Tongtai

Trust & Technology

Horizontal Machining Center

HA Series

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HA Series . 2017.04.24

HA-400II/500II

Minimal floor space requirement

HA-400II/500II adopts new splash guard design. Compared with the last generation, it saves 15% of floor space and allows the clients to have more space available.

High torque & power spindle

HA-400II/500II adopts 12,000 rpm spindle, with a motor output of 25/22 kW and maximum torque 233 Nm. This spindle is suitable for machining materials of aluminum alloy and steel, widely applied in the industries of automobile, hydraulic/pneumatic parts and general parts.

High efficiency machining

The new HA series has a redesigned casting structure. Furthermore, it adopts improvements on the structure rigidity, including triple-point support in the machine bed, double-wall structure design in the column and high rigidity linear guide ways in three axes.
Moreover, for machining efficiency, new HA series saves 10%-30% non-cutting time in three-axis rapid traverse, pallet/tool changing and B-axis positioning.

CONTENT

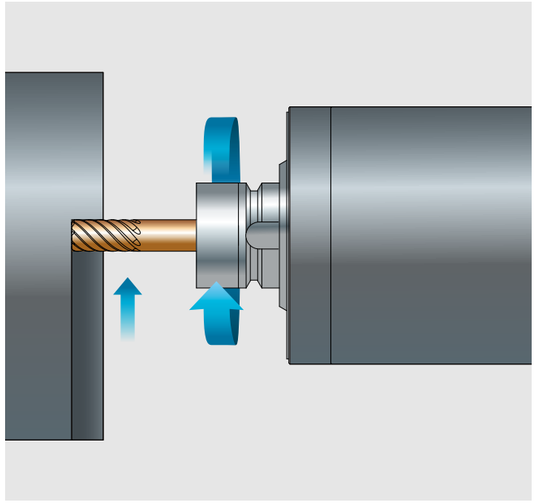
Main Specifications

Spindle	12,000 rpm High torque & power spindle
Three axes	Rapid traverse 60 m/min
	X/Y/Z axis travel HA-400II 610/580/580 mm HA-500II 710/680/680 mm
	X/Y/Z axis acceleration/deceleration 0.67 / 0.89 / 0.79 G
	X/Y/Z axis □45 mm High rigidity roller guide way
	X/Y/Z axis Ø40 mm High precision ballscrew
	Three axes linear scale (Optional)
B axis rotary table	Hirth coupling 1° rotary table
	NC 0.001° rotary table (Optional)
ATC	Separable type tool pots
	High speed cam type tool changing device

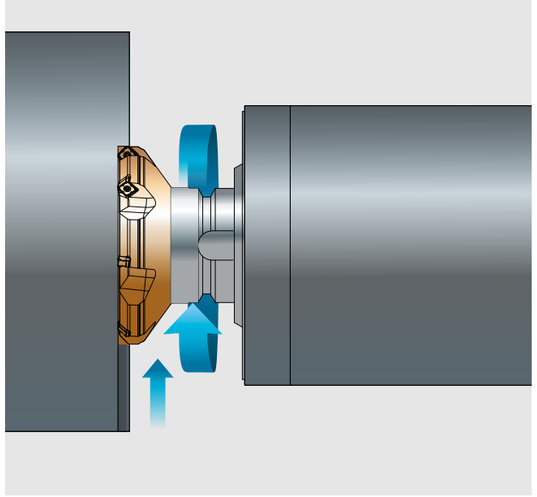
Machining ability

HA-500II testing data

End mill Ø16mm		
Material	S45C	FCD25
Depth/Width	20/12 mm	20/12 mm
Spindle speed	1,000 rpm	1,194 rpm
Feed rate	600 mm/min	716 mm/min
Chip removal rate	144 cm^3/min	172 cm^3/min

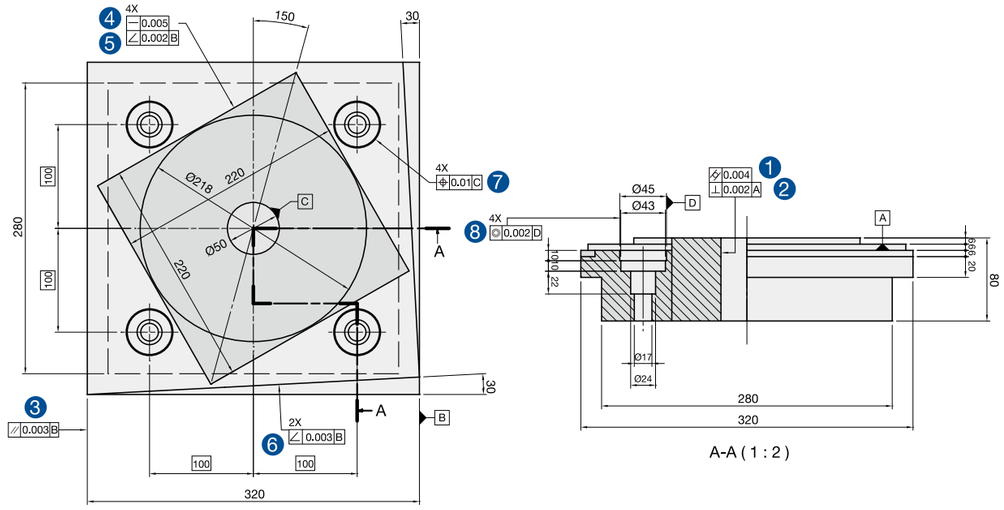


Face mill Ø80mm		
Material	S45C	FCD25
Depth/Width	5.5/65 mm	7/65 mm
Spindle speed	900 rpm	900 rpm
Feed rate	945 mm/min	945 mm/min
Chip removal rate	338 cm^3/min	430 cm^3/min



Machining accuracy

HA-500II testing accuracy



Test standard : ISO10791-7
Material : A6061

Unit : mm

Test items	Test accuracy
1 Cylindricity	0.004
2 Perpendicularity	0.002
3 Parallelism	0.003
4 Straightness	0.005
5 Angular accuracy	0.002
6 Angular accuracy	0.003
7 Position accuracy	0.01
8 Concentricity	0.002

Three axes accuracy

Test standard : VDI3441

Unit : μm

	Positioning accuracy	Repeatability accuracy
X axis	3.10	2.92
Y axis	3.9	2.84
Z axis	3.0	2.53
	Positioning accuracy with linear scale	Repeatability accuracy with linear scale
X axis	2.65	1.12
Y axis	2.16	0.95
Z axis	2.33	1.42

*The above data is measured in-house. The test result may not be obtained due to differences cutting conditions and environment conditions.

