High-Precision Vertical Machining Center for Die & Mold Manufacturers

NVD5000 α1 HSC

HSC: High Speed Cutting
- Figures in inches were converted from metric measurements.

- The photo shows the machine equipped with options.
The standard for die and mold machining that brings you rapid delivery and high quality.

Amid increased global competition in the die and mold machining field, both rapid delivery and high quality are essential to make sure orders keep coming in. The NVD5000 α1 HSC clears both these hurdles because it is specifically designed to handle dies and molds for manufacturers whose goal is delivering high added value. The NVD5000 α1 HSC will be an indispensable tool in raising your competitiveness.

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NVD5000 α1 HSC

**Machine size**

The basic design ensures maximum spindle movement, creating a large processing space. With moving room to spare, this machine can handle any type of job.

- **X-axis**: 800 (31.5) <A type>, 1,020 (40.2) <B type>
- **Y-axis**: 510 (20.1)
- **Z-axis**: 150 (5.9), 2,451 (96.5) <A type>, 2,781 (109.5) <B type>

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HSC: High Speed Cutting
MAPPS: Mori Advanced Programming Production System
High precision

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

The NVD5000 α1 HSC 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.

<table>
<thead>
<tr>
<th>High-precision machining features</th>
</tr>
</thead>
</table>
| **Direct scale feedback**  
(X, Y and Z axes) |
| 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 axes)** |
| 0.01 μm |
| Magnescale |
| High accuracy absolute scale SP47 |
| **Oil cooler**  
(separate type) |
| An energy-saving oil cooler is used that delivers very little temperature fluctuation. |
| **High-precision equipment** |
| **Coolant cooling unit (separate type)** |
| 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. |
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.

Die & Mold Specifications (standard feature)

<table>
<thead>
<tr>
<th>Personal Computer</th>
<th>CNC unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td></td>
</tr>
<tr>
<td>100 Mbps (theoretical value)</td>
<td></td>
</tr>
<tr>
<td>With 100BASE-TX/10BASE-T (automatic recognition)</td>
<td></td>
</tr>
</tbody>
</table>

**Die & Mold Specifications**

- **Ethernet**
  - Large-volume storage
  - Super high-speed processing using a RISC processor

- **Memory card for data server** (CF card 1 GB + ATA adaptor)
- **Fast data server**

**Al nano high-precision contour control**

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

- **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.
Spindle

Approximately 70% longer compared with previous model.

High-speed, high-power DDS motor.

High-speed spindle bearing

- Super high speeds are achieved with the stable supply of lubricant and the internal cooling effect of the air. It is further equipped with a long-life spindle bearing with greater wear-resistance and burn-resistance than previous models.

Dual contact specifications

- BT40 (standard)
- HSK-A63 (option)

- Oil feed is kept to a minimum to reduce frictional loss
- Air purge prevents dust infiltration

Spindle bearing roller life

Compared with previous model

Approximately 70% longer

Spindle acceleration/deceleration time

- BT40: 5.32 sec. NVD5000 α1 HSC Reduced by 50% 2.68 sec.
- HSK-A63: 5.48 sec. NVD5000 α1 HSC Reduced by 53% 2.56 sec.

Eco-friendly design

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

- Reduced consumption of electricity
  - Automatic sleep function
    - If the keyboard is not touched for a certain amount of time and NC operation is not being performed, power is cut off to the servo motor, the spindle, the coolant pump and the chip conveyor, thereby saving energy.
  - Automatic machine light function
    - If the operating panel is not touched for a certain amount of time, the interior light turns off. This saves energy and lengthens the life of the machine lights.

- BT40 (standard)
- HSK-A63 (option)
- Constrained face

- Oil-air lubrication
- Oil-bath ATC
- Energy-saving settings screen
Improved workability

Working environment

- **Improved ease of setup**
  - The large magazine door allows replacement of several tools at once.

- **Easy access to the machine’s table**
  - The table is located in front of the operator to make work inside the machine easier. The distance from the front of the machine to the table has been shortened.

  - Door opening
    - NVD5000 α1 A HSC: 1,032 mm (40.6 in.)
    - NVD5000 α1 B HSC: 1,386 mm (54.6 in.)

  - Distance from the front of the machine to the table:
    - 262 mm (10.3 in.)

  - Height from the floor to the upper face of the table:
    - 900 mm (35.4 in.)

- **Improved tool switching**
  - The top panel can be opened and closed, making crane accessibility quick and easy.

- **Easy tool switching**
  - Handlifts approach close to the setup station making it easy to load and unload heavy workpieces.

  - There is an area that has been designed into the bottom of the machine to make moving workpieces easier during set-up.

  - The illustration shows the NVD5000 α1A HSC.
  - Except for chip conveyor outside machine (screw type + drum filter type and hinge type + drum filter type) specifications.

- **Easy tool switching**
  - The large magazine door allows replacement of several tools at once.

