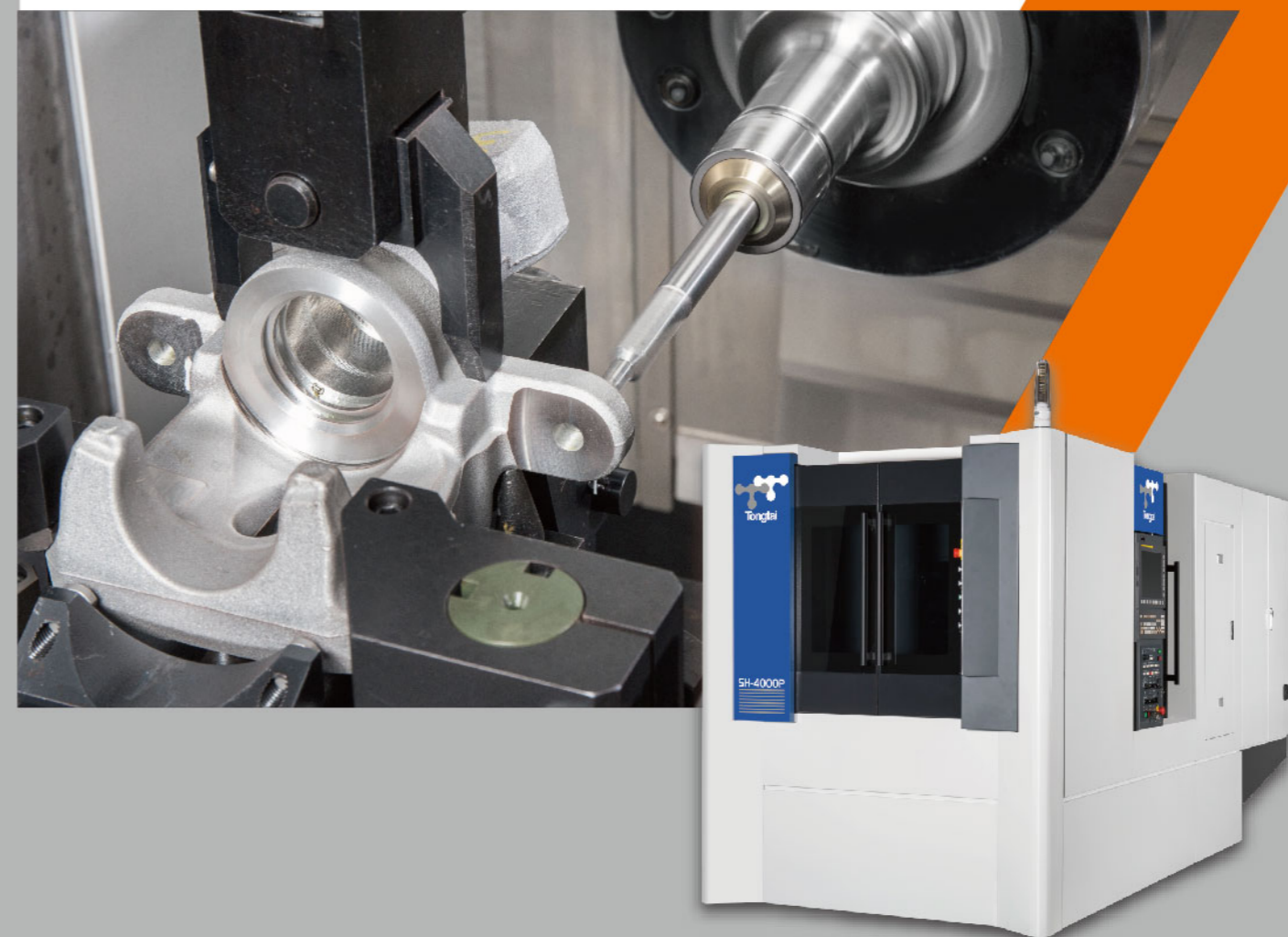


Horizontal Machining Center

SH-4000 Series



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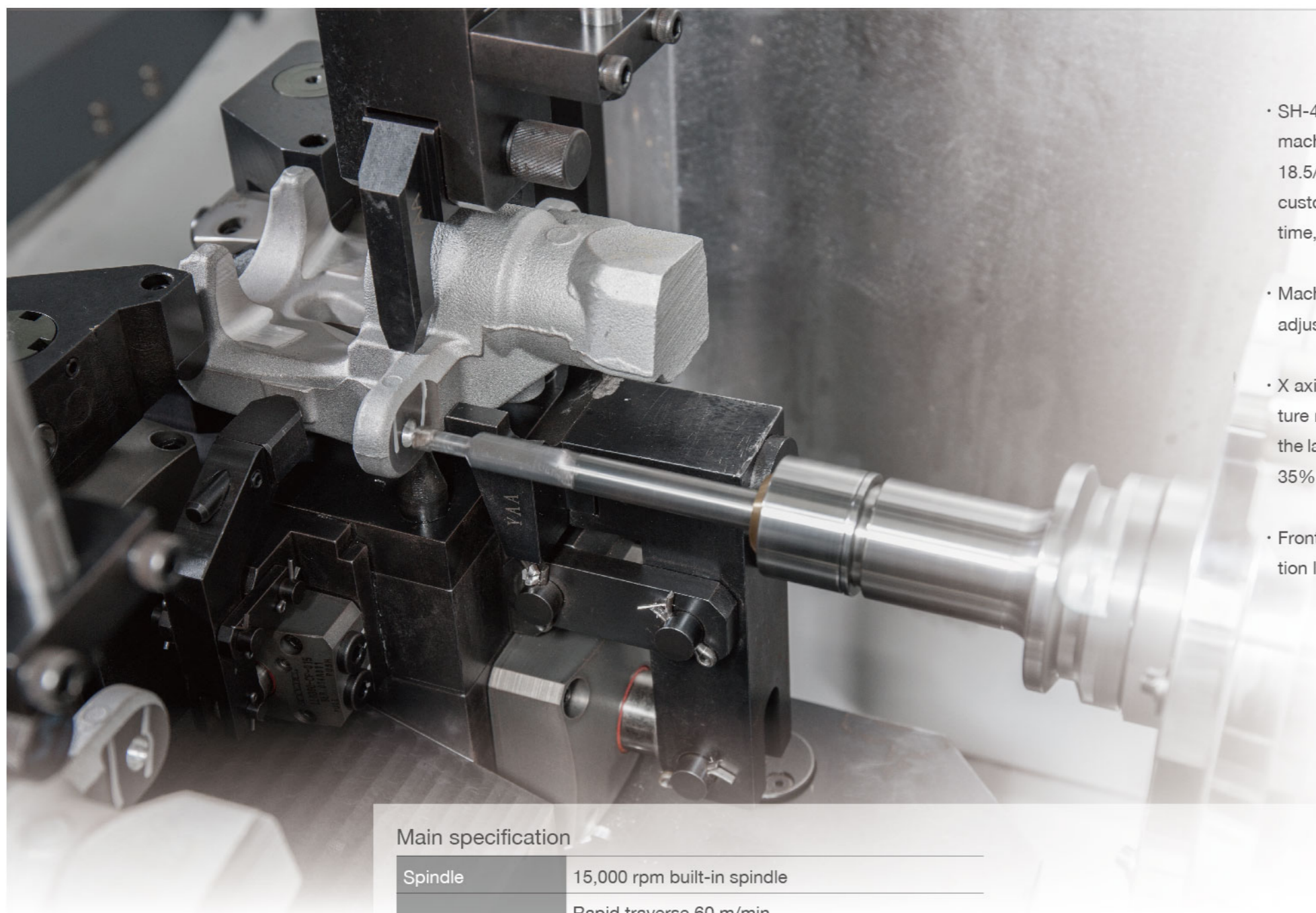
FAX : 86-512-63431622

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SH-4000 Series



- SH-4000 series is developed for smaller stroke need and aluminum parts machining. It is equipped with 15,000 rpm built-in spindle which has 18.5/25/37 kW power and 95/171/250 Nm torque output. In addition, for customers considering the requirements of cycle time and loading/unloading time, the APC (automatic pallet changer) system is available as an option.
- Machine bed adopts 3-point support structure which facilitates leveling adjustment and ensures a stable machine installation.
- X axis roller guide ways are set on stepped bed. This further increases structure rigidity, lightens structure weight, and saves floor space. Compared with the last generation machine, HA-400II, the entire floor space has decreased by 35%.
- Frontal width of machine is only 1,750 mm, which benefits the mass production line planning.

