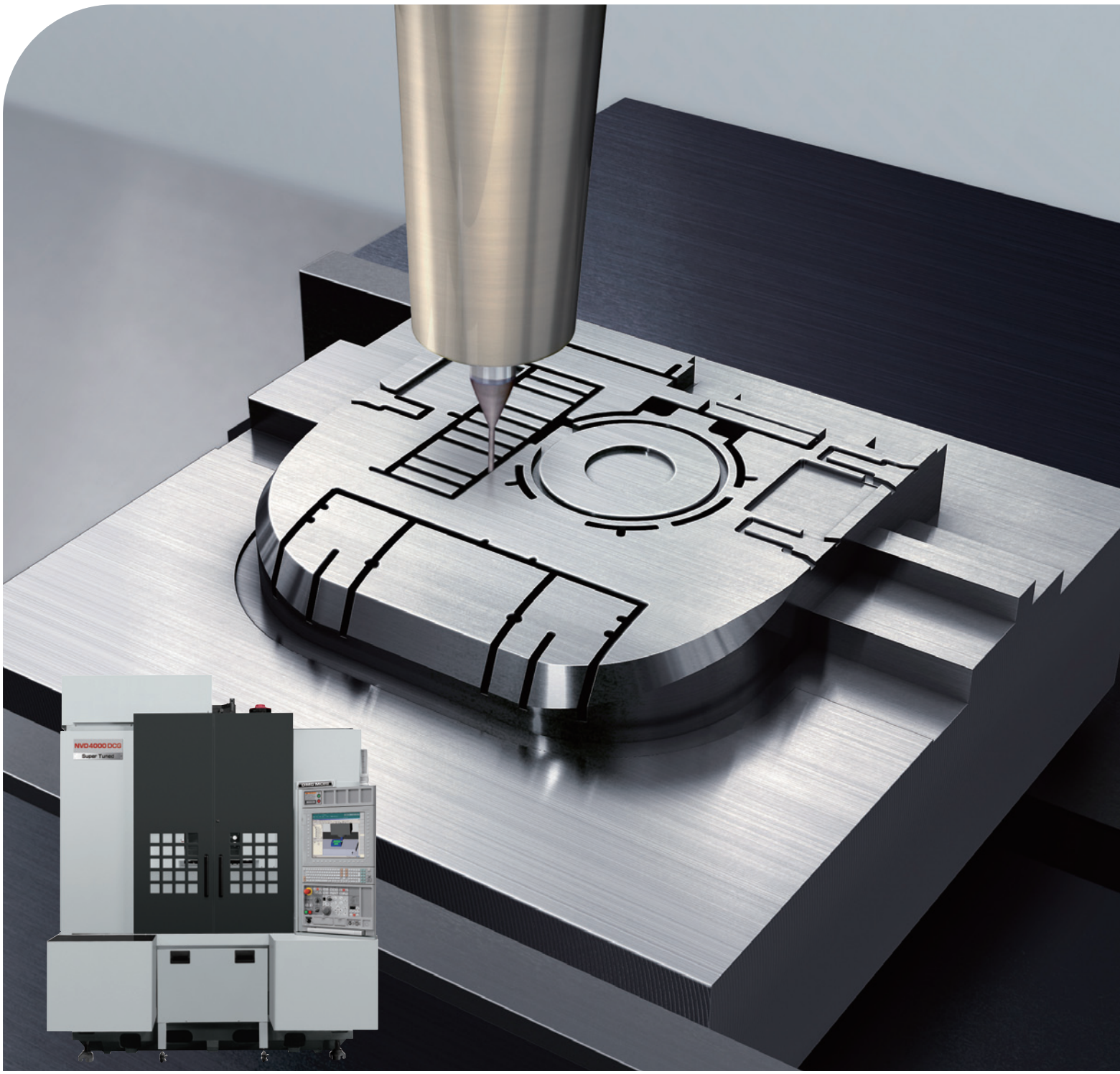
www.dmgmori.com

DMG MORI

High-Precision Vertical Machining Center for Die & Mold Manufacturers

NVD4000 DCG
NVD4000 DCG HSC

NVD4000 DCG



DCG®
Driven at the Center of Gravity

High-Precision Vertical Machining Center for Die & Mold Manufacturers

NVD4000 DCG
NVD4000 DCG HSC

The ultimate result in surface finish made possible by "DCG (Driven at the Center of Gravity)".

