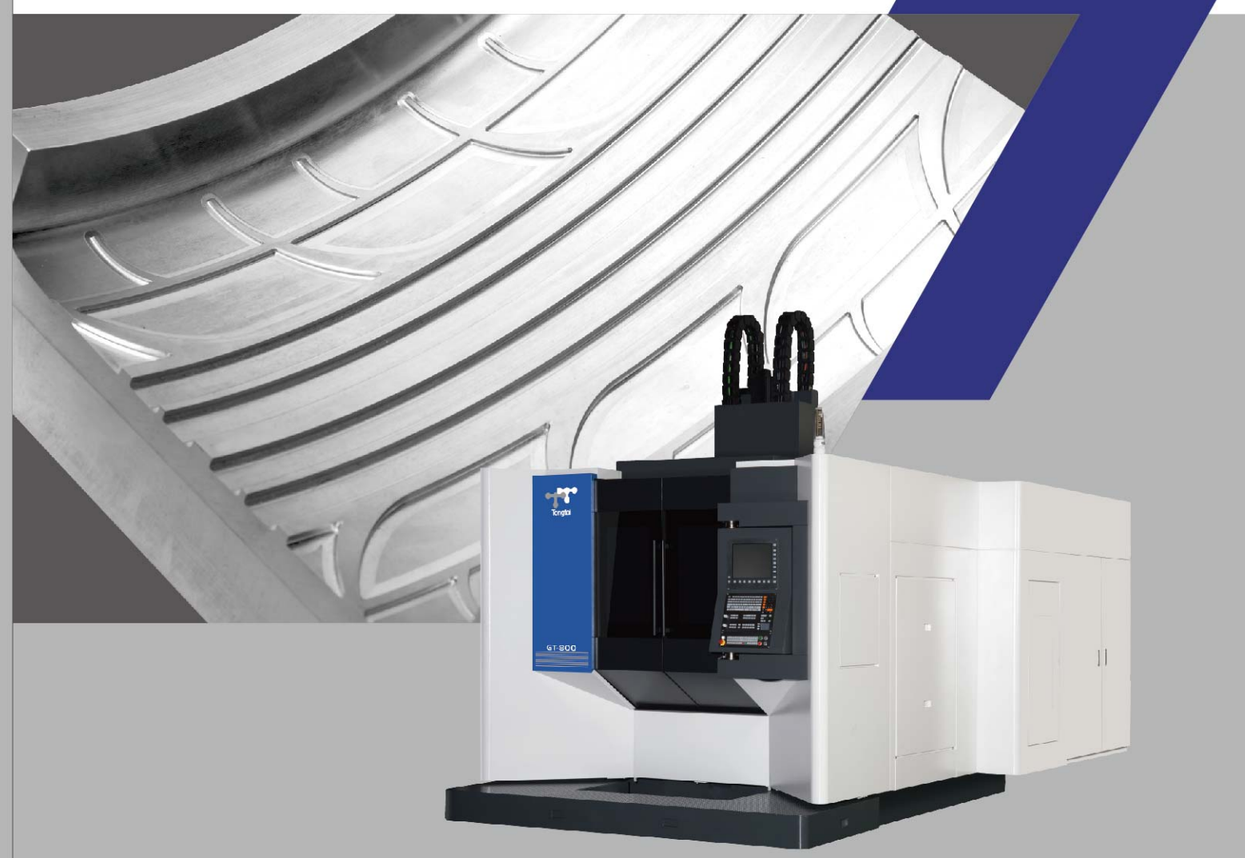
Tongtai

Trust & Technology

Five-Axis Vertical Machining Center

# GT-800

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GT-800 Five-Axis Vertical Machining Center . 2015.02/16

# GT-800

- GT-800 is developed for aerospace, mold, and automotive parts machining. According to the machining requirements, 15,000 rpm and 20,000 rpm spindle are both available for selection.
- Standard equipped with roller cam type A/C axis with a maximum 13,770/9,180 Nm torque output, these offer enough torque for acceleration need when A/C axis rapid reverse.
- On gantry type structure, the control of three linear axes is independent on workpiece weight, and the driven centers of three axes are all on these gravity center. It dramatically improves dynamic stability.
- The optimized force route design on spindle saddle, it minimizes the suspension of spindle and improves the stability and rigidity during machining.


