Trust & Technology

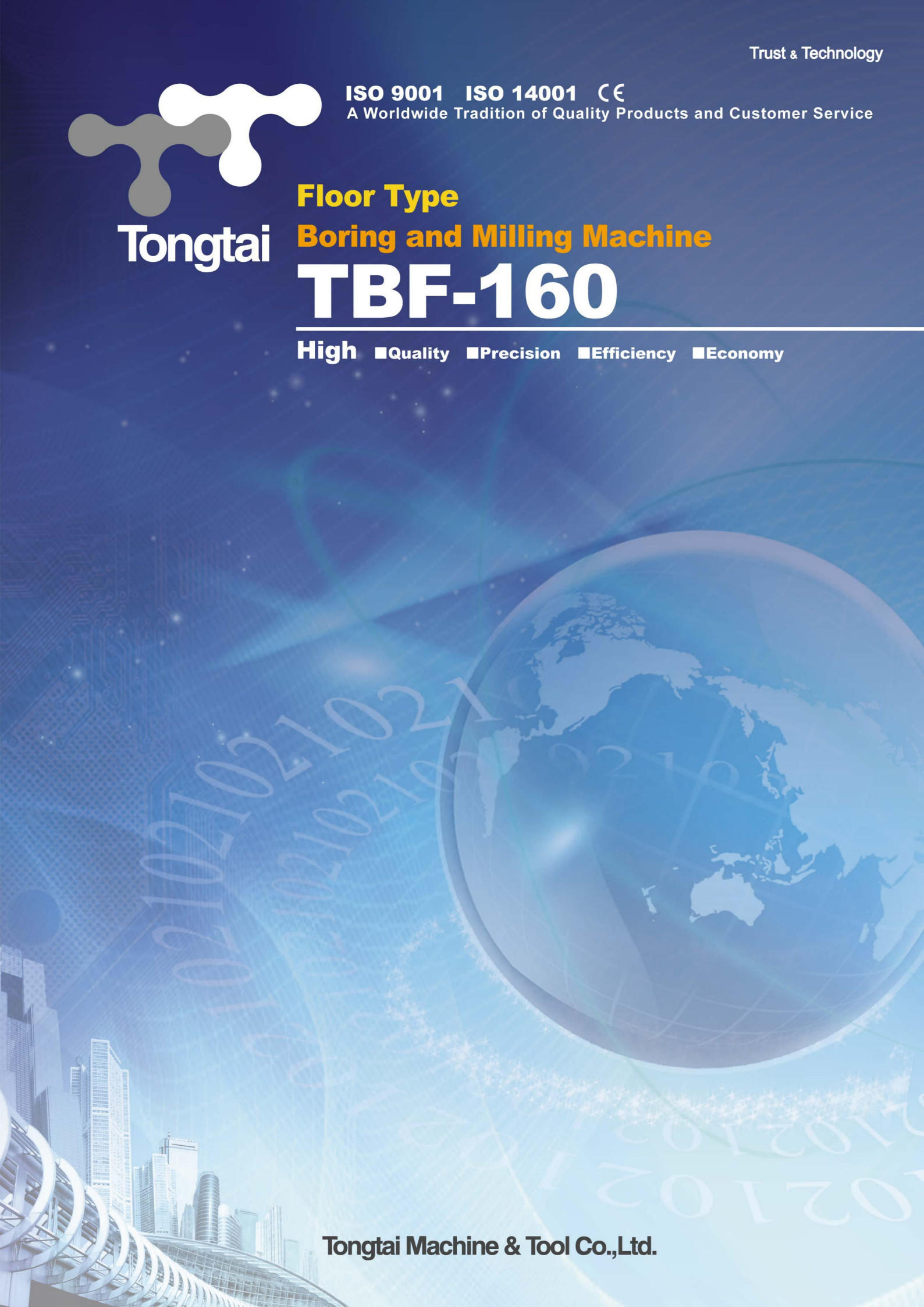
Tongtai

ISO 9001 ISO 14001 CE

A Worldwide Tradition of Quality Products and Customer Service

Floor Type
Boring and Milling Machine
TBF-160

High ■Quality ■Precision ■Efficiency ■Economy



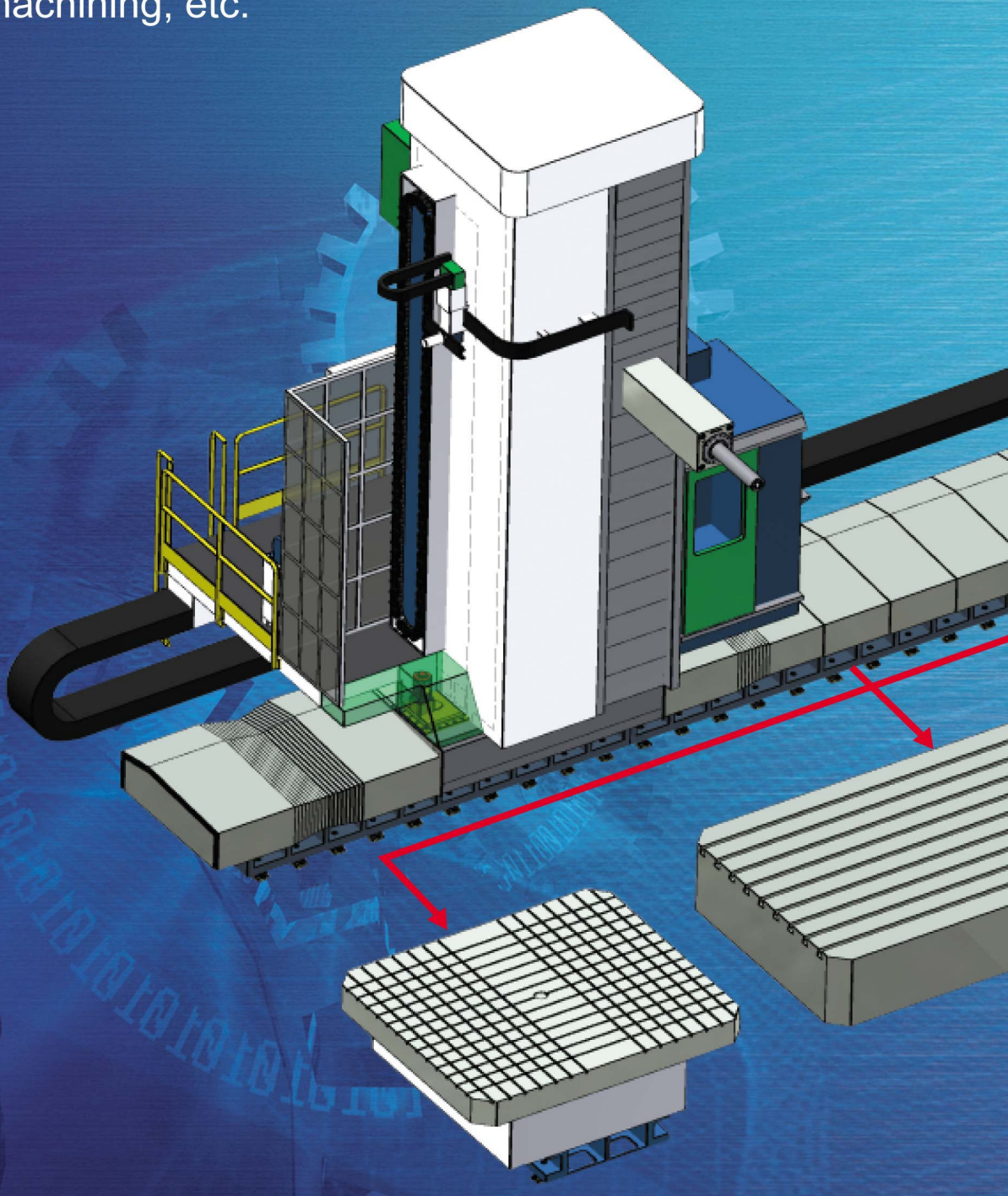
Tongtai Machine & Tool Co.,Ltd.