The DCG design minimizes vibration.
This technology was built specifically for high-precision machining.
DMG MORI SEIKI's NVD4000 DCG is a machine designed for die and mold machining, capable of giving you overwhelming competitiveness.

HSC: High Speed Cutting

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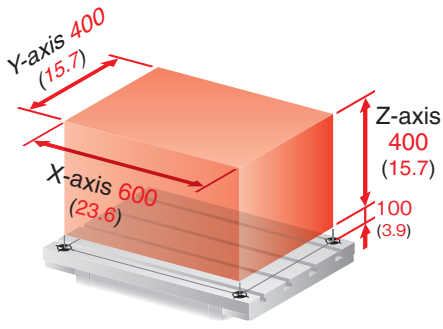
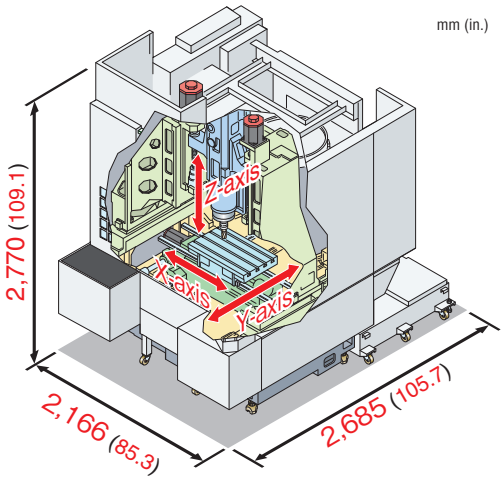
Machine size

mm (in.)





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

Driven at the Center of Gravity

DCG®
Driven at the Center of Gravity

Technology to minimize vibration.

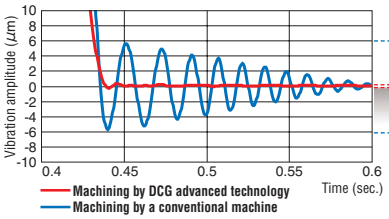
The vibration occurs when the rotational moment is generated from the moving machine structural parts, and it has had a negative effect on surface quality and machining accuracy. Our DCG technology, which drives the moving structural parts at their center of gravity, controls residual tool tip vibration, improves accuracy and acceleration, and extends tool life.

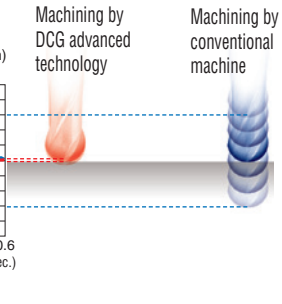
Vibration controlled

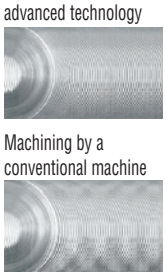
For positioning, machines with DCG virtually eliminate vibration, while machines without DCG continue to vibrate for a long time. DCG controls the rotational vibration which appears at every acceleration start point, and which is proportional to the distance between the drive point and the center of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

