

**GAMMA<sup>®</sup> CNC**  
Machining Center

**DMN Series**



**High Speed Drill Tapping  
Machining Center**

**ALWAYS  
STAND  
WITH YOU!**





### High Speed Drill Tapping Machining Center

The high-rigidity machine structure realizing the high-speed machining application with high-speed spindle and fast feed has high machining efficiency in combination with the direct-link high-speed spindle. It is particularly suitable for high-speed machining, 3C products, optoelectronics, auto parts, communication products, etc. It is also suitable for copper electrodes, dies and other applications.



**DMN-500L**  
BT30 12000/20000rpm

Direct-link spindle  
Travel: 500\*400\*380



**DMN-600L**  
BT30 12000/20000rpm

Direct-link spindle  
Travel: 600\*400\*380



## DMN-500/600L

### Steady Triangular Structure Casting

- ★ Test and analyze by using the most advanced finite element method and utilizing the pressure distribution of the computer simulation structure, the vibration source analysis and design changes, the structure location and other important mechanical and physical change factors in order to ensure that the design of all mechanical parts is improved to the optimum.
- ★ Although the cost of iron castings is higher, Gamma adheres to use of the iron castings to manufacture the main components as the damping capacity of the iron castings is ten times higher than the steel castings. The reinforcing ribs are also arranged in Gamma iron castings in order to minimize the distortion and maximize the damping capacity. In addition, all Gamma iron castings are thoroughly inspected to ensure there is no crack before and after machining.
- ★ The high-rigidity ultra-wide base and the chevron column are made of unibody HT300 cast iron to enjoy good stability, high rigidity and fine firmness and provide the most stable heavy load supporting force, and the workbench is not overhung and has excellent rigidity and stability in combination with the strengthened design of all shafts.

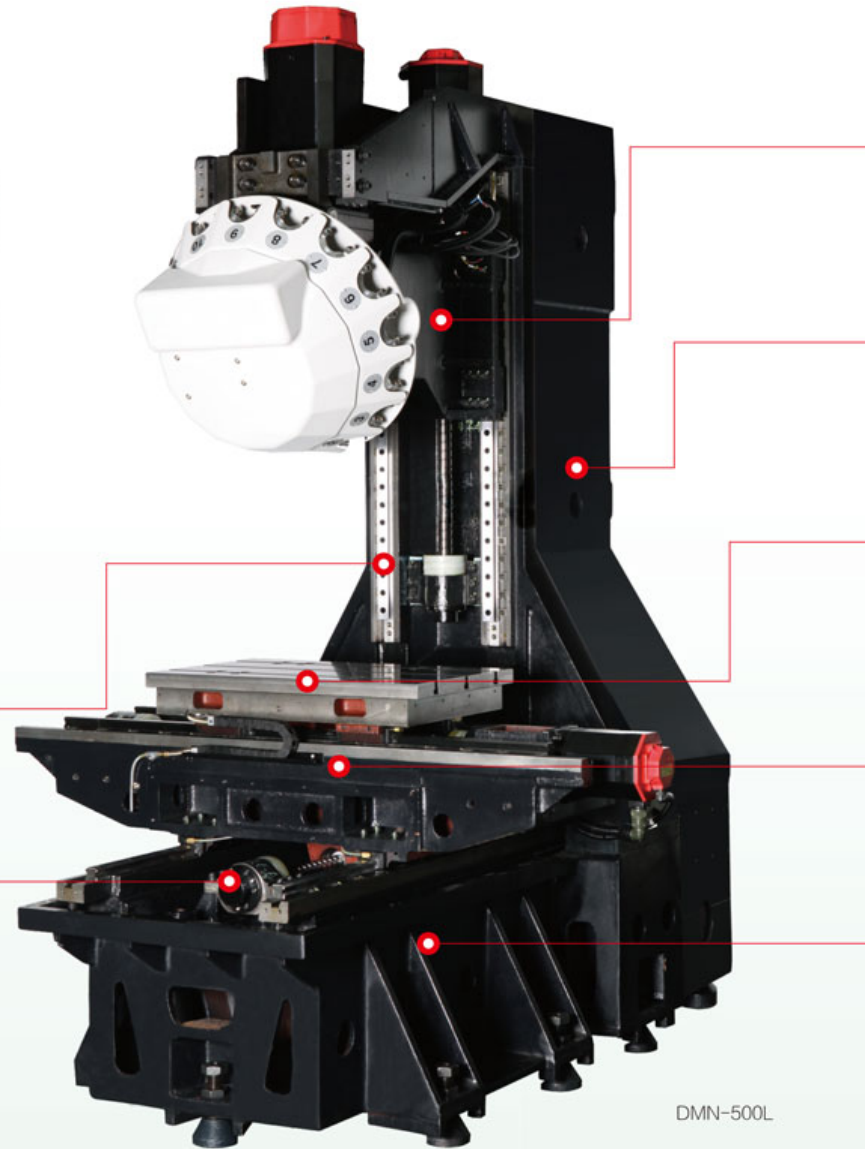
#### High Precision Guideway

Each linear guideway uses the quenched steel linear rail, which is preloaded to achieve the zero clearance and the full load capacity in each direction.  
X-axis and Y-axis precision linear ball guideway  
Z-axis precision linear roller guideway



#### High Precision C3 Ball Screw

The back clearance free, low noise and steady temperature rising control high-precision ball screw is used and is parallel to the guide rail through the precision measurement. The preloaded precision nut eliminates the back clearance.