Main specification

| | |
|---------------------|--|
| Spindle | 15,000 rpm built-in spindle |
| 3 axes | Rapid traverse 60 m/min |
| | X/Y/Z axis stroke 510/510/510 mm |
| | X/Y/Z axis acceleration/deceleration 1.0 G |
| | X/Y/Z axis □45 mm high rigidity roller guide way |
| | X/Y/Z axis Ø40 mm high precision ballscrew |
| B axis rotary table | NC0.001° indexing table |
| | Table size : 400 x 400 mm |
| | Max. workpiece size : Ø550 x H800 mm |

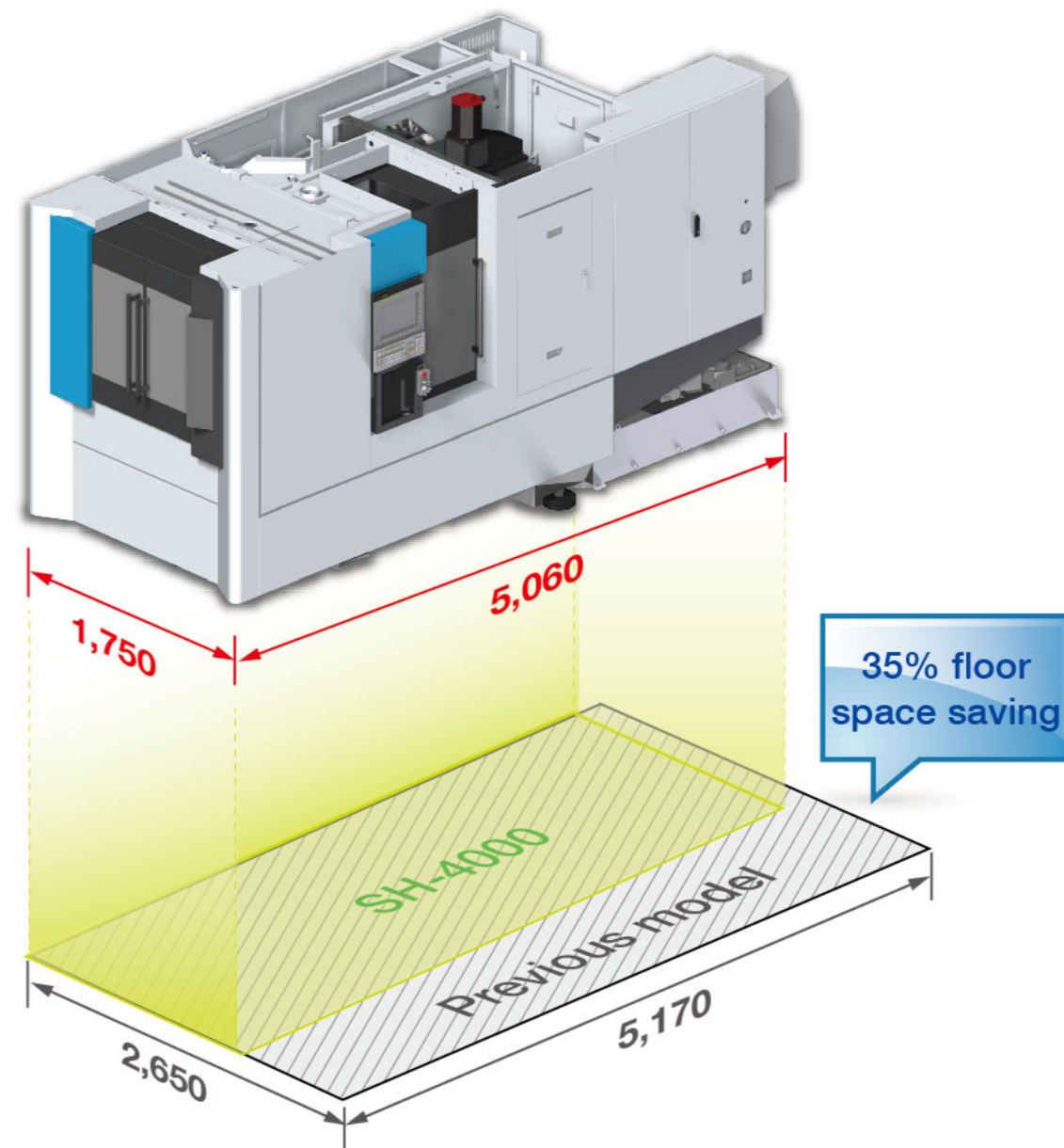
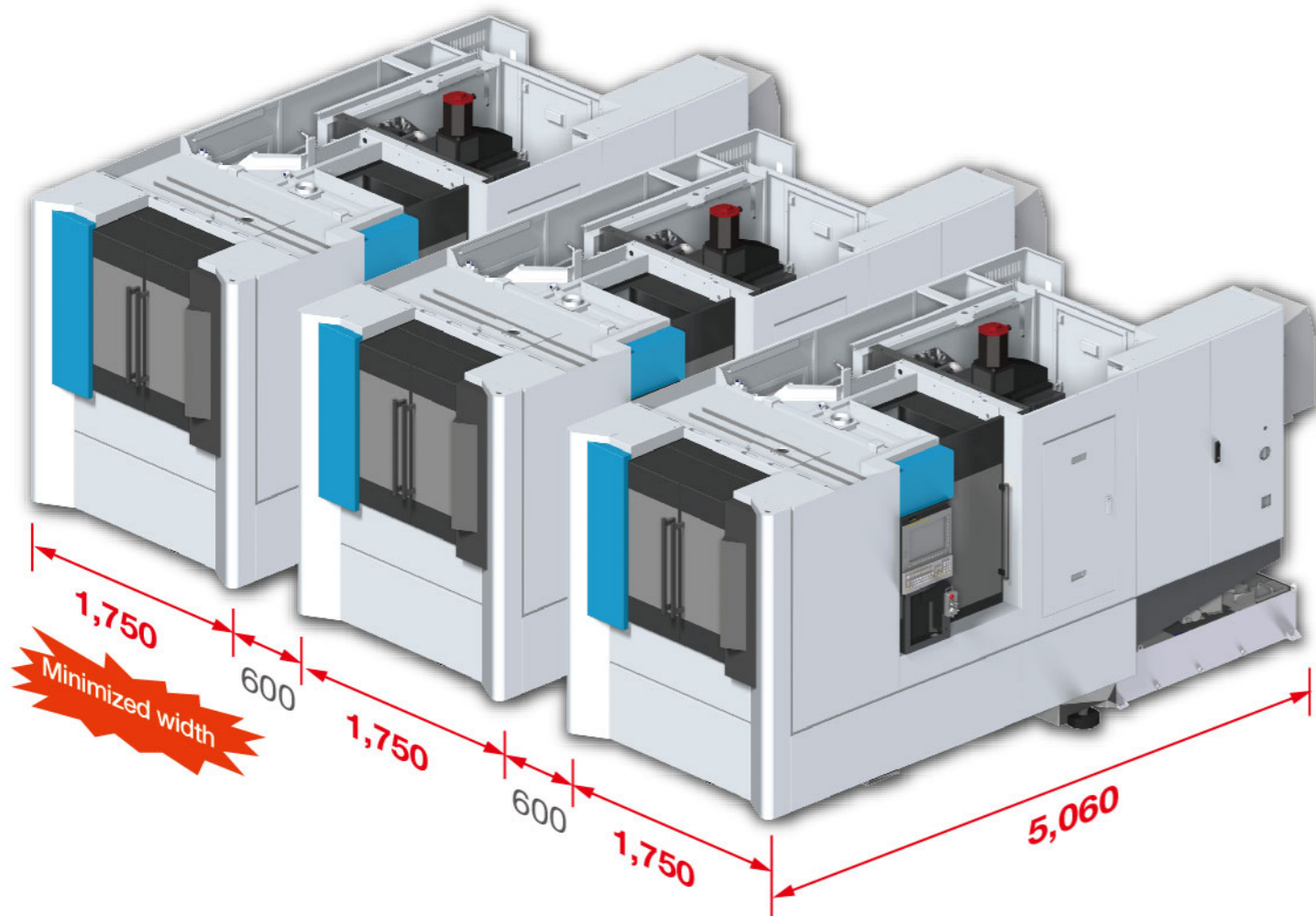
CONTENTS