## Main specification

| | |
|---|---|
| Spindle | 15000 rpm built-in type spindle (Std.) |
| | 20000 rpm built-in type spindle (Opt.) |
| X/Y/Z axis | Rapid traverse 48 m/min |
| | X/Y/Z axis stroke 850/1,020/610 mm |
| | X/Z axis □45 mm, Y axis □50 mm high rigidity roller guide way |
| | X/Y/Z axis Ø50 mm high precision ballscrew |
| A/C axis rotary table | A axis : Roller gear cam type |
| | C axis : Roller gear cam type/DD motor type (opt.) |
| | Table size : Ø800 mm |
| | Max. workpiece dimension : Ø1,000×H600 mm |

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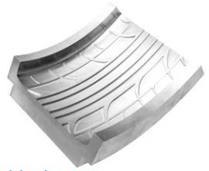
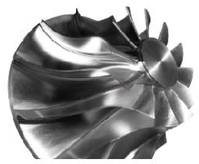
# Industry applications/Machining ability



**Mold industry**

Workpiece : Tire mold
Material : A6061(JIS)



**Energy industry**

Workpiece : Impeller
Material : A6061(JIS)

**Energy industry**

Workpiece : Impeller
Material : A6061(JIS)

**Automotive industry**

Workpiece : Cylinder head
Material : A356.2 (ASTM)

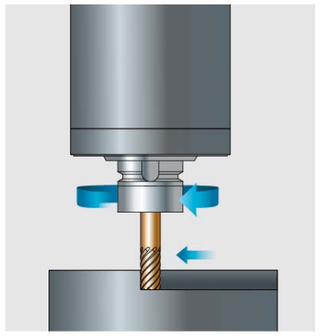
**Aerospace industry**

Workpiece : Blisk
Material : SUS 630(JIS)

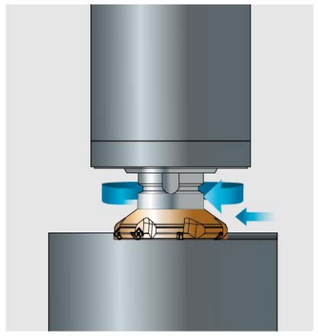
**Aerospace industry**

Workpiece : Blade
Material : SUS 630(JIS)

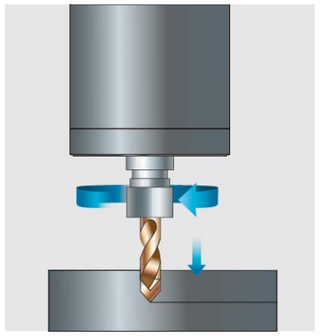
## GT-800 Cutting data



| Ø16mm End milling tool | |
|---|---|
| Materials | S45C |
| Cutting depth/width | 30/1.7 mm |
| Spindle speed | 10,000 rpm |
| Cutting feedrate | 15,000 mm/min |
| Material removal rate | 800 $cm^3$/min |



| Ø80mm Face milling tool | |
|---|---|
| Materials | S45C |
| Cutting depth/width | 1/65 mm |
| Spindle speed | 1,500 rpm |
| Cutting feedrate | 6,000 mm/min |
| Material removal rate | 400 $cm^3$/min |



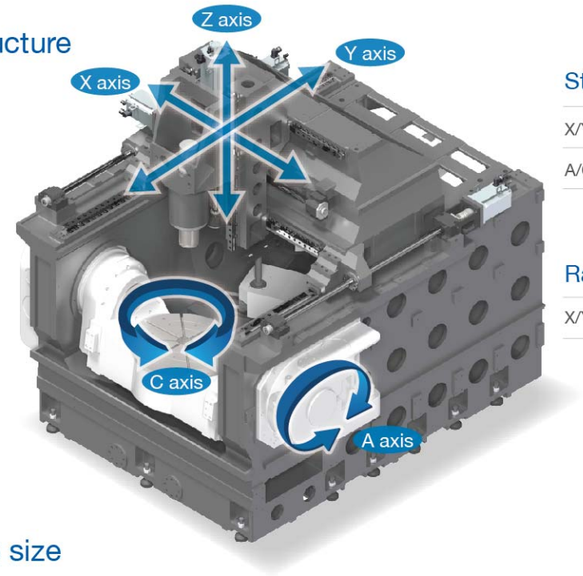
| Ø22mm Drill | |
|---|---|
| Materials | S45C |
| Spindle speed | 362 rpm |
| Feedrate | 0.2 mm/rev |
| Material removal rate | 104 $cm^3$/min |

※Note : Above data are the test result of GT-800 with 15,000 rpm buit-in type spindle.



