HUR – 1000 Five-Axis Vertical Machining Center

The five-axis machining center adopts a stable closed gantry structure and is equipped with a standard electric spindle, a two-axis direct-drive CNC turntable and a horizontal chain servo tool magazine. It can realize high-speed, high-precision and efficient machining of complex parts. It is widely used in new manufacturing of energy vehicles, aviation integral blisks, steam turbines impellers, molds and other products.

1. Overall layout of the machine

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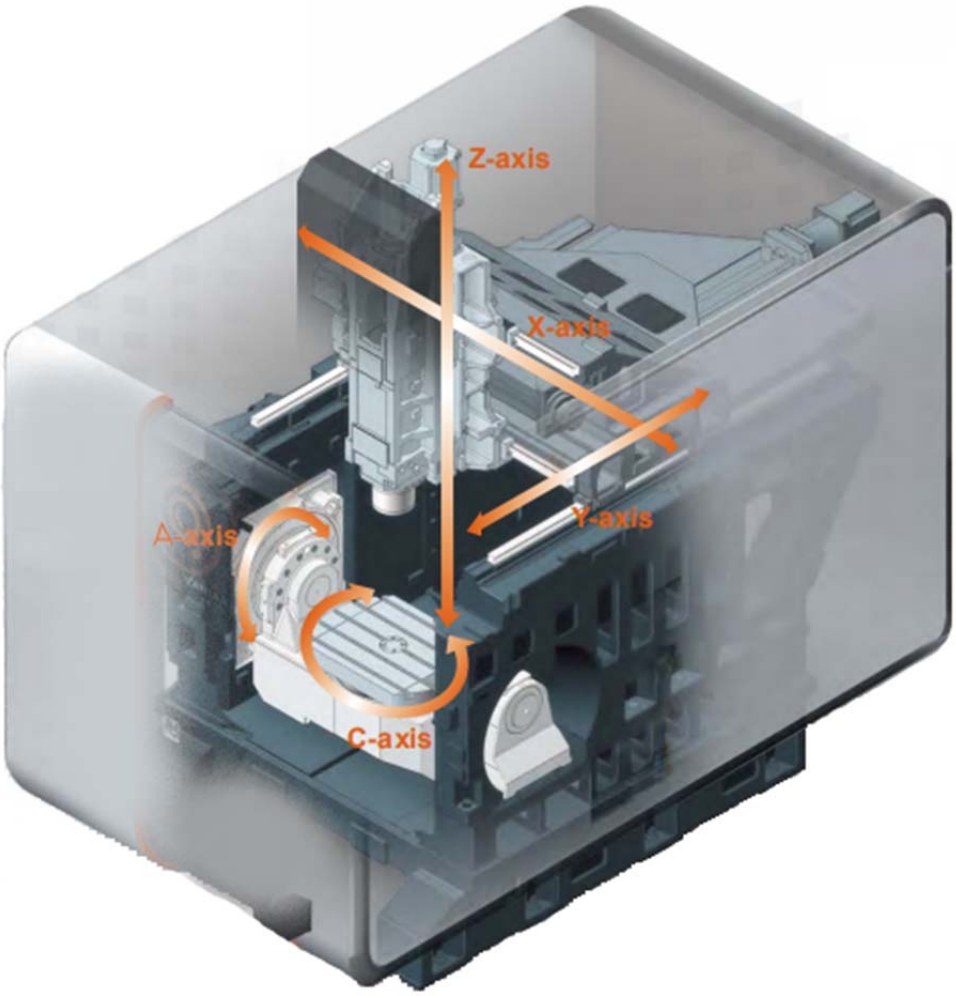

The OM – 1000 five-axis machining center adopts a stable gantry structure, the column is fixed on the base, the beam moves longitudinally along the column (Y direction), the slide plate moves laterally along the beam (X direction), and the headstock moves vertically along the slide plate (Z direction). The workbench adopts the self-developed direct-drive cradle structure, and various performance indicators have reached the international advanced level.