- 03 Industrial applications
- 05 Main structure
- 08 Operation
- 09 Peripheral accessories
- 12 Flexible Manufacturing System
- 13 TMS
- 15 Tool interference · Spindle output and torque chart
- 16 Machine dimensions
- 17 Standard/optional accessories
- 18 Specification



Industry applications

Suitable for mass production line planning & aluminum machining.



Workpiece: Caliper
Material: Aluminum alloy



Workpiece: ABS breaking valve
Material: Aluminum alloy



Workpiece: Differential cover
Material: Aluminum alloy



Workpiece: Motor cover
Material: Aluminum alloy



Workpiece: Connection arm
Material: Aluminum alloy

Main structure

High rigidity structure

Stroke

X/Y/Z axis 510/510/510 mm

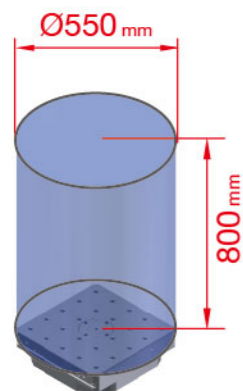
Rapid traverse

X/Y/Z axis 60/60/60 m/min

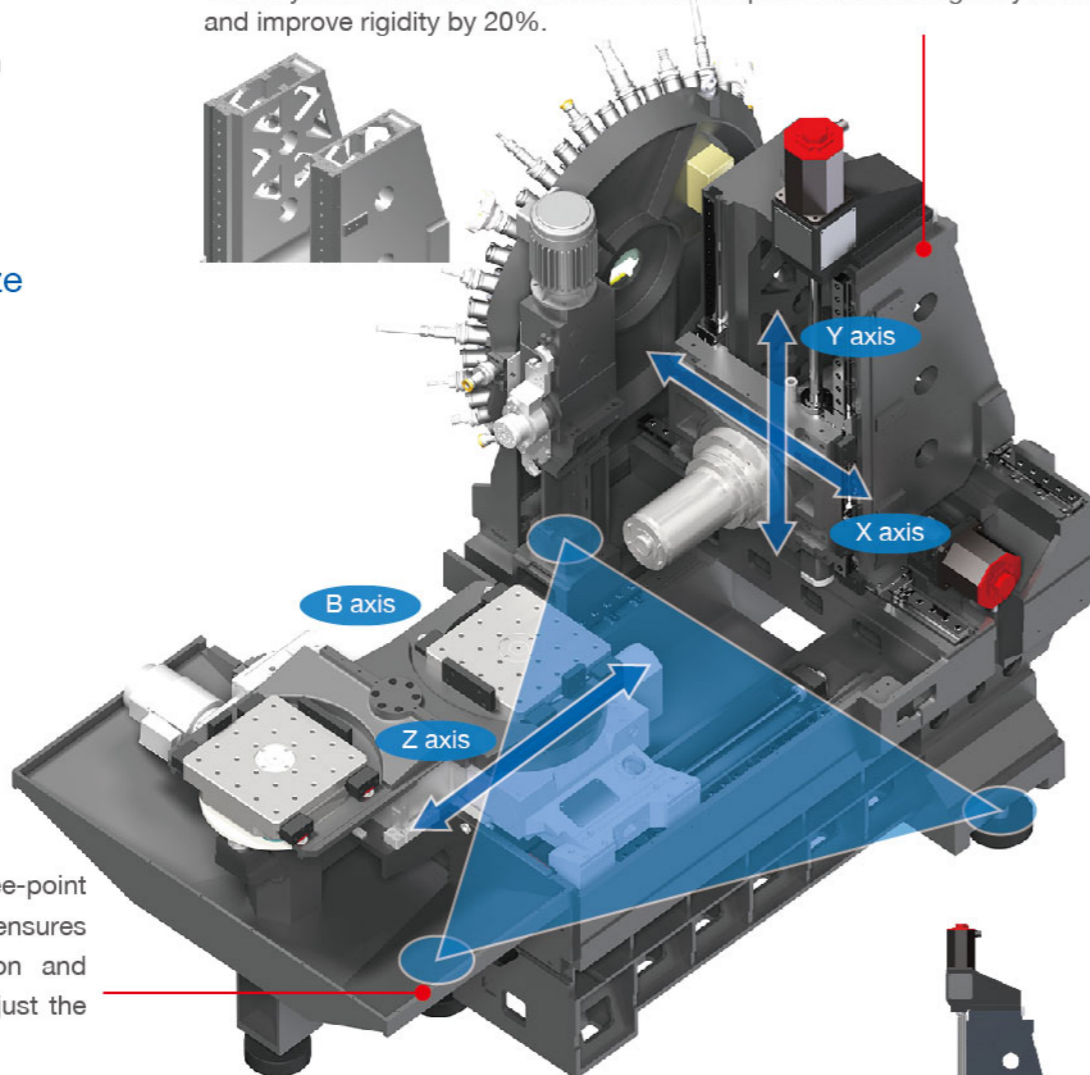
Acceleration/Deceleration

X/Y/Z axis 1.0 G

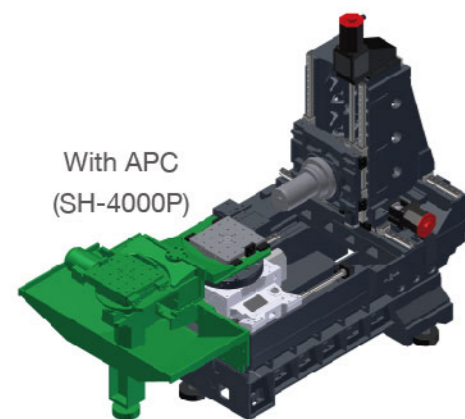
Max. workpiece size



- Double-wall and symmetrical structure design are used on the motion column to improve structural rigidity and reduce accuracy errors caused by thermal distortion.
- DHoneycomb structure of motion column helps to reduce weight by 25% and improve rigidity by 20%.



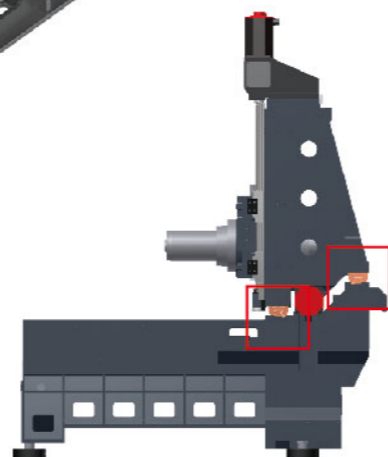
Machine bed adopts three-point support structure, which ensures stable machine installation and facilitates operators to adjust the machine.