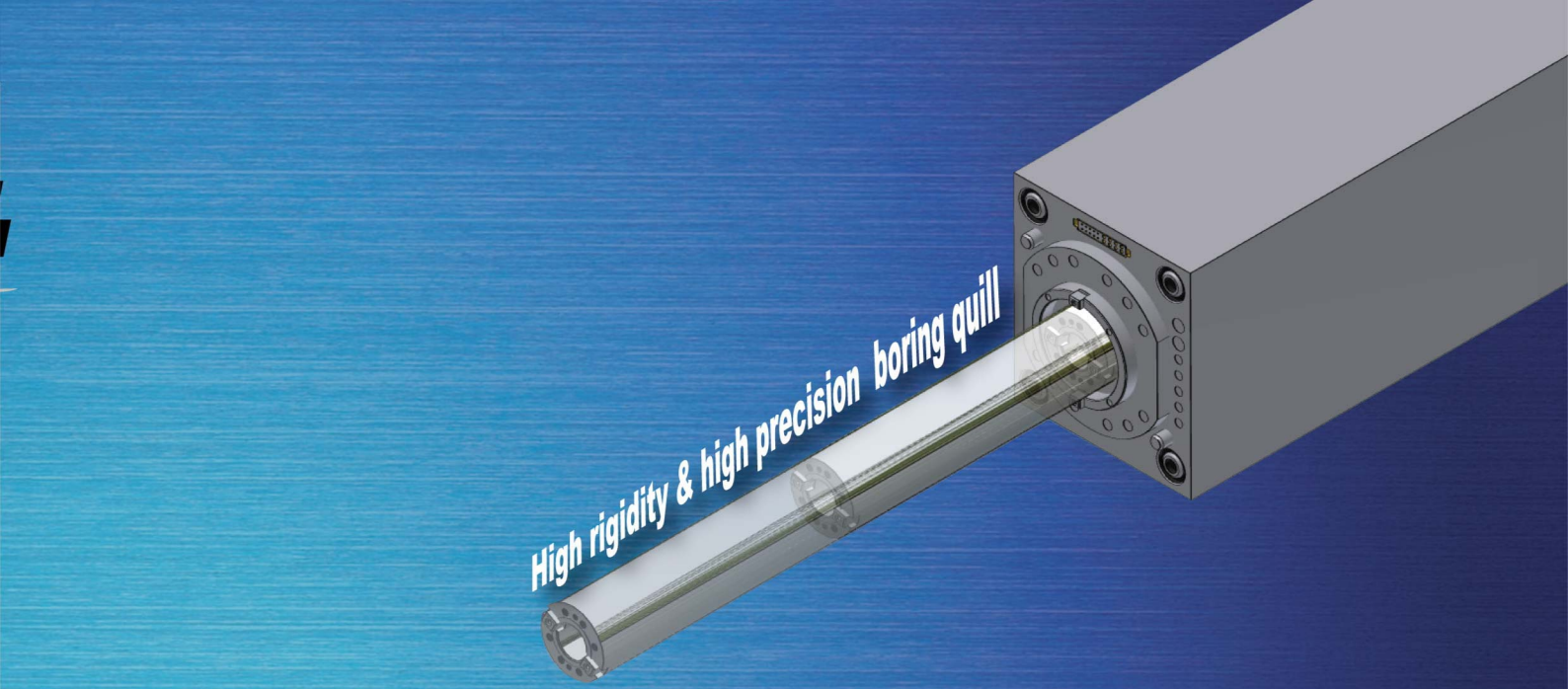
High machining accuracy remained for long-term running.

TBF-160

- Tongtai
- Boring and milling machine
- Floor type
- Quill diameter

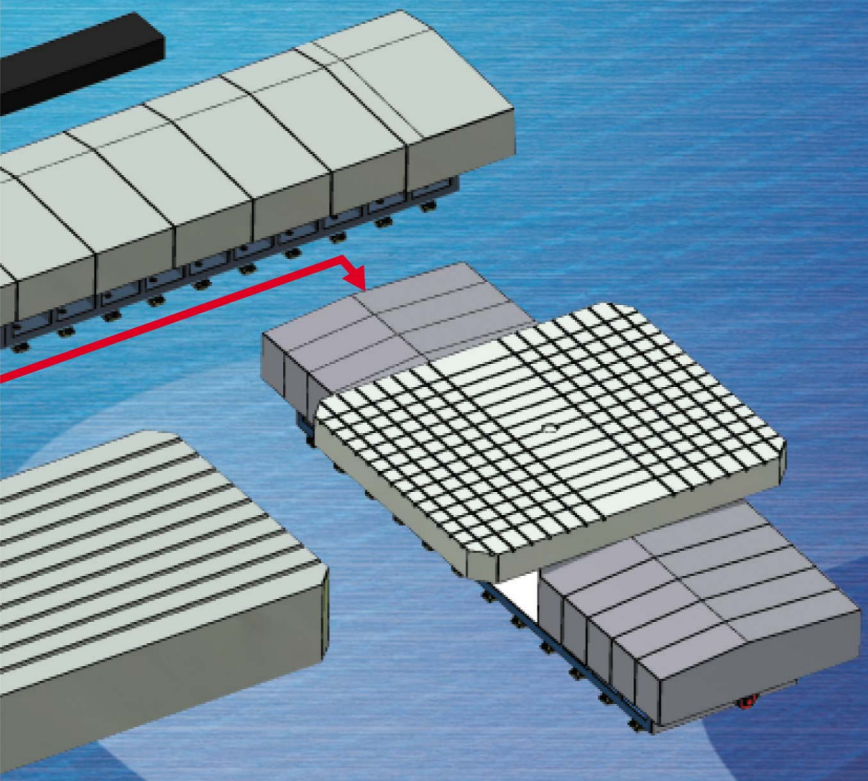
A variety of table options gives a wide range of applications for power generation, shipbuilding, aerospace, earthmoving, general machining, etc.





