DOOSAN

*Optimal Solutions for the Future*

# **DNM** series


**Global standard vertical machining center**

**DNM series**

DNM 4500
DNM 5700
DNM 6700

**ver.** EN 160920 SU



# **DNM** series

**Building on the history of the well proven and successful DNM and DNM ll series, the new version DNM series boasts even greater reliability and performance. In addition, the new series includes grease lubrication to the roller guideways for more environmental-friendliness. The design concepts of the DNM4500, DNM5700 and DNM6700 are high speed, high rigidity and suitability for universal applications. Standard features are the largest machining space in its class, direct coupled spindle, roller guideways and thermal error compensation to provide optimum precision.**

## Contents




### A highly versatile vertical machining center offering the largest machining space in its class

- While requiring the same installation floor space as the previous model, the new DNM series provides a larger table with increased Y axis travel and maximum table load.

### Standard Direct-Coupled Spindle for Higher Productivity

- The direct coupled spindle reduces vibration and noise, thereby improving the machines performance and environmental-friendliness compared to belt drive type.
- Higher productivity is achieved by reducing tool change time and improving all axes feed system acc/dec times.

### An environmental-friendly machine designed for stable and easy operation

- Thermal error compensation function fitted as standard optimizes machine accuracy by reducing the effects of heat build-up during extended periods of operation.
- The EOP function can be checked in the pop-up window on the NC main screen for convenient machine operation.
- Grease lubrication for axis roller guideways is a standard feature and reduces contamination of the operator's environment.

## Basic structure

Designed as a highly stable, rigid structure, the new DNM series offers a wide line-up from 400 to 670 mm in the Y axis, enabling the user to handle a wider range of workpieces.

**Travel distance (X x Y x Z axis)**

**DNM 4500**

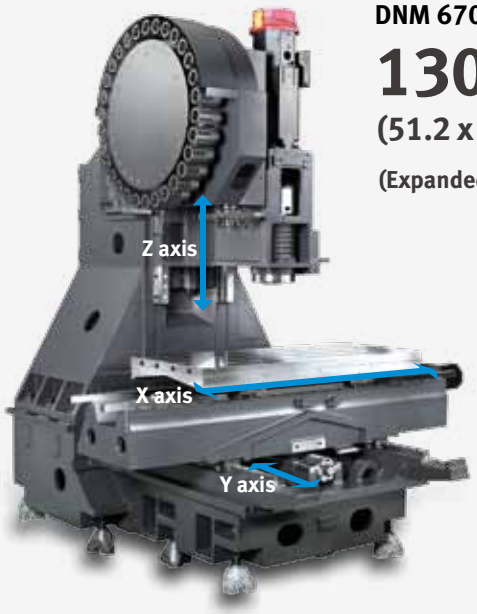
**800x450x510mm (31.5 x 17.7 x 20.1 inch)**

**(Expanded by 8% compare to previous model)**

**DNM 5700**

**1050x570x510mm (41.3 x 22.4 x 20.1 inch)**

**(Expanded by 8% compare to previous model)**




**DNM 6700**

**1300x670x625mm**

**(51.2 x 26.4 x 24.6 inch)**

**(Expanded by 2% compare to previous model)**

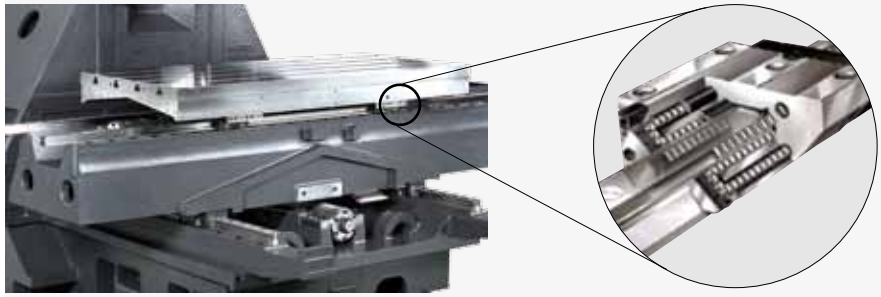
## Axis system

Environmentally friendly grease lubrication is adopted as standard for all the axis feed system, and roller-type LM Guides are provided to enhance the rigidity.

**Rapid traverse rate**

| X axis | Y axis | Z axis |
|---|---|---|
| **36m/min** | **36m/min** | **30m/min** |
| **(1417.3 ipm)** | **(1417.3 ipm)** | **(1181.1 ipm)** |

**Improving all axes feed system acc/dec times by up to 50% compare to previous model.**



**Grease lubrication for all axes is a standard feature.**

**Roller-type LM Guides are provided as a standard feature.**

## Table

Increased table size and maximum load capacity are included to offer maximum workpiece capacity even in the same floor space as previous model.

### Wide machining area

**Max weight on Table**

**DNM 4500**

**600kg (1322.8 lb)**

**DNM 5700**

**1000kg (2204.6 lb)**

**DNM 6700**

**1300kg (2866.0 lb)**

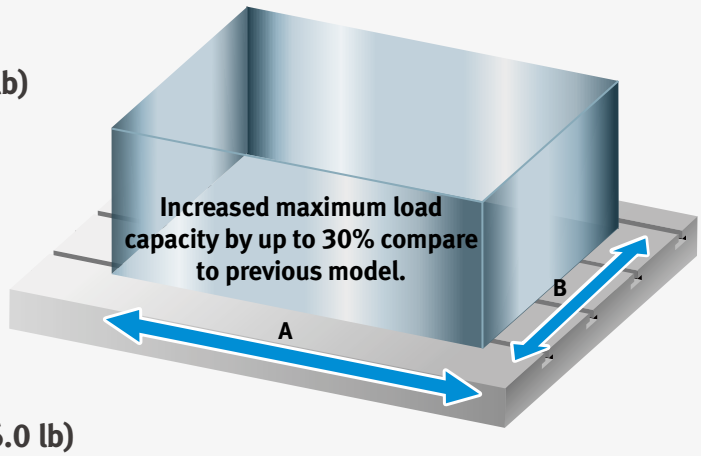



**Table size (A x B)**

**DNM 4500**

**1000 x 450mm**
**(39.4 x 17.7 inch)**

Expanded by 12% compare to previous model

**DNM 5700**

**1300 x 570mm**
**(51.2 x 21.3 inch)**

Expanded by 14% compare to previous model

**DNM 6700**

**1500 x 670mm**
**(59.1 x 26.4 inch)**

Expanded by 15% compare to previous model

## Spindle

Direct-coupled type spindles have been adopted as a standard feature to further reduce vibration and noise while enhancing productivity, work environment and machining accuracy.

**Max. spindle speed**

**8000r/min**

**12000r/min** option

**Max. spindle motor power**

**18.5kW (24.8 Hp)**

**Max. spindle motor torque**

**118N·m (86.9 lbf-ft)**

(8000 r/min std., 12000 r/min spindle torque)

**286N·m (206.7 lbf-ft)** option

(8000 r/min high torque version)

## Tool change system

Tool change time has been optimized to reduce non cutting time. The highly-reliable tool magazine can accommodate up to 30 tools as standard.

### Automatic tool change arm

**Tool to Tool time**

| | |
|---|---|
| Previous model | 1.3s |
| New DNM series | 1.2s |

Reduced by **7.7%**

**Chip to Chip* time**

| | |
|---|---|
| Previous model | 3.7s |
| New DNM series | 3.2s |

Reduced by **13.5%**

* The Chip-to-Chip time has been tested in accordance with Doosan's strict testing conditions, but may vary depending on the user's operating conditions.

### Magazine

**Tool storage capacity**

**30ea**

**40ea** option

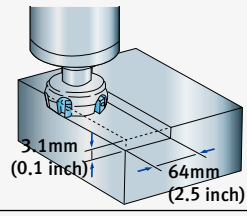
## Machining performance

The DNM series delivers the best cutting performance in its class to optimize productivity.

### Cutting performance

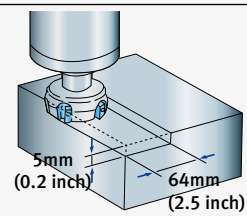
**Face mill (ø80mm (3.15 inch))** Carbon steel (SM45C)

| Chip removal rate cm³/min (inch³/min) | Spindle speed r/min | Feedrate mm/min (ipm) |
|---|---|---|
| 527 (32.2) | 1500 | 2700 (106.3) |



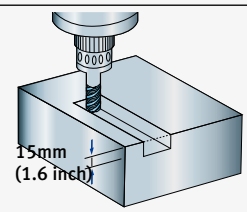

**Face mill (ø80mm (3.15 inch))** Aluminium(AL6061)

| Chip removal rate cm³/min (inch³/min) | Spindle speed r/min | Feedrate mm/min (ipm) |
|---|---|---|
| 1901 (116.0) | 1500 | 5940 (233.9) |



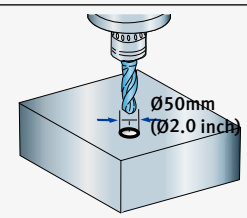

**End mill (ø30mm (i.2 inch))** Carbon steel (SM45C)

| Chip removal rate cm³/min (inch³/min) | Spindle speed r/min | Feedrate mm/min (ipm) |
|---|---|---|
| 48 (2.9) | 222 | 107 (4.2) |



