuit+workpiece seating detection 1 circuit (for 2-station APC <with pallets>)	○
	Hydraulic 2 circuits+workpiece seating detection 2 circuits (for 2-station APC <with pallets>)	○
2-station turn-type APC	Available only for 40/60-tool magazine specifications	○
One additional pallet	T-slot	○
	Tap	○

● When APC is selected, raised column specifications <100 mm (3.9 in.) or 200 mm (7.9 in.)> are required.

## Fixture/Steady rest

Additional 1-axis interface	○
Index table interface (M signal output from terminal block)	○
Pneumatic fixture interface	1 circuit

## Magazine

Tool storage capacity	20 tools	●
	40 tools	○
	60 tools	○

## ATC shutter

● 40~60-tool: with the APC specifications, a dummy tool to be mounted on the spindle during APC operation will be included.

## Coolant

Coolant system	●
Additional coolant system for tool tip	○
Oil mist system	○
Semi dry unit	Tanaka Import
Semi dry unit button	○
Coolant gun	Machining side Setup station side Setup station side and machining side
Shower coolant	Essential for chips that easily accumulate (Aluminum, etc.)
Through-spindle air specifications (only for air)	○
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, 1.5 MPa (217.5 psi)> center through	○*
Oil-hole drill coolant system	○
Oil-hole drill coolant/air switching specifications <oil-hole drill coolant system is necessary required separating>	○
Through-spindle coolant system (separate type) Interface	○
Through-spindle coolant system <unit on coolant tank, 1.5 MPa (217.5 psi)> side through	○*
Coolant chiller (separate type)	Optional when using water-soluble coolant Essential when using oil-based coolant
Coolant chiller	For standard coolant system+ for through-spindle coolant system
Mist collector HVS-150	Including stand
Mist collector interface HVS-150	Electric parts only

\* DMQP (DMG MORI Qualified Products)

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

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

● Some options are not available in particular regions. Please contact our sales representative for details.

## Coolant

φ 125 mm (φ 4.9 in.)	○
φ 150 mm (φ 5.9 in.)	○
φ 200 mm (φ 7.9 in.)	○

## Chip disposal

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>	●
Additional air blow for tool tip		○
Air blow button		○
Air gun		○
Chip conveyor (external+internal)	Interface Right discharge, scraper type+drum filter type Right discharge, hinge type Hinge type+drum filter type Magnet scraper type	○ ○ ☆ ☆
Chip bucket	254 L (67.1 gal.)	○*

## Measurement

Touch sensor	(M)	○
Touch sensor+ tool setter function (tool length only)	(M)	○
Touch sensor	(R)	○
Touch sensor+ tool setter function (tool length+diameter)	(R)	○
Laser sensor	(B)	○*
Laser sensor interface	(B)	○
Touch sensor (optical signal transmission type)	(R)	○
Touch sensor (optical signal transmission type)+ workpiece setter function	(R)	○
Inductive type touch sensor	(D)	○
Inductive type touch sensor+ workpiece setter function	(D)	○

● The specifications vary depending on the manufacturers.

(M): Made by Magnescale (R): Made by RENISHAW (B): Made by BLUM (D): Made by BIG DAISHOWA

## Improved accuracy

Direct scale feedback for X-, Y-, Z-axis	○
Oil chiller	●
Oil chiller (separate type)	○
High acceleration specifications	○

## Automation

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

## Pallet pools

CPP (Carrier Pallet Pool)	☆
---------------------------	---

## Other

Full cover	
Door interlock system (incl. mechanical lock): front door/setup station door (for APC)	
Door interlock system: electrical cabinet door/magazine door	
Low air pressure detecting switch	
Residual pressure relief valve	
Built-in worklight	●
T-nuts for table slots	
Leveling block	
Hand tools	
Signal light 3 layers (LED type: red, yellow, green)	
Dry anchor	○
Raised column	100 mm (3.9 in.) 200 mm (7.9 in.)
Earth leakage breaker	○
Danger sensing device interface (recommended when oil-based coolant is used or during unmanned operation)	○
Refrigerating type air dryer	○*
Tool wagon	○*
Tool cabinet	○*
Basic tooling kit	○*
Weekly timer	○
Workpiece counter	○
External M-code	5 10
Total counter	○
Manual pulse generator (separate type)	○