Specification

Item	Unit	TBF-160
X axis travel	mm	5000-25000
Y axis travel	mm	3000/4000/5000
Z axis travel	mm	1200
W axis travel	mm	1000
Spindle speed	rpm	6~3500
Spindle motor	kw	60

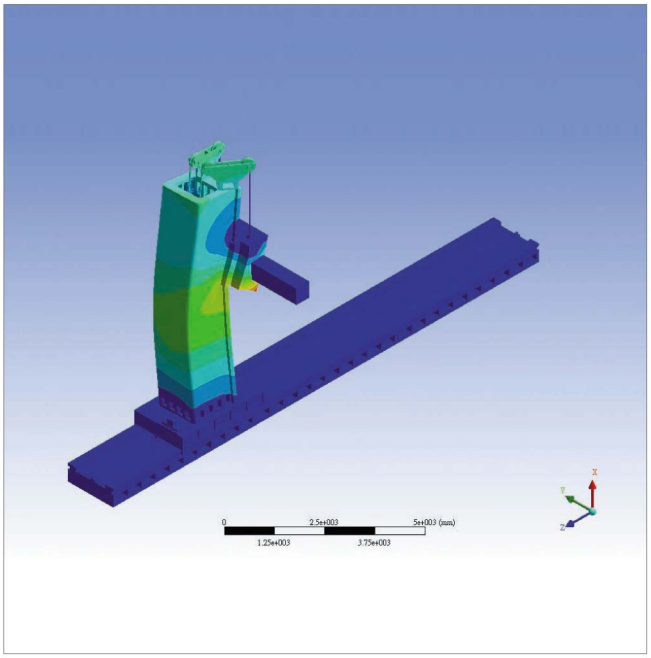


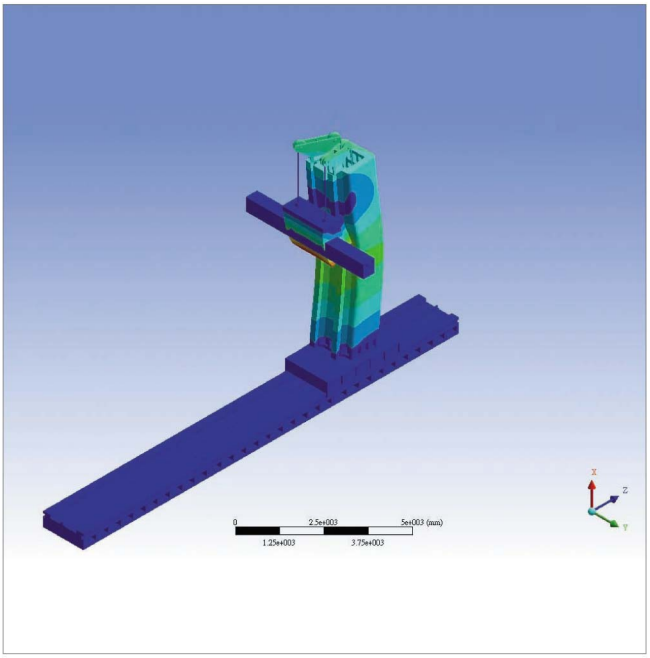
Accuracy

Positioning accuracy of X/Y/Z axis	0.025/2000 mm
Repeatability of X/Y/Z axis	± 0.010 mm
Positioning accuracy of B axis	10 Sec
Repeatability of B axis	± 4 Sec

Advantages

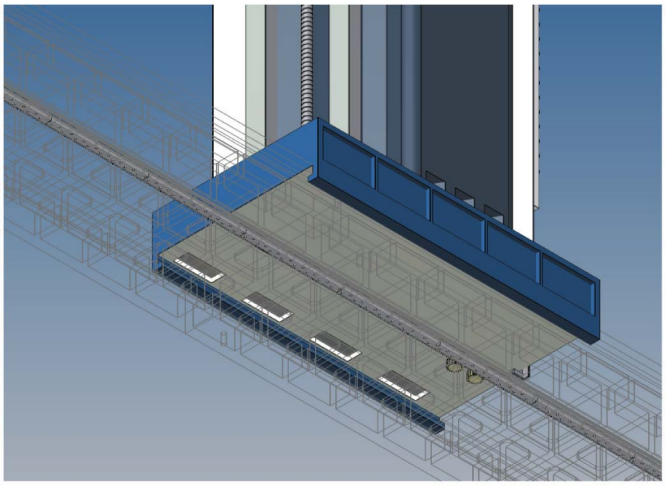
FEM analysis (Finite Element Method)





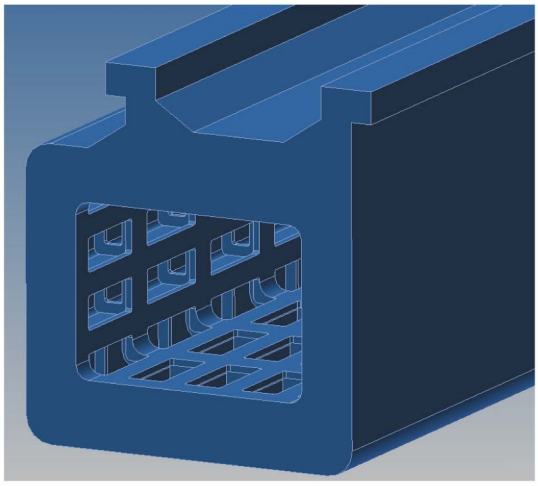
To fit the applications for power generation, shipbuilding, aerospace and general machining, FEM analysis is utilized to ensure the reliability for the target of powerful cutting capability, excellent accuracy and high productivity.
All the casting components are properly heat treated to ensure better structural rigidity for high efficiency machining.

Hydrostatic guideways



Hydrostatic system with high rigidity, high damping and low friction features to keep the accurate positioning and machine accuracy during heavy cutting operations.