Linear scale (Optional)

Linear scale is able to compensate the positioning error, repetition error, and pitch error of the ballscrew, which are caused by the temperature changing. The positioning accuracy achieves ±3μm with compensation of linear scales.

Main structure

High rigidity structure

Travel

X/Y/Z axis

HA-400II 610/580/580 mm

HA-500II 710/680/680 mm

Rapid traverse

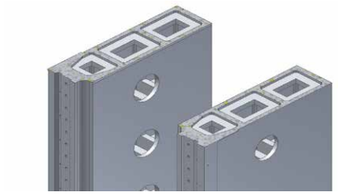
X/Y/Z axis

HA-400II / HA-500II 60 m/min

Acceleration/deceleration

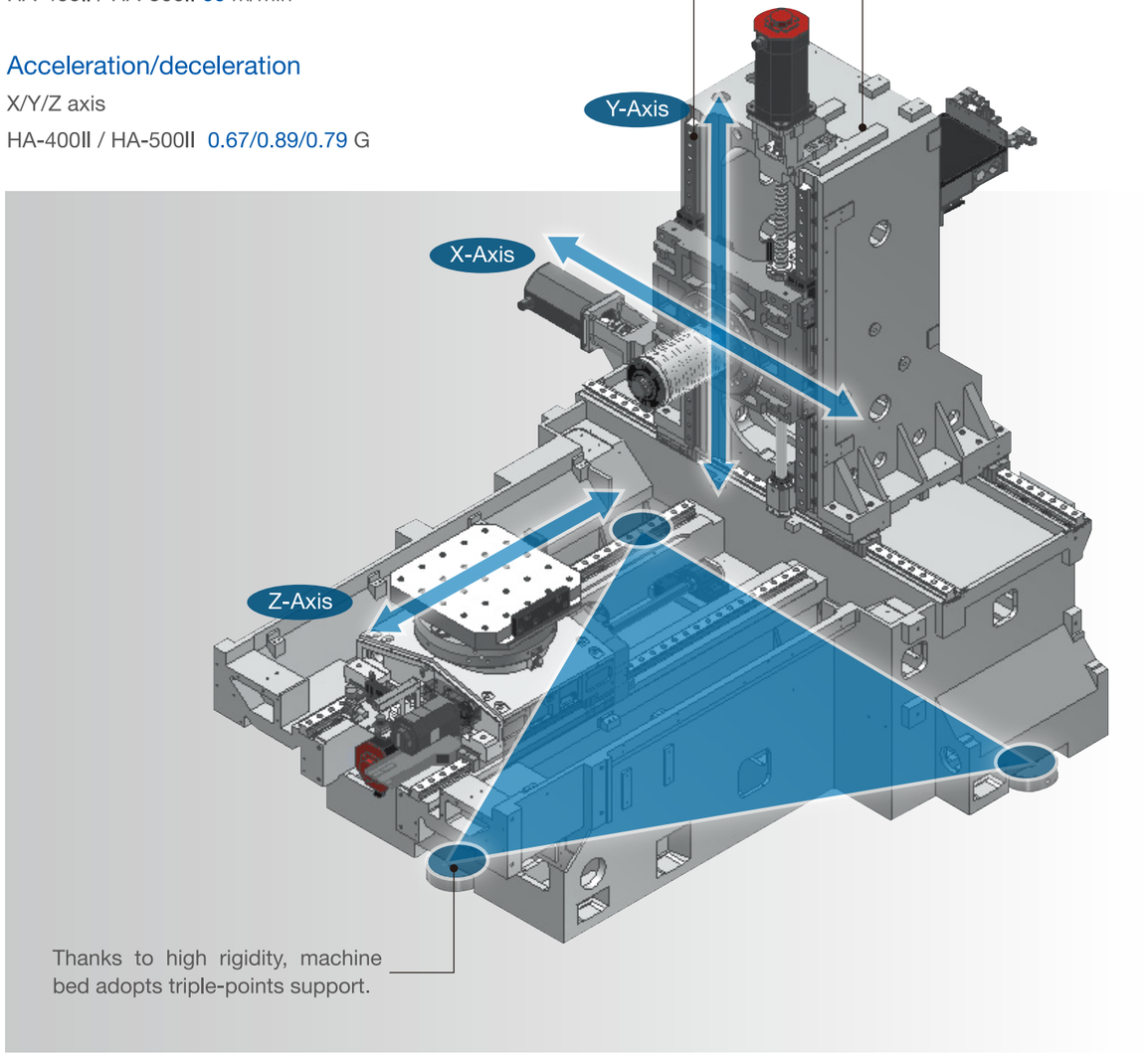
X/Y/Z axis

HA-400II / HA-500II 0.67/0.89/0.79 G



Three axes adopt high rigidity roller guide way

Column adopts double-wall and symmetrical structure



Thanks to high rigidity, machine bed adopts triple-points support.