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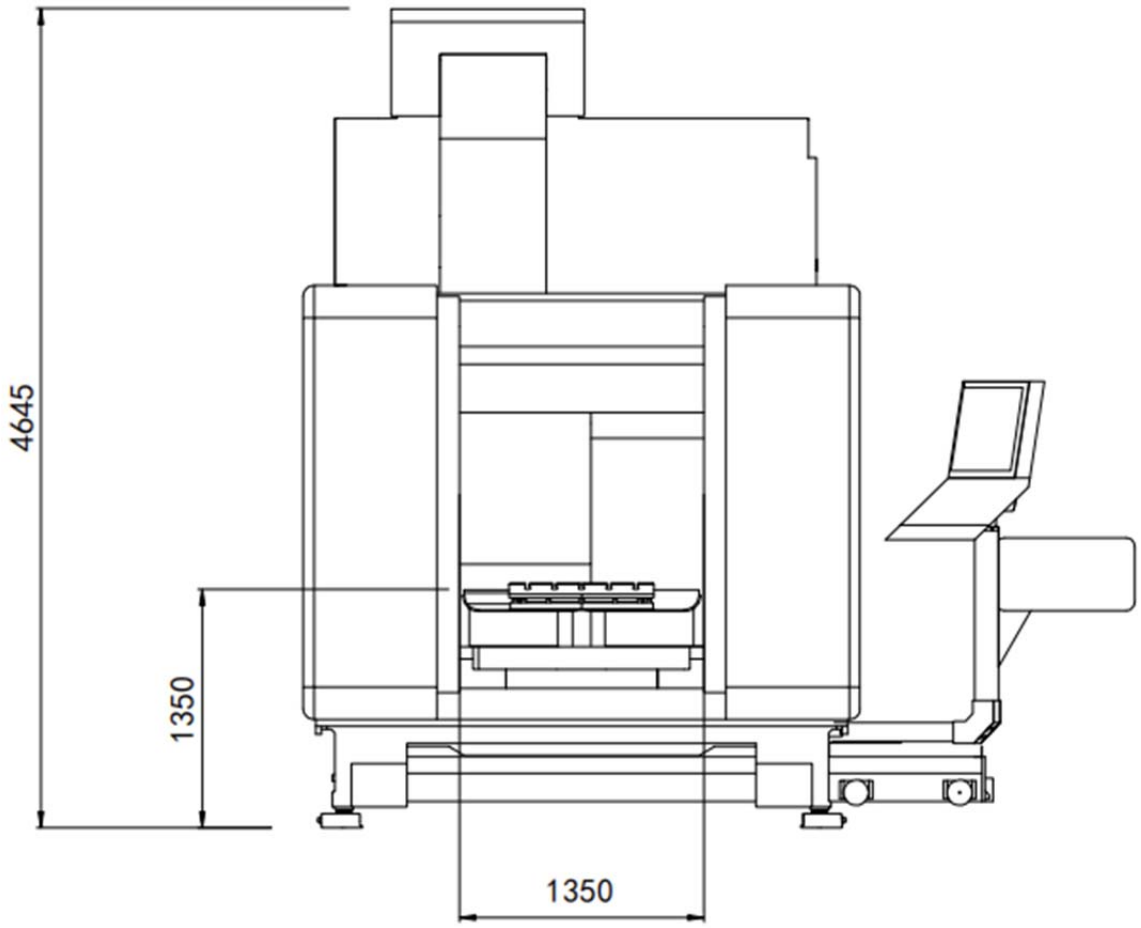