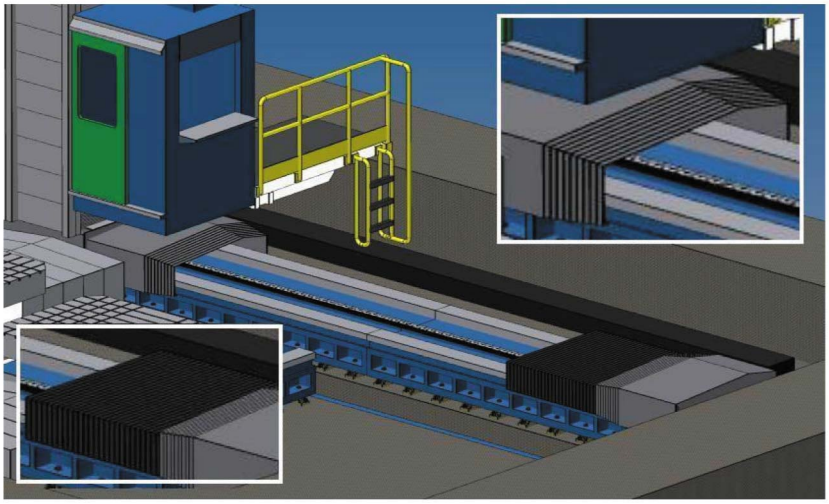
Double-wall column structure



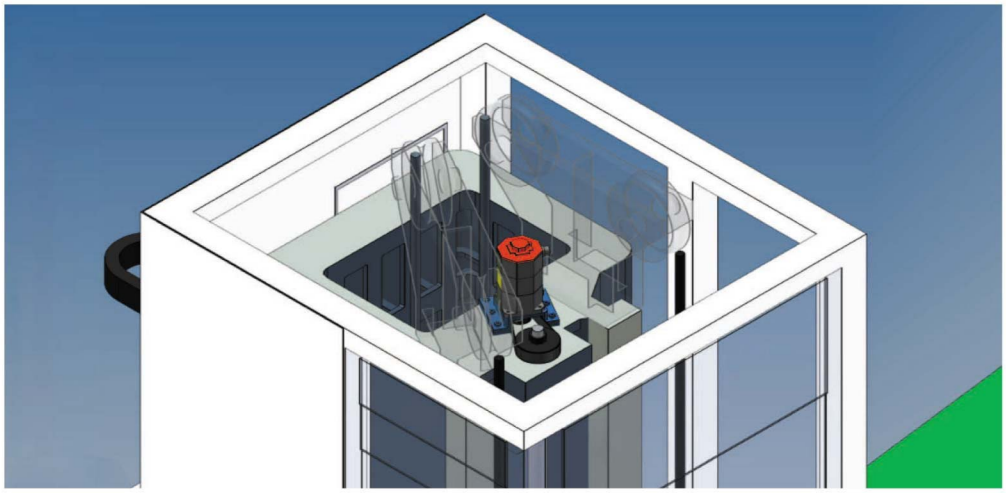
Double-wall column structure to guarantee the high rigidity, dimensional stability and good vibration damping capacity.

Chip proof function

Two-layer designed steel telescopic cover and waterproof bellows provide excellent protection against coolant and chips.

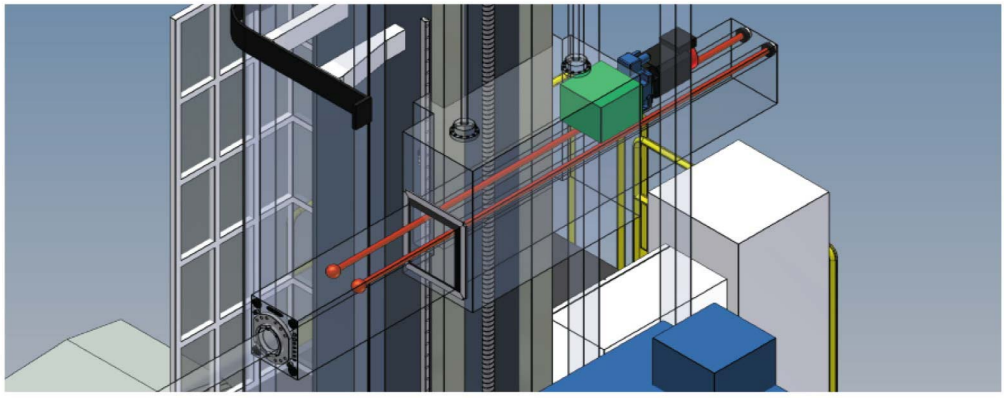


Accuracy compensation system



The headstock is balanced by a counterweight. In addition there are two hydraulic cylinders to compensate the headstock while moving the ram.

Hydraulic balancing system for Y axis.

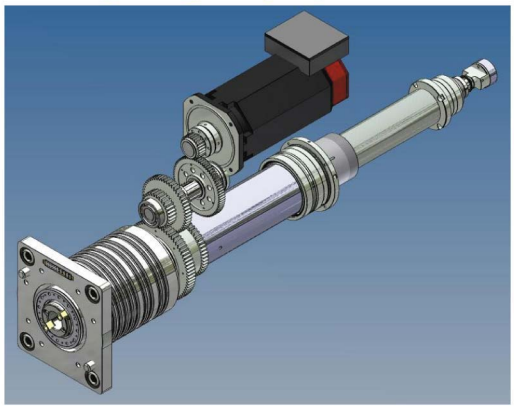


The servo controlled hydraulic system adjusts actively the tension on the front ropes in order to compensate the yielding created by the ram movement or head exchange.

Active pressure compensation system for the ram.

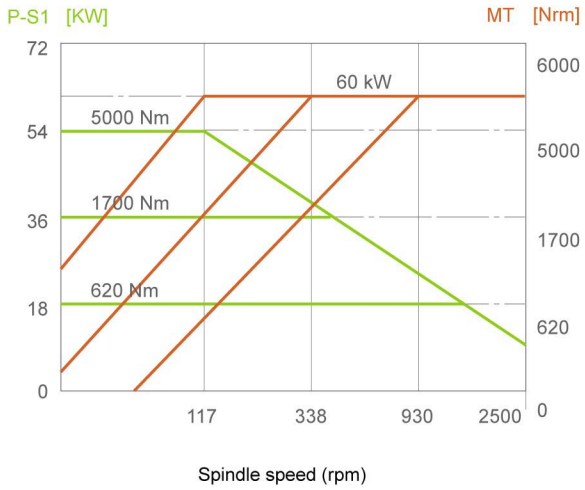
Spindle capability

High rigidity spindle

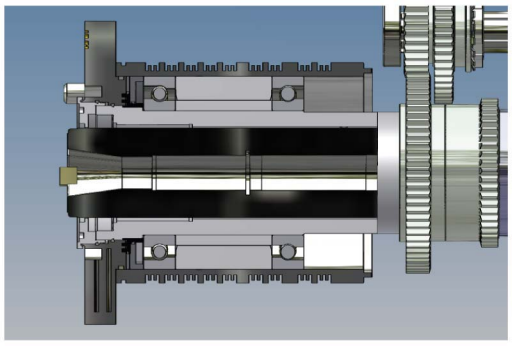


The 3- step gear box integrated by high precision gears creates high spindle torque for heavy duty cutting.

Spindle output and torque chart

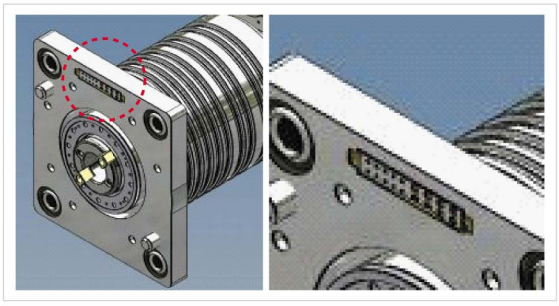


High precision spindle



High precision and high speed angular ball bearing for spindle with oil-air lubrication can keep the spindle accuracy and ensure the spindle life.

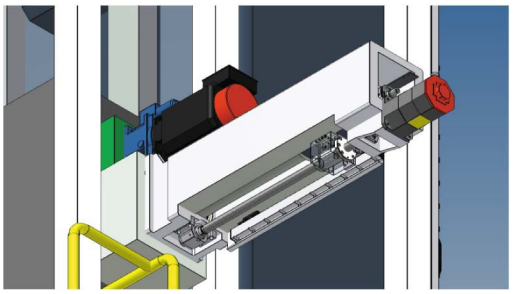
Interface of automatic milling head changing



The interface of automatic milling head changing system includes four pull-studs, two positioning pins and one electrical connector.

