



D₃₀₀ · D₅₀₀

5-Axis Vertical Machining Center

D
series



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Printed in Japan M447Ee 1708/3 (V-T-D)



The 5-Axis Vertical Machining Center brings
**Smooth launch on job-shop,
 and surefire success.**

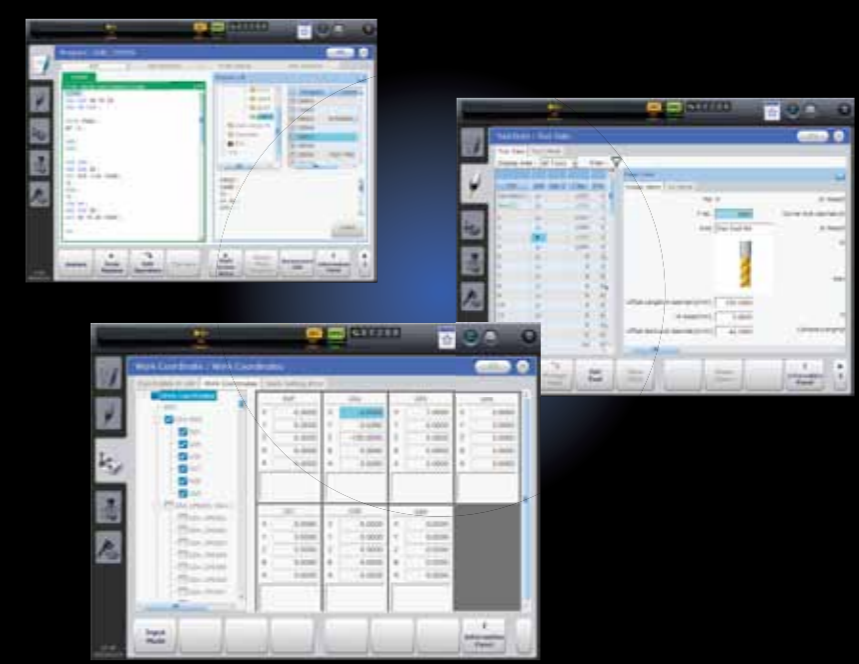
5-Axis Vertical Machining Center
Dseries



— Photo: D500 —

“Interference-free” table and slim size spindle-head — PAGE 3
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Leading an operator and a machine
Professional 6 [Controller]



"Interference-free" table and slim size spindle-head



Photo: D300



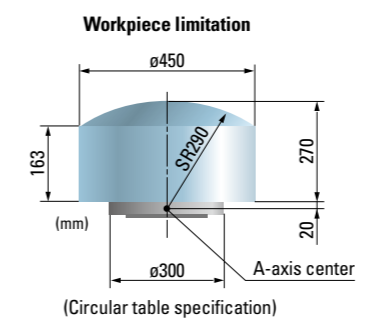
Spindle-table crash avoidance function

Setting interference area by inputting tool length, tool diameter and workpiece height, unexpected collision can be prevented. This function is effective not only during machining, but also during MDI/Manual operation.

D300

- Travels**
- X × Y × Z axis** : 300 × 500 × 350 mm
- A axis (tilting axis)** : 240° (±120°)
- C axis (rotating axis)** : 360° (continuous rotation)

Maximum table load: 120 kg



D500

- Travels**
- X × Y × Z axis** : 550 × 1000 × 500 mm
- A axis (tilting axis)** : 150° (-120° to +30°)
- C axis (rotating axis)** : 360° (continuous rotation)