Residual vibration comparison

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





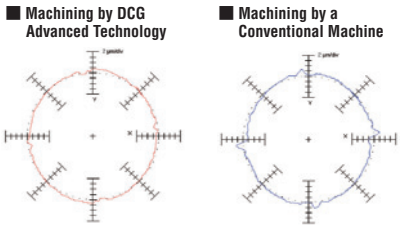


DCG effect

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

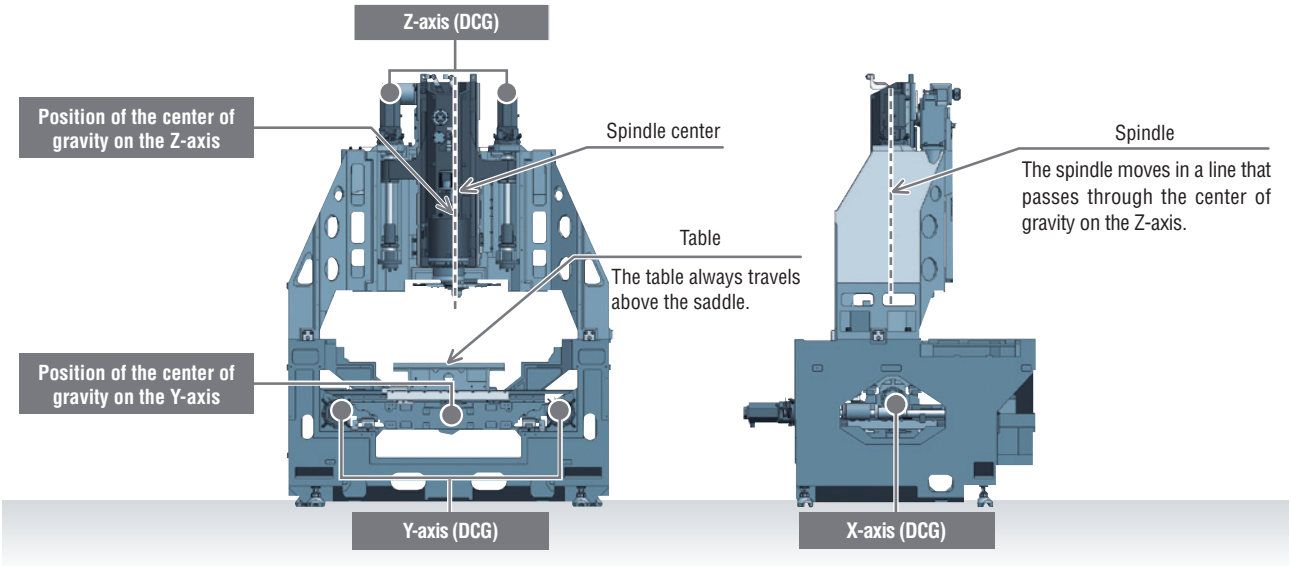
Improved roundness

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



Structure

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



OP Option

High precision

Equipped with standard functions for supporting high-quality machining of dies and molds.

The NVD4000 DCG focuses on advanced CNC control, high-precision positioning, and measures against heat displacement. A higher level of standard features has been selected in order to ensure high added-value die and mold machining.

High-precision machining features

Direct scale feedback

Standard features

An absolute magnetic linear scale (full closed-loop control) made by Magnescale is equipped as standard to offer high-precision positioning.

Resolution (X, Y and Z-axis)

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 cooler (separate type)

Standard features

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

Coolant cooling system (separate type)

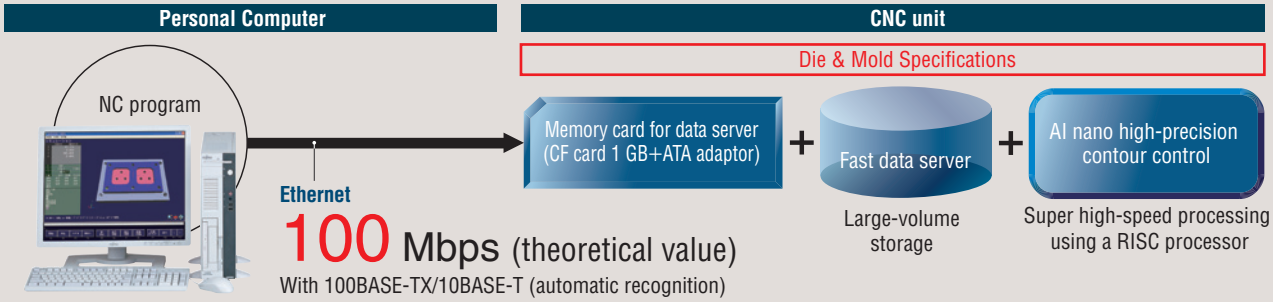
OP

Raised coolant temperature causes thermal displacement in the fixtures and workpiece, affecting the machining accuracy of the workpiece. Use this unit to prevent the 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.

● While this unit is not the only way to completely control the temperature of the coolant, it makes a major contribution to preventing increases in the oil temperature.

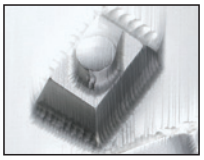
Die & Mold Specifications (standard features)



● AI nano high-precision contour control

This speeds up program processing, makes machine movement smoother, and raises machining precision.

■ With AI nano high-precision contour control



■ Without AI nano high-precision contour control

Cutting mode selection function

Time priority mode

Top priority at cutting time. Use when required accuracy is in low level like roughness cutting etc.. The cutting time is the shortest.