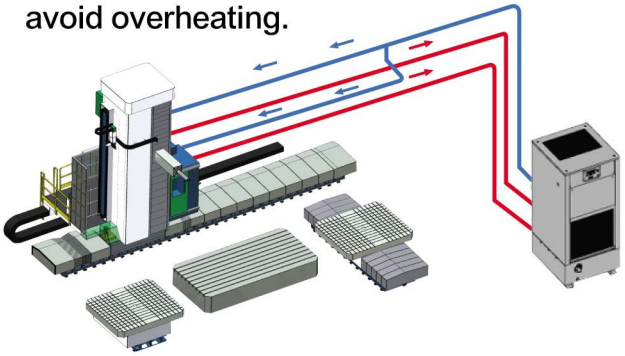
W axis feeding system

The boring quill is driven by the high precision ball screw and supported by the self-lubricated sleeves to ensure the rigidity with the movement of W axis.



Spindle cooling unit

The temperature of cooling oil re-circulated for the gear box is stably controlled by the cooling system to avoid overheating.



Servo feeding systems

X axis

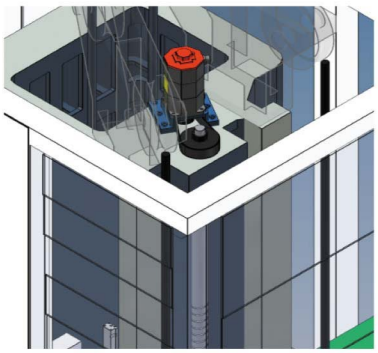
The column saddle is fitted with antifriction pads for preloaded hydrostatic support on both upper and lower sides of guideways and driven by high precision rack and double pinions with mechanical anti-backlash gear box.

Y axis

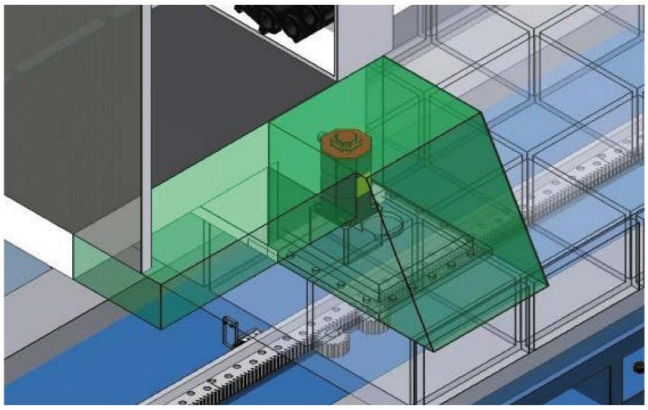
The headstock carrier is fitted with antifriction pads for preloaded hydrostatic support on both front and rear sides of guideways and driven by high precision ball screw.

Z axis

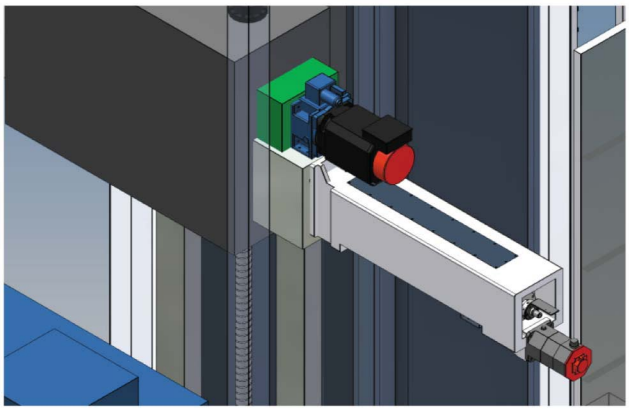
The ram is guided solidly on four faces inside the headstock, supported by preloaded hydrostatic oil film and driven by high precision ball screw.



■ Y axis feeding system



■ X axis feeding system



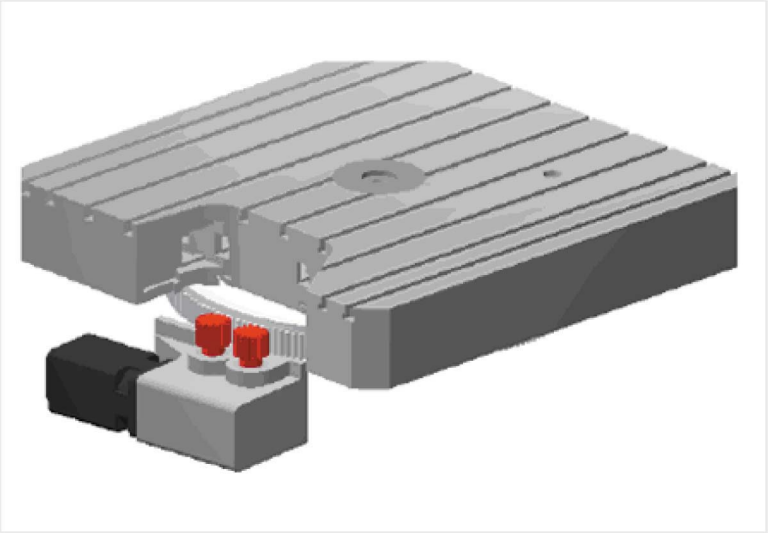
■ Z axis feeding system

ATC system

- Capacity: 60 tool (opt 90/120 tool)
- Tool shank: BBT50
- Max. tool dia.: Ø 140 mm
- Max. tool dia.: Ø 420 mm (w/o adjacent tool)
- Max. tool length: 600 mm
- Max. tool weight: 35 kg

■ Vertical and horizontal tool changing system

B axis (Opt.)