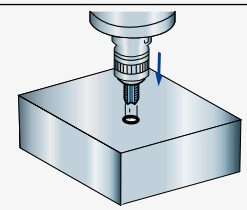

**U-Drill (ø50mm (2.0 inch))** Carbon steel (SM45C)

| Chip removal rate cm³/min (inch³/min) | Spindle speed r/min | Feedrate mm/min (ipm) |
|---|---|---|
| 501 (30.6) | 1500 | 255 (10.0) |



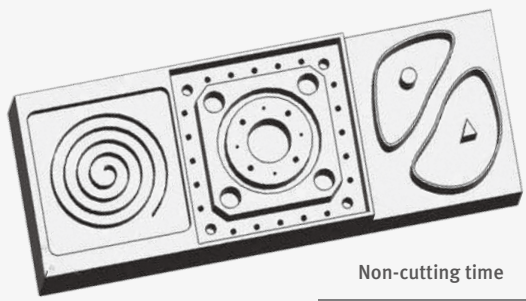

**Tap** Carbon steel (SM45C)

| Tap size mm | Spindle speed r/min | Feedrate mm/min (ipm) |
|---|---|---|
| M 36 x P 4.0 | 221 | 884 (34.8) |



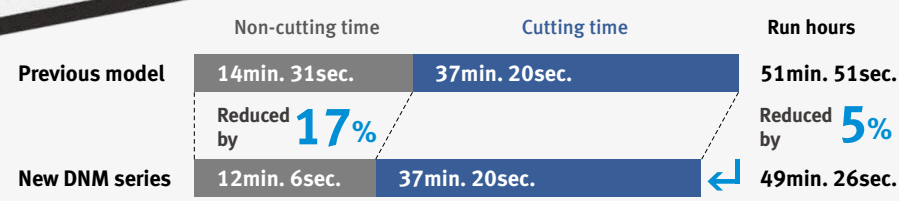
*The results, indicated in this catalogue are provides as example. They may not be obtained due to differences in cutting conditions and environmental conditions during measurement.

### High Productivity



**Sample work**

| | |
|---|---|
| Material | Aluminium (AL6061) |
| Material size | 561 x 210 x 30 mm (22.1 x 8.3 x 1.2 inch) |
| Using tools | 18 ea |




*The results, indicated in this catalogue are provides as example. They may not be obtained due to differences in cutting conditions and environmental conditions during measurement.

## Standard / Optional Specifications

Various optional features are available to satisfy customers' specific machining applications.

● Standard ○ Optional X N/A

| NO. | Description | Features | | DNM 4500 | DNM 5700 | DNM 6700 |
|---|---|---|---|---|---|---|
| 1 | Spindle | 8000 r/min (Unit: kW(Hp), N·m(lbf-ft) | 18.5(24.8)/11(14.8), 117.8(86.9)_FANUC | ● | ● | X |
| 2 | | | 18.5(24.8)/15(20.1), 117.8(86.9)_FANUC | X | X | ● |
| 3 | | | 15(20.1)/11(14.8), 286(210.9)_FANUC | ○ | ○ | ○ |
| 4 | | 12000 r/min (Unit: kW(Hp), N·m(lbf-ft) | 18.5(24.8)/11(14.8), 117.8(86.9)_FANUC | ○ | ○ | ○ |
| 5 | | | 17(22.8)/10(13.4), 108.6(80.1)_HEIDENHAIN | ○ | ○ | X |
| 6 | | | 32(42.9)/15(20.1), 203.7(150.2)_HEIDENHAIN | X | X | ○ |
| 7 | | | 16.5(22.1)/11(14.8), 141(104.0)_SIEMENS | ○ | ○ | X |
| 8 | | | 21.8(29.2)/16.3(21.9), 150.1(110.7)_SIEMENS | X | X | ○ |
| 9 | Magazine | Tool storage capacity | 30 ea | ● | ● | ● |
| 10 | | | 40 ea | ○ | ○ | ○ |
| 11 | Tool shank type | BIG PLUS BT40 | | ● | ● | ● |
| 12 | | BIG PLUS CAT40 | | ○ | ○ | ○ |
| 13 | | BIG PLUS DIN40 | | ○ | ○ | ○ |
| 14 | Raised column | 150 mm (5.9 inch) | | ○ | ○ | ○ |
| 15 | | 200 mm (7.9 inch) | | ○ | ○ | ○ |
| 16 | | 300 mm (11.8 inch) | | ○ | ○ | ○ |
| 17 | Coolant | FLOOD | 0.15 MPa(21.8 psi), 0.4 kW(0.5 Hp) | ● | ● | ● |
| 18 | | | 0.7 MPa(101.5 psi), 1.8 kW(2.4 Hp) | ○ | ○ | ○ |
| 19 | | TSC | None | ● | ● | ● |
| 20 | | | 2 MPa(290.1 psi), 1.5kW(2.0 Hp) | ○ | ○ | ○ |
| 21 | | | 2 MPa(290.1 psi), 4 kW(5.4 Hp) | ○ | ○ | ○ |
| 22 | | | 7 MPa(1015.3 psi), 5.5 kW(7.4 Hp) | ○ | ○ | ○ |
| 23 | | FLUSHING | | ○ | ○ | ○ |
| 24 | | SHOWER (200 L/min (52.8 gal/min)) | | ○ | ○ | ○ |
| 25 | Chip disposal | Chip conveyor | Chip pan | ● | ● | ● |
| 26 | | | Hinged type (Left/Right/Rear) | ○ | ○ | ○ |
| 27 | | | Magnetic scraper type (Left/Right/Rear) | ○ | ○ | ○ |
| 28 | | | Screw(AUGER) type (Left/Right) | ○ | ○ | ○ |
| 29 | | Chip bucket | | ○ | ○ | ○ |
| 30 | | Air blower | | ○ | ○ | ○ |
| 31 | | Air gun | | ○ | ○ | ○ |
| 32 | | Coolant gun | | ○ | ○ | ○ |
| 33 | | Mist collector | | ○ | ○ | ○ |
| 34 | Precision machining option | Linear scale | X / Y / Z axis | ○ | ○ | ○ |
| 35 | | AICC I (40 block) | | ○ | ○ | ○ |
| 36 | | AICC II (200 block) | | ○ | ○ | ○ |
| 37 | | SSP (Smooth Surface Package) | | ○ | ○ | ○ |
| 38 | Measurement & Automation | Automatic tool measurement | TS27R_RENISHAW | ○ | ○ | ○ |
| 39 | | | OTS_RENISHAW | ○ | ○ | ○ |
| 40 | | Automatic tool breakage detection | | ○ | ○ | ○ |
| 41 | | Automatic workpiece measurement | OMP60_RENISHAW | ○ | ○ | ○ |
| 42 | | Automatic front door with safety device | | ○ | ○ | ○ |
| 43 | Others | LED Work light | | ● | ● | ● |
| 44 | | 3 Color signal tower | | ● | ● | ● |
| 45 | | 4th axis auxiliary device interface | | ○ | ○ | ○ |
| 46 | | Tool load monitoring | | ● | ● | ● |
| 47 | | EZ Guide i | | ● | ● | ● |
| 48 | | Automatic power off | | ○ | ○ | ○ |

* Please contact DOOSAN to select detail specifications.

## Peripheral equipments

### Grease lubrication system

The standard grease lubrication system eliminates the need for an oil skimmer and reduces lubrication costs by about 60% compared to oil lubrication.

**Yearly maintenance cost**

**Max. 60% ↓**

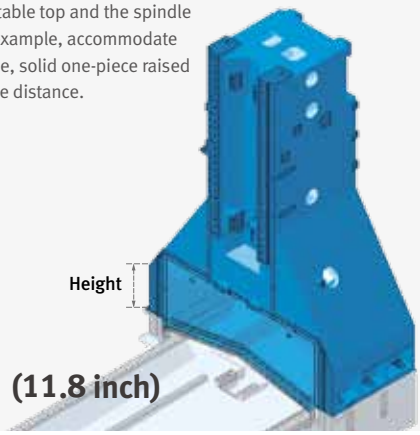

### Raised column option 14~16

When the distance between the table top and the spindle nose needs to be extended, for example, accommodate a fixture or rotary axis on the table, solid one-piece raised column can be used to extend the distance.