## 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 consult with our sales representative.

# Numerical control unit specifications F31iB, F31iB5

● : Standard ○ : Option

## Controlled axes

Controlled axes	X, Y, Z, MG
Simultaneously controlled axes	F31iB: 4 axes F31iB5: 5 axes
Least input increment	0.001 mm (0.0001 in.)
Least command increment	0.001 mm (0.0001 in.)
Max. command value	±99,999.999 mm (±9,999.999 in.)
Inch/metric conversion	G20/G21
Axis interlock	By external input: option
Machine lock	
Overtavel	
Door interlock	
Stroke limit check before movement	
Mirror image	
Software damper	Abnormal load detection
Load monitor function C	Soft key type

## Operation

Dry run	●
Single block	●
Jog feed	0–5,000 mm/min (0–197.0 ipm) <20 steps>
Manual reference position return	●
Manual pulse handle feed	Manual pulse generator: 1 unit ×1, ×10, ×100 (per pulse)
Z-axis neglect	●
Sequence number comparison and stop	○
Program restart	○
Tool retract and recover	○
Manual handle interruption	○

## Interpolation functions

Nano interpolation	●
Positioning	G00
Single direction positioning	●
Exact stop mode	G61
Tapping mode	G63
Cutting mode	G64
Exact stop	G09
Helical interpolation	Optional 2 axes and other 1 axis
Reference position return	G28
Reference position return check	G27
Return from reference position	G29
2nd reference position return	G30 (used for ATC)
Cylindrical interpolation	G7.1
Involute interpolation	G2.2/G3.2
Spiral/conical interpolation	○
Smooth interpolation	○
Nano smoothing	○
Threading, synchronous cutting/Feed per revolution	○
External high-speed skip (installation of high-speed skip terminal)	○
3rd, 4th reference position return	Standard with APC specifications
Tool spindle Cs control (Cs contour control+normal direction control)	<consultation is required if orbit machining or hole machining needs to be performed>
NURBS interpolation	○

## Feed functions

Rapid traverse rate	Max. 42,000 mm/min (1,653.5 ipm)
Cutting feedrate	1–42,000 mm/min (0.04–1,653.5 ipm) <with look-ahead control>
Rapid traverse override	F0/1/10/25/100%
Feed per minute	
Tangential speed constant control	
Cutting feedrate clamp	●

## Feed functions

Automatic acceleration/deceleration	Linear type (rapid traverse)/Exponential function type (cutting feed)
Rapid traverse bell-shaped acceleration/deceleration	●
Feedrate override	0–200% (10% increments)
Override cancel	●
Linear acceleration/deceleration after cutting feed interpolation	●
AI contour control I (look-ahead blocks are up to 30 blocks)	●
AI contour control II (look-ahead blocks are up to 200 blocks)	○
One-digit F code feed	F1 to F9
Small-hole peck drilling cycle	○
(the arbor with the overload torque detection function must be attached)	○

## Program input

Optional block skip	●
Max. command value	±9 digits (R, I, J, K is ±12 digits)
Program number/program name	4 digits 8 digits
Absolute/incremental programming	G90/G91
Decimal point programming	Decimal point programming or electronic calculator type decimal point programming can be set using parameters
Diameter/radius programming	
Plane selection	G17, G18, G19
Rotary axis designation	
Rotary axis roll-over	
Coordinate system setting	G92
Automatic coordinate system setting	
Workpiece coordinate system	G52–G59
Programmable data input	G10
Sub-program call	Up to 10 nestings
Custom macro	
Hole machining canned cycle	G80–G89
F15 format	
Programming resolution multiplied by 1/10 (least input increment C)	
Additional workpiece coordinate systems	48 sets 300 sets
Addition of optional block skip	Soft key type (2–9)
Optional chamfering/corner R	
Additional custom macro common variables	#100 to #199, #500 to #999
Interruption type custom macro	
Automatic corner override	
Scaling	
Coordinate system rotation	
Programmable mirror image	
Graphic copy	G72.1/G72.2
High-speed canned cycle* <MAPPS>	
MORI-POST advanced mode <MAPPS>	
DXF import function <MAPPS>	
Islands, open pockets* <MAPPS>	
Text engraving function <MAPPS>	

\* For Europe, this specification is provided as standard.