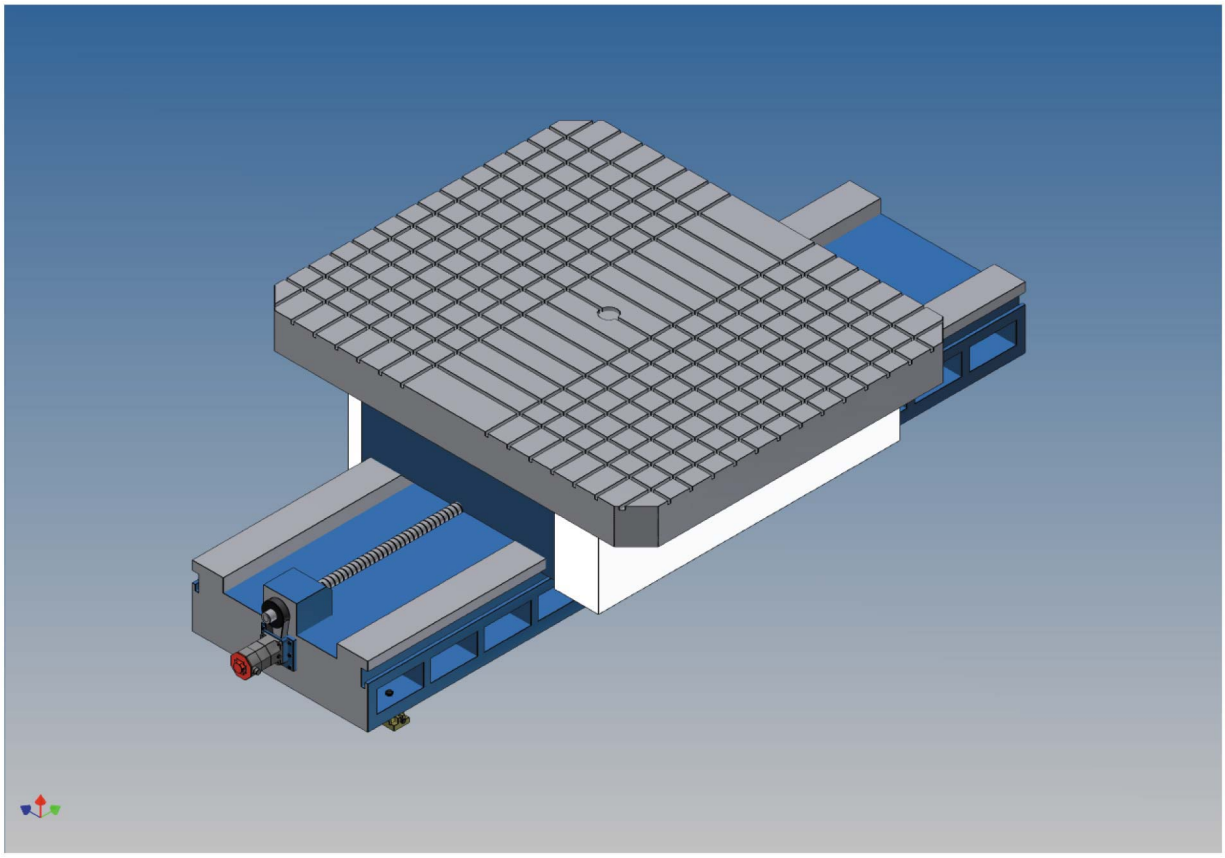


In addition to the high rigidity, high damping and low friction hydrostatic bearing, the rotary table is driven by a large gear with double pinions anti-backlash gear box to guarantee high accuracy and high efficiency.
The high resolution encoder is installed directly on the table center to ensure high positioning accuracy of B axis and a hydraulic brake disc system is provided to guarantee the high rigidity.

Table size available:

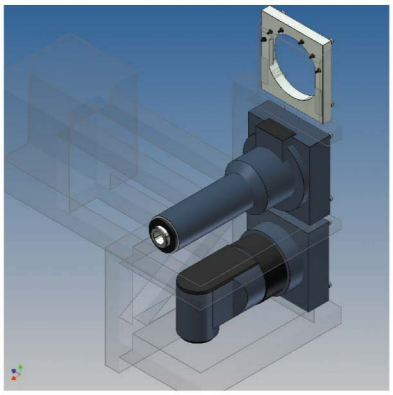
- 3500 x 3000 mm (max. load 65 ton)
- 3000 x 2500 mm (max. load 40 ton)

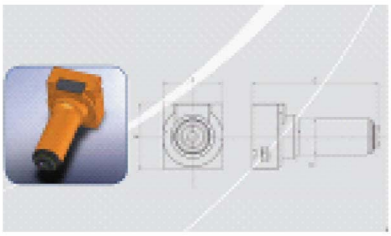
V axis (Opt.)

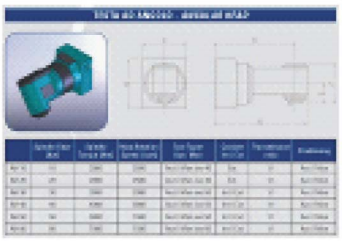


The housing of rotary table is fitted with antifriction pads for preloaded hydrostatic support on both upper and lower sides of guideways and driven by high precision ball screw.

Attachments (automatic changing milling heads) (Opt.)



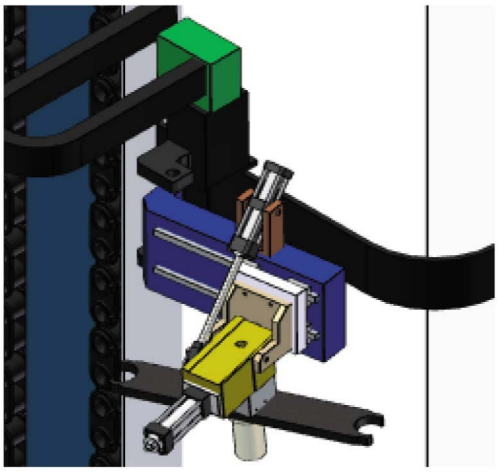




The versatility of TBF-160 is enhanced by the variety of attachments which includes 90 degree milling head available with 2.5 degree indexing around C axis, 800 mm extension head and others upon request.

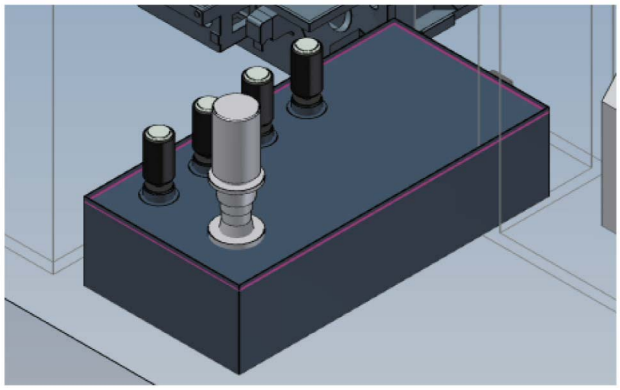
Miscellaneous

Vertical and horizontal tool changing system



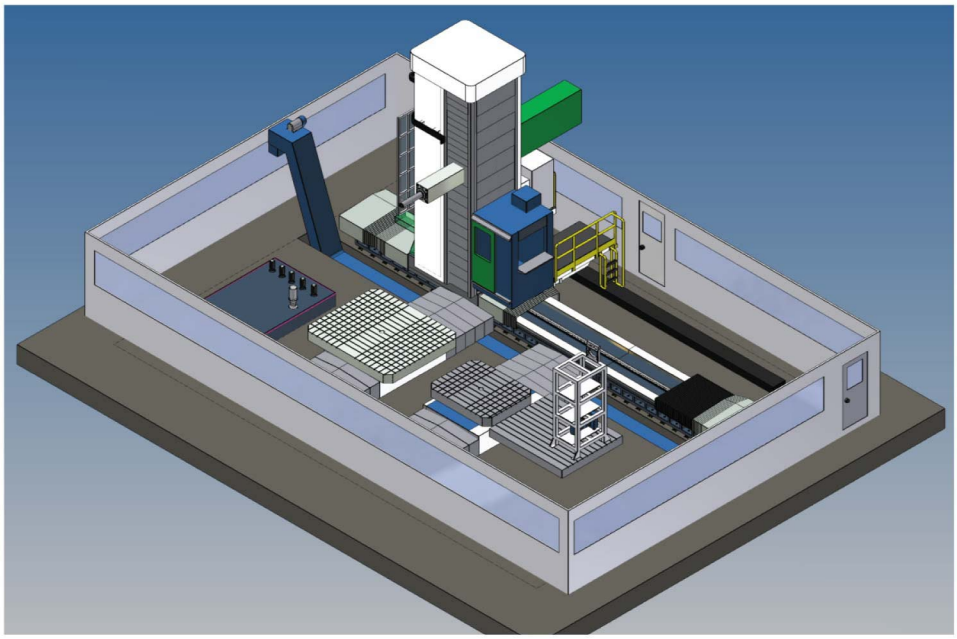
High pressure coolant through spindle

Coolant pressure: 15/35/70 bar



Surrounding splash guard design

Chip augers on both sides of V-axis deliver chips to the main chip conveyor along X-axis to eliminate cleaning time.
The high pressure coolant is pumped from the main coolant tank to the clean tank and filtered through a paper filter, and 2 cartridge fine filters are used to enhance the cleanliness for the coolant through spindle.



