DNM series
DNM 400 / 500 / 650
High Productivity Vertical Machining Center
DNM series
DNM 400 / 500 / 650
New series of vertical machining center
High quality and efficiency derived from high productivity analysis

DNM series are compact and durable machines created with the combination of optimized function and increased rigidity to satisfy the quality goal of global class and cost-saving. The high productivity analysis is the major principle of the DNM series which have been designed with the user's needs in mind.
High productivity

Basic concept structure and operation ensure its capability to get the best results of productivity regardless of any conditions and complexities.

Comparison of Non Cutting Time

Material: Aluminum (Al6061-T6)
Size: 155×155×50 mm
(6.1×6.1×2 inch)
No. of tools used: 14 tools

Comparison of Cutting Time

Material: Mold steel (HP4M)
Size: 270×270×100 mm
(10.6×10.6×3.9 inch)
No. of tools used: 5 tools

※ The results indicated in this catalog may not be obtained due to differences in cutting conditions.
Auto Tool Changer

Faster tool change time using cam increases productivity than previous model.

Tool change time (T-T-T)

<table>
<thead>
<tr>
<th>Previous Model</th>
<th>DNM series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 s</td>
<td>1.3 s</td>
</tr>
</tbody>
</table>

Tool storage capacity

<table>
<thead>
<tr>
<th>Previous Model</th>
<th>DNM series</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 tools</td>
<td>40 tools opt</td>
</tr>
</tbody>
</table>

Rapid Traverse

Linear motion guide ways and high speed servomotors apply high rapid axis movement. This reduces non-cutting time and machining time for greater productivity.

Minimum thermal transformation for high accuracy

Machine units are designed minimum thermal transformation by ball screw nut with cooling jacket.

<table>
<thead>
<tr>
<th>Rapid traverse</th>
<th>DNM 400 / 500 / 650</th>
<th>DNM 400HS / 500HS / 650HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis m/min (ipm)</td>
<td>36 (1417.3)</td>
<td>48 (1889.8)</td>
</tr>
<tr>
<td>Y-axis m/min (ipm)</td>
<td>36 (1417.3)</td>
<td>48 (1889.8)</td>
</tr>
<tr>
<td>Z-axis m/min (ipm)</td>
<td>30 (1181.1)</td>
<td>48 (1889.8)</td>
</tr>
</tbody>
</table>
### Machining Capacity

Provides high-productivity and high-accuracy in a variety of machining operations

#### Face mill

- **Carbon steel (SM45C)**
  - ø80mm (3.15 in.) Face mill (6Z)
  - Machining rate: 432 cm³/min (26.4 in³/min)
  - Spindle speed: 1500 r/min
  - Feedrate: 2700 mm/min (106.3 ipm)
  - 2 mm (0.08 in.)
  - 64 mm (2.52 in.)

- **Gray casting (GC25)**
  - ø80mm (3.15 in.) Face mill (6Z)
  - Machining rate: 691 cm³/min (42.2 in³/min)
  - Spindle speed: 1500 r/min
  - Feedrate: 3600 mm/min (141.7 ipm)
  - 3 mm (0.12 in.)
  - 64 mm (2.52 in.)

- **Aluminum (AL6061)**
  - ø80mm (3.15 in.) Face mill (6Z)
  - Machining rate: 1785 cm³/min (109 in³/min)
  - Spindle speed: 1500 r/min
  - Feedrate: 5580 mm/min (219.7 ipm)
  - 5 mm (0.2 in.)
  - 64 mm (2.52 in.)

#### End mill

- **Carbon steel (SM45C)**
  - ø30mm (1.2 in.) Endmill (6Z)
  - Machining rate: 36 cm³/min (2.2 in³/min)
  - Spindle speed: 222 r/min
  - Feedrate: 80 mm/min (3.1 ipm)
  - 15 mm (0.59 in.)
  - 64 mm (2.52 in.)

#### U-drill

- **Carbon steel (SM45C)**
  - Machining rate: 172 cm³/min (10.5 in³/min)
  - Spindle speed: 750 r/min
  - Feedrate: 84 mm/min (3.3 ipm)
  - ø51 mm (2 in.)

#### Tap

- **Carbon steel (SM45C)**
  - Machining rate: M30 X P3.5
  - Spindle speed: 212 r/min
  - Feedrate: 742 mm/min (29.2 ipm)

### Machining Accuracy

For increased repeatability and reliability

#### Roundness

- 5.40 µm
- Model: DNM 500
- Material: A7075F
- Tool: Endmill ø16mm (ø0.6 in.) (4 blades)

#### Roughness

- Ra 0.12 µm
- Spindle speed: 8000 r/min
- Feedrate: 1000 mm/min (39.4 ipm)

*The results indicated in this catalog may not be obtained due to differences in environmental conditions during measurement and cutting conditions.*
Easy Operation Package*

These DOOSAN software packages have been customized to provide user friendly functions.