**Height 150mm (5.9 inch)**

**200mm (7.9 inch)**

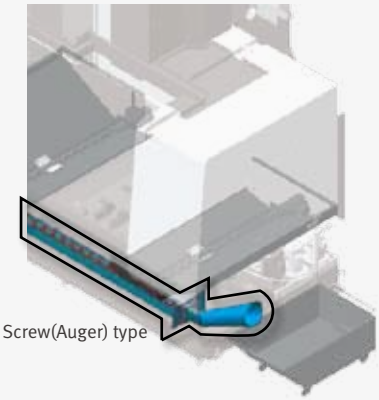
**300mm (11.8 inch)**




### Chip conveyor option 26~28

Hinged belt

Magnetic scraper




| Chip conveyor type | Material | Description |
|---|---|---|
| Hinged belt | Steel | Hinged belt chip conveyor, which is most commonly used for steel work [for cleaning chips longer than 30mm(1.2inch)], is available as an option. |
| Magnetic scraper | Cast Iron | Magnetic scraper type chip conveyor, which is ideal for die-casting work [for cleaning small chips], is available as an option. |
| Screw(Auger) type | Steel | Screw(Auger) type chip conveyor is suitable for minimizing installation space. About 85% floor space is required to install Screw(Auger) type chip conveyor compare to Hinged belt type. |

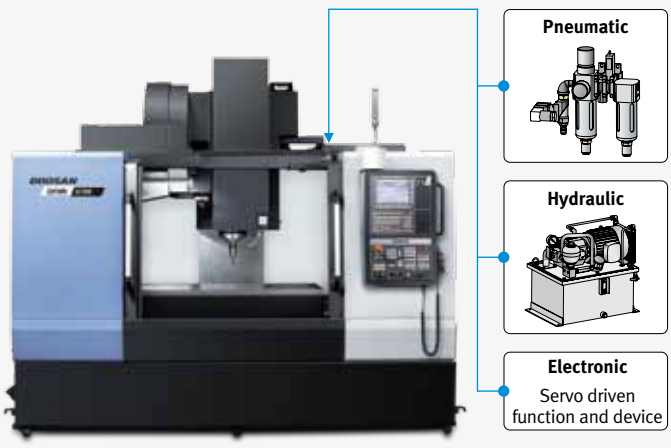
### Chip bucket option 29

**Capacity**

**300L (79.3 gal)**

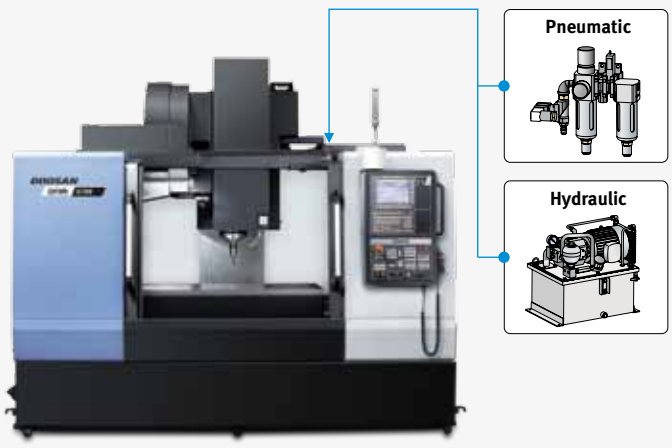
### 4th axis auxiliary device interface option 45

Users who wish to set up a rotary axis on the table to increase application flexibility are encouraged to contact Doosan in advance.




### Hydraulic / Pneumatic fixture line option

The user should prepare pipelines for hydraulic/pneumatic fixtures whose detailed specifications should be determined by discussion with Doosan.



## DOOSAN FANUC i

FANUC CNC has been optimized for Doosan's machine tools to maximize productivity.

### User-friendly operation panel

The newly-designed operation panel enhances operating convenience by common-design buttons and layout. Just like a PC, the QWERTY type keyboard has been adopted for easier and faster operation.


**10.4" Display**


- **10.4” Display**
- **USB & PCMCIA card (Std.)**
- **QWERTY type keyboard**
- **Easy to put button switch for attached option**
- **Ergonomic new design**
- **HOT KEY** ❶
  - To quick operate, some of buttons such as return reference point and tool management etc. are installed on the operation panel.
- **Vertical Key** ❷
  - Improving convenient to use NC functions

## Easy Operation Package

The software developed by Doosan's own technology provides numerous functions designed for convenient operation.


### EOP Main screen

On the operation panel, press the CUSTOM1 button to make the initial EOP screen show up.

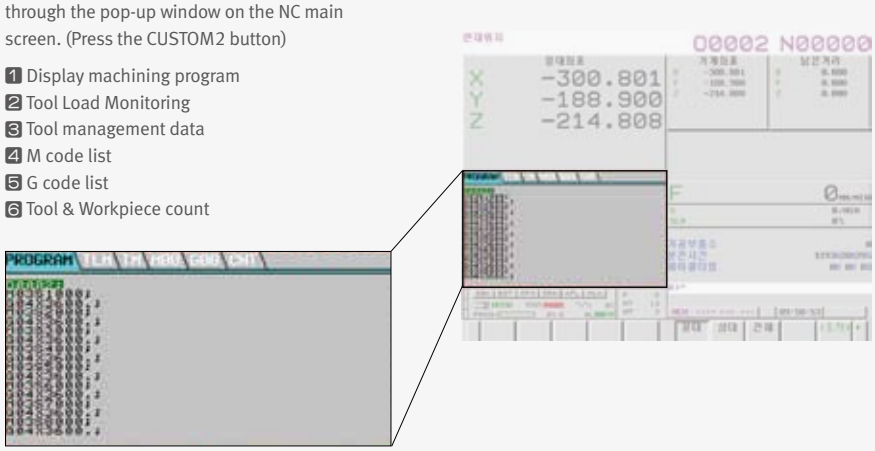
**[HOT KEY of EOP Function]**

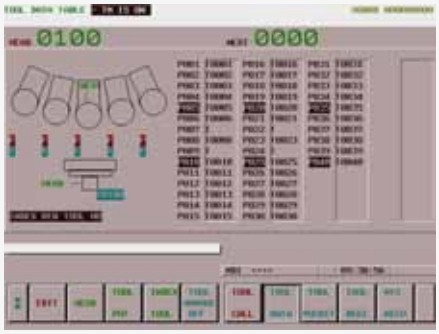
1 Tool management
2 Tool Load Monitoring
3 Table moving for setup
4 Work coordinate setting
5 ATC Recovery
6 Renishaw GUI

### Pop-up function

Various EOP functions can be monitored through the pop-up window on the NC main screen. (Press the CUSTOM2 button)

1 Display machining program
2 Tool Load Monitoring
3 Tool management data
4 M code list
5 G code list
6 Tool & Workpiece count





### Tool management

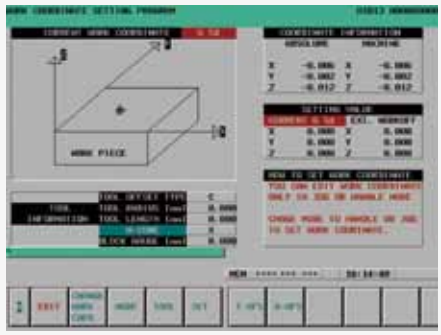
This function controls information on the tools in the tool magazine pots.

### ATC recovery

In the event of an error during ATC (automatic tool changer) operation, follow the on-screen instructions for an easy and prompt solution.

### Table moving for setup

Table can be moved to workpiece setup position with simple operation.

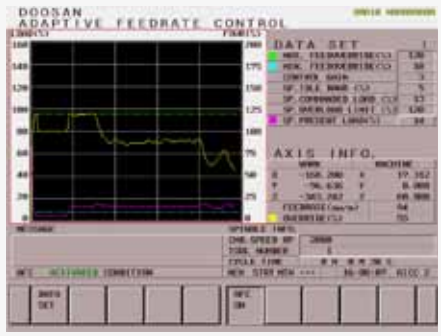


### Work coordinate setting

It is easy to configure various work offset settings.

### Tool load monitoring

During cutting operation, abnormal load caused by wear and tear of the tool is detected and an alarm is triggered to prevent further damage.




### Adaptive Feed Control(AFC)

If tool overload is detected during operation, the feed rate is controlled to prevent the tool from being damaged.

### Thermal compensation function

A thermal error compensation function is provided as a standard feature to secure stable cutting safe from potentially harmful environmental factors.

### Alarm guidance

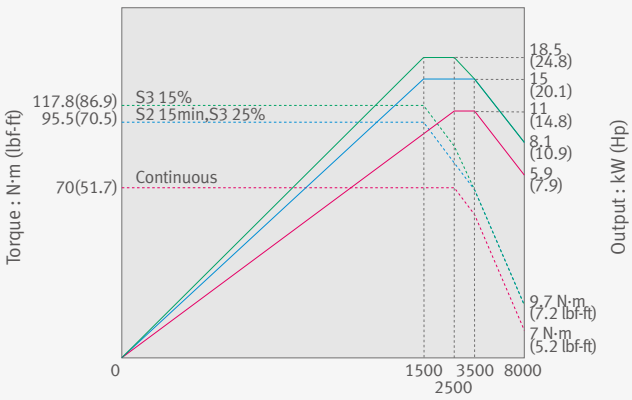
It is easy to show detailed information on frequently occurred alarms and recommended actions.