With APC (SH-4000P)



Without-APC (SH-4000)

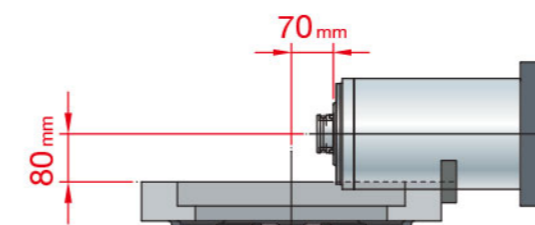


X axis roller guide ways are set on stepped bed, which not only increases structure rigidity but also achieves the goals of weight decreasing and floor space saving.

Considering the requirements of cycle time and loading/unloading time, an APC (automatic pallet changer) system is available as an option.

Spindle

- Max. spindle speed 15,000 rpm
- Spindle motor 18.5/25/37 kW
- Output torque 95/171/250 Nm
- Acceleration time 2.6 sec (0→15,000 rpm)
0.6 sec (0→6,000 rpm)

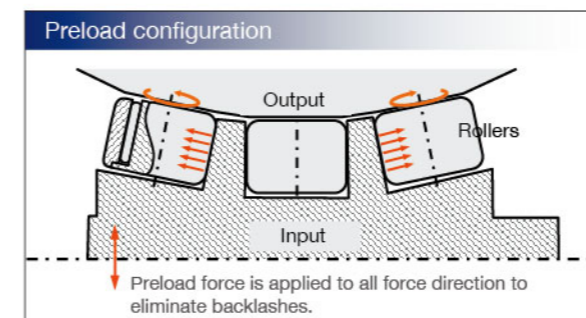


- Minimum distance from spindle nose to table center 70 mm
- Minimum distance from spindle center to table surface 80 mm

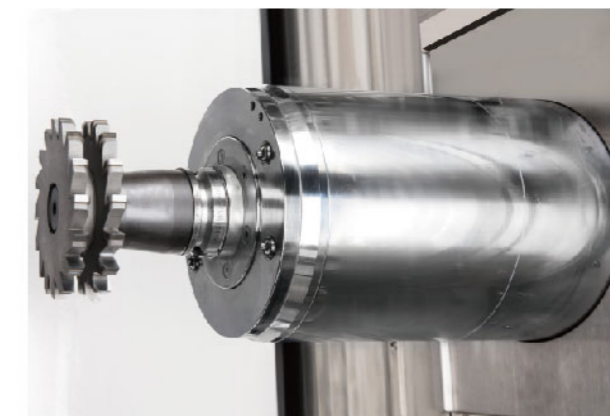
B axis rotary table

High rigidity roller gear cam mechanism

Because B axis rotary table is driven by roller gear cam with rolling contact between roller and cam, it can start at a lower torque. It is suitable for high speed rotation and high accuracy is guaranteed under long-term heavy duty cutting.

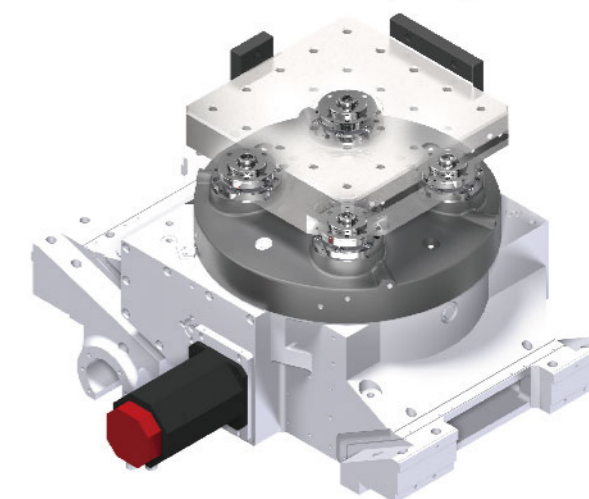


| | |
|---------------------------|-------------------|
| Zero backlash | Low abrasion |
| High positioning accuracy | Higher durability |



SH-4000 series is developed for machining aluminum alloy parts. For providing excellent machining performance in aluminum alloy part, the machine is equipped with 15,000 rpm built-in spindle which has 18.5/25/37 kW power and 95/171/250 Nm torque output.

High precision positioning cones with hydraulic locking device, generating 4.2 tons of clamping force to ensure the table stability during machining.



| | |
|--------------------------------|----------|
| Max. table load | 400 kg |
| Min. indexing degree of table | 0.001° |
| 90° indexing time of table | 0.5 sec |
| Clamping force of table | 4,200 kg |
| Braking force of table | 500 kg.m |
| Positioning accuracy of B axis | 30" |
| Repetition accuracy of B axis | 4" |

Mian structure

APC (Automatic Pallet Changer)(SH-4000P)

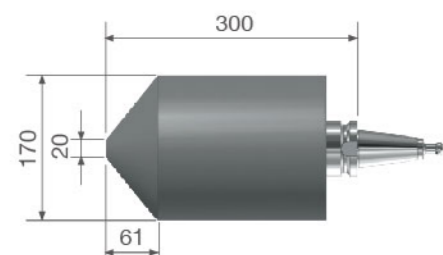
Cam type device driven by electric motor is used on APC system. It has the advantages of quick pallet changing, less noise, and stable working since isn't influenced by oil temperature.

| | Pallet changing time |
|----------|----------------------|
| SH-4000P | 6.0 sec |
| HA-400II | 10.0 sec |