DMN-500L



#### 1. Head Stock

The direct-link spindle is matched with the head stock with the rib strengthening design, featuring high sensitivity, no belt noise, low shock and no back clearance. The proportion of contact length between the spindle head and the column is proper, being golden proportion, providing steady support for the spindle, greatly improving the supporting area of the machine head and having very good machining stability.



#### 2. Chevron column

High-strength column structure design is adopted to bear heavy cutting and high-speed running without deformation. You will feel true powerful force. With the supporting of ultra-large and ultra-wide column, the internally reinforced layout and the grid intersecting arrangement of rib plates, the anti-torque ability is strong, so that the product is suitable for heavy cutting.



#### 3. Table

The ultra-thick and ultra-large table is arranged on X-axis flatwise, the weight is distributed uniformly on the workbench, and the rigidity and the bearing capacity are ultra-strong to ensure that the guide rail of the machine tool is durable and holds precision for a long time.



#### 4. Saddle

The double-T ultra-wide structure extends the contact span of the saddle, enhances the torsional strength, strengthens the dynamic stability and ensures speediness and stationarity.



#### 5. Heavy cast iron base

With the ultra-wide supporting anchor, the supporting area is large; with the supporting of box structure, strong stability and good rigidity, the product is suitable for heavy cutting machining.





## Direct-link Spindle

1. In combination with the oil temperature control system, the spindle can effectively produce the constant temperature effect in the high-speed running to effectively control the thermal distortion of the spindle and ensure the high speed and high precision of the spindle.
2. The spindle air curtain protection system effectively controls the vacuum collected dust generated due to high-speed running to ensure the spindle precision and extend the service life of the spindle.
3. The motor is connected with the high-rigidity zero clearance coupling of the spindle to reduce the loss of motor output power, so that the mechanical efficiency is high.

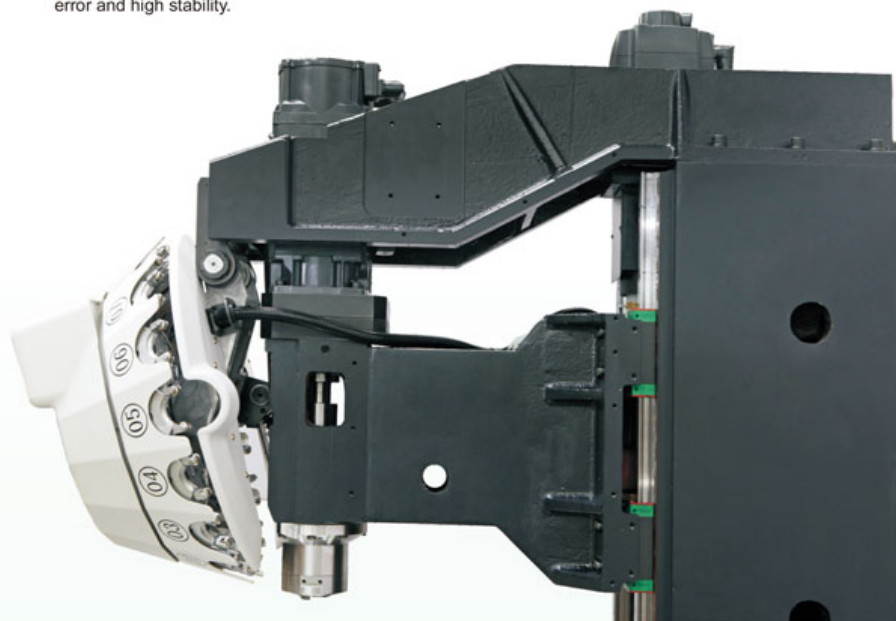


BT30-12000rpm

BT30-20000rpm



- ★ Direct-link spindle--Direct-link drive, high efficiency and not power loss of belt.
- ★ Highly rigid tapping, no transmission back clearance, high speed, and extended service life of tools.
- ★ High-speed machining, high precision, high efficiency, and die and high-quality machining; spindle with high speed up to 20000 rpm;
- ★ Low noise, small vibration, moderate cutting force, small deformation error and high stability.



For BT30-12000rpm, two pairs of upper and lower precision steel ball bearings are arranged at the spindle mouth part, the internal diameter of the bearing is  $\phi 45$ , and the external diameter of the bearing is  $\phi 95$ .

For BT30-20000rpm, two pairs of upper and lower precision ceramic bearings are arranged at the spindle mouth part, the internal diameter of the bearing is  $\phi 45$ , and the external diameter of the bearing is  $\phi 95$ .