## Spindle Power – Torque Diagram

### [FANUC] 8000 r/min

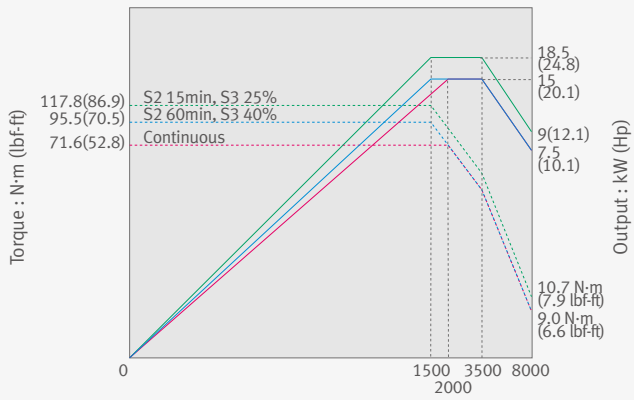
#### DNM 4500/5700

Max. spindle power: 18.5 kW (24.8 Hp)
Max. spindle torque: 117.8 N·m (86.9 lbf-ft)




#### DNM 6700

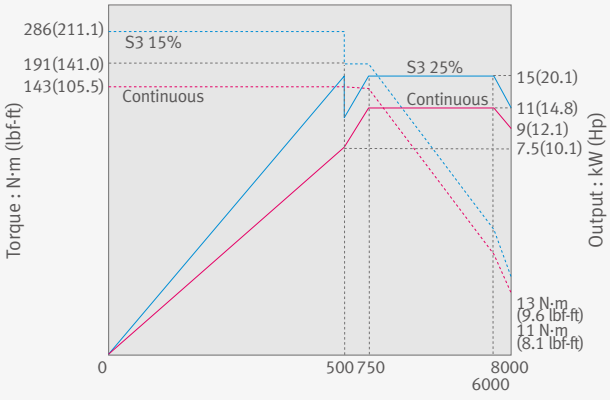
Max. spindle power: 18.5 kW (24.8 Hp)
Max. spindle torque: 117.8 N·m (86.9 lbf-ft)




### [FANUC] 8000 r/min High Torque option

#### DNM 4500/5700/6700

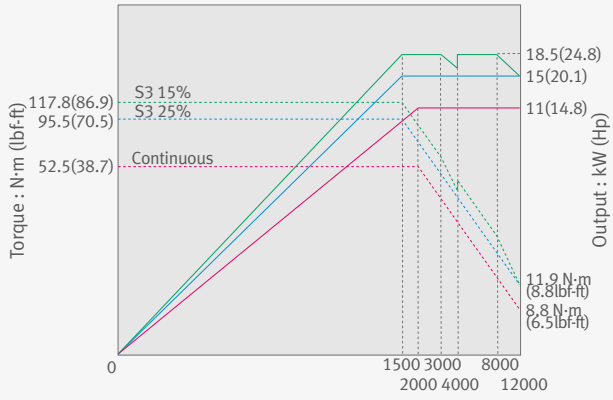
Max. spindle power: 15 kW (20.1 Hp)
Max. spindle torque: 286 N·m (211.1 lbf-ft)




### [FANUC] 12000 r/min option

#### DNM 4500/5700/6700

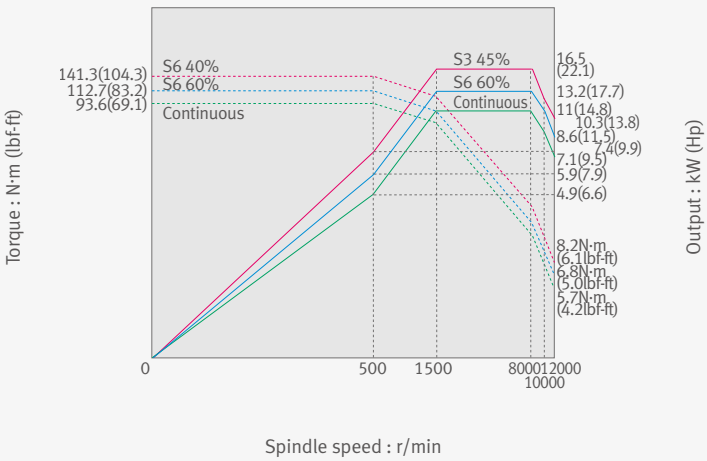
Max. spindle power: 18.5 kW (24.8 Hp)
Max. spindle torque: 117.8 N·m (86.9 lbf-ft)



## [SIEMENS] 12000 r/min

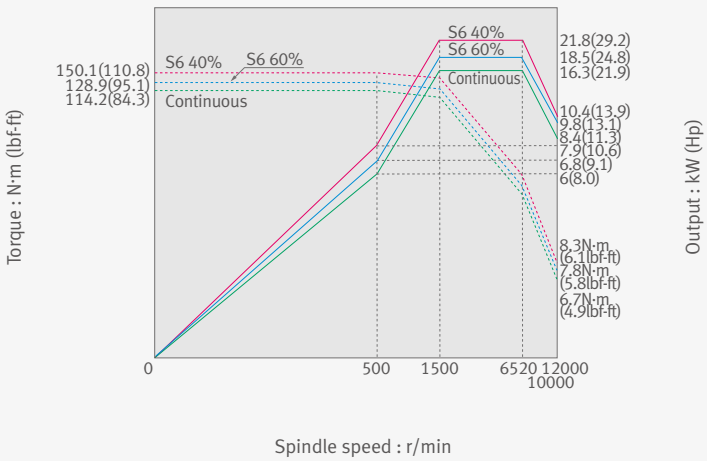
### DNM 4500/5700

Max. spindle power: 16.5 kW (22.1 Hp)
Max. spindle torque: 141.0 N·m (104.0 lbf-ft)




### DNM 6700

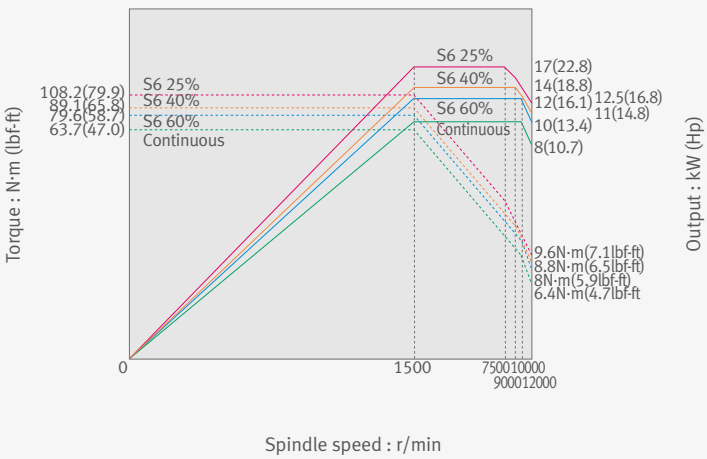
Max. spindle power: 21.8 kW (29.2 Hp)
Max. spindle torque: 150.1 N·m(110.7 lbf-ft)




## [HEIDENHAIN] 12000 r/min

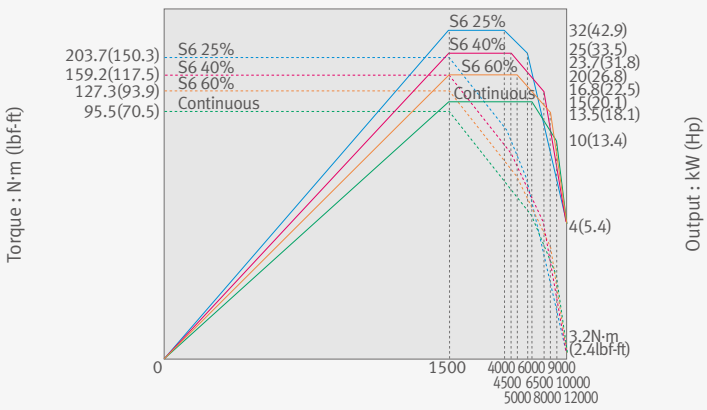
### DNM 4500/5700

Max. spindle power: 17 kW (22.8 Hp)
Max. spindle torque: 108.6 N·m (80.1 lbf-ft)




### DNM 6700

Max. spindle power: 32 kW (42.9 Hp)
Max. spindle torque: 203.7 N·m (150.2 lbf-ft)