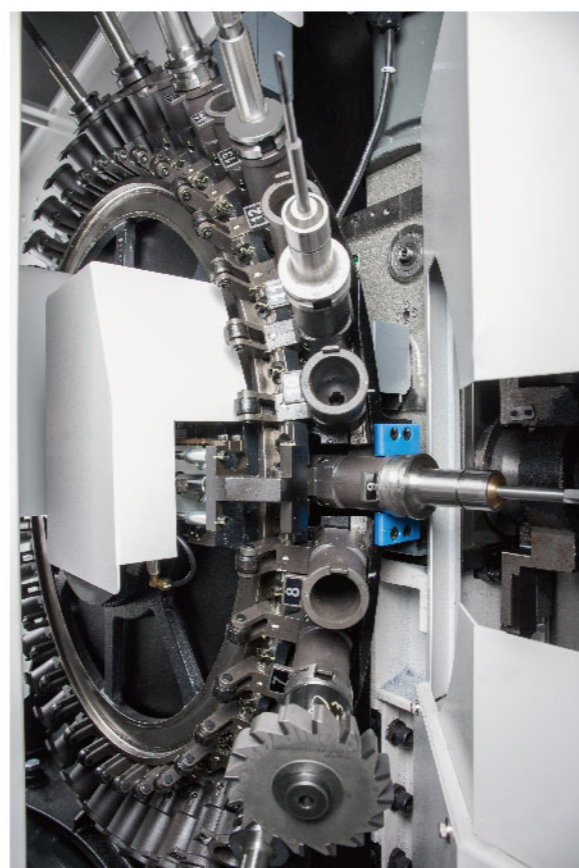
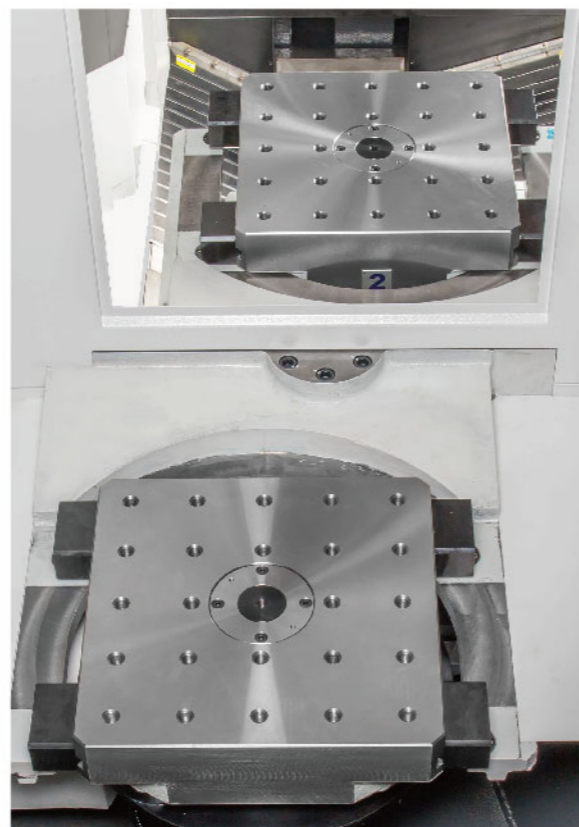
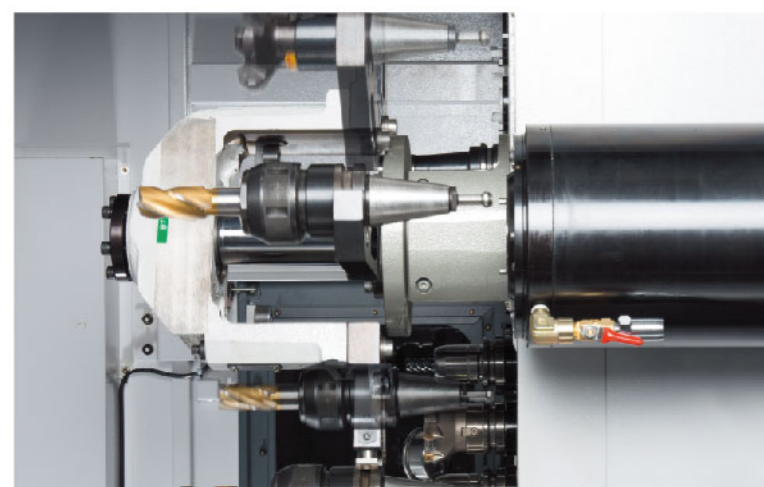
ATC (Automatic Tool Changer)

Japanese made cam mechanism is used on ATC gear box, which has the features of high stability, high durability, and rapid tool changing. A ring -type magazine (40 tools) is equipped to offer high speed indexing. Tool moving time of next adjacent tool is 2.5 sec.

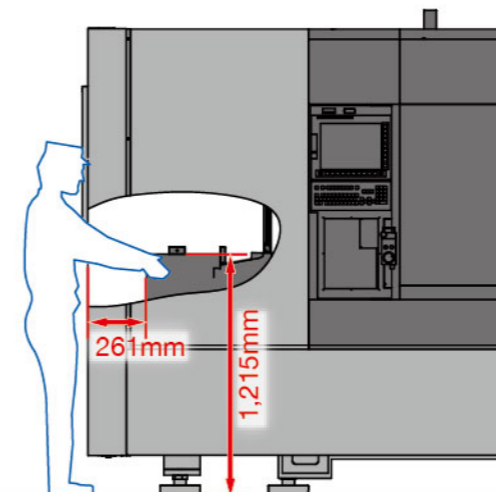
Allowable tool sizes in ATC



| | SH-4000(P) |
|---------------|---------------|
| T to T time | 1.4 Sec |
| C to C time | 2.6 Sec |
| Tool capacity | 40 \ 60(Opt.) |



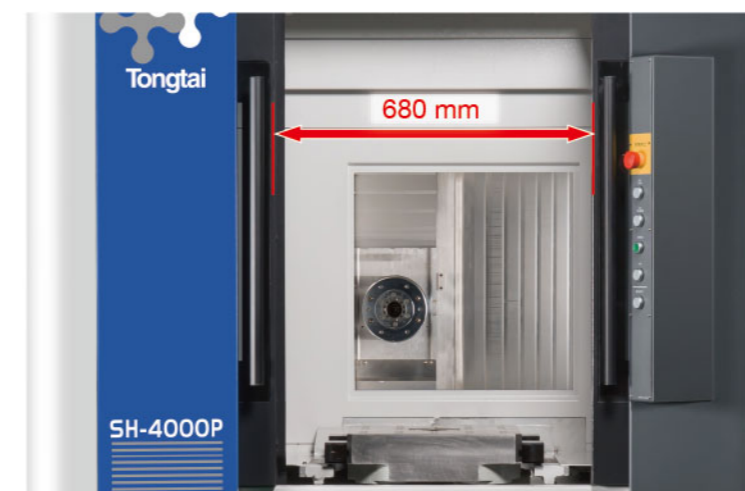
Operation



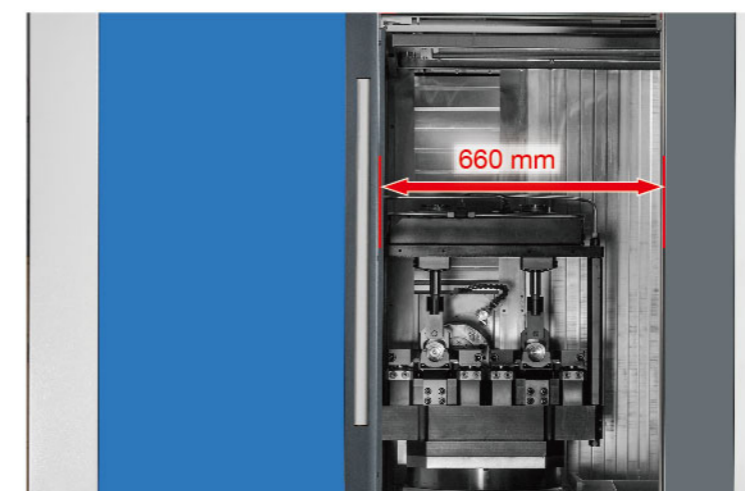
With excellent access to the table and a wide door opening facilitates loading/unloading and jig & fixture operations.



SH-4000P



SH-4000



Through centralized management of air FRL unit and lubrication pump, daily maintenance becomes easier.



A big size tool magazine door design facilitates tool checking and replacement.

Peripheral accessories

Rearward type chip conveyor

Standard equipped integrated type (chain type plus drum type) chip conveyor, it has outstanding chip disposal efficiency for different materials and chip size.

○ : suitable × : non-suitable

| Integrated type (chain type plus drum type) | Steel | | Cast iron | | Aluminum/ non-ferrous metal | | |
|--|-----------------|-------------|--------------|-------------|-----------------------------|-------------|--------------|
| | Long/Curl chips | Short chips | Powder chips | Short chips | Long/Curl chips | Short chips | Powder chips |
| | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

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.