### SIEMENS 828D BASIC

- Number of simultaneously controlled shafts: 3
- 8.4-inch TFT color display
- 80-digit floating-point number nanometer computing accuracy
- Tool management function
- Integrated automatic servo optimization function
- Two-dimensional graphic machining simulation
- Look-ahead blocks 50
- 1MB CNC user memory
- Memory extended through USB device or by inserting the user's CF card from the front interface
- On-line ISO language compiler
- Acceleration control
- Machine tool option management (Easy Extend)
- Program GUIDE circulating programming support
- On-line help system
- SINUMERIK Operate graphic user interface with animation support, automatic position calculation and program segment searching of machining functions

### Option functions

- Advanced extension process cycle
- Extended operation function
- Shop mill step programming
- Detection and removal of residual materials by contour machining
- SMS function (Easy Message)
- TRANSMIT/cylinder conversion
- Network drive management
- Tool replacement management
- Spline interpolation
- Contour handwheel
- 3D simulation machining
- Real-time machining simulation

### SIEMENS 828D (optional)

- Number of simultaneously controlled shafts: 3
- 8.4-inch TFT color display
- 80-digit floating-point number nanometer computing accuracy
- Tool management function
- Integrated automatic servo optimization function
- Two-dimensional graphic machining simulation
- 100-segment program pre-reading
- 3MB CNC user memory
- Memory extended through USB device or by inserting the user's CF card from the front interface
- On-line ISO language compiler
- Acceleration control
- Machine tool option management (Easy Extend)
- Program GUIDE circulating programming support
- Advanced extension process cycle
- On-line help system
- SINUMERIK Operate graphic user interface with animation support, automatic position calculation and program segment searching of machining functions

### Option functions

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- SMS function (Easy Message)
- TRANSMIT/cylinder conversion
- Network drive management
- Tool replacement management
- Spline interpolation
- Contour handwheel
- 3D simulation machining
- Real-time machining simulation

### Operation cabinet (operation panel)

- ★ Humanized man-machine operating interface.
- ★ The operation panel conforms to the safety specifications and is rotatable, being easy to operate and conforming to the best somatological visual height.
- ★ The fault warning signal is display on the screen to facilitate troubleshooting.
- ★ It adopts the 90-degree rotation design, being convenient to operate.
- ★ With touch keys as well as graphic and text display, it is simple to operate.
- ★ The important keys of the panel are additionally provided with the protective caps. Execute after conformation to avoid malfunction.
- ★ The red lamp is turned on for warning to facilitate troubleshooting if the machine is abnormal.
- ★ The movable handwheel is adopted to facilitate machine testing.



## FANUC

- The number of simultaneously controlled shafts is 4.
- Maximum look-ahead blocks 400
- Program protection and background editing functions.
- BI and AI series motors can be connected.
- The alarm and the alarm history are displayed to facilitate maintenance and repair.
- The working hours and the number of parts are displayed to facilitate production control.
- The standard embedded Ethernet provides 512kb memory to realize the connection with the personal computer and transmit NC program and the machine related data.
- The standard front Cf slot can realize the system backup, the program storage and DNC machining.
- It supports the traditional RS232 transmission mode.
- It supports ISO/EIA programming language.
- It supports servo Guide mate function.
- It supports CF card on-line editing.
- Standard 8.4-inch color LED display unit.
- FSSB high-speed rigid tapping.
- PLC ladder diagram display, on-line editing and password setting.
- AICC high-speed high-precision control mode.
- 40 segments of large capacity machining program are pre-read.
- Feedforward control and acceleration overshoot limit.
- HRV + high-speed high precision servo control.
- Graphic display function.
- Bell acceleration and deceleration before interpolation.
- Automatic data backup.

### Option functions

- The data server can extend the program storage space and realize the connection between the machine and the personal computer.
- AICC2 look-ahead blocks 200
- Look-ahead blocks 400
- Support preparation before machining (automatic centring).
- Rapid program restarting.
- Manual Guide function is realized.
- High-speed high-precision machining package:
  - a. AICCII high-speed high-precision control function
  - b. Smooth tolerance control
  - c. JERK control
  - d. Machining quality level adjustment function