## Miscellaneous function/Spindle speed function

Miscellaneous function (M function)	4-digit M code
Auxiliary function lock	
Multiple miscellaneous function commands	3 commands
Spindle speed function (S function)	5-digit S code
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)	4-digit T code
	32 sets (diameter + length=1 set, number of offsets indicates that diameter and length are displayed separately)
Number of tool offsets	
Tool offset memory C	D/H code, geometry/wear
Tool length offset	G43, G44, G49
Cutter radius offset	G40–G42
Tool length measurement	
	64 sets
Number of tool offsets	99 sets
<in total>	200 sets
(the number of selectable tool offsets depends on the tool storage capacity)	400 sets 499 sets 999 sets
Tool position offset	G45–G48
Rotary table dynamic fixture offset	
Tool life management	
Tool pair in total for tool life management	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>	

\*<sup>1</sup> Includes common variable 600 for custom macro.

\*<sup>2</sup> Separate consultation is required if hardware and software are customized.

## Mechanical accuracy compensation

Backlash compensation	±9,999 pulses
Rapid traverse/cutting feed backlash compensation	●
Stored pitch error compensation	●
Interpolation type pitch error compensation	●
Machine control support function	
Z-axis drop prevention function	●
Editing	
Expanded program editing	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 display/Number of parts display	●
Actual cutting feedrate display	●
Operating monitor screen	Load meter display etc.
Help function	●
Self-diagnosis	Includes alarm display, I/O signal diagnosis, and ladder diagram
Operation panel: display section	10.4-inch TFT color LCD
Multi-counter display <MAPPS>	○

## I/O functions and units

I/O interface	USB
	RS-232-C
Embedded Ethernet	●
50 MB Program storage area (for MAPPS-DNC operation function, for data backup) <MAPPS>	Files up to 10 MB in size can be edited
6 GB Program storage area (for MAPPS-DNC operation function, for data backup) <MAPPS>	Files up to 10 MB in size can be edited
Fast data server	100BASE-TX
Memory card for data server	CF card 1 GB + ATA adaptor
Memory card for MAPPS	CF card (4 GB/2 GB/512 MB) + ATA adaptor
DNC operation using external memory (front USB port)	○

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## ■ Program storage length and registerable programs