# Main structure

## Gantry type structure



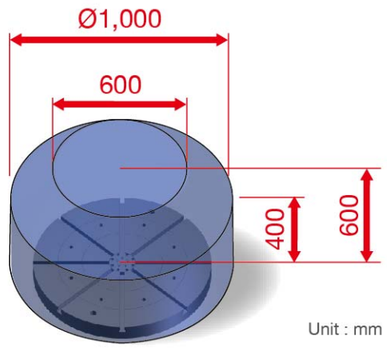

### Stroke

| | |
|---|---|
| X/Y/Z axis | 850/1,020/610 mm |
| A/C axis | 30°~-120°/360° |

### Rapid traverse

| | |
|---|---|
| X/Y/Z axis | 48/48/48 m/min |

## Max. workpiece size

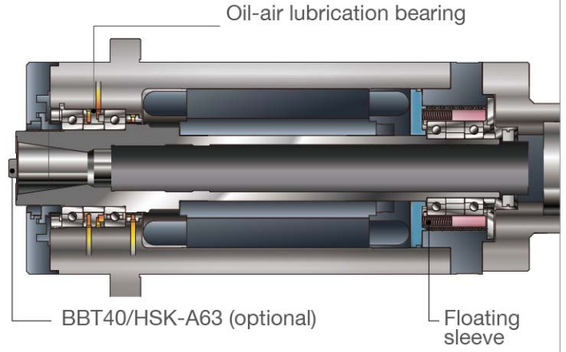



Unit : mm

| | | |
|---|---|---|
| Table size | Ø800 mm | |
| Max. table load | 1,000 kg | |
| Table rotary speed | A axis | 16 rpm |
| | C axis | 30 rpm<br>50 rpm (Opt.) |

## Spindle

- The spindle is equipped with oil-air lubricated bearings and oil-cooling cartridge, it constrains the thermal generation and reduces the thermal expansion in spindle.
- Temperature control system will alarm and stop manufacturing while the spindle temperature is too high, in order to prevent thermal damage of bearing.
- BBT dual-contact tool holder is equipped to enhance the stability and machining quality.
- Standard equipped with 15000 rpm spindle with 4 bearings, which arranged in DBB type on front side to provide high rigidity while heavy duty cutting.
- Floating sleeve on rear-end bearing is used on 20,000 rpm spindle to avoid the preload variation of bearing induced by thermal expansion and ensure bearing's lifetime.




20,000 rpm Built-in typeSpindle

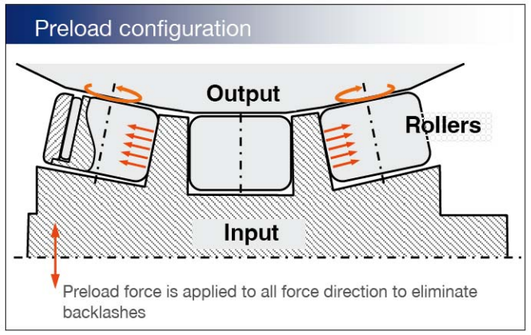
# Main structure

## Rotary table

### A/C axis : Roller gear cam type

The positioning accuracy, repeatablility accuracy, backlash and durability performances of roller gear cam mechanism are all better than worm-gear mechanism.

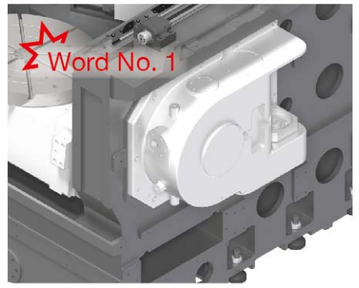
Because A/C axis rotary table is driven by roller gear cam with rolling contact between roller and cam, it can start at a lower torque. High acuracy is guaranteed under long-term heavy duty cutting.




| | | |
|---|---|---|
| A/C axis positioning accuracy | 5.6” | Zero backlash |
| A/C axis repetition accuracy | ±3.0” | High positioning accuracy |
| A axis torque | 4,536×2/13,770×2 Nm | Low abrasion |
| C axis torque | 3024/9180 Nm | Higher durability |

### Embeded A axis

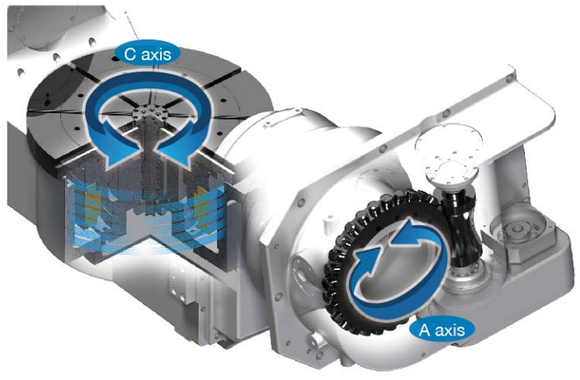
Roller gear cam type A axis structure is embedded in U-shape machine bed for enhancing table rigidity.