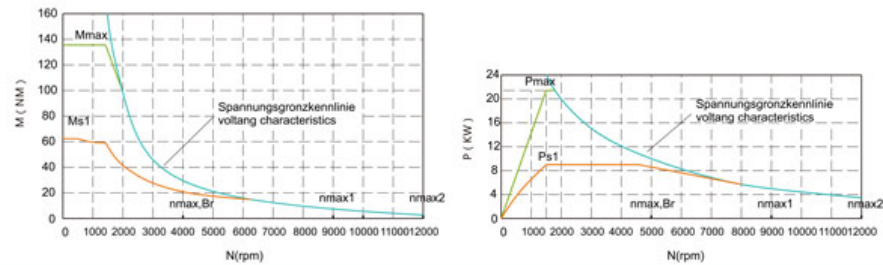
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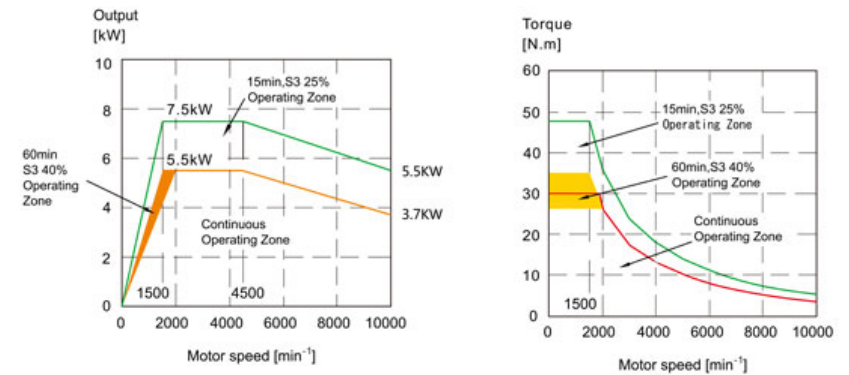


Direct-link spindle motor power and torque diagram (BT30-12000) (1PH8107)

$n_N$	$P_N$	$M_N$	$I_N$	$n_{max1}$	$n_{max2}$	$n_{max3}$	$n_{max.Br}$	$n_2$	$M_{max}$	$I_{max}$	$M_0$	$I_0$
(rpm)	(kW)	(Nm)	(A)	(rpm)	(rpm)	(rpm)	(rpm)	(rpm)	(Nm)	(A)	(Nm)	(A)
1500	9.0	57	23.5	9000	12000	—	5000	4500	135	54	63	25

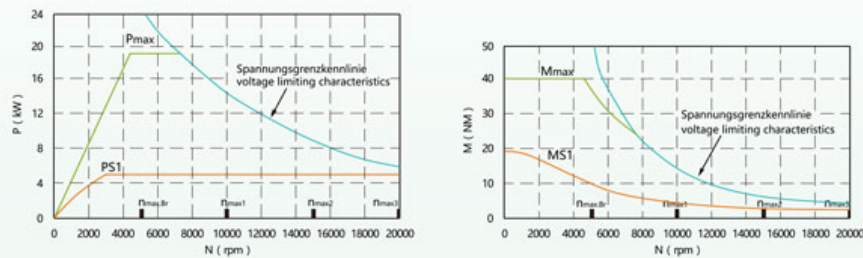


Direct-link spindle motor power and torque diagram (BT30-12000) (βII 6/12000)

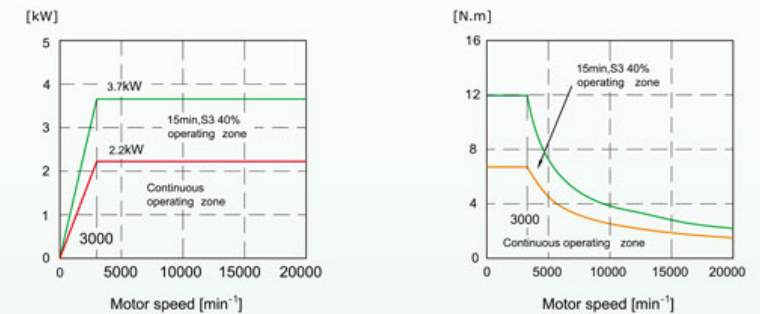


Direct-link spindle motor power and torque diagram (BT30-20000) (1PH8083)

$n_N$	$P_N$	$M_N$	$I_N$	$n_{max1}$	$n_{max2}$	$n_{max3}$	$n_{max.Br}$	$n_2$	$M_{max}$	$I_{max}$	$M_0$	$I_0$
(rpm)	(kW)	(Nm)	(A)	(rpm)	(rpm)	(rpm)	(rpm)	(rpm)	(Nm)	(A)	(Nm)	(A)
4500	4.8	10	17.0	10000	15000	20000	5000	20000	40	41	19	23



Direct-link spindle motor power and torque diagram (BT30-20000) (oil 2/20000)



### ATC for Tapping Center

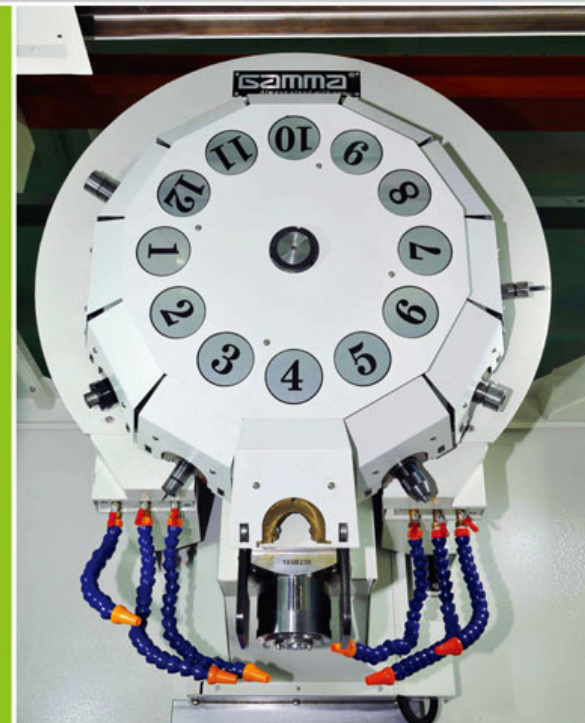
#### Tool changing time

#### Tool to tool (T1→T2): 1.8 sec

The rapid tool changing mechanism saves the non-cutting time, rapidly changes the tool and improves the production efficiency.