- **Interior brightness**
  - Brightness at tool tip position compared with previous model: ×2

The large magazine door allows replacement of several tools at once.
Peripheral equipment

Automatic 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.

In-machine measuring system (spindle)
- Automatic centering and automatic measurement are possible.
- Automatic measurement applications are included.

In-machine measuring system (table)
- Automatic length measurement and automatic breakage detection are possible.
- Automatic measurement applications are included.

Through-spindle coolant system

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

High-pressure coolant system (separate type)

<table>
<thead>
<tr>
<th>Discharge pressure (MPa/psi)</th>
<th>Unit on coolant tank</th>
<th>Separate type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 (217.5)</td>
<td></td>
<td>1.5/3/5/7.0</td>
</tr>
<tr>
<td></td>
<td>(217.5/507.5/1,015)</td>
<td></td>
</tr>
<tr>
<td>Installation space (mm/in.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>360×360 (14.2×14.2)</td>
<td></td>
<td>780×1,085 (30.7×42.7)</td>
</tr>
<tr>
<td>Water-soluble coolant</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Oil-based coolant</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Coolant filtration accuracy</td>
<td>40μm</td>
<td>20μm</td>
</tr>
</tbody>
</table>

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.

Through-spindle air specifications (for air only)

- Prevents chips from accumulating by releasing coolant from the nozzles.

Shower coolant

Semi-dry unit

Oil shot system

Recommended equipment

The high-pressure coolant unit generates a lot of heat because it discharges coolant at high pressure. The coolant cooling unit 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.

Through-spindle coolant system

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

Center through Side through

Coolant tank

Coolant cooling unit (separate type)

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

Through-spindle air specifications (for air only)

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

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

Oil skimmer
Efficiently separates coolant and lubricating oils.

Oil skimmer

Oil-hole drill coolant system

Coolant pump

Oil mist system

Oil tank

Chip conveyor (outside machine)

Scaper type + drum filter type

Hinge type (left discharge, right discharge)

Hinge type (rear discharge)

Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Workplace material and chip size</th>
<th>Specifications</th>
<th>Workplace material and chip size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steel</td>
<td>Cast iron</td>
<td>Aluminum/non-ferrous metal</td>
</tr>
<tr>
<td>Hinge type + drum filter type</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hinge type</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Scraper type + drum filter type</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Magnet scraper type</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Chip size guidelines:
- Short: chips 50 mm (2.0 in.) or less in length, bundles of chips < 40 mm (≈ 1.6 in.) or less
- Long: bigger than the above

The options table below the general options when using coolant. Changes may be necessary if you are not using coolant, or depending on the amount of coolant, compatibility with machines, or the specifications required.

Please select a chip conveyor to suit the shape of your chips. When using special or difficult-to-cut material (chip hardness HRC45 or higher), please consult with our sales representative.

Chip conveyors are available in various types for handling chips of different shape and material. For details, please consult with our sales representative.

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

Chip flow coolant (NVD5000 α1A HSC)
Using chip flow coolant allows smooth output of chips.

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

● The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.
A new high-performance operating system that pursues ease of use, and combines the best hardware in the industry with the advanced application/network systems.

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

**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.
  - MAPPS III: 68 sec. MAPPS IV: 45 sec. Approx. Reduced by 33%

**Main specifications**

- Main memory
  - Standard: 6 GB
  - Option: 20 GB

- User area
  - Standard: 6 GB
  - Option: 20 GB

- Interface
  - USB 2.0: 3 ports (Screen side: 1, Bottom and back of operation panel: each 1)
  - LAN: 2 ports (1000BASE-T)
  - RS-232-C port
  - Memory card slot

- Soft-keys
  - Left/right 12 keys
  - Bottom 12 keys

**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)

* 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.

**Fixed-point in-machine camera**

- 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)

**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.

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**Faster creation of programs**

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**Improved work efficiency**