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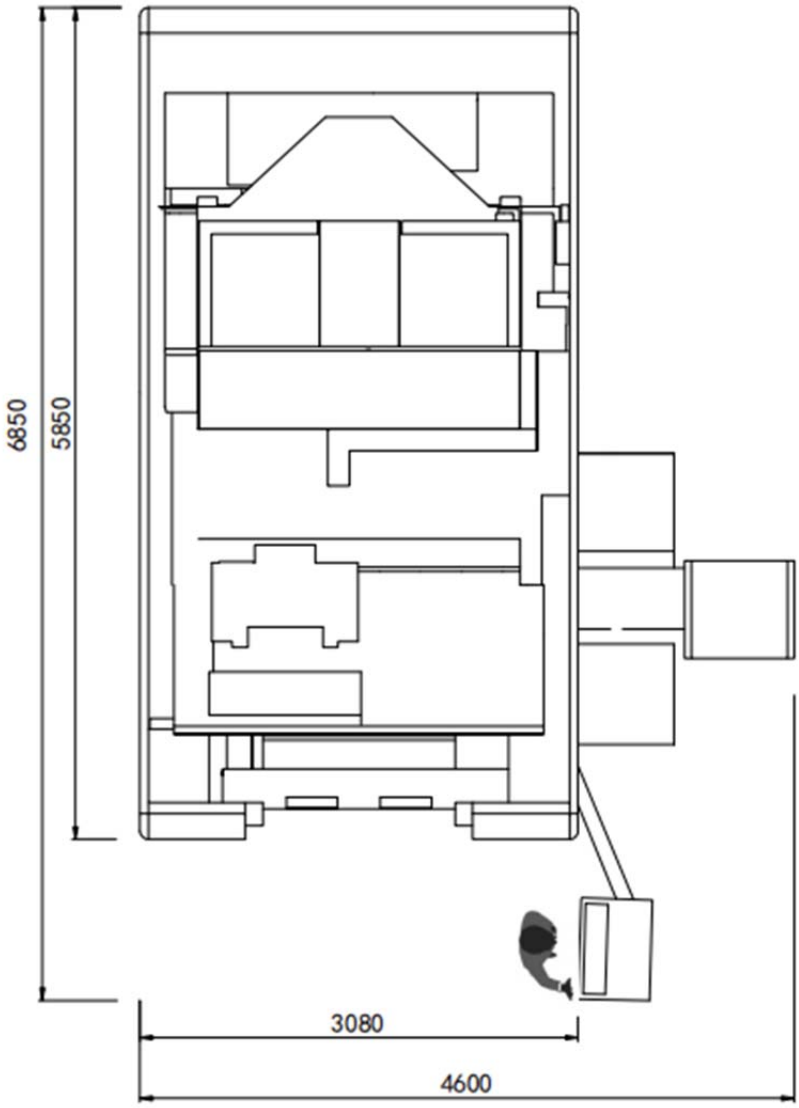

2. Feeding system
   The X, Y, Z axes adopt ultra-high rigidity, high-precision roller linear guides and high-performance ball screws, with low dynamic and static friction, high sensitivity, low vibration at high speed, no creep at low speed, high positioning accuracy, and excellent servo drive performance. X, Y, Z axis servo motors are connected with high precision ball screws through precision reducers, with flexible feeding, accurate positioning and high transmission precision. The Z-axis servo motor has a brake function. In the case of power failure, it can automatically hold the brake to hold the motor shaft tightly so that it cannot rotate, which plays a role in safety protection.
3. Electric spindle
   The motorized spindle adopts the self-developed BT50 motorized spindle (HSKA100 motorized spindle is optional), and the end is equipped with a ring spray joint to cool the tool. It has the advantages of high speed, high precision, high dynamic response, etc., and can realize stepless speed regulation , built-in high-precision encoder, can achieve directional accurate stop and rigid tapping.