- ★ The rapid, simple, reliable and long-life automatic tool changing device provides the steady and reliable tool changing action.
- ★ The innovated separating mechanism is prepositive, and the advanced cam driving mechanism ensures the high-precision rotation.
- ★ The tool selection ability at any position can be rapidly achieved by PLC software control.
- ★ It has small volume, light weight, fastest tool changing speed and more tools carried (16T/21T) in the same-level products.

Item/specification	
Max. Tool weight (kg)	3
Max. Tool length (mm)	200
Max. Tool Diameter (mm)	Full tool Adjacent tool
	Φ60 Φ80



### 12 Tools in Turret Magazine

#### Tool changing time

#### Tool to tool (T1→T2): 3 sec

High-speed mechanical tool changing system

Item/specification	
Max. Tool weight (kg)	4
Max. Tool length (mm)	200
Max. Tool Diameter (mm)	Full tool Adjacent tool
	Φ90 Φ150





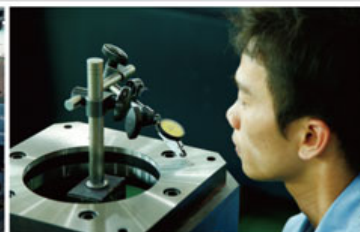
1 Correction of Z-axis ball screw



2 Parallelism correction of linear rail guideway



3 Correction of Y-axis screw rod ball screw



4 Flatness correction of spindle plate



5 Hardness detection of casting



6 Out of roundness testing of balibar

In order to ensure 100% pass of finished products, GAMMA provides the international first-class detection device to finish the comprehensive and systematic detection for each machine.

- 1 The parallelism and flatness of the Z-axis ball screw shall be corrected within 0.01 mm.
- 2 The parallelism and flatness of the linear guideway shall be corrected within 0.01 mm.
- 3 The parallelism and flatness of the Y-axis ball screw shall be corrected within 0.01 mm.

- 4 The flatness of the spindle plate shall be corrected within 0.005 mm.
- 5 The hardness measurement of the casting shall be up to HB200+20.
- 6 The out of roundness of the balibar shall be within 0.01 mm at 300mm.

- 7 The flatness of the table shall be within 0.015 mm.
- 8 XY verticality shall be within 0.005 mm.
- 9 XZ verticality shall be within 0.01 mm.

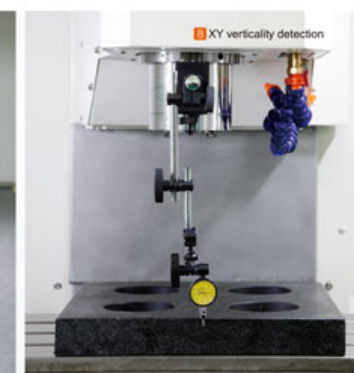


Laser testing

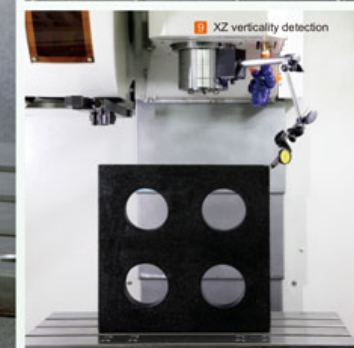
Strictly control each assembly detail.



7 Flatness detection of table



8 XY verticality detection



9 XZ verticality detection

## Three-dimensional detection

The main workpieces are three-dimensionally detected to ensure product precision.



1 Spindle pulling force test



2 Spindle shock test



3 Spindle temperature test



4 Spindle deflection test



1 The flatness of the spindle plate shall be corrected within 0.005 mm.

2 Spindle shock test: the shock displacement is less than  $3 \mu\text{m}$  at each speed.

3 Spindle temperature test: whether the spindle temperature is abnormal after the spindle runs for 24 hours.

4 Spindle deflection test: the spindle deflection shall be within 0.005 mm at 300 mm.

5 Spindle coupling test: the concentricity shall be within 0.005 mm.

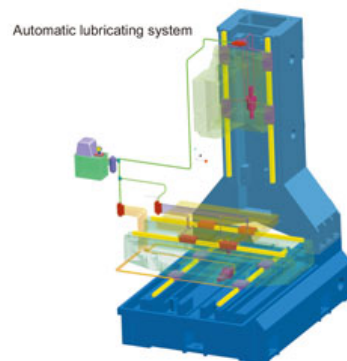
5 Spindle coupling test





### ■ Automatic Lubricating System

The positive displacement point-to-point lubrication is used to ensure that the lubricating oil is filled into each oil inlet and uniformly distributed on the machine.