Maximum table load: 350 kg

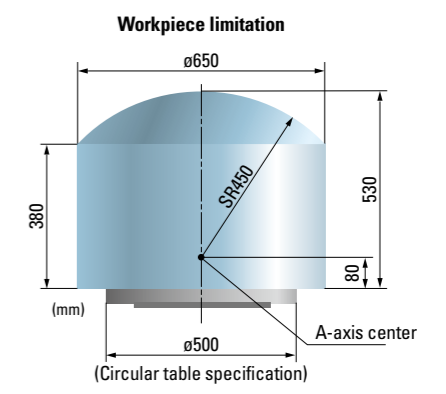
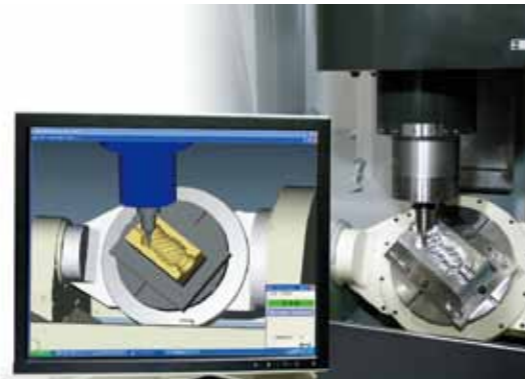


Photo: D500/2000 min⁻¹ spindle (optional specification)



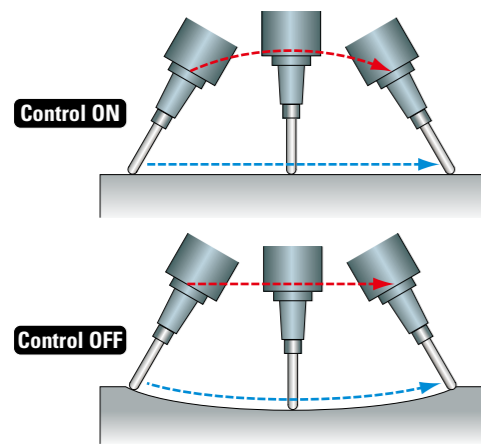
Collision safeguard

Real Time Interference Check



High-speed smooth TCP

Smooth control motion of simultaneous 5-axis machining
Tool center point is automatically controlled so that it moves along the programmed toolpath at the commanded speed even if the orientation of the tool changes.



Indexing program can be automatically generated (2 + 3 axis machining™)

By simply entering drawing data in the dedicated screen, a indexing program can be automatically generated.



(Machining example according to high-speed smooth TCP Function) Improve machined surface quality and shortens machining time drastically

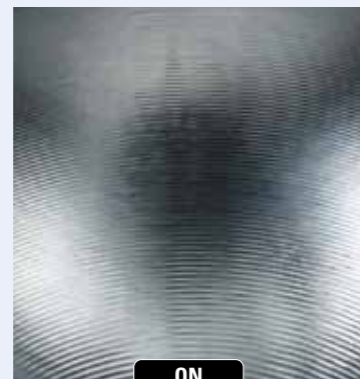
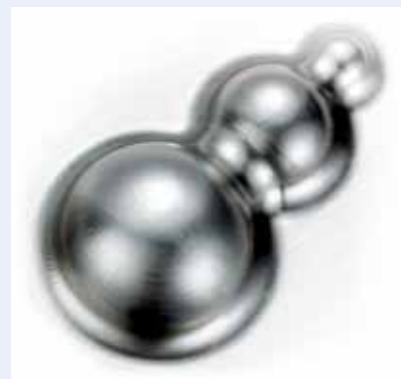


Photo: D300/ 20000 min-1 spindle (optional specification)

D300	15000 min⁻¹ (standard specification)	20000 min⁻¹*	30000 min⁻¹*
Speed range	50 - 15000 min ⁻¹	200 - 20000 min ⁻¹	300 - 30000 min ⁻¹
Taper hole	7/24 No.40 BBT40, HSK-A63	HSK-A63	HSK-F63
Motor power	22 / 18.5 / 15 / 11 kW (25 %ED / 10 min. / 30 min. / cont.)	15 / 11 kW (30 min. / cont.)	17 / 13 kW (30 min. / cont.)
D500	14000 min⁻¹ (standard specification)	20000 min⁻¹*	30000 min⁻¹*
Speed range	50 - 14000 min ⁻¹	50 - 20000 min ⁻¹	300 - 30000 min ⁻¹
Taper hole	7/24 No.40 BBT40, HSK-A63	7/24 No.40 HSK-A63	HSK-F63
Motor power	25 / 22 / 18.5 kW (10 min. / 30 min. / cont.)	18.5 / 15 kW (30 min. / cont.)	17 / 13 kW (30 min. / cont.)