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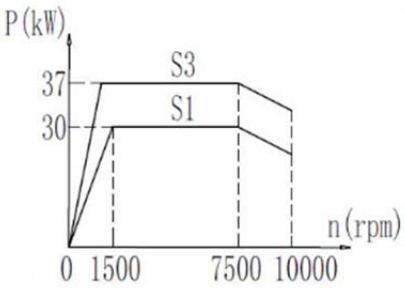
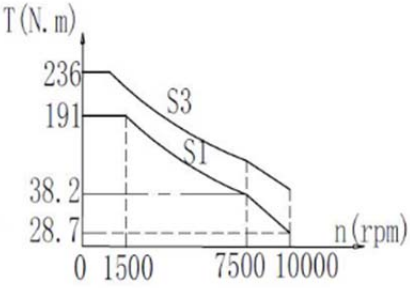
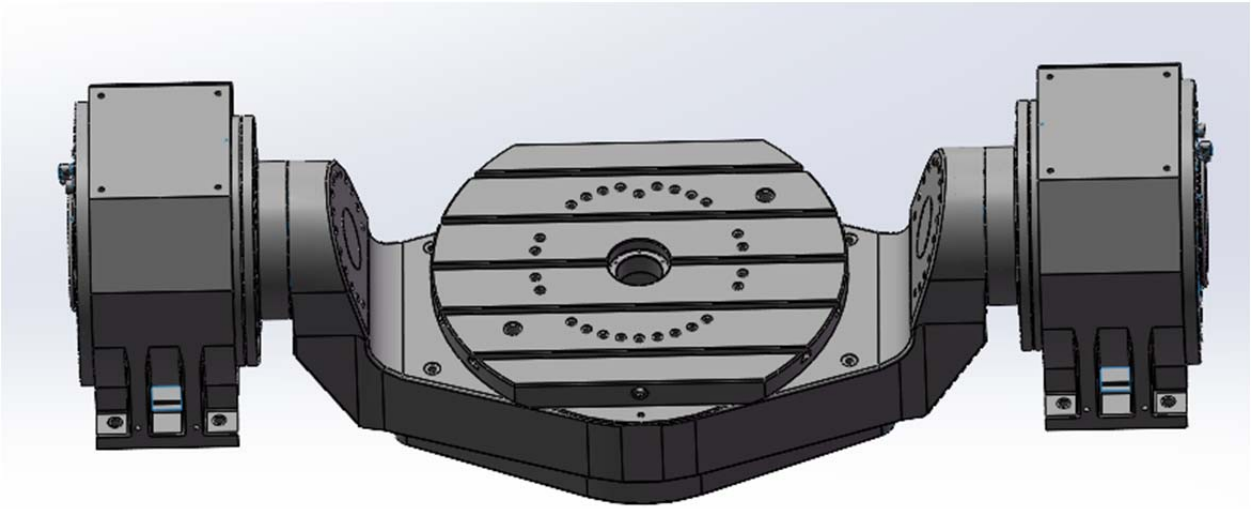




4. Turntable
   The self-developed dual-axis direct-drive cradle turntable is equipped with a high-precision absolute encoder and is cooled by a water cooler at a constant temperature. It has the advantages of high rigidity, high precision, and high dynamic response. The worktable adopts 5-18 mm radial T-slots, and the allowable load is 2000 kg (evenly distributed).