Spindle

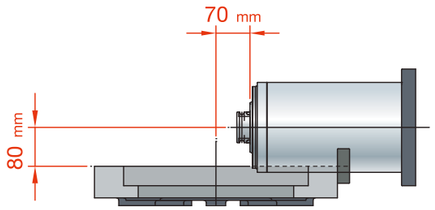
Max. speed 12,000 rpm

Spindle motor 25/22 kW

Output torque 233/143 Nm (S2/con.)

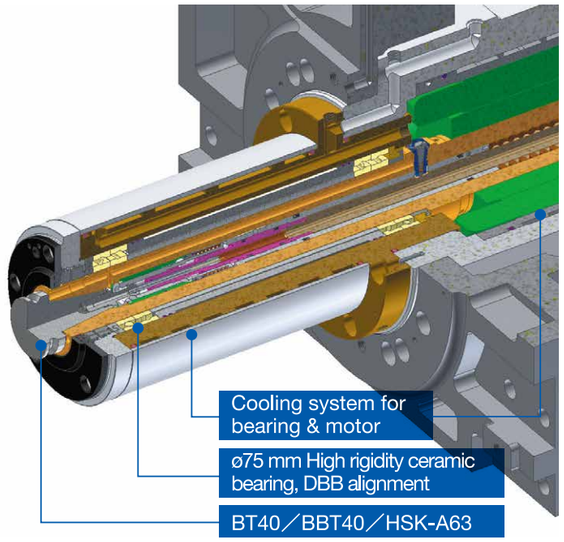
Acceleration time 2.6 sec (0→12,000 rpm)

0.9 sec (0→5,000 rpm)



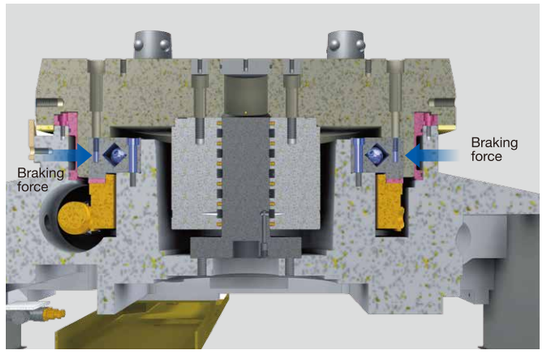
Min. distance from spindle nose to table center 70 mm

Min. distance from spindle center to table surface 80 mm



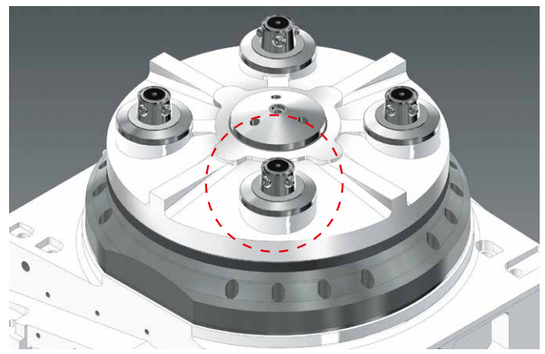
Full-circle hydraulic braking system (NC 0.001° index table)

HA series adopts a full-circle hydraulic braking system. The full-circle surface is locked synchronously by a metallic ring which is expanded by hydraulic oil. Because of the large clamping area, it can produce high rigidity and durability during heavy duty cutting.



B axis rotary table

High precision positioning cones with hydraulic locking device, generating 17 tons of clamping force to ensure the table stability during machining.



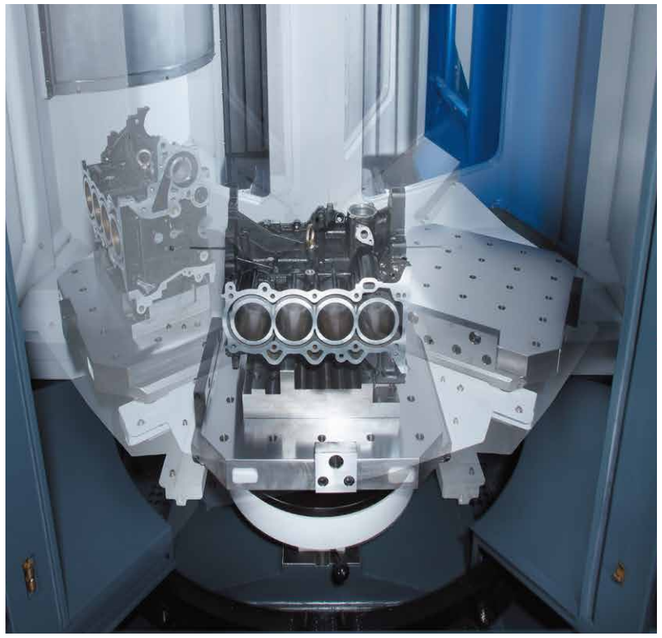
	HA-400II	HA-500II
Max. table load	400 kg×2	500 kg×2
90° indexing time of 1° rotary table (Standard)	2 sec	2 sec
90° indexing time of 0.001° rotary table (Optional)	1.1 sec	1.1 sec
Pallet clamping force	17,000 kgf	17,000 kgf
Braking torque	500 kg-m	500 kg-m

Main structure

APC

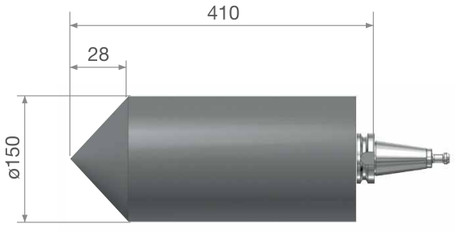
To increase dynamic rigidity, the hydraulic driving mechanism of APC is improved. Additionally, timers of PLC are optimized. Pallet changing time is saved dramatically.