### C axis : Direct-drive type (optional)

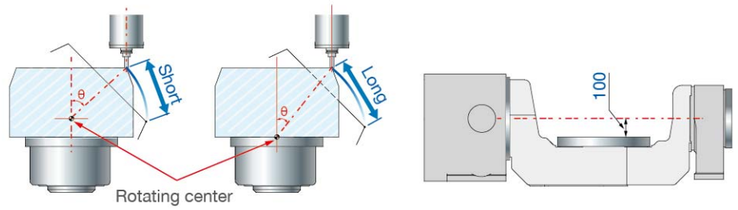
Direct-drive motor is used as the driver of C-axis rotating. It’s one of the best solutions for high speed machining. The advantages of DD motor are less volume, less error, higher resolution, higher torque, and higher speed.

It has 1,800/3,320 Nm torque output with 50 rpm rotary speed.




## Rotating center is higher than table surface

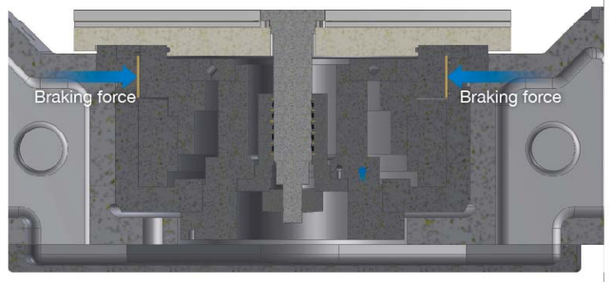
Rotating center of A axis is 100 mm higher than table surface, it can reduce the distance of tool moving with table rotation simultaneously, decrease cycle time and improve surface accuracy of contouring.




## A/C axis full-circle hydraulic braking system

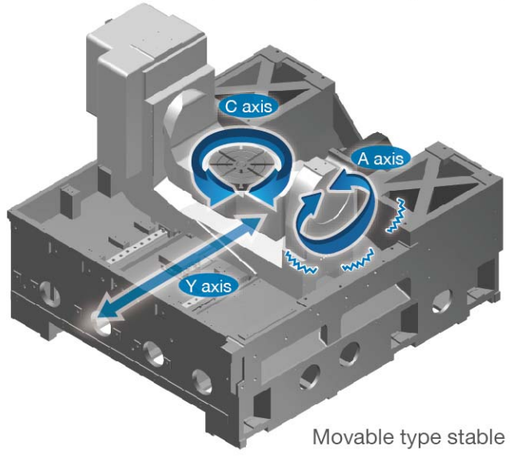
A/C axis adopts a full-circle hydraulic braking system. The full-circle surface is locked synchronously by a metallic ring which is expanded by hydraulic oil. Because of the large clamping area, it has the features of high rigidity and durability during heavy duty machining. Moreover, the braking position of the C axis is located near the table, to eusure the stability of the table when braking.

| | |
|---|---|
| Braking torque of A axis | 12,512×2 Nm |
| Braking torque of C axis | 6170 Nm |

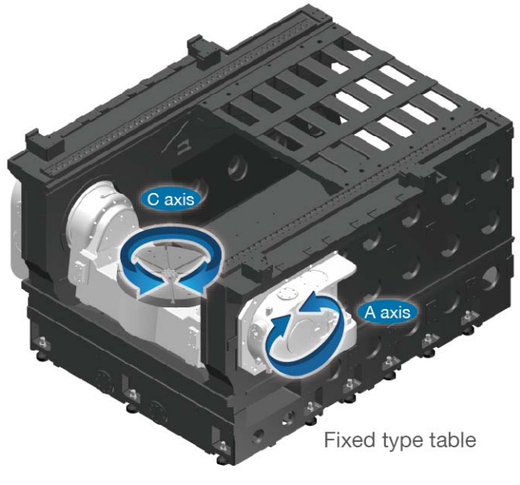



## Fixed type table design

The table of the A/C axis is fixed in a position. Compared with movable type, the A axis is not vibrated by feed axis movement. It improves the positioning accuracy in the A axis.