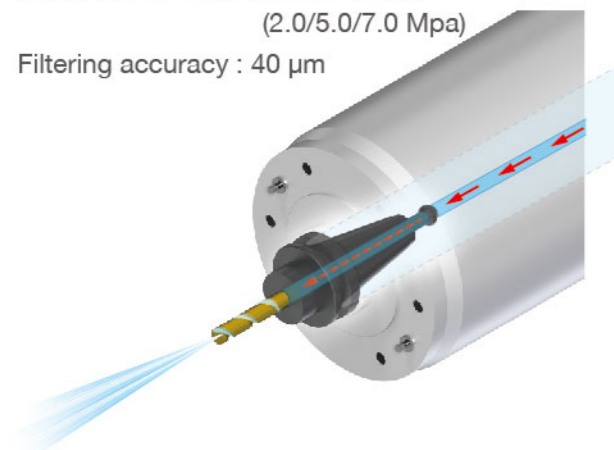
Coolant tank capacity: 700 L(80% full)

C.T.S. (Coolant through spindle) (optional)

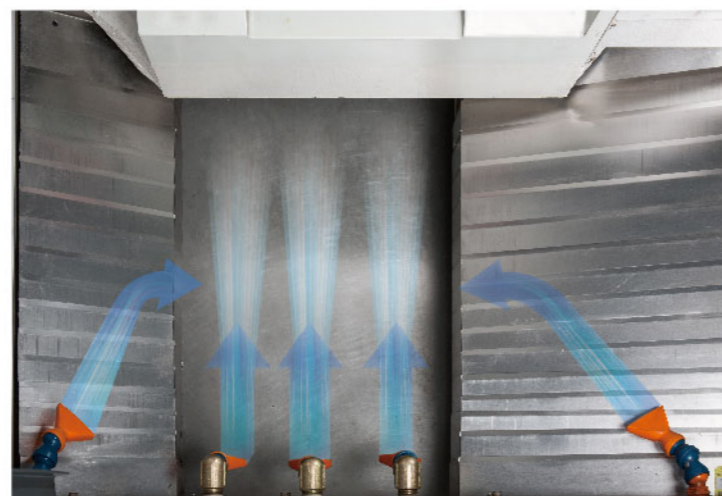
C.T.S. system increases the efficiency of chip disposal and extends the tool life by cooling the cutting point.

Discharge pressure : 20/50/70 bar
(2.0/5.0/7.0 Mpa)

Filtering accuracy : 40 μm



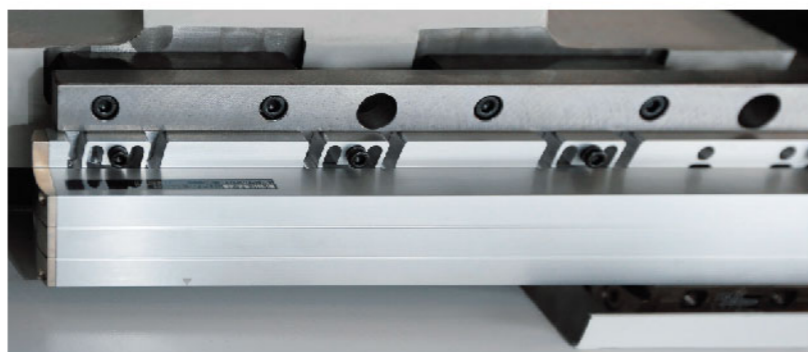
Chip disposal



Widely slanted sheet metal with central chip disposal device allows chips efficient removing efficiently.

Linear scale (Optional)

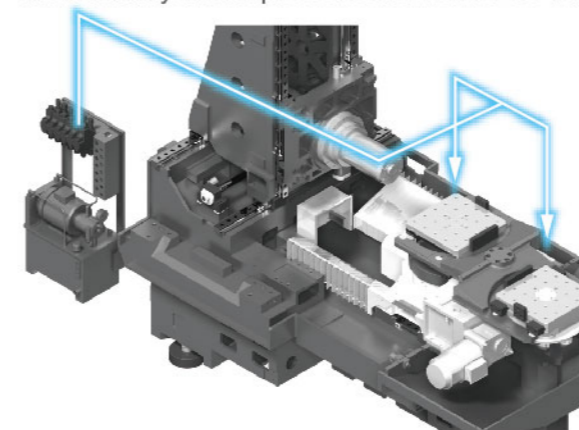
Linear scale is able to compensate the positioning error, repetition error, and pitch error of the ballscrew, which are caused by the temperature changing. The positioning accuracy achieves ±3μm with compensation of linear scales.



Hydraulic and pneumatic supply for jig & fixture

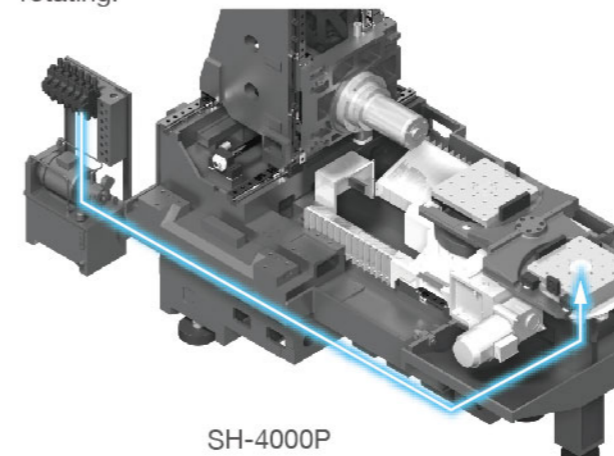
1.Suspended arm type supply

Totally 6 ports are provided on each side and the maximum hydraulic pressure allowed is 250 bar.

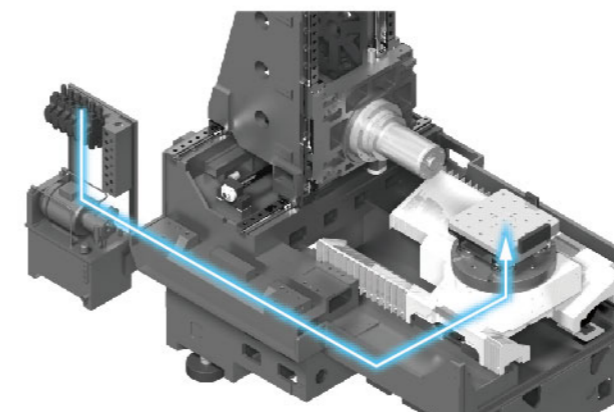


2.Hydraulic supply under pallet

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



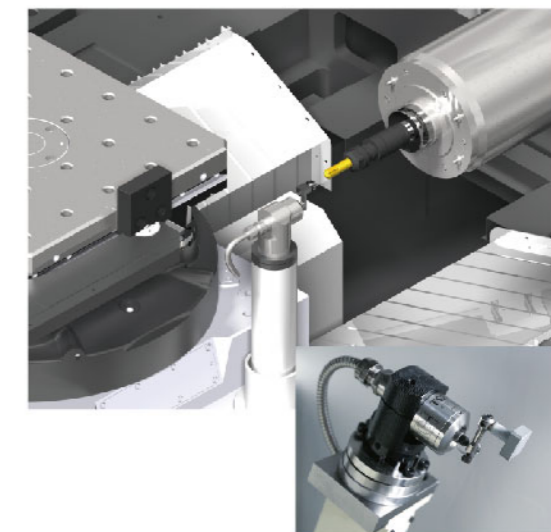
SH-4000P



SH-4000

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 the pallet to prevent interference from tool or workpiece.



Safety light curtain device (optional)

Safety light curtain device is available for avoiding accidental operation and ensuring operation safety.



For green future

Because of rising energy costs and strict international environmental laws, the energy efficiency of production equipment is a key factor that can influence the production costs. By this trend, the machine tools are not only need to satisfy the requirements of high speed and high precision, but also need to pursue the goals of high efficiency and environmental protection. In recent years, Tongtai has worked hard on developing the products with the concept of being environmentally friendly. Besides improve machine efficiency, the energy saving accessories are used on machines.

LHL lubrication system

Variable-frequency hydraulic unit

Lubricant
Save 90%

Parts damage
Decrease 50%

Coolant life
Improve 200%

Power consumption
Save 55%

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) |
| MMS | Minimum limited machining time | 4.5(10) |
| | CC1 control system | 1 |
| | MMS-5000(Machine status monitoring) | option |
| | MMS-5100(Remote monitoring service) | option |
| Number of machine | 1 (2) | |

TIMS Tongtai Intelligence Manufacturing System(Opt.)