(*optional specification)

Cutting performance



D300	Face mill	End mill	Drill	Tap
Material	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)
Tool diameter	: 63 mm : 50 mm	: 20 mm : 16 mm	: 35 mm : 35 mm	: M24-3.0 : M20-2.5
Radial depth of cutting	: 50 mm : 35 mm	: 14 mm : 14 mm	—	—
Axial depth of cutting	: 5 mm : 3 mm	: 15 mm : 2.5 mm	: 35 mm : 35 mm	: 24 mm : 20 mm
Metal removal rate	: 1364 cm ³ /min : 209 cm ³ /min	: 936 cm ³ /min : 56 cm ³ /min	: 245 cm ³ /min : 221 cm ³ /min	—
Spindle speed	—	—	—	: 300 min ⁻¹ : 250 min ⁻¹

D500	Face mill	End mill	Drill	Tap
Material	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)	: Aluminum (A5052) : Steel (S50C)
Tool diameter	: 80 mm : 80 mm	: 20 mm : 32 mm	: 48 mm : 48 mm	: M30-3.5 : M30-3.5
Radial depth of cutting	: 60 mm : 60 mm	: 15 mm : 20 mm	—	—
Axial depth of cutting	: 4 mm : 4 mm	: 14 mm : 8 mm	: 20 mm : 20 mm	: 20 mm : 20 mm
Metal removal rate	: 2400 cm ³ /min : 480 cm ³ /min	: 2016 cm ³ /min : 216 cm ³ /min	: 445 cm ³ /min : 206 cm ³ /min	—
Spindle speed	—	—	—	: 106 min ⁻¹ : 106 min ⁻¹

D300: 20000 min⁻¹ spindle
D500: 14000 min⁻¹ spindle



Machining example

D300


Die cast mold part

Material : Tool steel (SKD61, 48HRC)
Size : 104 × 74 × 100 mm
Number of tools : 5
Machining time : 1 hr. 26 min.



Triple splitter impeller

Material : Titanium (Ti-6Al-4V)
Size : Diameter 196 × 90 mm
Number of tools : 6
Machining time : 4 hr. 22 min.



Roller

Material : Carbon steel (SCM420H, 62HRC)
Size : Diameter 120 × 35 mm
Tool used : cBN Electroplated grinding wheel, diamond grinding wheel
Machining time : 1 hr. 31 min. 50 sec.

Roundness (circumferential/ height direction)
2.0 μm / 2.0 μm

Surface finish (circumferential/ height direction)
Rz0.5 μm / Rz1.0 μm

*Requires the special specification for grinding machining.



Inserts of plastic mold

Material : Mold steel (PX5, 33HRC)
Size : 75 × 60 × 65 mm
Number of tools : 3
Machining time : 1 hr. 24 min.



D500

Plastic mold (core)

Material : Mold steel (PX5, 33HRC)
Size : 440 × 260 × 300 mm
Number of tools : 30
Machining time : 71 hr. 24 min.



Knuckle arm

Material : Aluminum (A5052)
Size : Diameter 300 × 100 mm
Number of tools : 14
Machining time : 41 hr. 51 min.



Crankcase cover

Material : Aluminum (A5052)
Size : 285 × 75 × 170 mm
Number of tools : 3
Machining time : 30 hr.



Slide core

Material : Mold steel (PX5, 33HRC)
Size : 300 × 200 × 165 mm
Number of tools : 24
Machining time : 12 hr. 47 min.



Chip evacuation

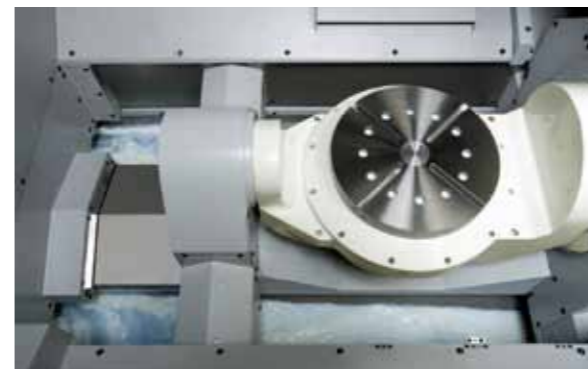
By nozzle coolant supply device and shower coolant^{*1}, chips are flushed into the troughs along the table. Then, they are reliably evacuated from machine by the base coolant and Lift-up chip conveyor^{*2}.