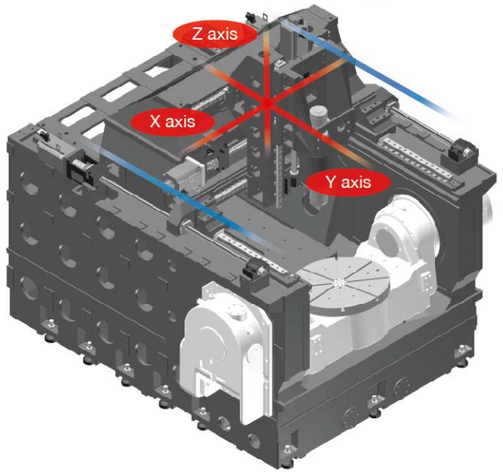

Movable type stable

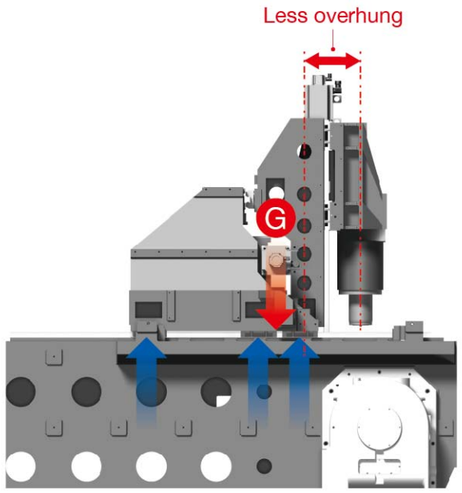



Fixed type table

# Main structure

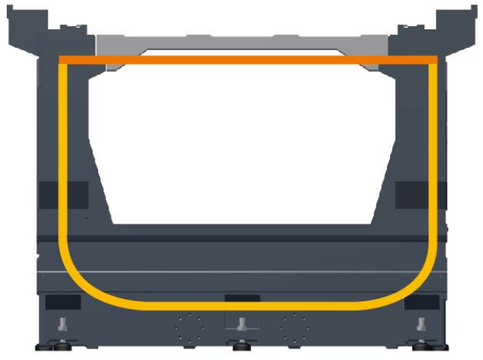
## Driven at the center of gravity



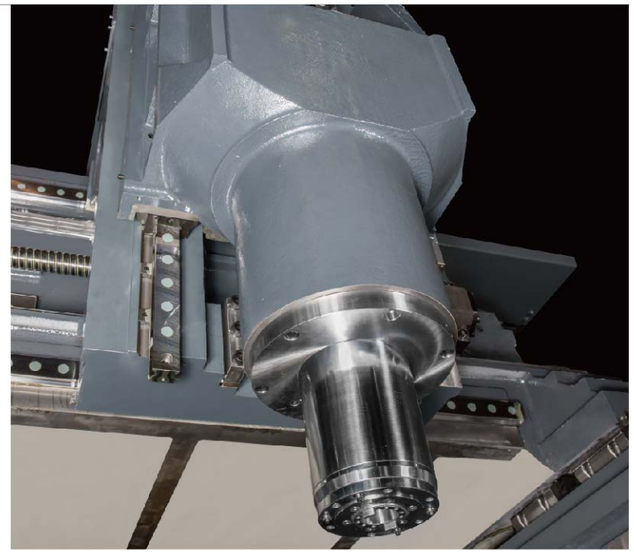




- The driven centers of three axes are all on these gravity center. It dramatically improves dynamic stability.
- The shortest force route between Z-axis and X-axis to optimize the weight of structure.
- The Y axis is supported by 6 slide blocks, and the gravity center falls within the supporting range of sliding block, it decreases the decline of spindle and improves dynamic stability.

## Integrated U-shape machine bed



The U-shape machine bed with two walls is casted as one-piece to reduce precision error during assembling. Furthermore, with a cross beam, an enclosed structure is formed that improves the structure rigidity.



## ATC (Automatic Tool Changer)

Adopts high reliable ATC system to shorten the non-cutting time and increase the productivity.

| | |
|---|---|
| T to T time | 3.7 sec |
| Tool capacity | 32(Opt. 40/64/80) |
| Max. tool weight | 8 kg |

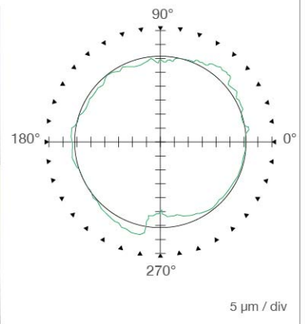

With adjacent tool


Without adjacent tool

Unit : mm

## Machining precision

| Test Standard : ISO-10791-7 | |
|---|---|
| Circularity | 10.13 μm |
| Material | A6061 |
| Tool | Super hard Ø20 mm end milling tool |
| Spindle speed | 3,183 rpm |
| Cutting feedrate | 4,755 mm/min |
| Workpiece shape | Ø80×Ø35×h15 mm |