Specification

Item	Specification	Unit	TBF-160
Table	Table size	mm	No.1/No.2 table 3000×3500/2500×3000
	Max. loading capacity	kg	No.1/No.2 table 65000/40000
	Min. index positioning	deg	0.001°
	Table locking		90°×4 positions by lock pin
Spindle	Quill diameter	mm	Ø160
	Spindle speed	rpm	6-3500
	Spindle motor	kw	60
	Spindle transmission		3 step
	Spindle max. torque	Nm	5000
	Spindle taper		BBT50
	Pull stud		MAS403P50T-1(45°)
Stroke	X axis stroke	mm	5000-25000
	Y axis stroke	mm	3000/4000/5000
	Z axis stroke	mm	1200
	W axis stroke	mm	1000
Feed	X/Y/Z/W axis rapid traverse	m/min	20/20/20/20
	V axis rapid traverse	m/min	10
ATC	Tool capacity	pc	60(Opt. 90/120)
	Max. tool diameter	mm	Ø125
	Max. tool diameter (w/o adjacent tool)	mm	Ø420
	Max. tool length	mm	600
	Max. tool weight	kg	35
Accuracy	Positioning accuracy	mm	0.025/2000
	Repeatability	mm	0.010
Controller			Siemens 840D (Opt. FANUC 31i/Heidenhain iTNC 530)

◎SPECIFICATIONS MAY BE CHANGED WITHOUT PRIOR NOTICE

Standard accessories

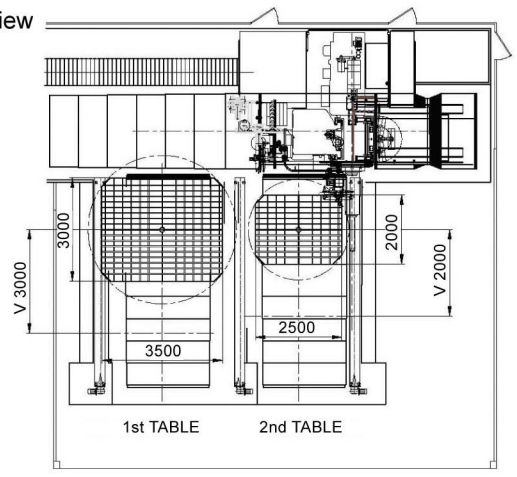
- Hydraulic unit
- Coolant system
- Air blower
- Automatic Lubrication system
- Rigid tapping
- Telescopic covers
- Chip conveyor
- Oil skimmer
- Work light
- Three-color warning light
- Tool box
- Leveling pads

Optional accessories

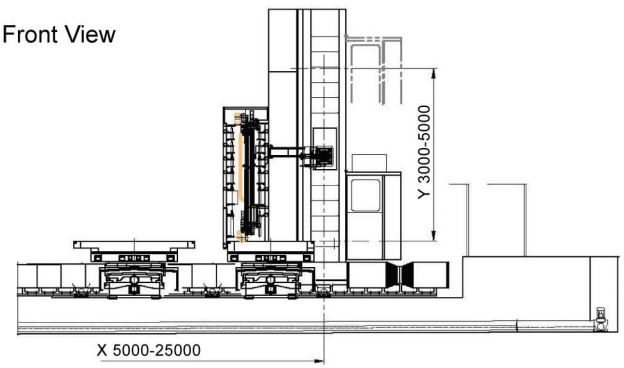
- Fanuc 31 or Heidenhain iTNC530
- B axis rotary table (0.001°)
- Coolant through spindle (15/35/70 bar)
- Linear scale for X/Y/Z axis
- Coolant chilling system
- Paper filter
- Transformer / Stabilizer
- Scraper type chip conveyor
- Door interlock
- CE Mark
- 90° milling head
- Extension milling head

Machine Dimensions

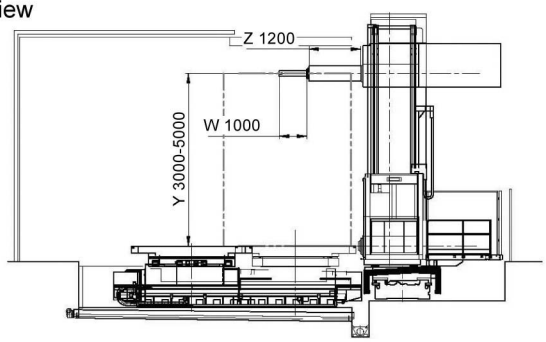
▸ Top View



▸ Front View



▸ Side View



SIEMENS 840D

Optimum, digital complete solutino with SINAMICS S120

- Optimum, digital complete solution with SINAMICS S120
- Up to 10 operating mode groups, 10 channels and 31 axes/spindles
- Channel structure: Simultaneous, asynchronous processing of parts program

Axis Functions

- Programmable acceleration
- Pair of synchronized axes (gantry axes)
- Setpoint exchange
- Tangential control
- Trailing axes (TRAIL)

Interpolations

- Linear interpolating axes
- Circle via certer point and end point
- Circle via interpolation point
- Helical interpolation
- Univeral interpolator NURBS (non-uniform rational B-splines)
- Continuous-path mode with programmable rounding clearance
- Multi-axis interpolation (4 axes)

Measurement functions/measurement cycles

- Measurement level 1:
  Two measurement inputs (switching with/without deletion of distance-to-go)
- Measurement level 2:
  Logging of measurement results, measurement functions from
  synchronized actions, cyclic measurement
  Measurement cycles for drilling/milling and turning: Calibrate workpiece probe, workpiece measurement, tool measurement

Technologies

- Punching/nibbling functions
- More than one feed in block (e.g. forcalipers)
- Handwheel override
- Contour handwheel
- Electronic transfer
- Processing package for five axes: Contains the multi-axis interpolation option

Motion-synchronous actions

- High-speed CNC inputs/outputs
- Synchronized action (max.16) and high-speed auxiliary funtion output including 3 synchronous functions
- Synchronized action, stage 2
- Positoning axes and spindles via synchronized actions (command axes)
- Evaluation of internal drive variables (prerequisite for Adaptive Control)
- Continuous dressing (paralles dressing, online modifiction of the tool offset)
- Asynchronous subroutine ASUP
- Multiple mode actions (ASUPs and synchronized actions in all operating modes)

Open Architecture

- Expand user interface
- SINUMERIK HMI programming package (OEM contract required)
- OA-open NCK software(OEM contract required)

Drive

- Scalable in performance, functionality and mechanical design
- Rated outputs to beyond 200 kW
  Rated currents of the Motor Modules from 3 A to 200 A
- Supply voltage levels from 380 V to 480V 3 AC
- System uniformity with "Totally Integrated Automation" at Siemens