Nozzle coolant / shower coolant^{*1}



(*1: optional equipment) Photo: D300

Base coolant / conveyor in splash guard^{*2}



(*2: optional specification) Photo: D300

Lift-up chip conveyor^{*3}

D300 Lift-up chip conveyor with coolant filtration (scraper type)
(optional equipment)



D500 Lift-up chip conveyor with coolant filtration (scraper type)

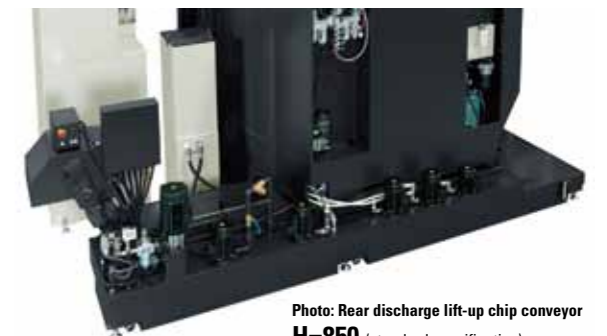


Photo: Rear discharge lift-up chip conveyor H=850 (standard specification)



Photo: Front discharge lift-up chip conveyor H=1250 (optional specification)

(*3: Refer to Page 16 specification list.)



Photo : D500
Pallet table specification
(optional specification)

Structure for smooth operation



Photo : D500
Pallet table specification
(optional specification)

Operator-friendly design

Tool tip and workpiece can be checked in natural posture.

Furthermore, workpiece loading is easy, thanks to the full overhead clearance for crane.



Photo: D300



Photo: D500 / Front discharge lift-up chip conveyor H1250 spec.* (*optional specification)



Photo: D300 / Thermal Guard (optional equipment), lift-up chip conveyor spec. (optional equipment)



Photo: D300



Center of Rotation Axis measurement

Before special high precision machining, center of rotation axes can be measured easily.

Maintenance

Units that require daily checking are concentrated on the side of the machine

Automation



Photo: D500/Automatic tool changer



Photo: D300/Automatic pallet changer (optional specification)

Automatic tool changer

		D300	D500
No. of tool storage capacity	(standard)	40	40
	(optional)	60, 124	60, 80, 113, 155, 197, 239, 281, 323
Maximum weight (kg)		8	8
Change time (sec)		0.8 (tool-to-tool)	4.2 (tool-to-tool)

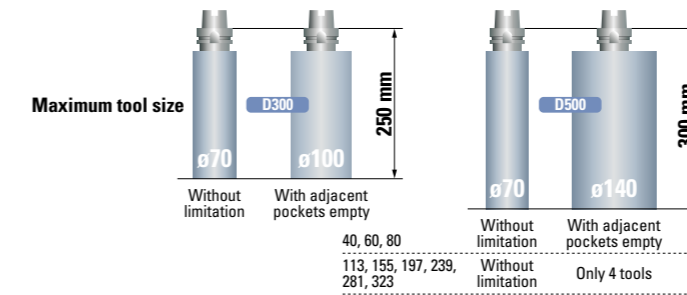


Photo: D300

Non-contact tool length measuring device



(optional equipment)

Automatic workpiece measuring device



(optional equipment)

Automatic pallet changer

(optional specification)

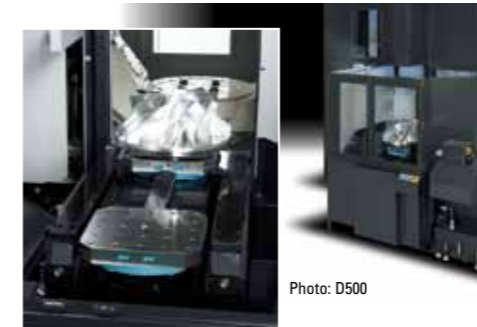


Photo: D500



Photo: D300



Photo: D500/ Pallet magazine specification

Automatic work changer (loading example)