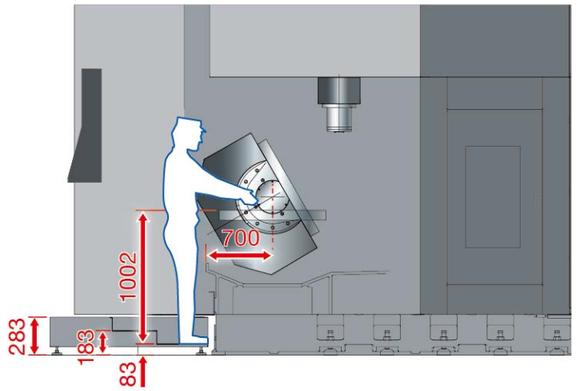


# Operation

## Swivel-type operation panel


The swivel panel makes operator easy to operate and inspect during operation.

## Accessibility




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

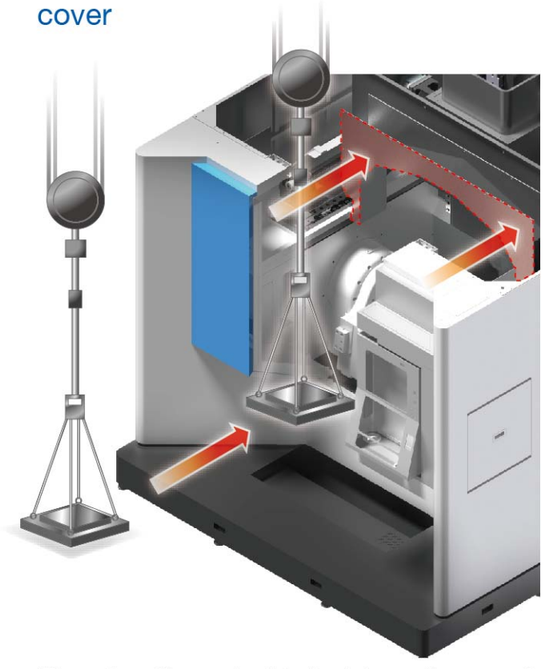
Unit : mm

The excellent access for tool changing and checking.

## Door opening width


Wide door opening facilitates the operation and maintenance.

## Automatic opening/closing telescopic cover



The automatic opening/closing telescopic cover of Y axis helps the haning work.

## Easy daily maintenance

Through centralized mangment of air FIRL unit and lubricant pump, daily maintenance is made easily.

# Peripheral accessories

## Linear scale (standard)

Standard equipped with linear scale to compensate positioning errors, repetition errors, and pitch errors caused by temperature changing in the ballscrew. This allows standard resolution to achieve ±5μm. The optional ±3μm accuracy improves precision even more.

Standard equipped with 2 μm and 5 μm rotary scales in A and C axis respectively for increasing the rotary positioning accuracy.

## Chip disposal (standard)

Standard equipped with chips disposal device at the side of machine to helps chip removing .

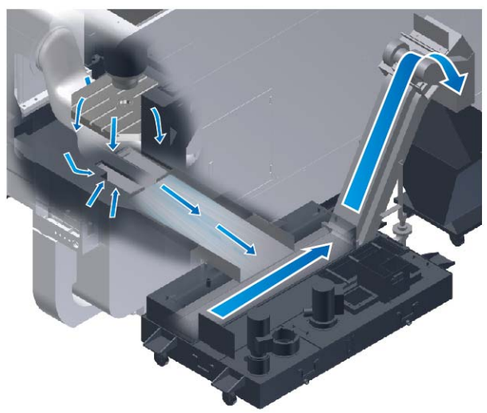
## Chip conveyor (optional)

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

| Specification | Steel | | Cast iron | | Aluminum/non-ferrous metal | | |
|---|---|---|---|---|---|---|---|
| | Long/ Curl chips | Short chips | Powder chips | Short chips | Long/ Curl chip | Short chips | Powder chips |
| Hinge type | ○ | × | × | × | ○ | × | × |
| Scraper type | × | ○ | ○ | ○ | × | ○ | ○ |
| Magnetic scraper type | × | ○ | ○ | ○ | × | × | × |