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.

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.

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.

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.



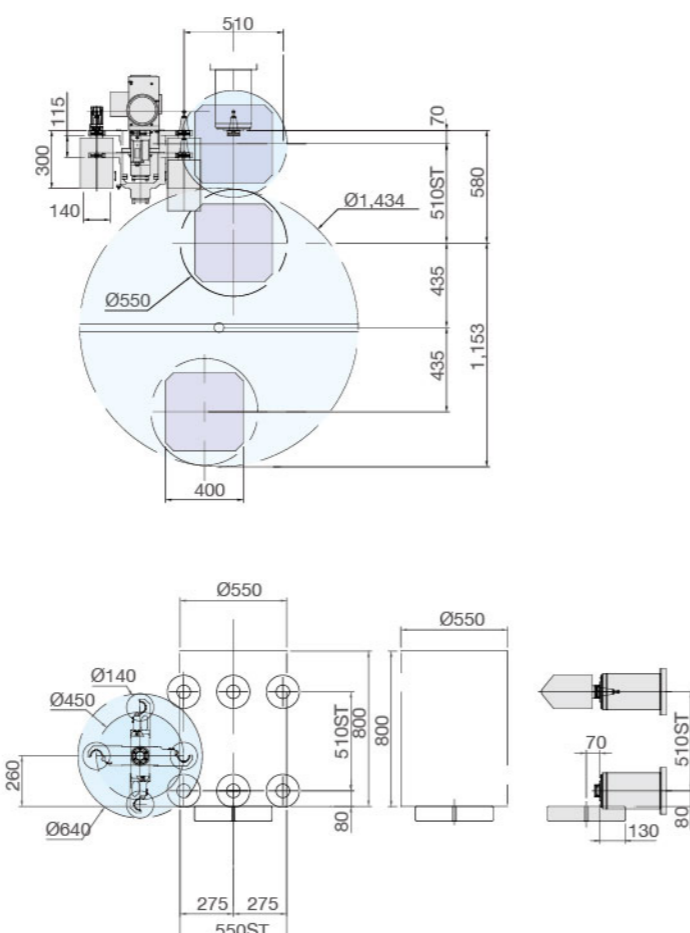
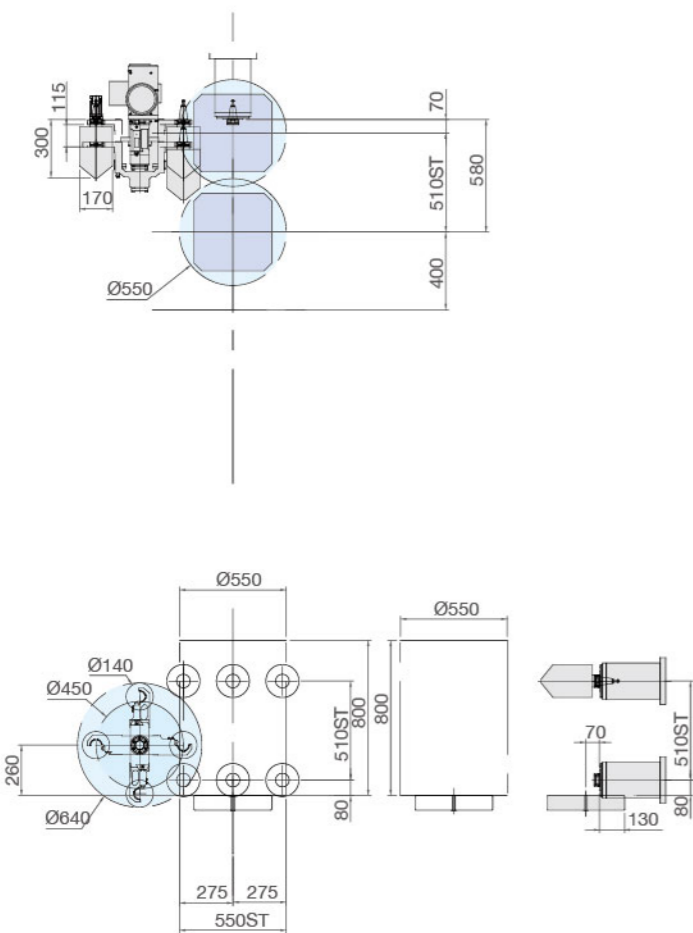
Tool interference • Spindle output and torque chart

Pull stud/Tool shank type • Machine dimensions

SH-4000 Interference diagram

SH-4000P Interference diagram

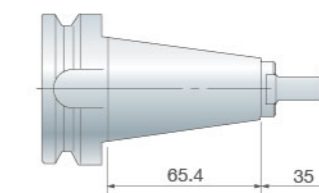
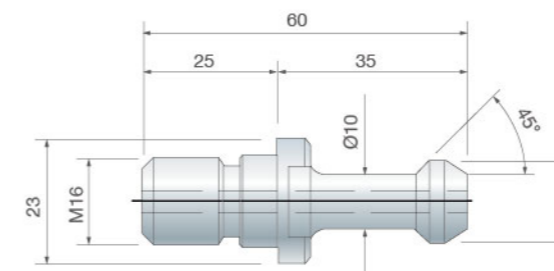
Unit : mm



Pull stud (C.T.S. A type)

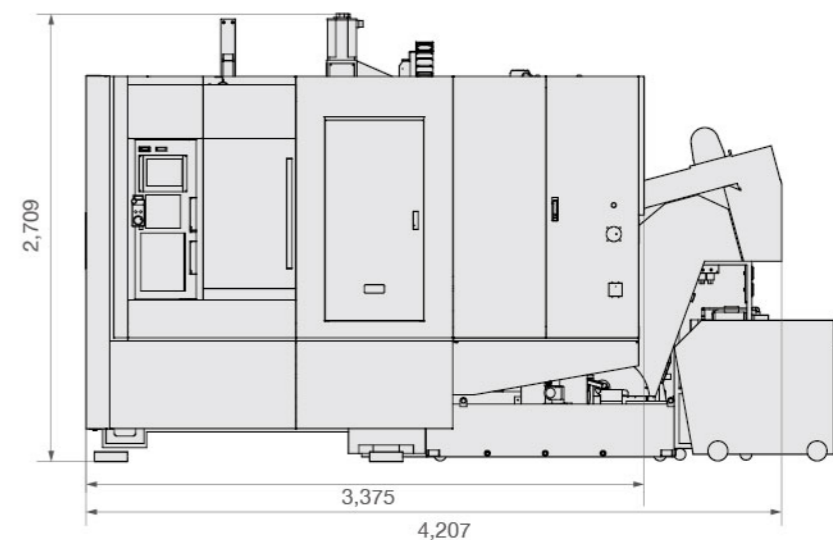
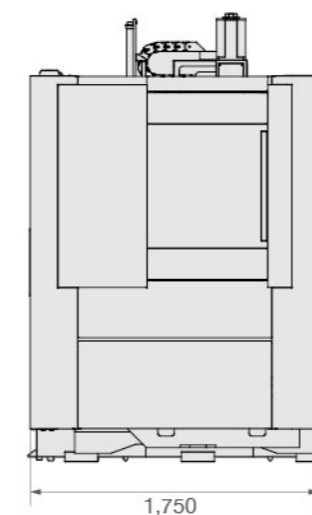
Tool shank type: MAS BT40