### ■ High-pressure backward flushing chip removal system

Two vertical motors are installed, one is used for backward flushing on two sides, and the other is used for the machine to directly cool the machined workpieces. The new backward flushing chip removal design is adopted to rapidly and thoroughly remove the chips attached to the inside of the machine. The high-pressure backward flushing chip removal system mainly carries away the machining heat generated in the chips to ensure the machining precision and the surface smoothness of the workpieces as well as the machine precision.



Heat exchanger



Tricolour light



Warm and soft daylighting



### ■ Heat exchanger

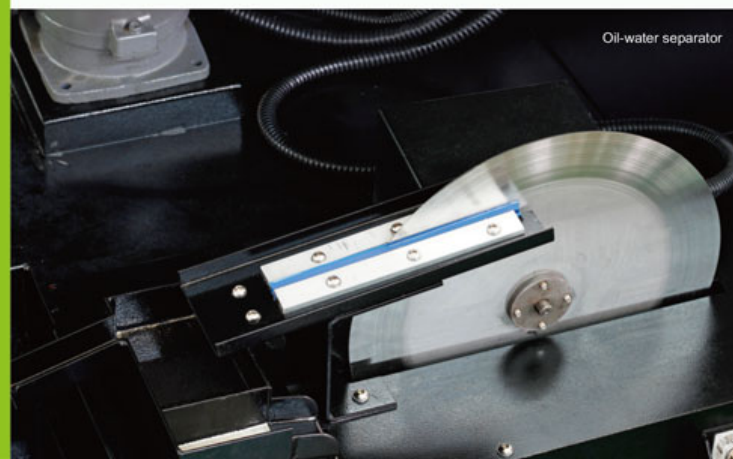
The heat exchanger is used in the electrical box to ensure that the heat in the electrical box is extracted rapidly to maintain the temperature in the box and stabilize the operation of control system.

### ■ Tricolour light

The tricolour light is arranged at the conspicuous position of the machine. When the machine is out of order, the tricolour light gives warning to the operator.

### ■ Warm and soft daylighting

One explosion-proof light is reasonably arranged on the two sides of the machine to fully ensure adequate lighting and protect the eyes from strong light.



Oil-water separator

### ■ Oil-water separator

The oil-water separator separates the oil from the mixture in the event of oil-water mixing, and ensures the quality of cutting fluid. The recovered oil can be reused to save the cost.





Laser tool setting gauge



Manual tool setting gauge



On-line measuring apparatus



Renishaw measuring contact



Energy-saving and environmentally friendly oil mist collector



Cutting fluid cooling system



Fourth axis



Air conditioner cooler for electrical cabinet

#### Energy-saving and environmentally friendly oil mist collector

It has high filter efficiency and statically filters; it is stable and reliable, and has high maintenance cost and low noise; it has high safety, no spark, no high voltage risk and vulnerable components; it can rapidly collect and capture the oil mist and dust and greatly improve the working quality of the machine.

#### Cutting fluid cooling system

It prevents the cutting fluid from being deteriorated, and effectively controls the cutting fluid to offer what is required by the machine at the specified constant temperature to greatly improve the machining precision.

#### Air conditioner cooler for electrical cabinet

The installation of air conditioner cooler can keep the temperature in the electrical cabinet constant to effectively stabilize the operation of control system.

#### Automatic fire extinguishing device

It has three start modes, i.e. automatic start, manual start and mechanical forced start. For the special fire extinguishing requirement in the enclosed space of the machine, the new automatic fire extinguishing device realizes the automatic fire detection and the automatic fire extinguishing for the machine and has working stability, reliability and safety.

#### Optical ruler

Absolutely reciprocating detection optical ruler powerful in the high precision positioning. (it can be installed on X/Y/Z-axis)



Optical ruler

#### Fourth axis

It uses the high-precision gear for positioning to ensure that the partitioning precision is  $\pm 5$  seconds. It has a precision structure assembled coupler not to float when partitioning.

In combination with the fourth axis, it can machine multiple surfaces and reduce the non-machining time when the workpieces is loaded and unloaded.

Fourth Axis			
Item/model	CNC-170R	CNC-250R	CNC-320R
Disc diameter (mm)	170	250	320
Vertical center height (mm)	135	160	185
Air pressure braking resistance (kg*m)	25	25	47
Oil pressure braking resistance (kg*m)	50	50	94
Maximum workpiece load (kg)	75	100	125

#### Automatic safety lock

The safety door interlocking device adopts the individualized design to protect the personal safety to the maximum extent and prevent the moving parts from causing injuries to the users.