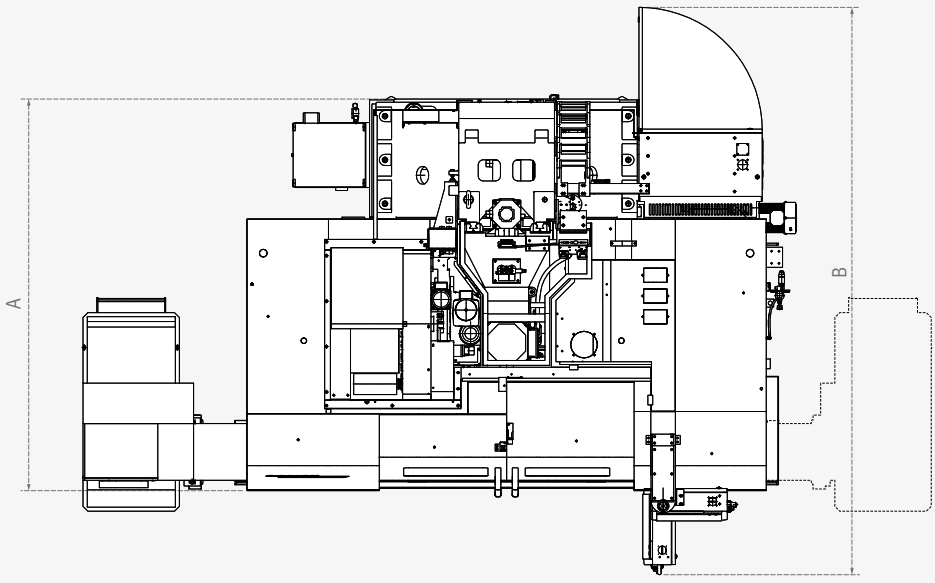


# External Dimensions

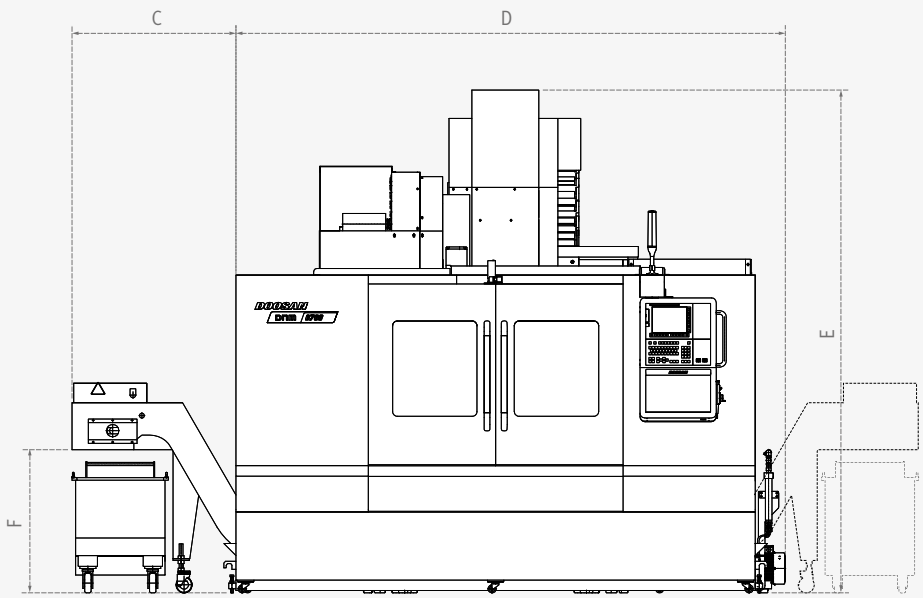
## DNM series (Left or Right side chip conveyor)

Unit: mm (inch)

Top View




Front View



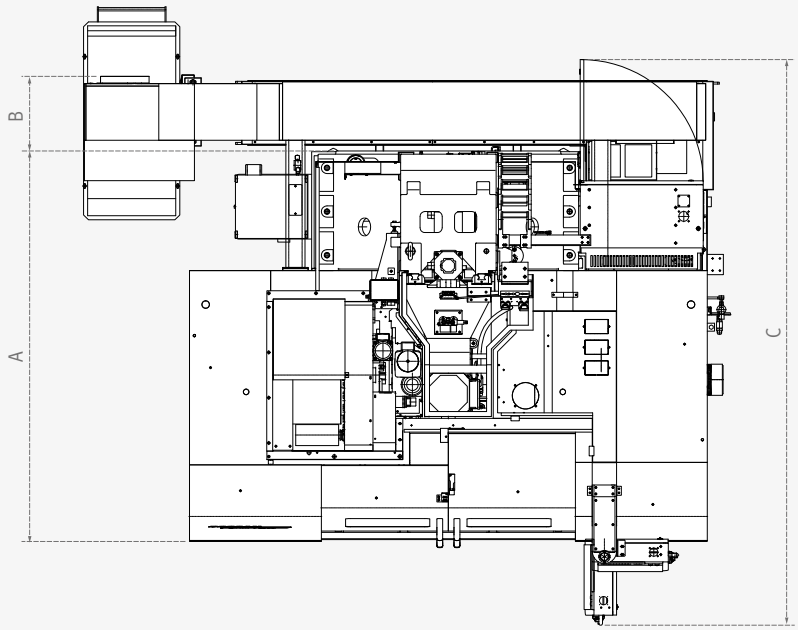

| Model | A (Length) | B[1] | C[2] | D (Width) | E (Height) | F[3] |
|---|---|---|---|---|---|---|
| DNM 4500 | 1966 (77.4) | 3219 (126.7) | 1010 (39.8) [414 (16.3)] | 2634 (103.7) | 2985 (117.5) | 883 (34.8) [440 (17.3)] |
| DNM 5700 | 2221 (87.4) | 3349 (131.9) | 1010 (39.8) [398 (15.7)] | 3145 (123.8) | 2985 (117.5) | 883 (34.8) [440 (17.3)] |
| DNM 6700 | 2415 (95.1) | 3498 (137.7) | 1010 (39.8) [378 (14.9)] | 3385 (133.3) | 3100 (122.0) | 883 (34.8) [440 (17.3)] |

1 Max. machine length (including electric cabinet door and operation panel swiveling)
2 Additional width to accommodate the side chip conveyor. [ ] indicates the additional width required to accommodate a screw(auger)type chip conveyor.
3 Height from the floor to the chip outlet. [ ] indicates the height when a screw(auger) type chip conveyor is installed.

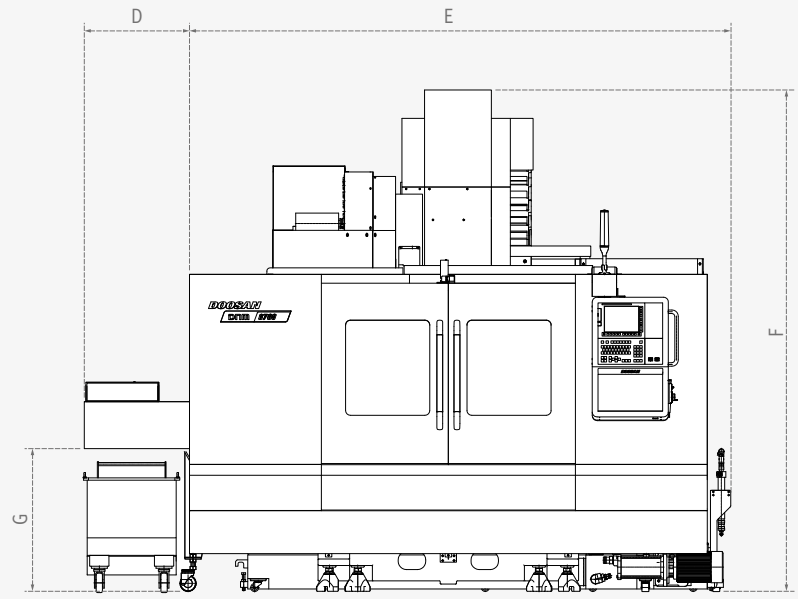
## DNM series (Rear side chip conveyor)

Unit: mm (inch)

Top View




Front View



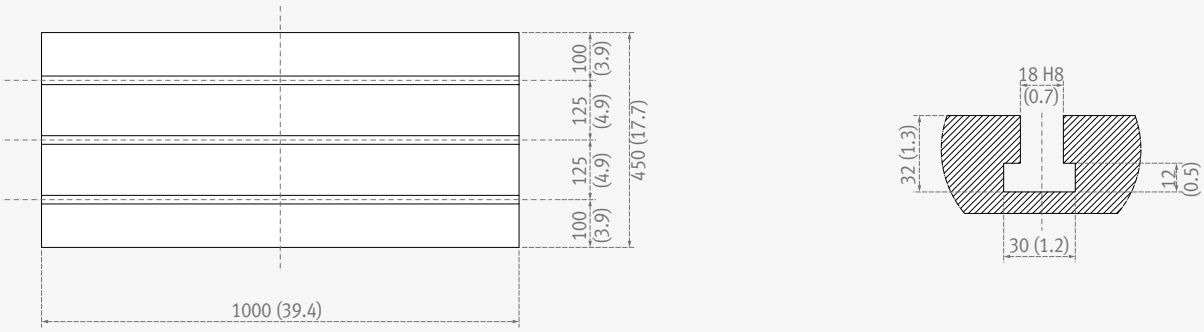

| Model | A (Length) | B[1] | C[2] | D[3] | E (Width) | F (Height) | G[4] |
|---|---|---|---|---|---|---|---|
| **DNM 4500** | 1966 (77.4) | 458 (18.0) | 3219 (126.7) | 880 (34.6) | 2607 (102.6) | 2985 (117.5) | 883 (34.8) |
| **DNM 5700** | 2221 (87.4) | 458 (18.0) | 3349 (131.9) | 650 (25.6) | 3105 (122.2) | 2985 (117.5) | 883 (34.8) |
| **DNM 6700** | 2415 (95.1) | 461 (18.1) | 3498 (137.7) | 650 (25.6) | 3342.5 (131.6) | 3100 (122.0) | 883 (34.8) |

1 Additional length required to accommodate a rear-side chip conveyor.
2 Max. machine length (including electric cabinet door and operation panel swiveling)
3 Additional space required for the machine to accommodate a rear-side chip conveyor.
4 Height from the floor to the chip outlet.