HA-400II	HA-500II
10 sec	10 sec
16 sec (Previous model)	15 sec (Previous model)

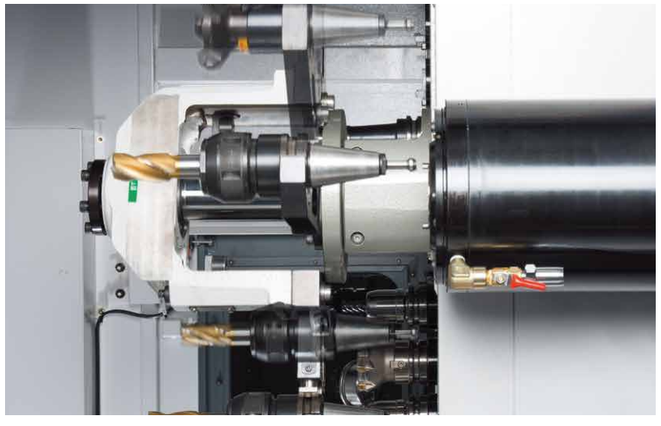


ATC

Automatic tool changer : Equipped with Japanese made cam type ATC.



Maximum tool size for automatic tool changing



	HA-400II	HA-500II
T to T	1.5 sec	1.5 sec
C to C	2.8 sec	3 sec
Tool capacity	60 pc 90/120 pc optional	60 pc 90/120 pc optional

Operation

Spacious area facilitates loading/unloading and jig & fixture operations.

Access to spindle facilitates rapid tool changing.

The tool magazine door design facilitates tool changing and checking. The operating distance and height is comfortable to operators.

	HA-400II	HA-500II
A	620	820
B	270	270
C	300	320

Unit : mm

Through centralized management of air FRL unit and lubricant pump, daily maintenance is made easily.

Peripheral accessories

Rearward type chip conveyor

According to different materials and chip size, Tongtai provides various chip conveyors for the best chip disposal.

○ : Suitable ✕ : Non-suitable

	Steel		Cast iron		Aluminum/Non-ferrous metal		
Specification	Long/ Curl chips	Short chips	Powder chips	Short chips	Long/ Curl chips	Short chips	Powder chips
Hinge type	○	✕	✕	✕	○	✕	✕
Scraper type	✕	○	○	○	✕	○	○
Magnetic scraper type	✕	○	○	○	✕	✕	✕
Drum type	✕	○	○	○	✕	○	○
Integrated type	○	○	○	○	○	○	○

Short chips : Chips shorter than 60 mm or ball type chips smaller than Ø40 mm.
Curl long chips : Chips' length is longer than short ones.

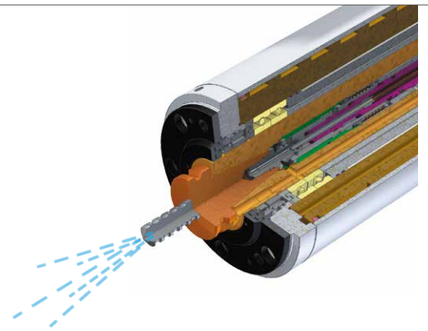
Coolant tank capacity
HA-400II / HA-500II 550 L(80% full)

Coolant Through Spindle (Optional)

C.T.S. increases the efficiency of chip disposal and extends the tool life by cooling the cutting position.

Discharge pressure : 20/40/70 bar
(2.0/4.0/7.0 MPa)

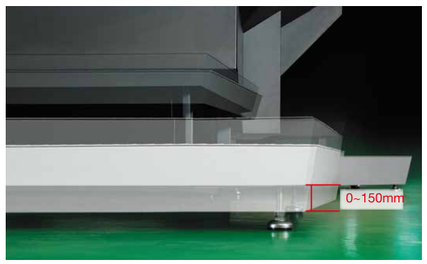
Filtering accuracy : 40 μm



Roof type flushing system (Standard)

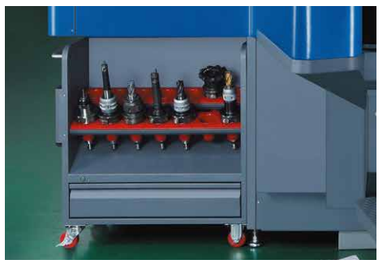
Roof type flushing system helps metal chips to be flushed into chip auger and saves time to clean up.

Assisted stair (Standard)



The assisted stairs on loading/unloading side and plarform area with platforms are adjustable according to operator's stature. This friendly design makes operators more comfortable.

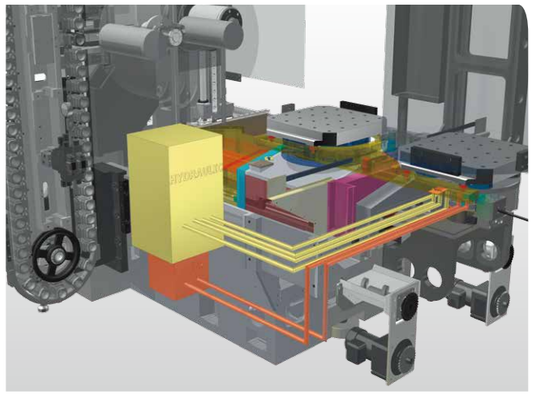
Tool cart (Optional)



The tool cart is available.

Hydraulic and pneumatic supply for jig & fixture (Optional)

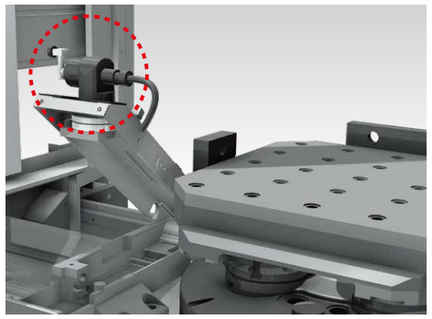
1. Suspended arm type supply
Totally 6 ports are provided on each side and the maximum hydraulic pressure allowed is 250 bar.



2. Hydraulic supply under pallet
Quick couplers are used for hydraulic supply under pallet. There is no limitation for B axis rotating.