Middle mode

Middle mode in time priority mode and accuracy priority mode.

Accuracy priority mode (the standard setting)

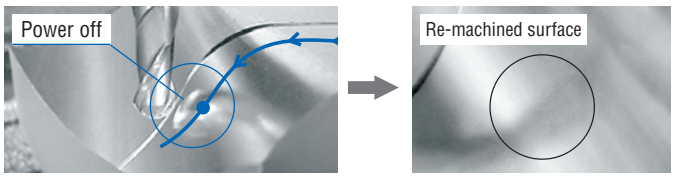
The mode which prioritizes the cutting accuracy.
Recommendation mode.

Custom mode

The mode which prioritizes the cutting accuracy further.
This mode produces the longest machining time of all four modes.

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.

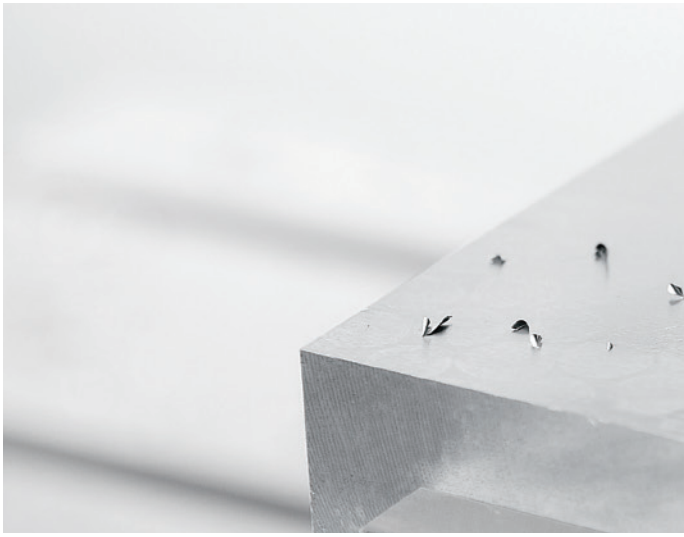
1. When the feed axis servo alarm has gone off.
2. When the power supply module alarm has gone off.
3. When the communication alarm between the CNC and the amp has gone off.

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

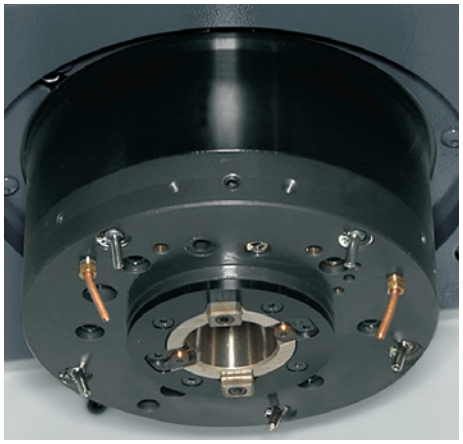
High speed

Unrivaled speed to meet your delivery schedules.

A high-speed spindle, combined with other mechanisms' greater speeds, greatly reduces both cutting and non-cutting times. This cuts down on lead times for machining dies and molds, meeting even the tightest of delivery schedules.



Spindle



High speed, high power DDS (Direct Drive Spindle) motor.

Max. spindle speed

NVD4000 DCG

12,000 min^{-1}

NVD4000 DCG HSC

20,000 min^{-1}

30,000 min^{-1} OP

Spindle acceleration time (0→12,000 min^{-1})

NVD4000 DCG 1.30 sec.

Spindle deceleration time (12,000 min^{-1}→0)

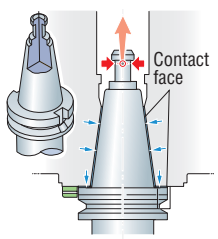
NVD4000 DCG 1.17 sec.

HSC: High Speed Cutting

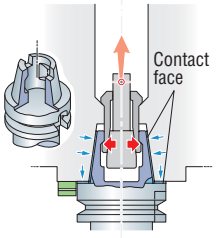
Two-face contact specifications

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.