1. Swivelling Operating Console

The operator control panel is mounted on an adjustable pendant for easy view and accessibility during set-up and operation. The layout and location of the panel is ergonomically designed to be efficient and convenient for the operator.

2. ATC operating button is arranged to Main Panel

This can give much easier operation and maintenance for ATC.

3. Portable MPG

Portable MPG makes a workpiece setting easier for the operator.

Top Cover

Top cover can be opened to provide easy access for loading heavy workpieces to the center of the table.

Easy setup

These DOOSAN software packages have been customized to provide user friendly functions.

* : Only available in 10.4" Color TFT LCD
High Rigidity

Stable bed and column assemblies are designed for high speed and heavy duty machining.

Compact Structure

Travel axes

Wide machining range select according to workpiece size

<table>
<thead>
<tr>
<th></th>
<th>DNM 400</th>
<th>DNM 500</th>
<th>DNM 650</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>mm (inch)</td>
<td>762 (30.0)</td>
<td>1020 (40.2)</td>
</tr>
<tr>
<td>Y-axis</td>
<td>mm (inch)</td>
<td>435 (17.1)</td>
<td>540 (21.3)</td>
</tr>
<tr>
<td>Z-axis</td>
<td>mm (inch)</td>
<td>510 (20.1)</td>
<td>510 (20.1)</td>
</tr>
</tbody>
</table>

The one piece bed is rigid and heavily ribbed Meehanite. These castings remain stable even under the heaviest cutting conditions. Fine grained Meehanite cast iron is used for its excellent vibration absorbing characteristics. The table is fully supported by the saddle in all positions and there is no table overhang. All axes have highly rigid and precise linear motion guideways.

Static rigidity

The high rigidity structure of DNM has raised the static rigidity up by 30% more than previous model with no weak point through FEM analysis.

Dynamic rigidity

Improving the frequency response and the damping ability of vibration makes it possible to increase the high eigenfrequency 35% up on the previous model.
**High Speed**

High speed spindle of high quality and rigidity helps increase the efficiency and performance of the machine.

**Spindle Head**

**Max. spindle speed**

<table>
<thead>
<tr>
<th>Spindle Type</th>
<th>Speed Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNM 400 / 500</td>
<td>8000 r/min</td>
</tr>
<tr>
<td>DNM 650</td>
<td>12000 r/min opt.</td>
</tr>
</tbody>
</table>

**Spindle power-torque diagram**

- **DNM 400 / 500**
  - 8000 r/min: 11/15 kW (14.8/20.1 Hp)
  - 15000 r/min: 18.5/22 kW (24.8/29.5 Hp)

- **DNM 650**
  - 8000 r/min: 15/18.5 kW (20.1/24.8 Hp)
  - 11/11 kW (14.8/14.8 Hp): 30min, S3 60%

**2-Face locking tool system (BIG PLUS)**

The 2-Face locking tool system offers simultaneous dual contact between the machine spindle face and tool holder flange face.

**Spindle head cooling system**

The refrigerated spindle cooling system circulates cooling oil to maintain a constant temperature for high accuracy, regardless of the ambient temperature or cutting conditions.

- **DNM HS series**
- **DNM series**

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The spindle of DNM HS series is driven by the powerful built-in motor which has 22 kW power and 167 N·m torque. This enables the thermal growth of Y-axis to be reduced by more than 40% of previous model by pulling the air heated by belt out using the FAN with standard function.
Chip Disposal

Chip treatment from the viewpoint of productivity improvement and environmental countermeasure is important. DNM series offer a variety of chip control equipment to provide enhanced accuracy and better chip removal capabilities.

Easy chip removal structure

The completely enclosed DNM series guarantee the confinement of chips and coolant to the inside of the machining area. Chips fall into the removable forward mounted chip pan for easy disposal.

Through spindle coolant
Middle pressure : 1.96 Mpa (284.2 psi)
High pressure : 6.86 Mpa (994.7 psi)

Screw conveyor

Flood coolant

Shower coolant

Chip conveyor
Hinge type
Scraper type
Drum filter type

Large capacity coolant tank with chip pan and box filter

Easy to discard chips piled up

Coolant tank capacity
DNM 400 : 300L
DNM 500 : 360L
DNM 600 : 380L
Optional Equipment

Various options available to meet customers’ needs and to provide efficient work and convenience.

Interface for additional equipment

Connection example of additional 1 axis interface

Hydraulic power unit may be additionally necessary according to rotary table specifications.