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

**Examples of camera locations**

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

<table>
<thead>
<tr>
<th>Item</th>
<th>NVD5000 α 1A/40 HSC</th>
<th>NVD5000 α 1B/40 HSC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis &lt;longitudinal movement of table&gt;</td>
<td>mm (in.)</td>
<td>800 (31.5)</td>
</tr>
<tr>
<td>Y-axis &lt;cross movement of saddle&gt;</td>
<td>mm (in.)</td>
<td>510 (20.1)</td>
</tr>
<tr>
<td>Z-axis &lt;vertical movement of spindle head&gt;</td>
<td>mm (in.)</td>
<td>510 (20.1)</td>
</tr>
<tr>
<td>Distance from table surface to spindle gauge plane</td>
<td>mm (in.)</td>
<td>150—660 (5.9—26.0)</td>
</tr>
<tr>
<td><strong>Table</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working surface</td>
<td>mm (in.)</td>
<td>1,100×600 (43.3×23.6)</td>
</tr>
<tr>
<td>Table loading capacity</td>
<td>kg (lb.)</td>
<td>1,000 (2,200)</td>
</tr>
<tr>
<td>Table surface configuration &lt;T slots width/pitch/No. of T slots&gt;</td>
<td>18 mm×100 mm×6 (0.7 in.&lt;3.9 in.&lt;6)</td>
<td></td>
</tr>
<tr>
<td><strong>Spindle</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. spindle speed</td>
<td>min⁻¹</td>
<td>20,000</td>
</tr>
<tr>
<td>Number of spindle speed ranges</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Type of spindle taper hole</td>
<td></td>
<td>No. 40</td>
</tr>
<tr>
<td>Spindle bearing inner diameter</td>
<td>mm (in.)</td>
<td>65 (2.6)</td>
</tr>
<tr>
<td><strong>Feedrate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse rate</td>
<td>mm/min (ipm)</td>
<td></td>
</tr>
<tr>
<td>Cutting feedrate</td>
<td>mm/min (ipm)</td>
<td>1—20,000 (0.04—787.4) when using look-ahead control&gt;</td>
</tr>
<tr>
<td>Jog feedrate</td>
<td>mm/min (ipm)</td>
<td>0—5,000 (0—197.0) &lt;20 steps&gt;</td>
</tr>
<tr>
<td><strong>ATC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool-to-tool</td>
<td>s</td>
<td>1.0/1.5</td>
</tr>
<tr>
<td>Cut-to-cut (chip-to-chip)</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>&lt;without ATC shutter&gt;</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>Tool changing time</td>
<td>s</td>
<td>Max. tool changing time: 8.8</td>
</tr>
<tr>
<td>Cut-to-cut (chip-to-chip)</td>
<td>s</td>
<td>Max. tool changing time: 15.9</td>
</tr>
<tr>
<td>&lt;without ATC shutter&gt;</td>
<td>s</td>
<td>Max. tool changing time: 21.7</td>
</tr>
<tr>
<td>Tool changing time</td>
<td>s</td>
<td>Max. tool changing time: 21.7</td>
</tr>
<tr>
<td>Tool changing time</td>
<td>s</td>
<td>Max. tool changing time: 21.7</td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle drive motor &lt;10 min/30 min/cont&gt;</td>
<td>kW (HP)</td>
<td>18.5/15/11 (24.7/20/15)</td>
</tr>
<tr>
<td><strong>Feed motor</strong></td>
<td>kW (HP)</td>
<td>X, Y, Z: 3.0 (4)</td>
</tr>
<tr>
<td><strong>Coolant pump motor &lt;50 Hz/60 Hz&gt;</strong></td>
<td>kW (HP)</td>
<td>0.635+0.73(0.84+0.97)/1.04+1.12(1.39+1.61)</td>
</tr>
<tr>
<td><strong>Power source (standard)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical power supply &lt;cont&gt;</td>
<td>kVA</td>
<td>32.7</td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>MPa (psi), L/min (gpm)</td>
<td>0.5 (72.5), 200 (52.8) 787.4) &lt;when using look-ahead control&gt;</td>
</tr>
<tr>
<td><strong>Tank capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant tank capacity</td>
<td>L (gal.)</td>
<td>230 (60.7)</td>
</tr>
<tr>
<td><strong>Machine size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine height</td>
<td>mm (in.)</td>
<td>2,603 (102.5)</td>
</tr>
<tr>
<td>Floor space &lt;width×depth&gt; (machine body only)</td>
<td>mm (in.)</td>
<td>2,451×2,747 (96.5×108.1)</td>
</tr>
<tr>
<td>Mass of machine</td>
<td>kg (lb.)</td>
<td>7,450 (16,390)</td>
</tr>
<tr>
<td><strong>Noise data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-weighted, time-average radiated sound</td>
<td>dB</td>
<td>60—77 (Measurement uncertainty is 4 dB)</td>
</tr>
</tbody>
</table>
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 liability (including for lost profits or business interruption or under the limited service warranty included herein) as a result of the Equipment being disabled.

DMG MORI SEIKI CO., LTD.

Nagoya Head Office
2-35-16 Miseki, Nakamura-ku, Nagoya City, Aichi 458-0002, Japan
Phone: +81-52-587-1811

Tokyo Branch
18th floor, Shinagawa Intercity Tower A, 2-15-1 Konan Minato-ku, Tokyo 108-6018, Japan
Phone: +81-3-5460-3570

Nara Campus
Nara No. 1 Plant
362 Idono-cho, Yamato-Koriyama City, Nara 639-1183, Japan
Phone: +81-743-53-1121

Nara No. 2 Plant
106 Kita-Koriyama-cho, Yamato-Koriyama City, Nara 639-1160, Japan
Phone: +81-743-53-1125

Iga Campus
201 Midai, Iga City, Mie 519-1414, Japan
Phone: +81-595-45-4151

Chiba Campus
488-19 Suzurno-cho, Fushibashi City, Chiba 274-0052, Japan
Phone: +81-47-410-8800

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