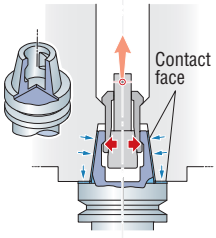
BT40*



HSK-A63 OP



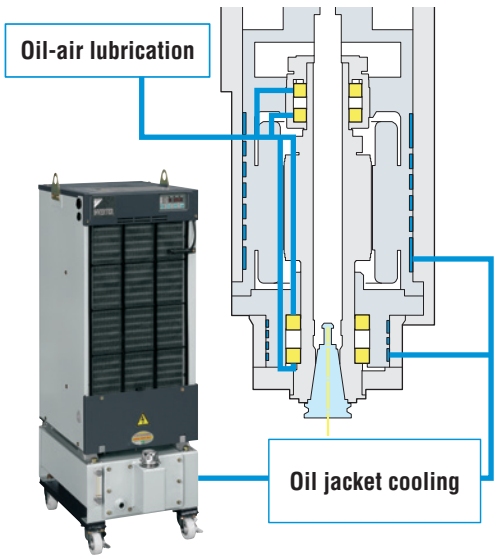
HSK-F63
(30,000 min^{-1} specifications) OP



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

Spindle lubrication

The spiral oil jacket around the spindle controls temperature increases in the spindle. The amount of lubricating oil is minimized, so friction loss due to lubricating oil is reduced.

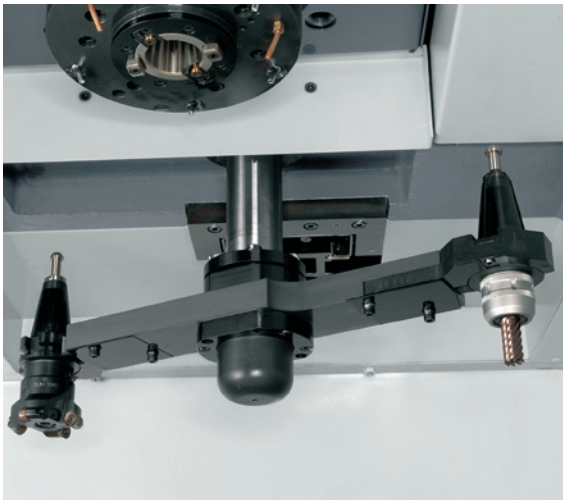


Oil cooler (separate type)

OP Option

ATC, Magazine

ATC tool changing time



The tool clamp mechanism has been simplified, improving ATC reliability.

Cut-to-cut (chip-to-chip)
<without ATC shutter>
Max. tool changing time:
5.5 sec.
Min. tool changing time:
3.6 sec.
(20-tool specifications)
<ISO 10791-9, JIS B6336-9>

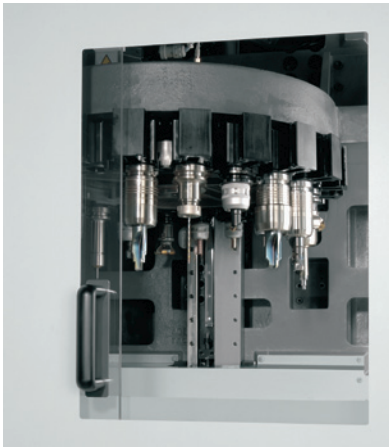
- Depending on the arrangement of tools in the magazine, the cut-to-cut (chip-to-chip) time may be longer.

Tool-to-tool
1.0 sec.

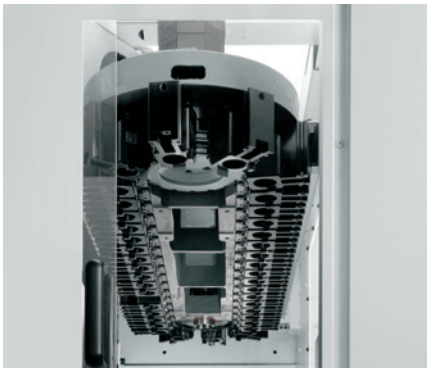
ISO: International Organization for Standardization JIS: Japanese Industrial Standard

Tool storage capacity

The tool magazine has been specially designed for space, fitting in the standard installation space even if options or more tools are added.