Connection example of fixture interface

Fixture check list (for hydraulic / pneumatic fixtures)

- **Pressure source**
  - Hydraulic  P/T  A/B
  - Pneumatic  P/T  A/B

- **Number of ports**
  - 1 pair (2-PT 3/8" port)
  - 2 pair (4-PT 3/8" port)
  - 3 pair (6-PT 3/8" port)

- **Hydraulic power unit**
  - Supply scope:  
    - User
    - DOOSAN
  - (Please check the below detail specification, if you want Doosan to supply.)
  - Use Doosan standard unit
    - 24 L/min (6.3 gal/min) / 4.9 MPa (711 psi)
  - Special requirement
    - _______ L/min (gal/min) at _______ MPa (psi)

**Automatic tool measurement**
**Automatic workpiece measurement**
**Minimum Quantity Lubrication**
**Oil skimmer**

Recommandable rotary table size: DNM 400/500: ø250 mm (9.84 inch)
DNM 650: ø320 mm (12.6 inch)
External Dimensions

DNM 400

Top View

Front View

Side View

Table

DNM 500

Top View

Front View

Side View

Table
### Machine Specifications

#### Standard Feature
- 10.4" Color TFT LCD
- Assembly & operation tools
- Ball screw nut cooling system (HS series)
- Coolant tank & chip pan
- Door interlock
- Flood coolant system
- Installation parts
- Screw conveyor
- Signal tower (red, yellow, green)
- Portable MPG
- Splash guard
- Work light
- X, Y, Z Absolute pulse coder

#### Optional Feature
- 4th axis preparation
- Automatic power off
- Automatic tool measurement
- Automatic workpiece measurement
- Cam ATC (40 tools)
- Chip conveyor & chip bucket
- EZ Guide i
- MQL (Minimum Quantity Lubrication)
- Spindle head cooling system
- Oil skimmer
- Shower coolant
- Test bar
- Through spindle coolant

*Note: () are optional.

#### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>DNM 400</th>
<th>DNM 500</th>
<th>DNM 650</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travels</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Travel distance</td>
<td>X-axis</td>
<td>mm (inch)</td>
<td>762 (30.0)</td>
<td>1020 (40.2)</td>
</tr>
<tr>
<td></td>
<td>Y-axis</td>
<td>mm (inch)</td>
<td>435 (17.1)</td>
<td>540 (21.3)</td>
</tr>
<tr>
<td></td>
<td>Z-axis</td>
<td>mm (inch)</td>
<td>510 (20.1)</td>
<td>625 (24.6)</td>
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<tr>
<td>Distance from spindle nose to</td>
<td>mm (inch)</td>
<td>150-660 (5.9-26.0)</td>
<td>150-775 (5.9-30.5)</td>
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<tr>
<td>Distance from spindle nose to</td>
<td>mm (inch)</td>
<td>512 (20.2)</td>
<td>587 (23.1)</td>
<td>747 (29.4)</td>
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<tr>
<td><strong>Feedrates</strong></td>
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<tr>
<td>Rapid Traverse Rate</td>
<td>X-axis</td>
<td>m/min (ipm)</td>
<td>36 (1417.3)</td>
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</tr>
<tr>
<td></td>
<td>Y-axis</td>
<td>m/min (ipm)</td>
<td>36 (1417.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z-axis</td>
<td>m/min (ipm)</td>
<td>30 (1181.1)</td>
<td></td>
</tr>
<tr>
<td>Max. Cutting feedrate</td>
<td>mm/min (ipm)</td>
<td>15000 (590.6)</td>
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<tr>
<td><strong>Table</strong></td>
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<tr>
<td>Table size</td>
<td>mm (inch)</td>
<td>920 (36.2)</td>
<td>1200 (47.2)</td>
<td>1300 (51.2)</td>
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<td>Table loading capacity</td>
<td>kg (lb)</td>
<td>600 (1322.8)</td>
<td>800 (1763.7)</td>
<td>1000 (2204.6)</td>
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<tr>
<td>Table surface type</td>
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<td>4-125*18H8</td>
<td>5-125*18H8</td>
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<tr>
<td><strong>Spindle</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Spindle speed</td>
<td>r/min</td>
<td>8000 (8000,12000)</td>
<td>8000 (12000)</td>
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<tr>
<td>Spindle taper</td>
<td>ISO #40, 7/24 TAPER</td>
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<tr>
<td>Max. Spindle torque</td>
<td>N-m (ft-lbf)</td>
<td>106 (140,106)</td>
<td>117.7 (106)</td>
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</tr>
<tr>
<td><strong>Automatic Tool Changer</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Type of tool shank</td>
<td>BT40</td>
<td></td>
<td></td>
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<tr>
<td>Tool storage capacity</td>
<td>ea</td>
<td>30 (40)</td>
<td></td>
<td></td>
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<tr>
<td>Max. tool diameter</td>
<td>Continuous</td>
<td>mm (inch)</td>
<td>Ø80 (Ø76) (Ø3.1 (Ø3.0))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Without Adjacent Tools</td>
<td>mm (inch)</td>
<td>Ø125 (Ø125) (Ø4.9 (Ø4.9))</td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (inch)</td>
<td>300 (11.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg (lb)</td>
<td>8 (17.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool selection</td>
<td>memory random</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool change time (Tool-to-tool)</td>
<td>s</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool change time (Chip-to-chip)</td>
<td>s</td>
<td>3.7</td>
<td>3.9</td>
<td></td>
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<tr>
<td><strong>Motors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle motor power</td>
<td>kW (Hp)</td>
<td>15/11 (20.1/14.8)</td>
<td>18.5/15 (24.8/20.1)</td>
<td></td>
</tr>
<tr>
<td>Coolant pump motor power</td>
<td>kW (Hp)</td>
<td>0.25 (0.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power source</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Electric power supply(rated capacity)</td>
<td>kW A</td>
<td>33.5</td>
<td>42.55</td>
<td></td>
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<tr>
<td>Compressed air supply</td>
<td>Mpa (psi)</td>
<td>0.54 (78.3)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Tank capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant tank capacity</td>
<td>L (gal)</td>
<td>300 (79.3)</td>
<td>380 (100.4)</td>
<td></td>
</tr>
<tr>
<td>Lubrication tank capacity</td>
<td>L (gal)</td>
<td>1.4 (0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Machine Dimensions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>mm (inch)</td>
<td>2703 (106.4)</td>
<td>2815 (110.8)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>mm (inch)</td>
<td>2092 (82.4)</td>
<td>2284 (89.9)</td>
<td>2572 (101.3)</td>
</tr>
<tr>
<td>Width</td>
<td>mm (inch)</td>
<td>2615 (103.0)</td>
<td>3350 (131.9)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg (lb)</td>
<td>5000 (11023.0)</td>
<td>6500 (14329.8)</td>
<td>8500 (18739.0)</td>
</tr>
</tbody>
</table>