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

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

# Machine specifications

Item			NV4000 DCG
Travel	X-axis travel <longitudinal movement of table>	mm (in.)	600 (23.6)
	Y-axis travel <cross movement of saddle>	mm (in.)	400 (15.7)
	Z-axis travel <vertical movement of spindle head>	mm (in.)	400 (15.7)
	Distance from table surface to spindle gauge plane	mm (in.)	100–500 (3.9–19.7) [150–550 (5.9–21.7) <APC <raised column 100 (3.9)> specifications]
Table	Distance from floor surface to table surface	mm (in.)	900 (35.4) [950 (37.4) <APC specifications>]
	Table working surface	mm (in.)	700×450 (27.6×17.7) <for APC specifications, please check the pallet configuration diagrams.>
	Table loading capacity	kg (lb.)	350 (770) [250 (550) <APC specifications>]
Table surface configuration <T slots width×pitch×No. of T slots>			18 mm×100 mm×4 (0.7 in.×3.9 in.×4)
Spindle	Max. spindle speed	min <sup>-1</sup>	12,000 [20,000] [30,000]
	Number of spindle speed ranges		1
	Type of spindle taper hole		No. 40 [HSK-F63 <sup>*1</sup> ]
	Spindle bearing inner diameter	mm (in.)	70 (2.8) [60 (2.4) <sup>*1</sup> ]
Feedrate	Rapid traverse rate	mm/min (ipm)	X, Y, Z: 42,000 (1,653.5)
	Cutting feedrate	mm/min (ipm)	X, Y, Z: 1–42,000 (0.04–1,653.5) <for look-ahead control <theoretical value>
	Jog feedrate	mm/min (ipm)	0–5,000 (0–197.0) <20 steps>
ATC	Type of tool shank		BT40 <sup>*2</sup> [DIN40] [CAT40] [HSK-A63] [HSK-F63 <sup>*1</sup> ]
	Type of retention knob		DMG MORI 90° type [45°(MAS-I)] [60°(MAS-II)] [HSK-A63] [HSK-F63 <sup>*1</sup> ]
	Tool storage capacity		20 [40] [60]
	Max. tool diameter	With adjacent tools mm (in.)	80 (3.1) [70 (2.7) <with the 40- and 60-tool specified tool magazine>]
		Without adjacent tools mm (in.)	125 (4.9)
	Max. tool length	mm (in.)	250 (9.8)
	Max. tool mass	kg (lb.)	8 (17.6) [3 (6.6) <sup>*1</sup> ]
	Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	11 (8.1)
	<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 changing time	Tool-to-tool s	1.0
		MAS s	2.8
<ul style="list-style-type: none"> <li>● The time differences are caused by the different conditions &lt;travel distances, etc&gt; for each standard.</li> <li>● Depending on the arrangement of tools in the magazine, the cut-to-cut (chip-to-chip) time may be longer.</li> </ul>		Cut-to-cut (chip-to-chip) <without ATC shutter> ISO 10791-9 JIS B6336-9 s	20-tool specifications: 5.5 (max.), 3.6 (min.) [40-tool specifications: 10.9 (max.), 3.6 (min.)]
Power sources <standard>	Spindle drive motor	kW (HP)	18.5/15/11 (24.7/20/15) <10 min/30 min/cont> <high-speed winding side> [18.5/13 (24.7/17.3) <1 min/conts <sup>*1</sup> >]
	Feed motor	kW (HP)	X: 1.6 (2.1), Y: 1.6 (2.1)×2, Z: 3.0 (4.0)×2
	Coolant pump motor (50 Hz/60 Hz)	kW (HP)	0.6 (0.8)/1.02 (1.37)
Tank capacity	Electrical power supply <cont>	I94314C01 (kVA)	27.0 [29.3 <sup>*1</sup> ]
	Compressed air supply	MPa (psi), L/min (gpm)	0.5 (72.5), 200 (52.8) (when the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required) <ANR>
Tank capacity	Coolant tank capacity	L (gal.)	340 (89.8) [375 (99.0) <APC specifications>]
Machine size	Machine height	mm (in.)	2,770 (109.1) [2,870 (113.0) <APC specifications>]
	Floor space <width×depth>	mm (in.)	2,166×2,685 (85.3×105.7) [2,571×2,715 (101.2×106.9) <APC specifications> ● Separate space is needed for the oil chiller. Depth×width=843 mm×400 mm (28.5×15.7 in.) (on electrical cabinet side of machine rear)]
	Mass of machine	kg (lb.)	6,740 (14,828) [7,450 (16,390) <APC specifications>]
Noise data	A-weighted, time-average radiated sound pressure level	dB	58–77 (Measurement uncertainty is 4 dB)

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

<sup>\*1</sup> 30,000 min<sup>-1</sup> specifications<sup>\*2</sup> 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 two-face contact tool when cutting at 15,000 min<sup>-1</sup> or higher.

● Tool storage capacity (40 tools, 60 tools): with the APC specifications, a dummy tool to be mounted on the spindle during APC operation will be included.

● 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.

● Noise data: the measurement was performed at the front of the machine with a maximum spindle speed of 12,000 min<sup>-1</sup>. Please contact our sales representative for details.

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



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