20 tools



40 tools OP

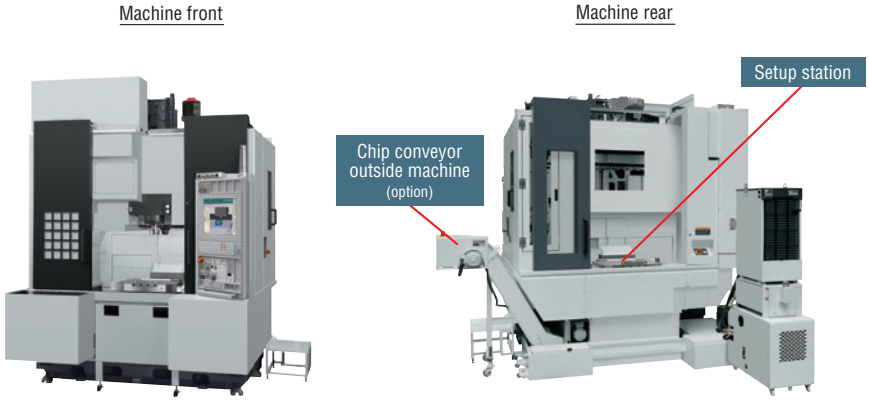
60 tools OP
(for more than 60 tools, see one of our representatives)

- With the APC specifications, a dummy tool to be mounted on the spindle during APC operation will be included.

Peripheral equipment

Automatic operation support

2-station turn-type APC OP



Tool storage capacity

40 tools/60 tools
(including a dummy tool)

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

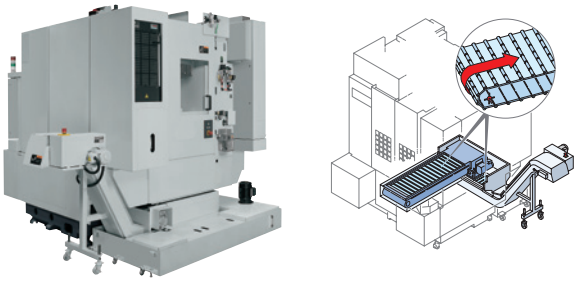
600×400 mm
(23.6×15.7 in.)
A new design allows access from the back of the machine when setting up the APC. This contributes to space savings.

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

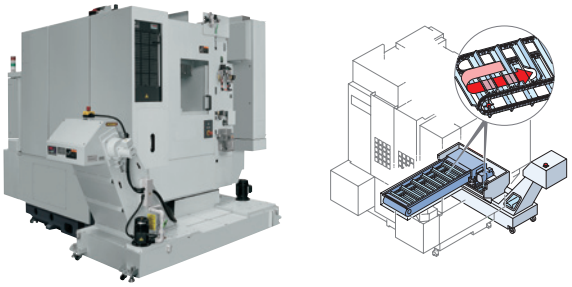
Chip strategy

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.

Chip conveyor (hinge type) OP



Chip conveyor (scraper type+drum filter type) OP



Specifications	Workpiece material and chip size ○: Suitable ×: Not suitable				
	Steel		Cast iron	Aluminum/non-ferrous metal	
	Long	Short	Short	Long	Short
Hinge type+drum filter type Consultation is required	○	○	○	○	○
Hinge type	○	○	×	○	×
Scraper type+drum filter type	×	○	○	×	○
Magnet scraper type Consultation is required	×	○	○	×	×

● Chip size guidelines
Short: chips 50 mm (2.0 in.) or less in length, bundles of chips ϕ40 mm (ϕ1.6 in.) or less
Long: bigger than the above

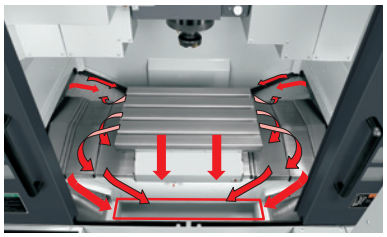
● The options table below the general options when using coolant. Changes may be necessary if you are not using coolant, or depending on the amount of coolant, compatibility with machines, or the specifications required.
● Please select a chip conveyor to suit the shape of your chips. When using special or difficult-to-cut material (chip hardness HRC45 or higher), please consult with our sales representative.
● Chip conveyors are available in various types for handling chips of different shape and material. For details, please consult with our sales representative.