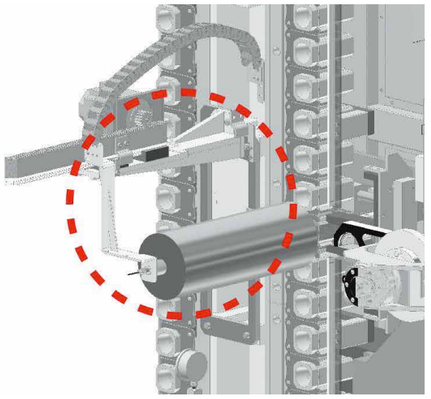
Interior tool measuring device (Optional)

It can measure tool length and tool diameter. In storage, it can be drawn back on the lateral side of pallet to prevent interference from tool or workpiece.



Tool magazine side tool breakage detector (Optional)

Tool breakage can be detected on the standby position of tool magazine side for saving cycle time.



TIMS Tongtai Intelligence Manufacturing System

Considering productivity improvement, better machining precision, operating facilitation, as well as protection and maintenance assistance, TIMS includes four management functions: production management, intelligent monitoring, tool management, and workpiece management. These provide customers a comprehensive intelligence manufacturing system and a friendly human-machine interface.

Production management

Cutting Load Monitoring
The spindle and feeding axis motor loads are able to be monitored from the operation panel directly. The tool number is also shown during machining.

APC Information
The operator is able to assign the program codes of A/B pallet in the operating interface directly and the system will call the corresponding programs of workpiece automatically.

Machine Alarm Messages Record
Alarm messages will be recorded in detail during machine processing.

Troubleshooting and Maintenance Support
Graphical display interface assists operators to understand detail alert and warning information.

Tool management

Tool Usage Time Tracking
Record the information of last machining date, time, and accumulated machining time in each tool.

Tool Compensation
When the machining process needs tool length compensation, the operator is able to key in the compensation data for the tools.

Tool Life Management
Display the tool life information and reminds the operator to check workpiece before tool life almost approaching its maximum.

Tool Overload Protection
Display the information tool loads, spindle loads, machining time, abnormal data, and overload value of tools. When overload value reached, system will shut down the machine and show the alarm message.

Intelligent monitoring

Motor Load Monitoring
Monitoring and retrieving the motor load data during machining from the operation panel. In addition, according to the setting values, the system will show the alarm messages or shut down the machine.

Machining Adaptive Control
Monitoring the spindle loads and the system enables automatic feeding adjustment to protect tools and ensure machining efficiency.

Crush Protection
With the real-time detection of servo loads during feeding, the electrical brake is activated when a crash happens to minimize the damage.

Workpiece management

Workpiece positioning
The CCD camera is used to monitor the characteristics of workpiece, and then the system will calculate and compensate program coordinates for increasing machining precision.

Flexible Manufacturing System (FMS)

Flexible Manufacturing System (FMS) means a reasonable, flexible and versatile machining system including machine itself, auto moving system, and software which can integrate both. Main application is suitable for products of low volume and high variety, in detail will include the machining unit, storage unit, logistic handling unit, accessory unit and control unit. First four units are hardware of flexible manufacturing system. The control unit will integrate each hardware, control the info flow between each unit and make the whole system flexible, reasonable and compactable.

Container
It allows temporary storage of machined parts and finished goods. The basic storage capacity is 10 sets and possible to expand to 20 sets maximum.

Stacker Crane
It assists workpiece movement from storage area to loading area, loading area to machining station, or between the stations.

Loading/unloading station
Raw material and finished workpiece can be loaded and unloaded at this station. One loading/unloading station is standard and the second one is available.

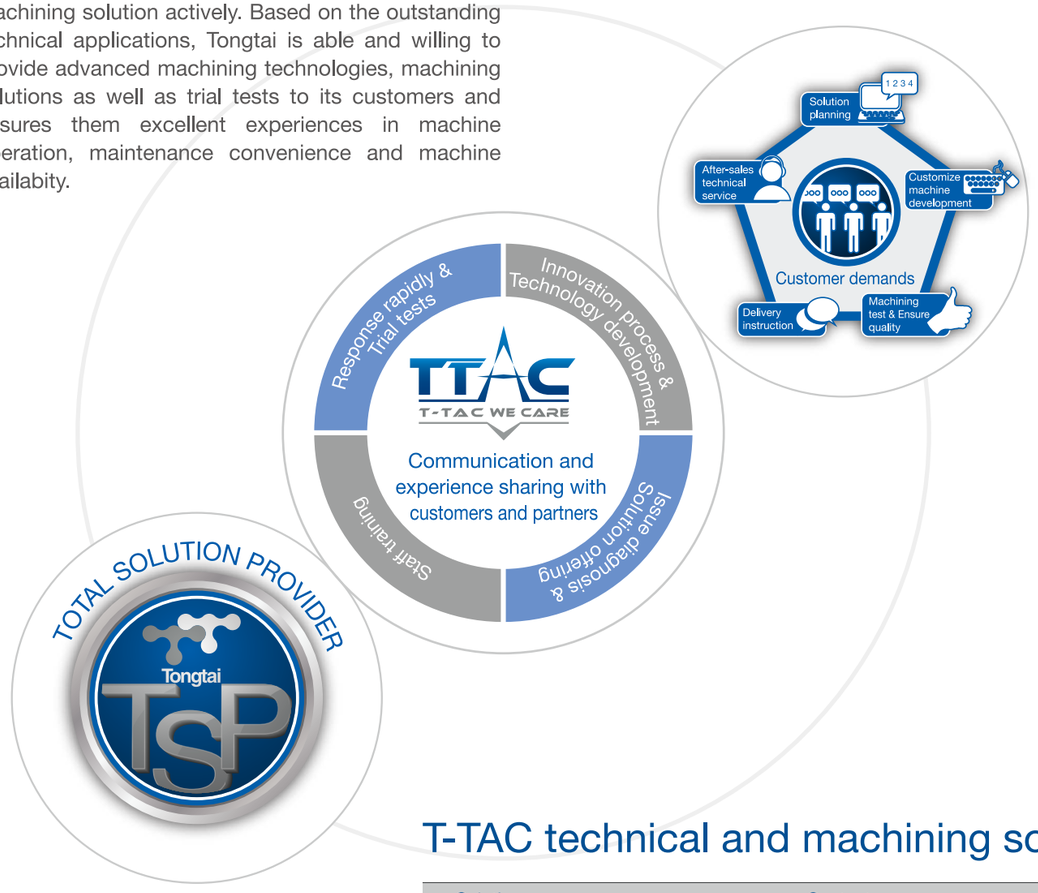
Manufacturing Management System, MMS
All control information of FMS can be set in this system. Moreover, it can combine with a monitoring module for collecting the production information and feedback.