## Table

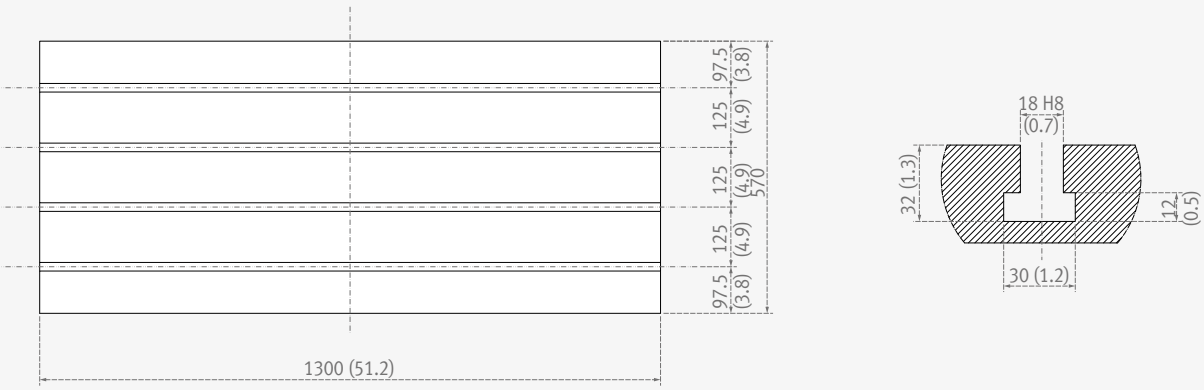
### DNM 4500

Unit: mm (inch)



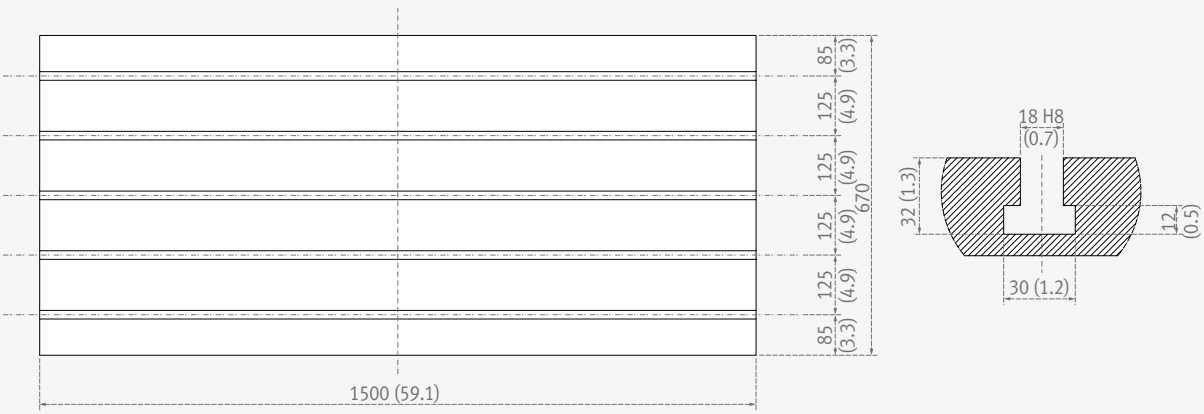

### DNM 5700

Unit: mm (inch)




### DNM 6700

Unit: mm (inch)



## Machine Specifications


| Description | | | Unit | DNM 4500 | DNM 5700 | DNM 6700 |
|---|---|---|---|---|---|---|
| Travels | Travel distance | X axis | mm (inch) | 800 (31.5) | 1050 (41.3) | 1300 (51.2) |
| | | Y axis | mm (inch) | 450 (17.7) | 570 (22.4) | 670 (26.4) |
| | | Z axis | mm (inch) | 510 (20.1) | 510 (20.1) | 625 (24.6) |
| | Distance from spindle nose to table top | | mm (inch) | 150~660 (5.9~26.0) | | 150~775 (5.9~30.5) |
| Table | Table size | | mm (inch) | 1000 x 450 (39.4 x 17.7) | 1300 x 570 (51.2 x 22.4) | 1500 x 670 (59.1 x 26.4) |
| | Table loading capacity | | kg (lb) | 600 (1322.8) | 1000 (2204.6) | 1300 (2866.0) |
| | Table surface type | | mm (inch) | T-SLOT (3-125(4.9) x 18(0.7)H8) | T-SLOT (4-125(4.9) x 18(0.7)H8) | T-SLOT (5-125(4.9) x 18(0.7)H8) |
| Spindle | Max. spindle speed | | r/min | 8000 {12000} | | |
| | Taper | | - | ISO #40 | | |
| | Spindle power | Fanuc (S3/Cont.) | kW (Hp) | 18.5 (24.8) / 11 (14.8) {15 (20.1) / 11 (14.8)*} | | 18.5 (24.8) / 15 (20.1) {18.5 (24.8) / 11 (14.8)**, 15 (20.1) / 11 (14.8)*} |
| | | Siemens (S6 40%/Cont.) | kW (Hp) | 16.5 (22.1) / 11 (14.8) | | 21.8 (29.2) / 16.3 (21.9) |
| | | Heidenhain (S6 25%/Cont.) | kW (Hp) | 17 (22.8) / 10 (13.4) | | 32 (42.9) / 15 (20.1) |
| | Max. spindle torque | Fanuc (S3) | N·m (lbf-ft) | 117.8 (86.9) {286 (210.9)}* | | |
| | | Siemens (S6 40%) | N·m (lbf-ft) | 141 (104.0) | | 150.1 (110.7) |
| | | Heidenhain (S6 25%) | N·m (lbf-ft) | 108.6 (80.1) | | 203.7 (150.2) |
| Feedrates | Rapid traverse rate | X axis | m/min (ipm) | 36 (1417.3) | | |
| | | Y axis | m/min (ipm) | 36 (1417.3) | | |
| | | Z axis | m/min (ipm) | 30 (1181.1) | | |
| Automatic Tool Changer | Type of tool shank | Tool shank | - | BT 40 {CAT 40 / DIN 40} | | |
| | | Pull stud | - | PS806 {Modified DIN / DIN 69872 #40} | | |
| | Tool storage capa. | | ea | 30 {40} | | |
| | Max. tool diameter | Continous | mm (inch) | 80 (3.1) {76 (3.0)} | | |
| | | Without Adjacent Tools | mm (inch) | 125 (4.9) | | |
| | Max. tool length | | mm (inch) | 300 (11.8) | | |
| | Max. tool weight | | kg (lb) | 8 (17.6) | | |
| | Tool selection | | | MEMORY RANDOM | | |
| | Tool change time (Tool-to-tool) | | sec | 1.2 | | |
| | Tool change time (Chip-to-chip) | | sec | 3.2 | | |
| Power source | Electric power supply(rated capacity) | | kVA | 29.6 | | 38.1 {33.0***} |
| | Compressed air supply | | MPa (psi) | 0.54 (78.3) | | |
| Tank capacity | Coolant tank capacity | | L (gal) | 260 (68.7) | 310 (81.9) | 325 (85.9) |
| Machine Dimensions | Height | | mm (inch) | 2985 (117.5) | 2985 (117.5) | 3100 (122.0) |
| | Length | | mm (inch) | 2158 (85.0) | 2413 (95.0) | 2597 (102.2) |
| | Width | | mm (inch) | 2615 (103.0) | 3110 (122.4) | 3350 (131.9) |
| | Weight | | kg (lb) | 5000 (11023) | 6500 (14330) | 8500 (18739) |
| Contrel | NC system | | - | DOOSAN FANUC i / SIEMENS S828D / HEIDENHAIN TNC620 | | |

* 8000 r/min High torque version(FANUC only) ** 12000 r/min spindle power
*** Power capacity of 8000 r/min high torque and 12000 r/min spindle

## NC Unit Specifications

# DOOSAN FANUC i

● Standard ○ Optional X N/A

| No. | Item | | Spec. | DOOSAN FANUC i |
|---|---|---|---|---|
| 1 | Controlled axis | Controlled axes | 3 (X,Y,Z) | X, Y, Z |
| 2 | | Additional controlled axes | 5 axes in total | ○ |
| 3 | | Least command increment | 0.001 mm / 0.0001" | ● |
| 4 | | Least input increment | 0.001 mm / 0.0001" | ● |
| 5 | | Interpolation type pitch error compensation | | ○ |
| 6 | Interpolation & Feed Function | 2nd reference point return | G30 | ● |
| 7 | | 3rd / 4th reference return | | ● |
| 8 | | Inverse time feed | | ● |
| 9 | | Cylinderical interpolation | G07.1 | ● |
| 10 | | Bell-type acceleration/deceleration before look ahead interpolation | | ● |
| 11 | | Automatic corner override | G62 | ● |
| 12 | | Automatic corner deceleration | | ● |
| 13 | | Manual handle feed | Max. 3unit | 1 unit |
| 14 | | Handle interruption | | ● |
| 15 | | Manual handle retrace | | ○ |
| 16 | | Nano smoothing | AI contour control II is required. | ○ |
| 17 | | AI APC | 20 BLOCK | ● |
| 18 | | AICC I | 40 BLOCK | ○ |
| 19 | | AICC II | 200 BLOCK | ○ |
| 20 | | AICC II(Preview block number increase) | 400 BLOCK(Special hardware and AI contour control II) | ○ |
| 21 | Spindle & M code Function | M- code function | | ● |
| 22 | | Retraction for rigid tapping | | ● |
| 23 | | Rigid tapping | G84, G74 | ● |
| 24 | Tool Function | Number of tool offsets | 400 ea | 400 ea |
| 25 | | Tool nose radius compensation | G40, G41, G42 | ● |
| 26 | | Tool length compensation | G43, G44, G49 | ● |
| 27 | | Tool life management | | ● |
| 28 | | Tool offset | G45 - G48 | ● |
| 29 | Programming & Editing Function | Custom macro | | ● |
| 30 | | Macro executor | | ● |
| 31 | | Extended part program editing | | ● |
| 32 | | Part program storage | 512KB(1280m) | 1280m |
| 33 | | Part program storage | 2MB(5120m) | ○ |
| 34 | | Inch/metric conversion | G20 / G21 | ● |
| 35 | | Number of Registered programs | 400 ea | 400 ea |
| 36 | | Number of Registered programs | 1000 ea | ○ |
| 37 | | Optional block skip | 9 BLOCK | ● |
| 38 | | Optional stop | M01 | ● |
| 39 | | Program file name | 32 characters | ● |
| 40 | | Sequence number | N 8-digit | N8 digit |
| 41 | | Playback function | | ● |
| 42 | | Addition of workpiece coordinate system | G54.1 P1 - 48 (48 pairs) | 48 pairs |
| 43 | | Addition of workpiece coordinate system | G54.1 P1 - 300 (300 pairs) | ○ |
| 44 | OTHER FUNCTIONS (Operation, setting & Display, etc) | Embeded Ethernet | | ● |
| 45 | | Graphic display | Tool path drawing | ● |
| 46 | | Loadmeter display | | ● |
| 47 | | Memory card interface | | ● |
| 48 | | USB memory interface | Only Data Read & Write | ● |
| 49 | | Operation history display | | ● |
| 50 | | DNC operation with memory card | | ● |
| 51 | | Optional angle chamfering / corner R | | ● |
| 52 | | Run hour and part number display | | ● |
| 53 | | High speed skip function | | ● |
| 54 | | Polar coordinate command | G15 / G16 | ● |
| 55 | | Programmable mirror image | G50.1 / G51.1 | ● |
| 56 | | Scaling | G50, G51 | ● |
| 57 | | Single direction positioning | G60 | ● |
| 58 | | Pattern data input | | ● |
| 59 | | Jerk control | AI contour control II is required. | ○ |
| 60 | | Fast Data server with1GB PCMCIA card | | ○ |
| 61 | | Fast Ethernet | | ○ |
| 62 | | 3-dimensional coordinate conversion | | ○ |
| 63 | | Figure copying | G72.1, G72.2 | ○ |
| 64 | | Machining time stamp function | | ○ |
| 65 | | EZ Guide I with 10.4" Color TFT | -.Doosan infracore Conversational Programming Solution<br>-.When the EZ Guide i is used, the Dynamic graphic display cannot application " | ● |
| 66 | | Dynamic graphic display (with 10.4" Color TFT LCD) | -.Machining profile drawing.<br>-.When the EZ Guide i is used, the Dynamic graphic display cannot application | ○ |