5. Tool magazine
   The tool magazine adopts BT50 horizontal chain servo tool magazine, which can accommodate 30 tools.

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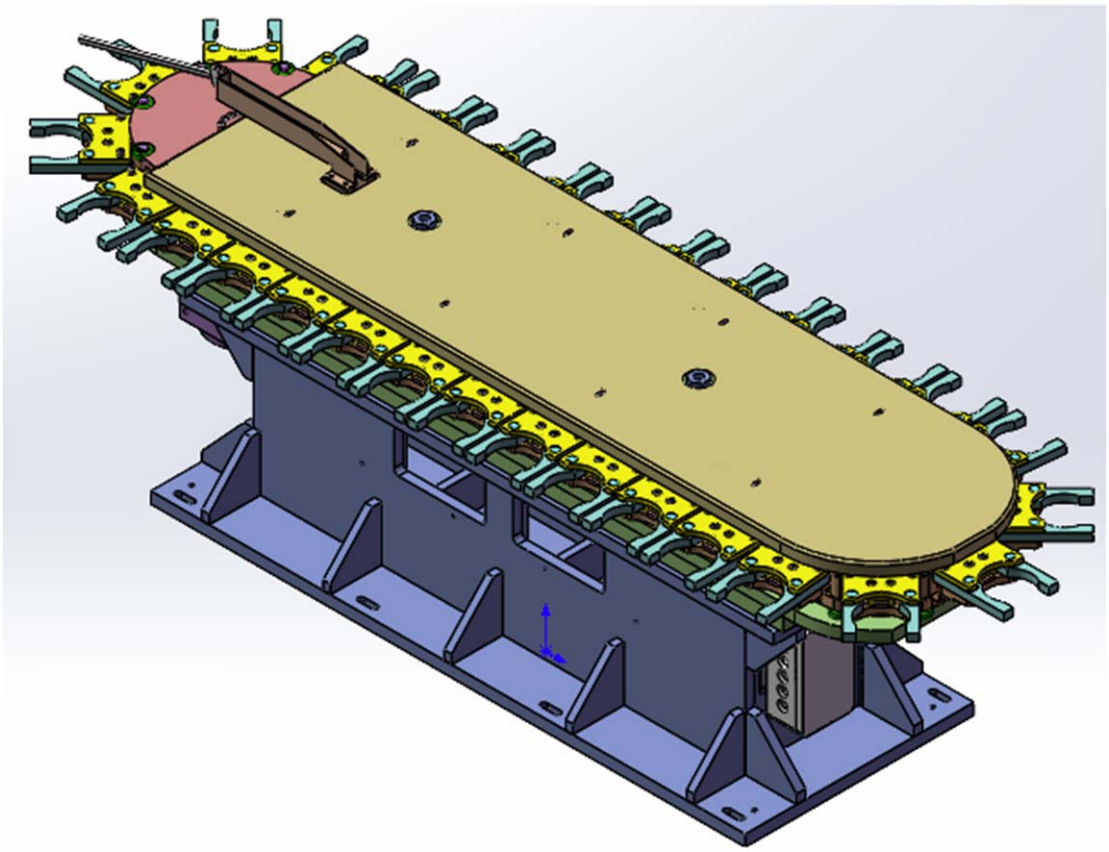

6. Fully closed loop feedback system
   X, Y, Z linear axes are equipped with HEIDENHAIN LC195S absolute value grating ruler; A and C rotary tables are equipped with HEIDENHAIN RCN2310 absolute value angle encoders to realize full closed-loop feedback of 5 feed axes, ensuring the machine has high precision and high precision retention.

7. Cooling and pneumatic system
   Equipped with large flow cooling pump and water tank to provide sufficient cooling of the tools and workpieces. The headstock end face is equipped with cooling nozzles, which can be controlled by M code or control panel. Equipped with a water cooler for constant temperature cooling, to ensure that the electric spindle and the direct drive turntable are in good working condition and can run efficiently for a long time. The pneumatic system adopts pneumatic

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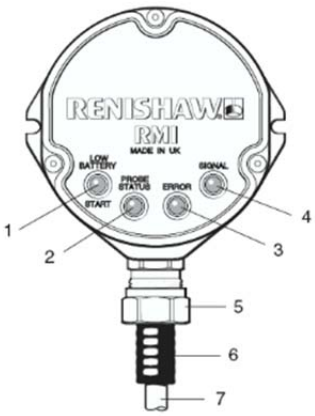
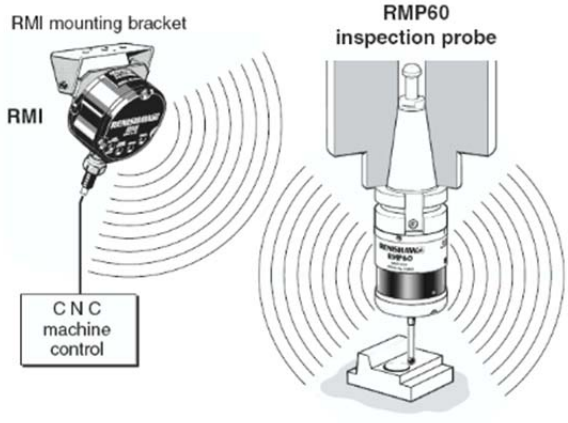
components for filtering, and realizes the functions of cleaning and blowing the taper hole of the spindle, protecting the air seal of the spindle bearing, and blowing and cleaning the grating ruler.