○ : Suitable × : Non-suitable

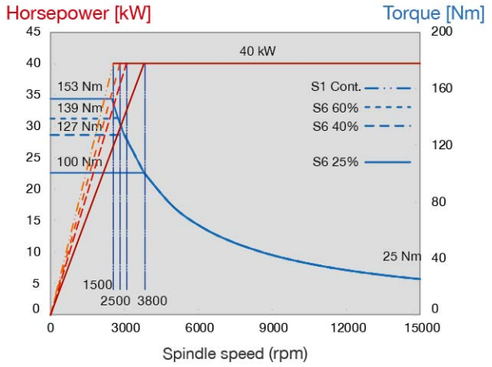
Short chips : The length of chips is below 60 mm or Ø40 mm (ball shape cutting)
Long/Curl chips : The length of chips is longer than short chips mentioned above



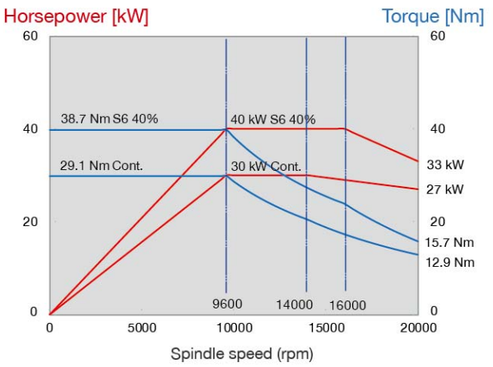


# Spindle output and torque chart

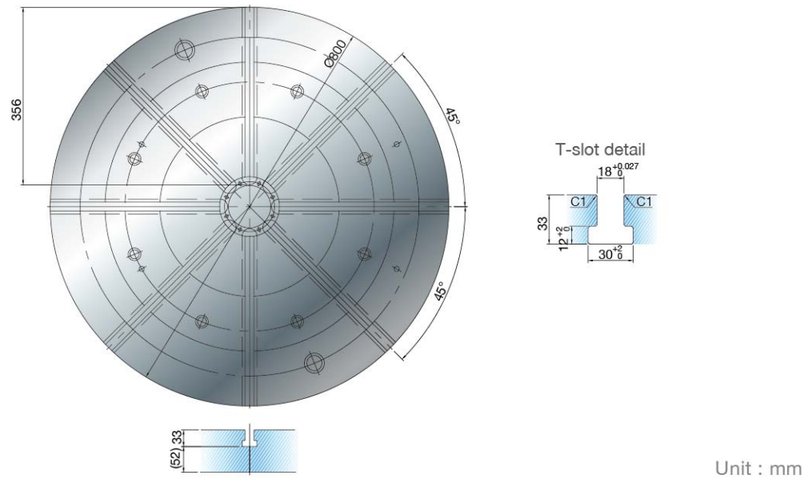
## 15,000 rpm Built-in type spindle (Std.)