Automatic safety lock

Automatic fire extinguisher nozzle

Carbon dioxide fire extinguisher

Automatic fire extinguishing induction rod

#### Laser tool setting gauge

The laser tool setting gauge can measure and detect the tool with the diameter as small as 0.003 mm at any point of the laser beam; the repeated accuracy can be  $\pm 0.1 \mu m$  in the specific environment; the level of protection is IP\*8 in the rapid tool setting and breakage detection. (Continuous dive test)

#### Manual tool setting gauge

High precision

The manual tool setting gauge has the repeated positioning precision of  $1 \mu m$ , the direct driving contact mode and high parallelism, and can measure the small diameter tool.

High leakproofness

The manual tool setting gauge has the level of protection of IP67, is waterproof, oilproof and cutting fluid resistant, has good leakproofness and keeps high precision for a long time.

Ultra-long life

The tool setting operation can be performed for 3 million times, its tool setting surface is a replaceable contact surface, and the manual tool setting gauge can be ground, polished and titanized to extend the service life of the gauge.



#### On-line measuring apparatus

360-degree infrared transmission  
Level of protection: IP\*8  
One-way repeated accuracy:  $1.0 \mu m$   
In the machine detection process, 90% non-cutting time is saved, and the process control is improved, so that the non-benefit tool setting and workpiece aligning time is shortened. The workpiece scrapping caused by the aligning error is eliminated. The workpiece is accurately detected to reduce the offline detection non-cutting time after machining.



## DMN-500/600L

### Highlights:

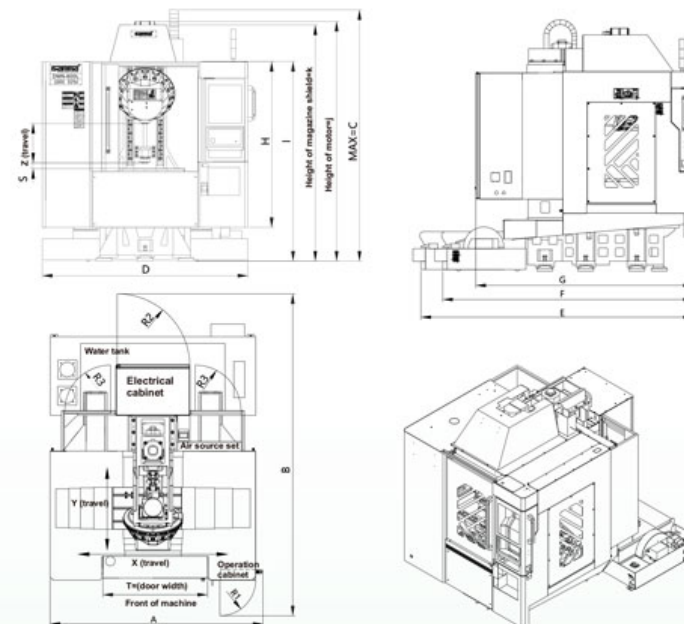
- ★ DMN-500/600L high speed drill tapping machining center is a most advanced machining center and has capacities of high-speed drilling and milling, tapping and comprehensive milling.
- ★ The black and white sheet metal integrated design shows the style and features and has no eye fatigue caused by the intense colors of other brands; the integrity and leakproofness are good.
- ★ The speed of the precision spindle is 12,000 rpm (optional: 20,000 rpm), so the product has the characteristics of light mass, low expansion factor and high hardness, etc.
- ★ The strong backward flushing makes the cuttings removed.
- ★ Rapid displacement of X/Y/Z-axis: 60/60/60 m/min.
- ★ High-speed mechanical tool changing system T1→T2: 1.8 sec.

DMN-500/600L BT30-12000/20000rpm

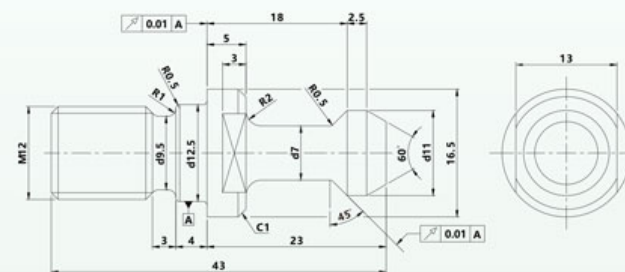
Spindle Speed	Spindle Motor	Spindle Type	Travel
12000rpm Optional: 20000rpm	5.5/7.5kw 2.2/3.7kw	Direct-link BT30	500*400*380 600*400*380
Tool Magazine	Fast Feed Speed	Table Size	Table Load
16 sun-type tools Optional: 21 tools	60/60/60	650*400 750*400	300kg



## Structure Diagrams



MODEL	A	B	C	D	E	F	G	H	I	J	K	R1	R2	R3	S	T	X	Y	Z
DMN-500L	1770	3120	2410	1700	2530	2330	2080	1580	1900	2230	2250	340	440	670	80	600	500	400	380
DMN-600L	2020	3120	2410	1950	2530	2330	2080	1580	1900	2230	2250	340	440	670	80	800	600	400	380