Unit : mm



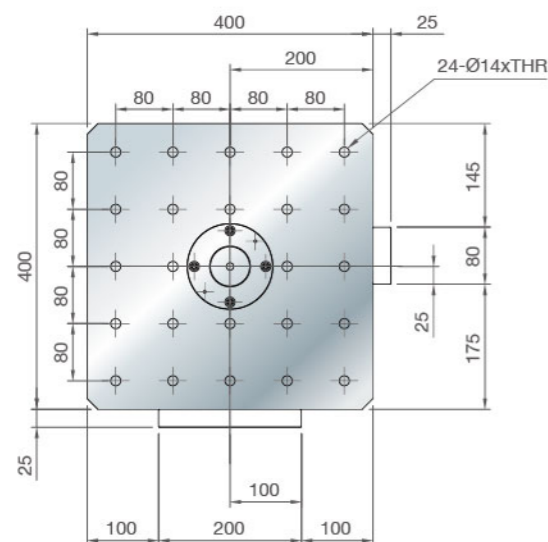
SH-4000 Machine dimensions

Unit : mm

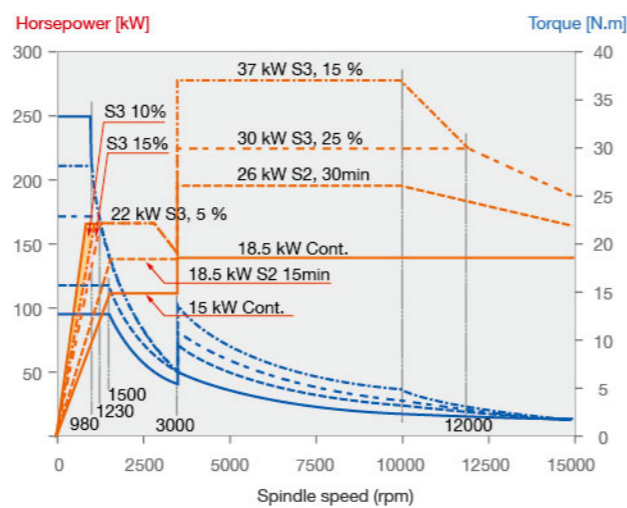


Pallet

Unit : mm

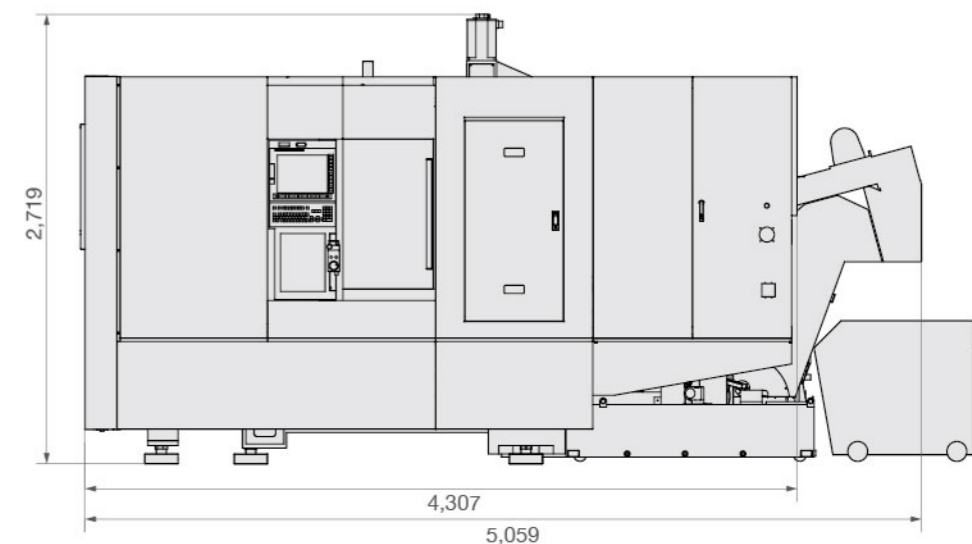
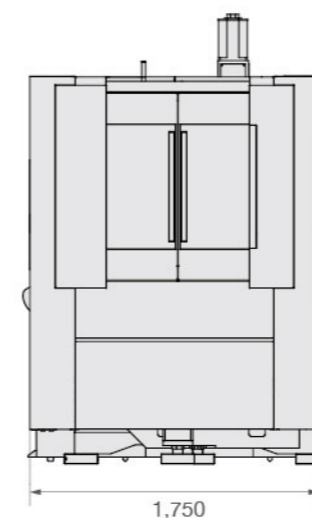


15,000rpm built-in spindle



SH-4000P Machine dimensions

Unit : mm



Standard/optional accessories

SH-4000(P)

| | | Standard | Optional |
|------------------------------|--|------------|----------|
| Spindle | Built-in type 15,000 rpm | ● | |
| B-axis | NC 0.001° index table (without rotary encoder) | ● | |
| | NC 0.001° index table (with rotary encoder) | | ○ |
| APC | Single pallet | ● SH-4000 | |
| | Dual pallet | ● SH-4000P | |
| Tool Shank | BBT-40 | ● | |
| | HSK-A63 | | ○ |
| | DIN-40 | | ○ |
| | CAT-40 | | ○ |
| Angle of BT-40 Pull stud | MAS407 BTI(45°) | ● | |
| | MAS407 BTII(60°) | | ○ |
| | MAS407 BTIII(90°) | | ○ |
| Tool capacity | 40 pc | ● | |
| | 60 pc | | ○ |
| Coolant through spindle pump | 20 bar | | ○ |
| | 50 bar | | ○ |
| | 70 bar | | ○ |
| Cooling system | Spindle coolant system | ● | |
| | Air conditioner for electrical cabinet | ● | |
| | Coolant temperature control system | | ○ |
| | Hydraulic temperature control system | | ○ |
| Chip conveyor | Central chip removing coolant system | ● | |
| | Integrated type conveyor | ● | |
| Lubrication system | LHL integrated lubrication system | ● | |
| Positioning accuracy system | Three axes scal 5 μm resolution. | | ○ |
| | Three axes scal 3 μm resolution. | | ○ |
| Tool measuring system | Touch sensor(Installed in the interior of the machine for measuring tool length, tool breakage, and tool diameter) | | ○ |
| Others | Workpiece measuring device | | ○ |
| | Machining air blow | | ○ |
| | Air gun | ● | |
| | Coolant gun | ● | |
| | Oil skimmer | | ○ |
| | Oil mist collector | | ○ |
| Controller | FANUC Oi-M 10.4" | ● | |
| | FANUC Oi-M 15" | | ○ |

Specification

| Item | Specification | Unit | SH-4000(P) |
|--------------|--|--------|----------------------------|
| Pallet | Table size (L×W) | mm | 400×400 |
| | Max. loading capacity | kg | 400 |
| | Table height from floor | mm | 1,200 |
| | Max. workpiece dimension (diameter x height) | mm | Ø550×800 |
| | Max. Indexing increment | deg | 0.001° |
| Spindle | Spindle taper | | 7/24 Taper No.40 |
| | Spindle speed | rpm | 15,000 |
| Travel | X/Y/Z axis stroke | mm | 510/510/510 |
| | Spindle center to table | mm | 80-590 |
| | Spindle nose to table | mm | 70-580 |
| Feed | X/Y/Z axis rapid traverse | m/min | 60/60/60 |
| | Cutting feedrate | mm/min | 1-20,000 |
| ATC | Tool shank | | BT-40 (BBT-40) |
| | Tool capacity | pc | 40 (Opt.60) |
| | Max. tool diameter | mm | Ø75 |
| | Max. tool diameter(w/o adjacent tool) | mm | Ø150 |
| | Max. tool length | mm | 410 |
| Motor | Max. tool weight | kg | 8 |
| | Spindle motor | kW | 22/15 |
| | X/Y/Z servo motor | kW | 4.5/5.5/4.5 |
| Machine size | Coolant motor | kW | 0.55×4 / 1.1 |
| | Width × Depth × Height | mm | 1,750×4,210 (5,060) ×2,720 |
| | Weight | kg | 7,900 (8,500) |

◎Specifications may be changed without prior notice