## 20,000 rpm Built-in type spindle (Opt.)

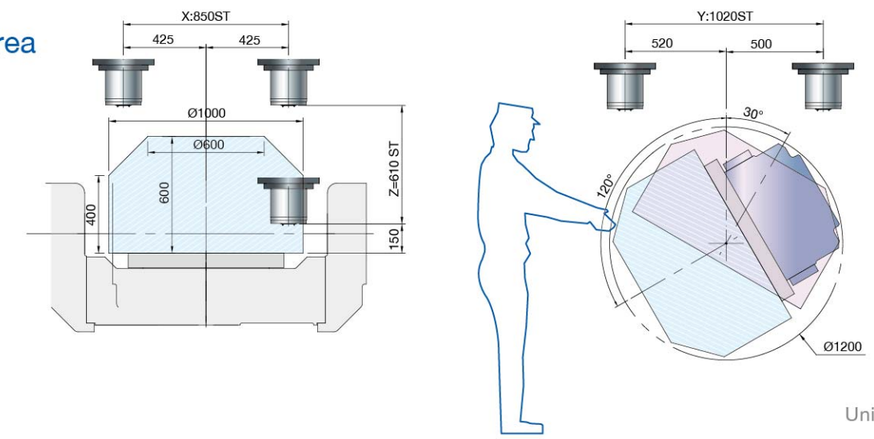



## Table size




Unit : mm

## Working area




Unit : mm

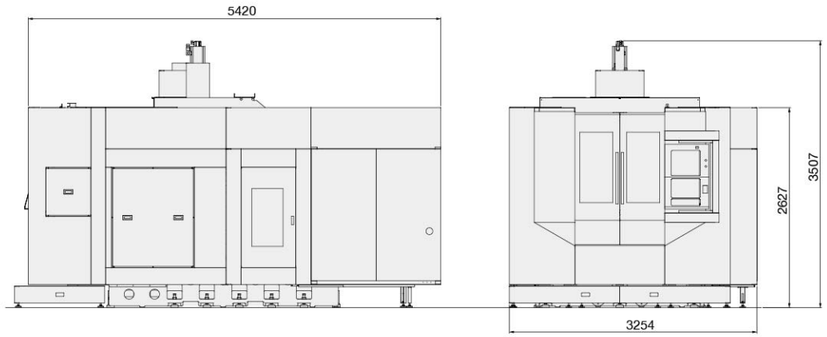
# Standard/optional accessories

| | | Standard | Optional |
|---|---|---|---|
| Spindle | Built-in type 15,000 rpm | ● | |
| | Built-in type 20,000 rpm | | ○ |
| Table | Roller gear type A axis | ● | |
| | Roller gear type C axis | ● | |
| | DD motor type C axis | | ○ |
| Tool Shank | BBT-40 | ● | |
| | HSK-A63 | | ○ |
| Tool capacity | 30 tools | ● | |
| | 40 tools | | ○ |
| | 64 tools | | ○ |
| | 80 tools | | ○ |
| Coolant through spindle pump | 20 bar | | ○ |
| | 50 bar | | ○ |
| | 70 bar | | ○ |
| Cooling system | Spindle coolant system | ● | |
| | Air conditioner for electrical cabinet | ● | |
| Chip conveyor | Scraper type conveyor | | ○ |
| | Hinge type conveyor | | ○ |
| Lubrication system | General lubrication system | ● | |
| | LHL integrated lubrication system | | ○ |
| Positioning accuracy system | Three axes linear scale 5μm resolution | ● | |
| | Three axes linear scale 3μm resolution | | ○ |
| | A axis linear scale (2μm) | ● | |
| | C axis linear scale (5μm) | ● | |
| | C axis linear scale (2.5μm) | | ○ |
| Tool measuring system | Tongtai made touch type tool breakage detector | | ○ |
| | Marposs Mida Laser 75P tool breakage detector | | ○ |
| Automatic door | | | ○ |
| Others | Workpiece measuring device | | ○ |
| | Machining air blow | ● | |
| | Air gun | ● | |
| | Coolant gun | | ○ |
| | Oil skimmer | | ○ |
| | Oil mist collector | | ○ |
| Controller | HEIDENHAIN TNC640 | ● | |
| | SIEMENS 840D | | ○ |
| | FANUC 31i-M | | ○ |

◎specifications may be changed without prior notice



# Machine dimension · Specifications




Unit : mm

## Specification

| Item | Specification | Unit | GT-800 |
|---|---|---|---|
| Table | Table size (LxW) | mm | Ø800 |
| | Max. loading capacity | kg | 1,000 |
| | Table height from floor | mm | 1,100 |
| | Max. workpiece dimension (diameter×height) | mm | Ø1,000×600 |
| | A/C axis min. indexing increment | deg | 0.001° |
| Spindle | Spindle taper | | 7/24 Taper No.40 |
| | Spindle speed | rpm | 15,000 (Opt. 20,000) |
| Stroke | X/Y/Z axis stroke | mm | 850/10,20/610 |
| | Spindle nose to table | mm | 150-760 |
| | A axis stroke | deg | +30 ~ -120 |
| | C axis stroke | deg | ±360 |
| Feed | X/Y/Z axis rapid traverse | m/min | 48/48/48 |
| | A/C axis rapid traverse | rpm | 16/30 (DD motor 16/50) |
| | Cutting feedrate | mm/min | 1-10,000 |
| ATC | Tool shank | | BBT-40 (Opt. HSK-63A) |
| | Tool capacity | pc | 30 (Opt. 40、64、80) |
| | Max. tool diameter | mm | Ø80 |
| | Max. tool diameter (w/o adjacent tool) | mm | Ø125 |
| | Max. tool length | mm | 300 |
| | Max. tool weight | kg | 8 |
| Motor | Spindle motor | kW | 40/40 (Opt. 40/30) |
| | X/Y/Z axis servo motor | kW | 6.5/8.6/8.6 |
| | Coolant motor | kW | 0.37×2 |
| Machine size | Wide×Depth×Height | mm | 3,254×5,420×3,507 |
| | Weight | kg | 26,000 |

◎specifications may be changed without prior notice