BT30 Rivet Diagram





Product Model	DMN-500L				Product Model	DMN-600L			
Travel (XYZ)	500*400*380				Travel (XYZ)	600*400*380			
Table size (mm)	650*400				Table size (mm)	750*400			
Spindle nose to table (mm)	80-460				Spindle nose to table (mm)	80-460			
Control system	FANUC		SIEMENS 828D		Control system	FANUC		SIEMENS 828D	
Display	8.4" color LCD				Display	8.4" color LCD			
Spindle motor	βil 6 /12000 ( 5.5/7.5 kW )	αil2/20000 ( 2.2/3.7 kW )	1PH8107 ( 9/15 kW )	1PH8083 ( 4.8 kW )	Spindle motor	βil 6 /12000 ( 5.5/7.5 kW )	αil2/20000 ( 2.2/3.7 kW )	1PH8107 ( 9/15 kW )	1PH8083 ( 4.8 kW )
Axis servo motor	XY : βis 12/ 3000 ( 1.8 kW ) Z : βis 22/ 3000B ( 3.0 kW )	XY : αiF8/3000 ( 1.6 kW ) Z : αiF22/3000B ( 4.0 kW )	XY : 1FK7063 ( 2.3 kW , 3000 RPM ) Z : 1FK7083 ( 3.3 kw, 3000RPM, with brake)		Axis servo motor	XY : βis 12/ 3000 ( 1.8 kW ) Z : βis 22/ 3000B ( 3.0 kW )	XY : αiF8/3000 ( 1.6 kW ) Z : αiF22/3000B ( 4.0 kW )	XY : 1FK7063 ( 2.3 kW , 3000RPM ) Z : 1FK7083 ( 3.3 kw, 3000RPM, with brake)	
Spindle	BT30				Spindle	BT30			
Max speed (RPM)	12000	20000	12000	20000	Max speed (RPM)	12000	20000	12000	20000
Drive system	Direct drive				Drive system	Direct drive			
External diameter of spindle bearing (mm)	Φ95				External diameter of spindle bearing (mm)	Φ95			
Spindle air seal	Protect spindle lubrication, extend spindle life				Spindle air seal	Protect spindle lubrication, extend spindle life			
Max weight on table (kg)	300				Max weight on table (kg)	300			
Rapid (X/Y/Z)	60/60/60				Rapid (X/Y/Z)	60/60/60			
Max cutting (mm/min)	1-15000				Max cutting (mm/min)	1-15000			
Ball screw Φ/ pitch	Φ32 P20 C3 Precision class				Ball screw Φ/ pitch	Φ32 P20 C3 Precision class			
Ball screw support type	Precision bearing				Ball screw support type	Precision bearing			
Slide way type	X/Y-axis: linear ball guideway 30 Precision class Z-axis: linear roller guideway 30 Precision class				Slide way type	X/Y-axis: linear ball guideway 30 Precision class Z-axis: linear roller guideway 30 Precision class			
Tool magazine	Taiwan Sanjet				Tool magazine	Taiwan Sanjet			
Specification	BT-30				Specification	BT-30			
Tool changing time (T-T) (sec)	1.8				Tool changing time (T-T) (sec)	1.8			
Tool changing type	Turret type				Tool changing type	Turret type			
Capacity	16 tools (optional: 21 tools)				Capacity	16 tools (optional: 21 tools)			
Max. tool weight (kg)	3				Max. tool weight (kg)	3			
Max.tool Dia. (adjacent empty tool)	Φ80				Max.tool Dia. (adjacent empty tool)	Φ80			
Balance system	No balance weight / servo motor direct drive				Balance system	No balance weight / servo motor direct drive			
Auto lubrication system	Pressurised positive displacement automatic oiler, automatically and uniformly distributing the lubricating oil				Auto lubrication system	Pressurised positive displacement automatic oiler, automatically and uniformly distributing the lubricating oil			
High pressure cooling system	High pressure motor flushing				High pressure cooling system	High pressure motor flushing			
Chip removal mode	Backward flushing type chip removal				Chip removal mode	Backward flushing type chip removal			
Power required (Kva)	15				Power required (Kva)	15			
Air required (Kg/cm²)	6-8				Air required (Kg/cm²)	6-8			
Dimensions L×W×H (mm)	1700*2440*2400				Dimensions L×W×H (mm)	1950*2440*2400			
Machine weight (Kg)	3100				Machine weight (Kg)	3200			

\*1. The specifications will be changed for the continuous improvement of models without prior notice; our company reserves all the right for the final explanation.

\*2. For spindle motors and servo motors,  $\beta$  motors are optional. Contact the business agent of our company.

\*3. Other type spindles and control systems can be custom-made.







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**DMN series**

High Speed Drill Tapping  
Machining Center



**HV series**

Heavy Cutting Vertical  
Machining Center



**HE series**

Horizontal Heavy Cutting  
Machining Center



**GV series**

Super High Speed Double  
Column Machining Center



**LV series**

High Speed Vertical  
Machining Center



**BN series**

High-performance Vertical Double  
Column Machining Center