- Based on following four conditions to decide the priority of handling sequence, “first in first out”, “optimization route ”, “machine intelligence judgments” and “manual priority sequence adjust”.
- Operator can control the raw material input, adjust priority sequence, and check workpiece history record.
- When one single machine is down, other machine can still work properly.

Item		Specification
Workpiece storage system	Number of stacker cranes	1
	Max. loading capacity of stacker crane(kg)	1000
	Number of containers	1(2)
	Storage number of pallet	10 (20)
	Number of loading/unloading station	1 (2)
	Minimum limited machining time	4.5(10)
MMS	CC1 control system	1
	MMS-5000(Machine status monitoring)	option
	MMS-5100(Remote monitoring service)	option
Number of machine		1 (2)

Tongtai- Technical Application Center

The purpose of T-TAC is to take care of customer's machining solution actively. Based on the outstanding technical applications, Tongtai is able and willing to provide advanced machining technologies, machining solutions as well as trial tests to its customers and ensures them excellent experiences in machine operation, maintenance convenience and machine availability.

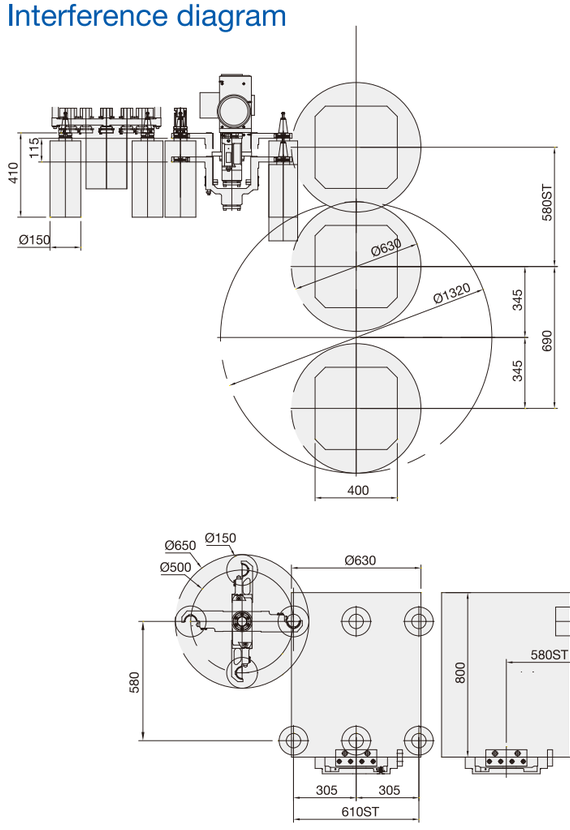


T-TAC technical and machining solutions

Solutions	Contents
Product manufacture test	Through the manufacturing progress and jig & fixture plans, Tongtai's skilled staff will manufacture the first piece for understanding the client's corresponding demands.
Machining technologies	By introducing innovative technologies and adding the extra functions, T-TAC is available to provide the brand-new solutions.
Machine technology	Our technical staff will test current problems, which clients have, in the same machine model for processing problem diagnosis and providing possible solutions. Furthermore, our skilled staff is able to provide the services at the client's factory.
Training	T-TAC is open to train current clients, potential customers, agents, teachers/students, and employees and to strengthen their abilities.
Technology exhibits	T-TAC is also an excellent platform to launch new products/technologies by cooperation with software/hardware suppliers. With presentation of highly reliable products/technologies, it's possible to provide higher efficiency and availability solutions than existing ones.