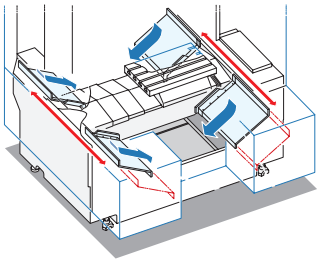
Chip receiver

The chip bucket can be pulled forward, minimizing the maintenance space for the operator.

Center trough construction

Using a center trough allows for a greater tilt angle towards the center, thereby improving chip disposal performance.





Y-axis single cover
A fixed cover is placed to protect the Y-axis, thus raising reliability.

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

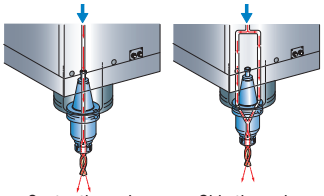
Coolant-related

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>	780×1,085 (30.7×42.7) <high-pressure coolant system>
Water-soluble coolant	○	○
Oil-based coolant	×	○*
Coolant filtration accuracy	40 μm	20 μm

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



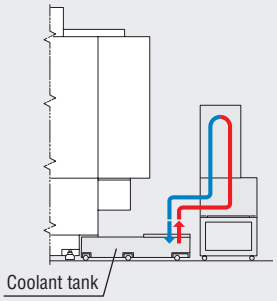
Center through　Side through

High-pressure coolant system (separate type)

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

Recommended equipment

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



Coolant cooling system (separate type)

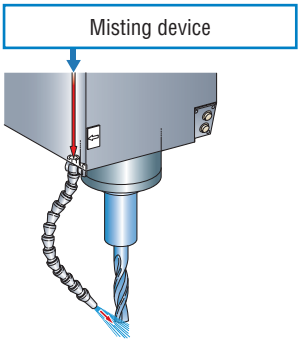
Coolant tank

A high capacity coolant tank comes as a standard feature.

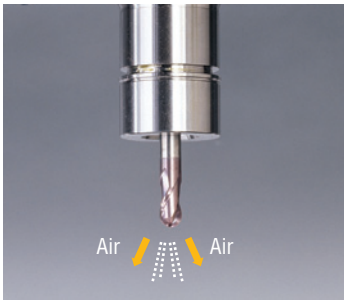
Tank capacity
340 L
(89.8 gal.)

Semi-dry unit OP

Supplies air and oil mist to the cutting tip. This unit is also eco-friendly.



Through-spindle air specifications (for air only) OP



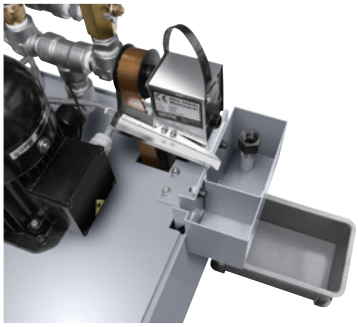
● When the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required.

Oil mist collector <Consultation is required> OP

Powerful vacuum sucks out chips and oil mist that accumulate inside the machine.

Oil skimmer OP

Efficiently separates coolant and lubricating oils.



Coolant gun OP

The high-pressure coolant flushes out all the chips that accumulate throughout the machine.

● The photo shows the NHX4000.

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

MAPPS Ⅳ

High-Performance Operating System
for Machining Centers

● 19-inch operation panel

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

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

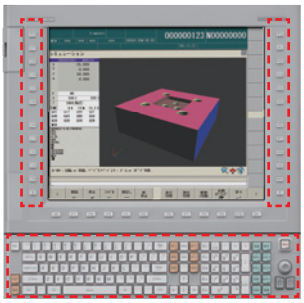
Outstanding operability

Vertical soft-keys

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

Keyboard

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



Advanced hardware

Reduction of drawing time

Shorter drawing time was achieved thanks to increased CPU performance.

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

* Option

Faster creation of programs

CAM software ESPRIT

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

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

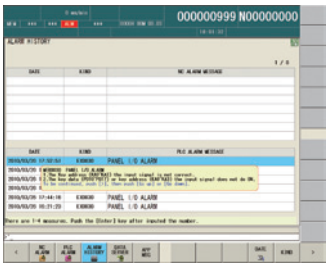
* Applicable Operating Systems: Windows® Vista Business / Ultimate, Windows® 7 Professional / Ultimate

● A PC is required to use ESPRIT®. Please prepare PCs by yourself.