# SIEMENS S828D

● Standard ○ Optional X N/A

| No. | Item | | Spec. | S828D |
|---|---|---|---|---|
| 1 | Controlled axis | Controlled axes | 3 axes | X, Y, Z |
| 2 | | Additional controlled axes | Max. 5 axes in total | ○ |
| 3 | | Least command increment | 0.001mm (0.0001 inch) | ● |
| 4 | | Least input increment | 0.001mm (0.0001 inch) | ● |
| 5 | | Travel to fixed stop with Force Control | | ○ |
| 6 | Interpolation & Feed Function | Reference point return | G75 FP=1 | ● |
| 7 | | 2nd reference point return | G75 FP=2 | ● |
| 8 | | 3rd / 4th reference return | G75 FP=3, 4 | ● |
| 9 | | Inverse time feedrate | G93 | ● |
| 10 | | Helical interpolation | | ● |
| 11 | | Polynomial interpolation | | N/A |
| 12 | | Spline interpolation (A, B and C splines) | | ○ |
| 13 | | Separate path feed for corners and chamfers | | ● |
| 14 | | Acceleration with Jerklimitation | | ● |
| 15 | | Compressor for 3-axis machining | | ● |
| 16 | | Temperature compensation | | ● |
| 17 | | Look ahead number of block | 150 BLOCK | ● |
| 18 | | Cartesian point-to-point (PTP) travel | | ● |
| 19 | | TRANSMIT/cylinder surface transformation | | ○ |
| 20 | Spindle Function | Tapping with compensating chuck/rigid tapping | | ● |
| 21 | | Retraction for rigid tapping | | ● |
| 22 | Tool Function | Tool radius compensations in plane | | ● |
| 23 | | Number of tools/cutting edges in tool list | 256/512 | ● |
| 24 | | | 600/1500 | N/A |
| 25 | | Tool length compensation | | ● |
| 26 | | Operation with tool management | | ● |
| 27 | | Tool list | | ● |
| 28 | | Replacement tools for tool management | | ○ |
| 29 | | Monitoring of tool life and workpiece count | | ● |
| 30 | | Manual measurement of tool offset | | ● |
| 31 | | Magazine list | | ● |
| 32 | Programming & Editing Function | Number of levels for skip blocks 1 | | ● |
| 33 | | Number of levels for skip blocks 8 | | ○ |
| 34 | | Program/workpiece management | On additional plug-in CF card | ● |
| 35 | | | On integral Hard disk PCU50.3 | N/A |
| 36 | | | On USB storage medium (e.g. disk drive, USB stick) | ● |
| 37 | | | On network drive | ○ |
| 38 | | Program editor | Programming support for cycles program(Program Guide) | ● |
| 39 | | | CNC editor with editing functions: Marking, copying, deleting | ● |
| 40 | | | Programming graphics/free contour input (contour calculator) | ● |
| 41 | | | ShopMill Machining step programming | ● |
| 42 | | Technology cycles for drilling/milling | | ● |
| 43 | | Pocket milling free contour and islands stock removal cycle | | ● |
| 44 | | Residual material detection | | ● |
| 45 | | Access protection for cycles | | ● |
| 46 | | Programming support can be extended, e.g. customer cycles | | ● |
| 47 | | 2D simulation | | ● |
| 48 | | 3D simulation, finished part | | ● |
| 49 | OTHERS FUNCTIONS (Operation, setting & Display, etc) | Switchover: inch/metric | | ● |
| 50 | | Manual measurement of zero/work offset | | ● |
| 51 | | Automatic tool/workpiece measurement | | ● |
| 52 | | Reference point approach, automatic/via CNC program | | ● |
| 53 | | Execution from USB or CF card interface on operator panel front | | ● |
| 54 | | Execution from network drive | | ○ |
| 55 | | 10.4" color display | | ● |
| 56 | | 15.0" color display | | N/A |
| 57 | | Alarms and messages | | ● |
| 58 | | Remote Control System (RCS) remote diagnostics | RCS Host remote diagnostics function | ○ |
| 59 | | | RCS Commander (viewer function) | ● |
| 60 | | Automatic measuring cycles | | ○ |