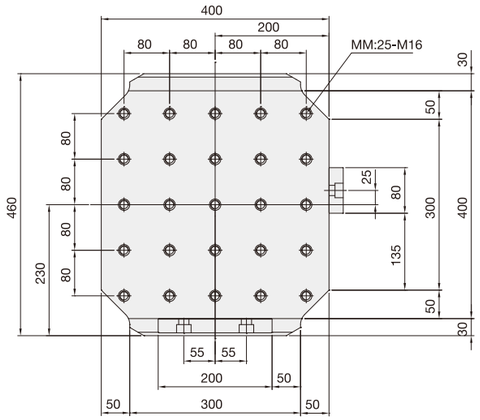
HA-400II

Interference diagram



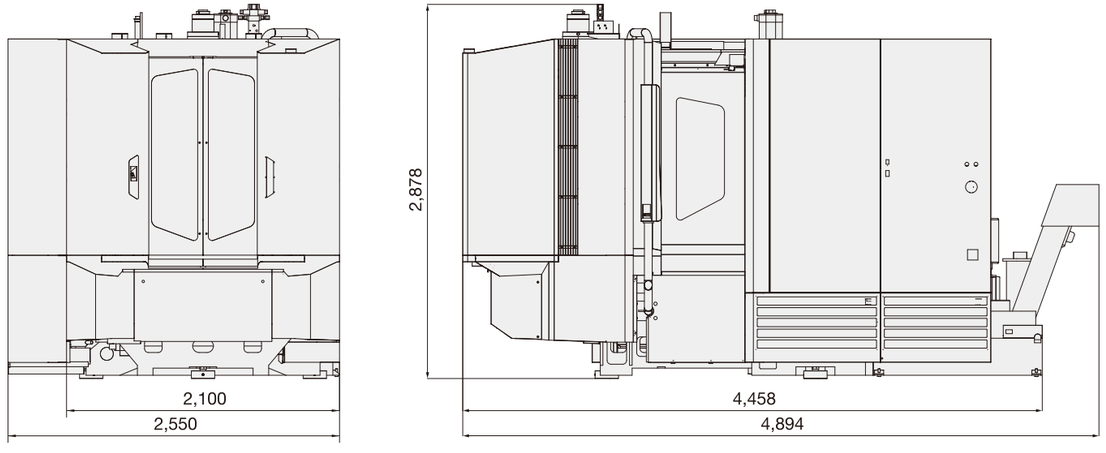
Pallet

Unit : mm



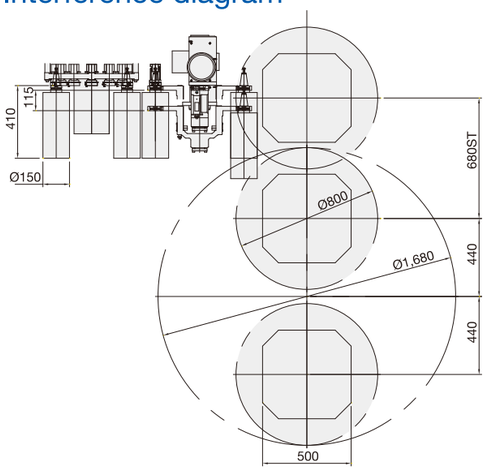
Machine dimensions

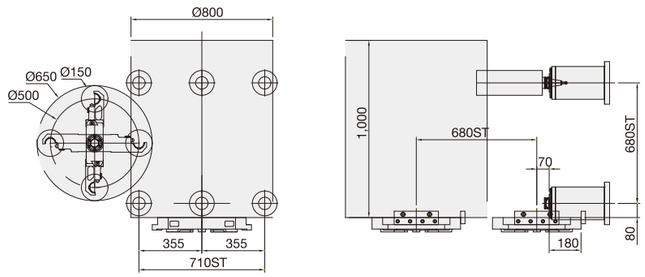
Unit : mm



HA-500II

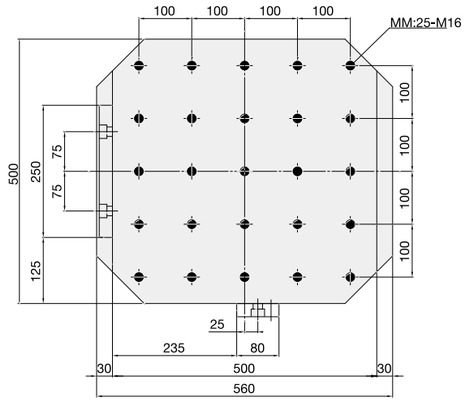
Interference diagram





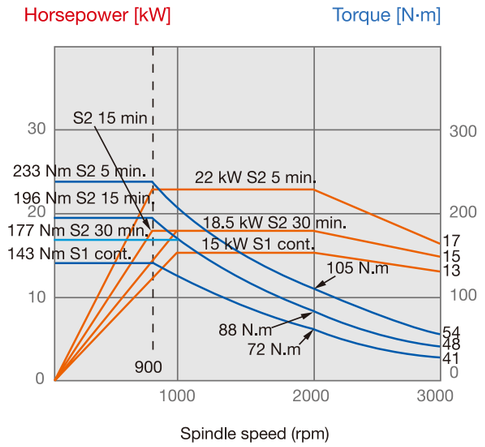
Pallet

Unit : mm

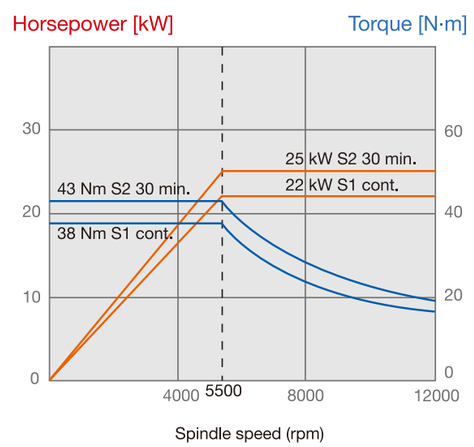


Spindle output and torque chart

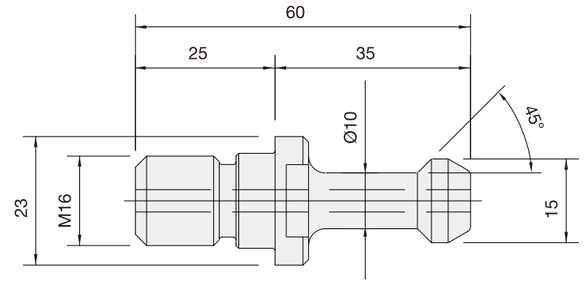
12,000 min^{-1} (rpm) <Low winding>



12,000 min^{-1} (rpm) <High winding>

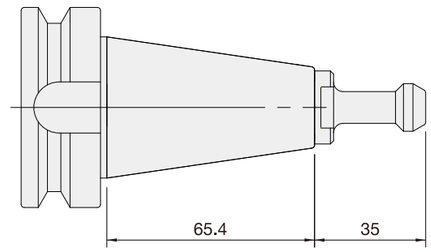


Pull stud (Coolant through spindle A type)