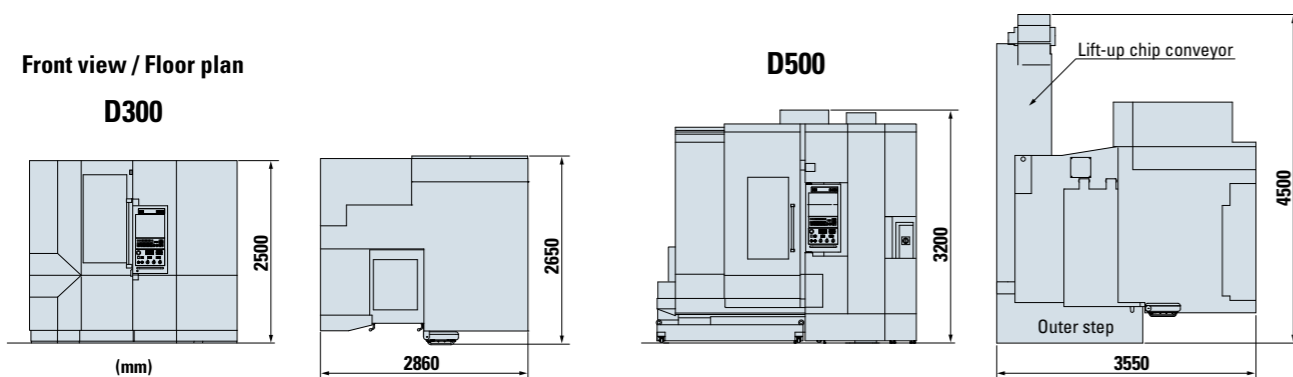


Photo: D300

		D300	D500
Number of pallets		2	2
Exchange method		Two pallets simultaneous change by turning arm	
Maximum pallet load (kg)		100	250, 300, 500

- ⊙ Robot shutter*
 - ⊙ Loader interface*
 - ⊙ Pallet magazine*
- (*optional specification)

Specifications (standard specifications)		D300	D500	
Travels	X × Y × Z axis	300 × 500 × 350 mm	550 × 1000 × 500 mm	
	A axis	240° (±120°)	150° (-120° to +30°)	
	C axis	360° (continuous rotation)	360° (continuous rotation)	
Table	Table working area	ø300 mm	ø500 mm	
	Maximum workpiece size (diameter × height)	450 × 270 mm (with limitation)	650 × 500 mm (with limitation)	
	Maximum table load	120 kg	350 kg	
	Table surface configuration	T-slot (12H8 × 4)	T-slot (14H8 × 4)	
Spindle	Speed range	50 - 15000 min ⁻¹	50 - 14000 min ⁻¹	
	Motor power	22 / 18.5 / 15 / 11 kW (25%ED / 10 min. / 30 min. / cont.)	25 / 22 / 18.5 kW (10 min. / 30 min. / cont.)	
	Torque	120 / 99 / 77 / 42 N·m (10%ED / 15%ED / 25%ED / cont.)	201 / 167 / 118 / 96 N·m (15%ED / 25%ED / 15 min. / cont.)	
	Taper hole	7/24 taper No. 40	7/24 taper No. 40	
	Bearing inner diameter	70 mm	85 mm	
	Number of speed range	2 step with electric changeover	2 step with electric changeover	
	Cooling / lubrication	Jacket / Oil-air	Jacket / Oil-air	
Feedrates	Rapid traverse	X, Y, Z axis	60000 mm/min	48000 (X axis), 50000 (Y, Z axis) mm/min
		A axis	45000°/min	18000°/min
		C axis	54000°/min	18000°/min
	Cutting feed	X, Y, Z axis	1 - 50000 mm/min	1 - 32000 (X axis), 40000 (Y, Z axis) mm/min
		A axis	1 - 45000°/min	1 - 18000°/min
		C axis	1 - 54000°/min	1 - 18000°/min
Automatic tool changer	Tool shank	JIS B6339 40T	JIS B6339 40T	
	Retention knob	JIS B6339 40P	JIS B6339 40P	
	Tool storage capacity	40 tools	40 tools	
	Maximum tool diameter (without limitation / with limitation)	70 / 100 mm	70 / 140 mm	
	Maximum tool length	250 mm	300 mm	
Maximum tool weight	8 kg	8 kg		
Machine size (standard)	Height	2500 mm	3200 mm	
	Width × Depth	2860 × 2650 mm	3550 × 4500 mm	
	Machine mass (including NC unit)	7600 kg	15700 kg	
Floor space	Width × Depth	3380 × 3695 mm	4900 × 4500 mm	