Improved ease of maintenance

Alarm help function

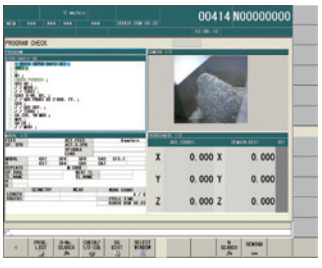
When an alarm occurs, MAPPS identifies the cause of the trouble and provides solutions.



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)

MAPPS: Mori Advanced Programming Production System

● The photo shown may differ from actual machine.
● Information about the screen is current as of December 2013.

Machine specifications

Item				NVD4000 DCG	NVD4000 DCG HSC	
				12,000 min^{-1}	20,000 min^{-1}	[30,000 min^{-1}]
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>]		
	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^{-1}	12,000	20,000	30,000
	Number of spindle speed ranges			1		
	Type of spindle taper hole			No. 40		No. 40 (HSK-F63)
	Spindle bearing inner diameter		mm (in.)	70 (2.8)		60 (2.4)
Feedrate	Rapid traverse rate		mm/min (ipm)	X, Y, Z: 20,000 (787.4)		
	Cutting feedrate		mm/min (ipm)	X, Y, Z: 1—20,000 (0.04—787.4) <with look-ahead control and AI nano high-precision contour control>		
	Jog feedrate		mm/min (ipm)	0—5,000 (0—197.0) <20 steps>		
ATC	Type of tool shank			BT40* [DIN40] [CAT40] [HSK-A63]		HSK-F63
	Type of retention knob			DMG MORI SEIKI 90° type [45°(MAS-I)] [60°(MAS-II)] [HSK-A63]		HSK-F63
	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)
	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		
	Tool changing time	Tool-to-tool	s	1.0		
	● 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.	MAS	s	2.8		
		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.)]		
Motor	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/cont>
	Feed motor		kW (HP)	X: 1.6 (2.1), Y: 1.6 (2.1)×2, Z: 3.0 (4)×2		
	Coolant pump motor <50/60 Hz>		kW (HP)	0.6 (0.8)/1.02 (1.37)		
Power sources <standard>	Electrical power supply <cont>		I94315A01 (kVA)	27.7		30.0
	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 cooler. Depth×width=843×400 mm (33.2×15.7 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

* 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.
- 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 <air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10 °C (50 °F) or below>.
- A criterion capacity to select a compressor is 90 L/min (23.8 gpm) per 0.75 kW (1 HP). However, this figure may differ depending on the type of compressors and options attached. For details, please check the compressor specifications.
- Noise data: The values were measured at the front of the NV4000 DCG with a maximum spindle speed of 12,000 min^{-1}. Please contact our sales representative for details.
- The information in this catalog is valid as of December 2013.

HSC: High Speed Cutting

<Precautions for Machine Relocation>

EXPORTATION: All contracts are subject to export permit by the Government of Japan. Customer shall comply with the laws and regulations of the exporting country governing the exportation or re-exportation of the Equipment, including but not limited to the Export Administration Regulations. The Equipment is subject to export restrictions imposed by Japan and other exporting countries and the Customer will not export or permit the export of the Equipment anywhere outside the exporting country without proper government authorization. To prevent the illegal diversion of the Equipment to individuals or nations that threaten international security, it may include a "Relocation Machine Security Function" that automatically disables the Equipment if it is moved following installation. If the Equipment is so-disabled, it can only be re-enabled by contacting DMG MORI SEIKI or its distributor representative. DMG MORI SEIKI and its distributor representative may refuse to re-enable the Equipment if it determines that doing so would be an unauthorized export of technology or otherwise violates applicable export restrictions. DMG MORI SEIKI and its distributor representative shall have no obligation to re-enable such Equipment. DMG MORI SEIKI and its distributor representative shall have no liability (including for lost profits or business interruption or under the limited service warranty included herein) as a result of the Equipment being disabled.

- If you have any questions regarding the content, contact our sales representative.
- The information in this catalog is valid as of January 2014. Designs and specifications are subject to changes without notice.
- The machines shown in the catalog may differ from the actual machines. The location and the size of the nameplates may also differ from the actual machines, or the nameplates may not be attached to some machines.
- DMG MORI SEIKI is not responsible for differences between the information in the catalog and the actual machine.

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