Programming

- CNC programming language
  Programming in parallel with machining
  Dimensions can be specified as metric, in inch or mixed
  Work offsets, programmabel (frames)
  Reference point approach by program
  Look Ahead
  Inclined-surface machining with frames
  Program preprocessing
  Dynamic preprocessing memory (FIFO)
  Online ISO dialect interpreter
  Program/workpiece management
  NC user memore (RAM) 3 to 15 MB for parts programs, tool compensation, offsets
  256 MB HMI user memory on the NCU
- Programming support system
  User-friendly program editor
  Machining step programming
  Multi-channel sequence programming
  Programming support for geometry inputs and cycles
  Process-oriented cycles for drilling/milling and turning
  Programming and operating support for turning and milling machines with ShopTurn HMI and ShopMill HMI
  CAD reader for PC, convert DXF files to contours and drilling templates
  SinuTrain for PC, training software

Simulation

- 10 Channels
- HMI Advanced
- Simulation for turning and milling

Spindle Functions

- Extensive spindle functions, such as different thread cutting functions, automatic gear stage selection, oriented spindle stop, on-the-fly axis synchroniztion
- Synchronous spindle/multi-edge turning

Tools

- Tool types for turning, drilling/milling, grindling and groove sawing
- Configurable number of intermediate blocks for tool radius compensation
- Tool radius compensations with approach and retract strategies
- Tool management functions
- TDI: Tool management functions

Operation

- Clear operation by means of operating areas each with eight horizontal/vertical softkeys
  Control Unit management:
  Operator panel lock
  User oriented, hierarchical access protection
  Screen texts in several languages
  (English, German, Spanich, French, Italian, Chinese (simplified))
  Program window for block display

Communication/data management

- Data storage to memory medium on USB and on the CF card of the NCU
  Data backup on hard disk
  Data backup to network via Ethernet
- Direct Numeric Control (DNC):
  CNC program transmission via network, CNC program comparison,

Service and maintenance

- EPS Network Services :
  Remote operation and observation of machine control, analyzing and processing
  machine faults, states-oriented maintenance
- TPM Total Productive Maintenance

Monitoring functions

- Working area limitation
- Software and hardware limit switch monitoring
- Position monitoring
- Downtimes monitoring
- Clamping monitoring
- 2D/3D protection zones
- Contour monitoring
- Axis limitation from the PLC
- Spindle speed limitation
- Contour monitoring with tunnel function
- Path length evaluation
- PROFIBUS tool and process monitoring
- Safety routines continuously active for overtemperature, battery, voltage, memory, fan monitor

Compensation

- Feedforward control, speed-dependent
  Temperature compensation
- Quadrant error compensation per operation
  Interpolation lead screw and measurement system error compensation
- Backlash compensation
- Space error compensation (SEC)for kinematic transformations
- Precontrol, acceleration-dependent

PLC

- Optimum, digital complete solution with SINAMICS S120
- Up to 10 operating mode groups, 10 channels and 31 axes/spindles
- Channel structure: Simultaneous, asynchronous processing of parts program

Motors

- Synchronous motors,
  permanently-excited 1 FT6, 1FK, Static torque of between
  0.4 and 300 Nm, Rated speeds 1500 rpm to 6000rpm
- Linear motors 1 FN
  with rated feedrate forces from 200 to 20700 N, Speeds of 58 to 736 m/min
- Torque motors 1 FW
  with static torques from 96 to 2450Nm, Speeds 40 to 495 rpm
  Main Spindle Motors
- Compact, ready-to-install synchronous built-in motors 1FE with rated torques of 5 to 820 Nm and speeds up to 40000 rpm
- Depending on the design, air or water-cooled asynchronous motors in the power range from about 5 kW to 100kW are available as 1PH with drilled shaft from material feeding, clamping and cooling as well as a series of water-cooled built-in motors

Commissioning

- Commissioning software integrated in HMI advanced:
- Parameterizing and optimizing Commissioning software on PC/PG
- SinuCom NC

Safety functions

"Safe standstill" and "Safe brake control" integrated in drive Safety Integrated

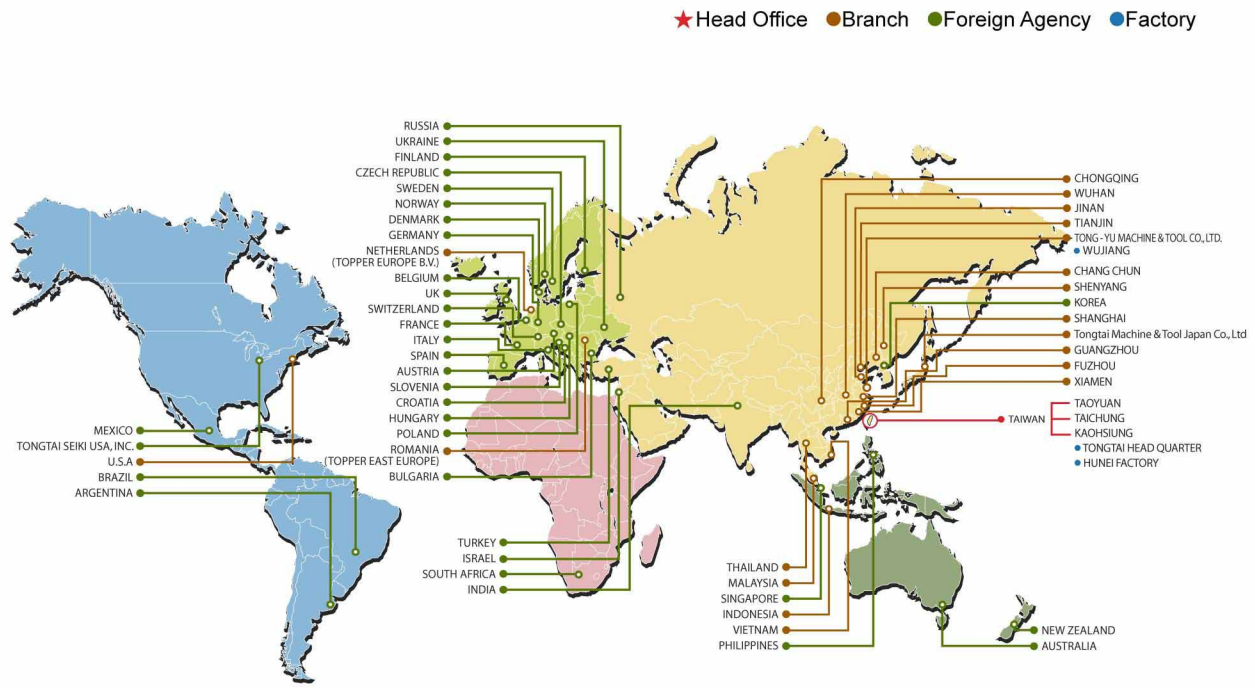
Diagnostic functions

- Alarms and messages
  Trip recorder can be activated for diagnostic purposes
- PLC status
  Remote Control System (RCS)

Transformations

- Cartesian point-to-point (PTP) traveling
- Concatenated transformations
- Generic transformation

Global Sales & Service Network



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2012.02.04 Design by Tongtai Machine & Tool Co., Ltd