Unit : mm

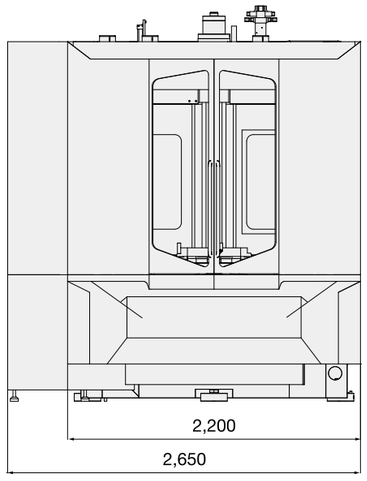
Tool shank MAS BT40

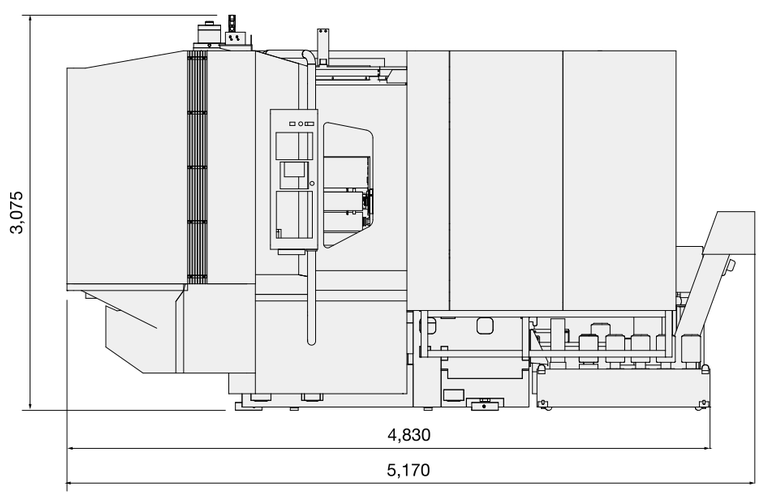


Unit : mm

Machine dimensions

Unit : mm





Standard/optional accessories

		Standard	Optional
Spindle	12,000 rpm High torque & power spindle	●	
B axis	Hirth coupling 1° rotary table	●	
	NC 0.001° index table (Rotary encolder in B axis is available)		○
Tool shank	BT40	●	
	HSK-A63		○
	DIN40		○
	CAT40		○
Angle of BT40 pull stud	MAS407 BTIII(90°)		○
	MAS407 BTII(60°)		○
	MAS407 BTI(45°)	●	
Coolant through spindle pump	20 bar	●	
	35 bar		○
	70 bar		○
Tool capacity	60 pc	●	
	90 pc		○
	120 pc		○
Cooling system	Spindle cooling system	●	
	Hydraulic temperature control system		○
	Coolant temperature control system		○
	Air conditioner for electrical cabinet		○
Automatic pallet changer	Two pallets	●	
	8PPL system		○
	FMS (flexible manufacture system)		○
Interior chip disposal	Two chip augers	●	
Chip conveyer	Scraper type conveyor	●	
	Magnetic scraper type conveyor		○
	Hinge type conveyor		○
	Drum type conveyor		○
	Integrated type conveyor		○
Lubrication system	General lubricant system	●	
	LHL integrated lubrication system		○
Three axes linear scale	5 μm resolution	●	○
	3 μm resolution		○
Jig & fixture hydraulic/ pneumatic supply	Suspended arm type supply, 6 holes on each side (Maximum hydraulic pressure is 250 bar)		○
	Table type, 6 holes on APC side (Maximum hydraulic pressure is 250 bar)		○
Tool measuring system	Tool breakage detector (Installed on tool magazine side to detect tool breakage)		○
	Retreat Renishaw TS-27R touch sensor (Installed in the interior of the machine for measuring tool length, tool breakage and tool diameter)		○
Controller	FANUC 0i-M	●	
	FANUC 31i-M		○
Other accessories	Renishaw OMP60 workpiece measuring system		○
	Machining air blow		○
	Air gun		○
	Coolant gun		○
	Oil skimmer		○
	Oil mist collector		○

Specifications

Item	Specification	Unit	HA-400II	HA-500II
Travel	X axis	mm	610	710
	Y axis	mm	580	680
	Z axis	mm	580	680
	Spindle nose to table center	mm	70-650	70-750
	Spindle center to table surface	mm	80-660	80-760
	Table height from floor	mm	1,150	1,150
Pallet	Pallet size	mm	400×400	500 x 500
	Max. load	kg	400×2	500 x 2
	Pallet face		M16×25 holes	M16×25 holes
	Min. Indexing increment	degree	1 (0.001° optional)	1 (0.001° optional)
Spindle	Spindle speed	rpm	12,000	12,000
	Spindle shift	step	Two steps by electric	Two steps by electric
	Spindle taper		7/24 Taper No.40	7/24 Taper No.40
	Bearing diameter	mm	75	75
Feed	Rapid traverse	m/min.	60	60
	Cutting feedrate	mm/min.	1-20,000	1-20,000
ATC	Tool shank		BT40	BT40
	Pull stud	degree	90(MAS-P40T)	90(MAS-P40T)
	Tool capacity	pc	60	60
	Max. tool diameter	mm	Ø75	Ø75
	Max. tool diameter (w/o adjacent tool)	mm	Ø150	Ø150
	Max. tool length	mm	410	410
	Max. tool weight	kg	12	12
	Tool selection system		Fixed type	Fixed type
APC	Number of pallets		2	2
	Pallet changing system		Rotary type	Rotary type
Required electricity	Required electricity	kva	45	45
	Required voltage	v	200-220 ±10%	200-220 ±10%
	Current frequency	hz	50 or 60 ±1%	50 or 60 ±1%
	Pneumatic source	mpa	0.5	0.5
	Air supply	liter/min	400	400
Capacity	Hydraulic tank	liter	30	30
	Lubricant tank	liter	2	2
	Coolant tank	liter	550	550
Weight		kg	9,500	12,200
Controller	FANUC		0i-M	