Note: { } are optional.
NC Unit Specifications

DOOSAN FANUC-i series

**INTERPOLATION & RED FUNCTION**
- Rigid tapping G84, G74
- Spindle speed command S5 digits
- Spindle serial output
- M-code function M3 digits
- Linear ACC / DEC after interpolation
- Linear ACC / DEC before interpolation (Specify AI Contour control II)
- Feedrate clamp by circular acceleration (Specify AI Contour control II)
- Automatic corner deceleration (Specify AI Contour control II)
- Program restart
- Thread cutting, synchronous cutting
- DSQ1 (AICC II + Machine condition selection function) 80 block preview
- Helical interpolation
- Spindle speed override 10 - 150 %
- Spindle orientation
- Reference point return G27, G28, G29
- Positioning G00
- Manual handle feedrate x1, x10, x100 (per pulse)
- Manual handle feed 1 unit
- Jog override (10% increments) 0-200 %
- Feedrate override (10% increments) 0-200 %
- Feed per minute
- Circular interpolation G02, G03
- Stored stroke check 1 Overtravel controlled by software
- Tool position offset G45 - G48
- Tool offset and work offset are entered by G10, G11
- Tool load monitoring function (Doosan)
- Programmable mirror image G50.1 / G51.1
- Polar coordinate interpolation G12.1 / G13.1

**FUNCTIONS**
- Tool compensation C
- Number of tool offsets 64
- Tool length compensation G64, G64.6
- Tool function command 127 items
- Tool life management Geometry, Wear and Length, Radius offset, renew,
- Geometric, Wear and Length, Radius offset, renew,

**INTERPOLATION & RED FUNCTION**
- Rigid tapping G84, G74
- Spindle speed command S5 digits
- Spindle serial output
- M-code function M3 digits
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- Spindle orientation
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- Positioning G00
- Manual handle feedrate x1, x10, x100 (per pulse)
- Manual handle feed 1 unit
- Jog override (10% increments) 0-200 %
- Feedrate override (10% increments) 0-200 %
- Feed per minute
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- Stored stroke check 1 Overtravel controlled by software
- Tool position offset G45 - G48
- Tool offset and work offset are entered by G10, G11
- Tool load monitoring function (Doosan)
- Programmable mirror image G50.1 / G51.1
- Polar coordinate interpolation G12.1 / G13.1

**FUNCTIONS**
- Tool compensation C
- Number of tool offsets 64
- Tool length compensation G64, G64.6
- Tool function command 127 items
- Tool life management Geometry, Wear and Length, Radius offset, renew,
Optimal Solutions for the Future

http://www.doosaninfracore.com/machinetools/

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- The specifications and information above-mentioned may be changed without prior notice.
- For more details, please contact Doosan.