* The space for the movable parts and maintenance in addition to the space for the machine main body are required. For the details, please refer to the specification.

Standard Specifications | ● D300 | ● D500

- | 15000 min⁻¹ spindle
- | 14000 min⁻¹ spindle
- | Spindle temperature controller
- | ø300 mm T-slot circular table
- | ø500 mm T-slot circular table
- | 40-tool magazine
- | Base coolant
- | Conveyor in splash guard (operator side)
- | Nozzle coolant (D300: Built-in 6 nozzles / D500: 8 nozzles)
- | Through spindle air
- | ATC door lock
- | Operator door interlock (operation mode)
- | Automatic grease supply unit
- | Portable manual pulse generator (with the handle enable button)
- | Lighting device (for machining chamber) (with 1 LED lamp)
- | Lift-up chip conveyor with coolant filtration (scraper type, 820 L) H=850 (select front or rear type)
- | Program storage edit user memory 2GB +1GB
- | Registered program number 1000
- | Data center memory capacity 1GB
- | Rigid tapping
- | Super G1.5 control
- | Helical interpolation
- | High Speed Smooth TCP
- | VP Control
- | 3-dimensional cutter compensation
- | Spindle-table crash avoidance function
- | Standard tool length function
- | Automatic fire extinguisher interface
- | ECO mode functions

Optional Specifications | ■ D300 | ■ D500
Optional Equipment | ★ D300 | ★ D500

- | 20000min⁻¹ spindle (HSK-A63 only)
- | 30000min⁻¹ spindle (HSK-F63 only)
- | Tool magazine (60, 124 tools)
- | Tool magazine (60, 80, 113, 155, 197, 239, 281, 323 tools)
- | Scale feed back
- ★ | Automatic workpiece measuring device (with center of rotation axis measurement and measuring block)
- ★ | Non-contact tool length measuring device
- | Automatic pallet changer
- | ø300 mm circular table (T-slot, 200 kg weight load)
- | ø500 mm circular table (T-slot, 500 kg weight load)
- | ø630 mm circular table (T-slot, 350 kg / 500 kg weight load)
- | Pallet table specification (ø200 mm / ø300 mm)
- | 400 × 400 Pallet table specification (tapped hole / T-slot, 300 kg weight load, 1pc pallet)
- | 500 × 500 Pallet table specification (tapped hole, 250 kg / 500 kg weight load, 1pc pallet)
- | 500 × 500 Pallet table specification (T-slot, 500 kg weight load, 1pc pallet)
- | Pallet changer
- | Vertical 3-tire pallet magazine
- | Through spindle coolant (1.5 MPa / 7 MPa) and Air
- ★ | Shower coolant system (D300: 9 nozzles *6 nozzles when pallet changer is selected, D500: 15 nozzles)
- ★ | Tilttable chip bucket
- ★ | Tilt truck chip bucket
- | Conveyors in splash guard (hinge type)
- ★ | Lift-up chip conveyor with coolant filtration (Right discharge, scraper type, 350 L / 600 L)
- | Lift-up chip conveyor with coolant filtration (Rear / Front discharge, scraper type, 820 L) H1250
- ★ | MQL unit
- ★ | Coolant temperature controller (with heater)
- ★ | Thermal guard
- ★ | 3-dimensional manual feed
- ★ | 3-dimensional circular interpolation
- ★ | 3-dimensional coordinate conversion
- ★ | Scroll machining function
- | Customer specified machine color

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