## NC Unit Specifications

# HEIDENHAIN TNC620

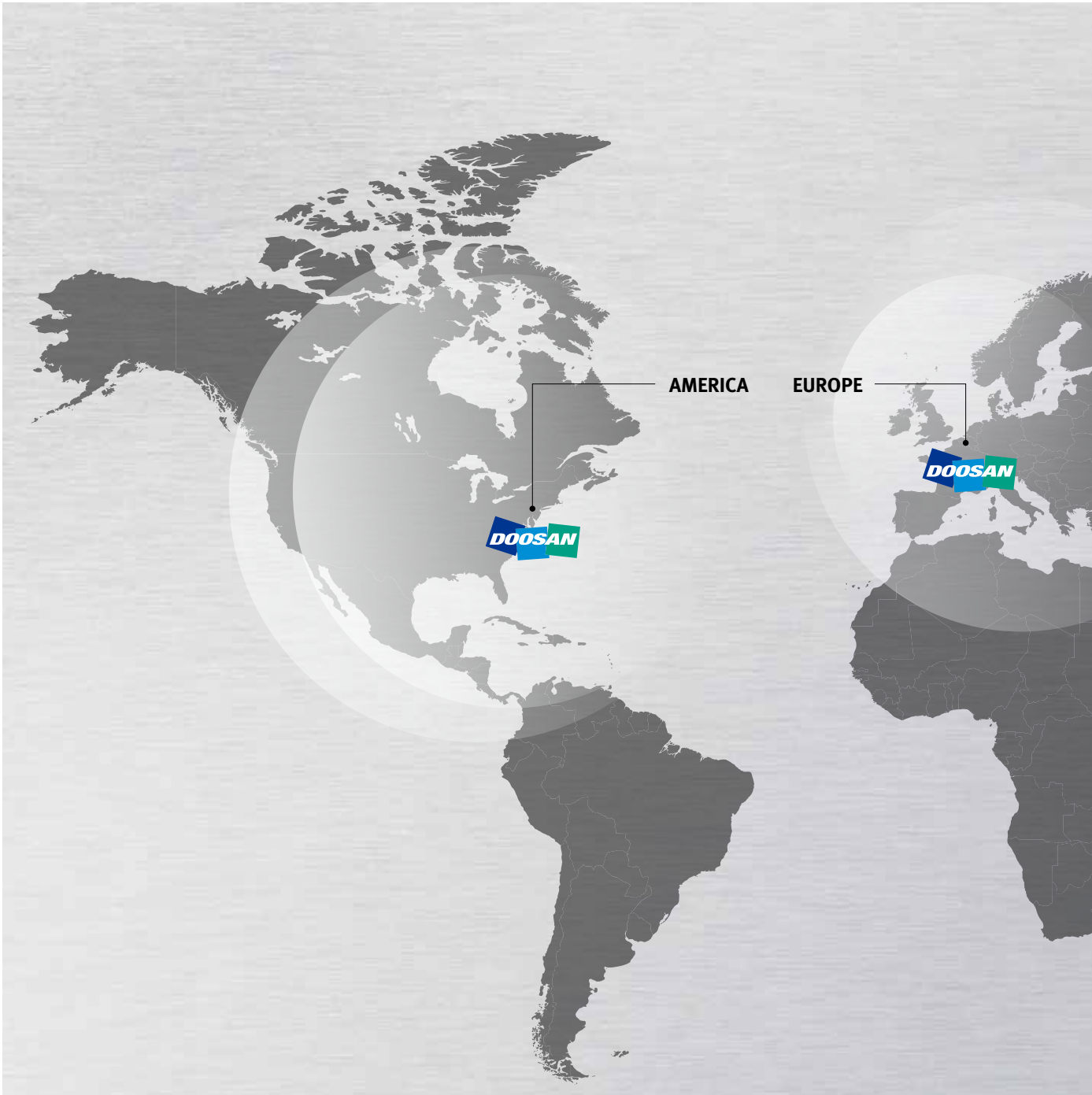
● Standard ○ Optional X N/A

| NO. | Item | | Spec. | TNC 620 |
|---|---|---|---|---|
| 1 | Axes | Controlled axes | 3 axes | X, Y, Z |
| 2 | | Additional Controlled axes | Max. 18 axes in total | ○ (Max. 6axes) |
| 3 | | Least command increment | 0.0001 mm (0.0001 inch), 0.0001° | ● |
| 4 | | Least input increment | 0.0001 mm (0.0001 inch), 0.0001° | ● |
| 5 | | MDI / DISPLAY unit | 15.1 inch TFT color flat panel | ● |
| 6 | | Program memory for NC programs | SSDR | 8GB |
| 7 | Commissioning and diagnostics | Data interfaces | Ethernet interface | ● |
| 8 | | | USB interface (USB 2.0) | ● |
| 9 | Machine functions | Look-ahead (Intelligent path control by calculating the path speed ahead of time) | Max. 1024 blocks. | N/A |
| 10 | | | Max. 5000 blocks. | ● |
| 11 | | HSC filters | | ● |
| 12 | | Switching the traverse ranges | | N/A |
| 13 | User functions | Tool compensation | In the working plane and tool length | ● |
| 14 | | | Radius-compensated contour lookahead for up to 99 blocks (M120) | ○ |
| 15 | | | Three-dimensional tool radius compensation | ○ |
| 16 | | Tool table | Central storage of tool data | ● |
| 17 | | | Multiple tool tables with any number of tools | ● |
| 18 | | MDI mode | | N/A |
| 19 | | Tilting the working plane with Cycle 19 | | ○ |
| 20 | | Tilting the working plane with the PLANE function | | ○ |
| 21 | | Manual traverse in tool-axis direction | after interruption of program run | ● |
| 22 | | Function TCPM | Retaining the position of tool tip when positioning tilting axes | ○ |
| 23 | | Rotary table machining | Programming of cylindrical contours as if in two axes | ○ |
| 24 | | | Feed rate in distance per minute | ○ |
| 25 | | New 3-D simulation graphics in full detail | | ● |
| 26 | | Program verification graphics | Plan view, view in three planes, 3-D view | ● |
| 27 | | | 3-D line graphics | ● |
| 28 | | Enhanced file management | | ● |
| 29 | | Context-sensitive help for error messages | | ● |
| 30 | | TNCguide | Browser-based, context-sensitive helpsystem | ● |
| 31 | | Calculator | | ● |
| 32 | | "Save As" function | | ● |
| 33 | Fixed cycles | Pecking | Cycle 1 | ● |
| 34 | | Tapping | Cycle 2 | ● |
| 35 | | Slot milling | Cycle 3 | ● |
| 36 | | Pocket milling | Cycle 4 | ● |
| 37 | | Circular pocket | Cycle 5 | ● |
| 38 | | Datum shift | Cycle 7 | ● |
| 39 | | Mirror imaging | Cycle 8 | ● |

● Standard ○ Optional X N/A

| NO. | Item | | Spec. | TNC 620 |
|---|---|---|---|---|
| 40 | Fixed cycles | Dwell time | Cycle 9 | ● |
| 41 | | Rotation | Cycle 10 | ● |
| 42 | | Scaling factor | Cycle 11 | ● |
| 43 | | Program call | Cycle 12 | ● |
| 44 | | Oriented spindle stop | Cycle 13 | ● |
| 45 | | Rigid tapping (controlled spindle) | Cycle 17 | ● |
| 46 | | Working plane | Cycle 19 | ○ |
| 47 | | Cylinder surface | Cycle 27 | ○ |
| 48 | | Cylinder surface slot milling | Cycle 28 | ○ |
| 49 | | Cylinder surface ridge milling | Cycle 29 | ○ |
| 50 | | Tolerance (HSC mode, TA) | Cycle 32 | ○ |
| 51 | | Rigid tapping, new | Cycle 207 | ● |
| 52 | | Tapping with chip breaking | Cycle 209 | ● |
| 53 | | Polar pattern | Cycle 220 | ● |
| 54 | | Cartesian pattern | Cycle 221 | ● |
| 55 | | Engraving | Cycle 225 | ● |
| 56 | | Multipass milling | Cycle 230 | ● |
| 57 | | Face milling | Cycle 233<br>Eenhanced with side walls, milling direction and strategy | ● |
| 58 | | Centering | Cycle 240 | ● |
| 59 | | Single-lip deep-hole drilling | Cycle 241 | ● |
| 60 | | Datum setting | Cycle 247 | ● |
| 61 | | Rectangular pocket, complete | Cycle 251 | ● |
| 62 | | Circular pocket, complete | Cycle 252 | ● |
| 63 | | Slot, complete | Cycle 253 | ● |
| 64 | | Circular slot, complete | Cycle 254 | ● |
| 65 | | Rectangular stud, complete | Cycle 256 | ● |
| 66 | | Circular stud, complete | Cycle 257 | ● |
| 67 | | Thread milling | Cycle 262 | ● |
| 68 | | Thread milling/countersinking | Cycle 263 | ● |
| 69 | | Thread drilling/milling | Cycle 264 | ● |
| 70 | | Helical thread drilling/milling | Cycle 265 | ● |
| 71 | | Outside thread milling | Cycle 267 | ● |
| 72 | | Trochoidal milling | Cycle 275 | ● |
| 73 | Touch probe cycles | Calibrating the effective radius on a circular stud | | ● |
| 74 | | Calibrating the effective radius on a sphere | | ● |
| 75 | Cycles for automatic workpiece inspection | Save kinematics | | ○ |
| 76 | | Measure kinematics | | ○ |
| 77 | | Preset compensation | | ○ |
| 78 | | TS calibration of length | | ○ |
| 79 | | TS calibration in a ring | | ○ |
| 80 | | TS calibration on stud | | ○ |
| 81 | Options | Software option 1 | Rotary table machining, Coordinate transformation, Interpolation | ○ |
| 82 | | Software option 2 | 3-D machining, Interpolation | ○ |

# Responding to Customers Anytime, Anywhere




## Global Service Support Network

| Corporations | Dealer Networks | Technical Centers | Factories |
|---|---|---|---|
| 5 | 122 | 18 | 3 |

Technical Center: Sales Support, Service Support, Parts Support

## Doosan Machine Tools' Global Network, Responding to Customer's Needs nearby, Anytime, Anywhere

Doosan machine tools provides a system-based professional support service before and after the machine tool sale by responding quickly and efficiently to customers' demands. By supplying spare parts, product training, field service and technical support, we can provide top class support to our customers around the world.


### Domestic Service Support Network

| Integrated Support Centers | Sales Branch Offices | Post-Sales Service Centers | Designated Repair Service Centers |
|---|---|---|---|
| 2 | 7 | 6 | 31 |

## Customer Support Service

We help customers to achieve success by providing a variety of professional services from pre-sales consultancy to post-sales support.

### Supplying Parts

- Supplying a wide range of original Doosan spare parts
- Parts repair service

### Field Services

- On site service
- Machine installation and testing
- Scheduled preventive maintenance
- Machine repair

### Technical Support

- Supports machining methods and technology
- Responds to technical queries
- Provides technical consultancy

### Training

- Programming / machine setup and operation
- Electrical and mechanical maintenance
- Applications engineering

## Major Specifications

### DNM series

| Description | UNIT | DNM 4500 | DNM 5700 | DNM 6700 |
|---|---|---|---|---|
| Max. spindle speed | r/min | 8000 {12000}* | | |
| Max. spindle power | kW (Hp) | 18.5(24.8) {15(20.1)**} | | |
| Max. spindle torque | N·m (lbf-ft) | 118 {86.9) {286(210.9)**} | | |
| Taper | - | ISO #40 | | |
| Travel distance (X / Y / Z) | mm (inch) | 800 / 450 / 510 (31.5 / 17.7 / 20.1) | 1050 / 570 / 510 (41.3 / 22.4 / 20.1) | 1300 / 670 / 625 (51.2 / 26.4 / 24.6) |
| Tool storage capa. | ea | 30 {40} | | |
| Table size | mm (inch) | 1000 x 450 (39.4 x 17.7) | 1300 x 570 (51.2 x 22.4) | 1500 x 670 (59.1 x 26.4) |
| NC system | - | DOOSAN FANUC i / SIEMENS S828D / HEIDENHAIN TNC620 | | |

*{ } Optional ** 8000 r/min High torque version

# Doosan Machine Tools

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## *Optimal Solutions for the Future*


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* For more details, please contact Doosan Machine Tools.
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