8. Centralized lubrication system
   The slide block of the guide rail and the nut of the ball screw are all lubricated with thin grease, and the lubrication is provided regularly and quantitatively to ensure the precision and stability of the ball screw and the guide rail.
9. Oil and gas lubrication system
   The electric spindle is equipped with imported oil and gas lubrication device, which can fully lubricate and cool the spindle. The sensor can provide abnormal lubrication alarm, which can effectively ensure the spindle can work stably at high speed for a long time.
10. Workpiece measuring system
    The machine is equipped with Renishaw RMP60 radio probe, used in conjunction with the RMI receiver, the working frequency is 2400 MHz to 2483.5 MHz, the measurement one-way repeatability is less than or equal to 1um (480 mm/min measurement speed, using a 50 mm stylus), and the applicable working temperature is 5°C to 55°C





11. Tool measuring system The machine is equipped with Renishaw NC4 laser tool setter, the measurement repeatability is ±0.1um, and the working temperature is 5°C to 50°C.

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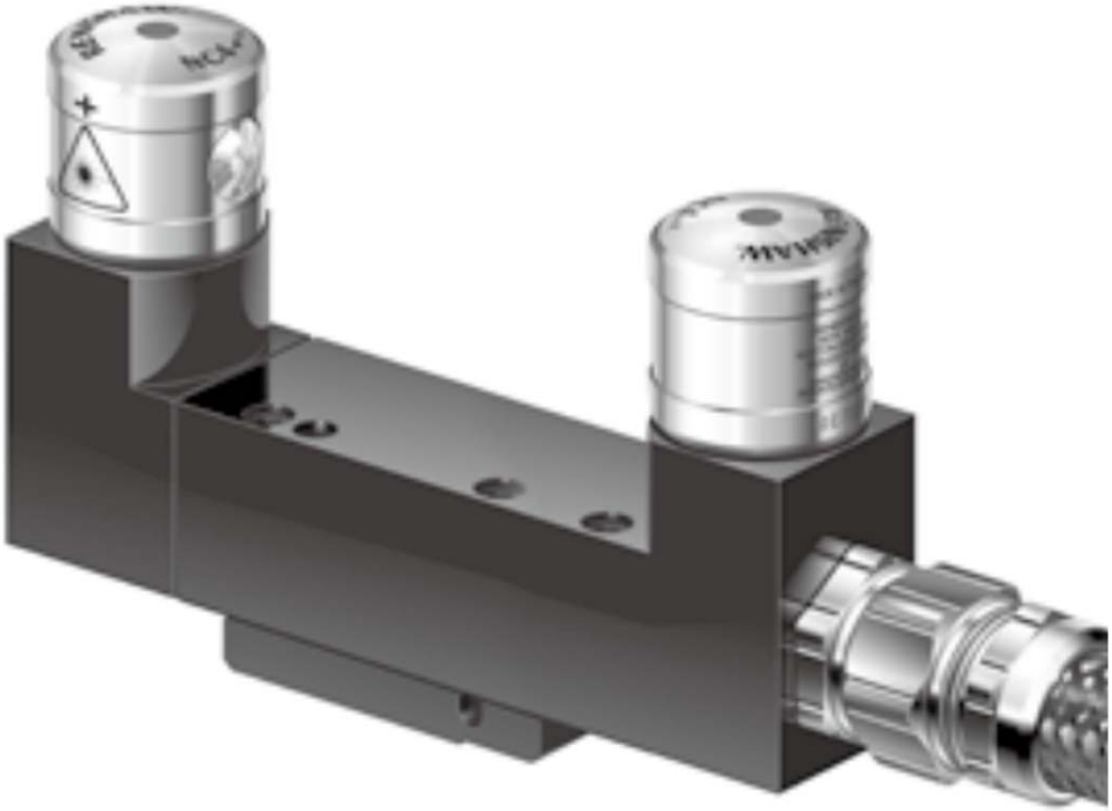

12. Five-axis precision calibration function The machine is equipped with Renishaw's AxiSet Check-Up Rotary Axis Line Checker kit, paired with the workpiece measurement system RMP60, enabling machine users to quickly and accurately check the condition of rotary axes and identify problems caused by temperature and humidity changes, machine collisions or wear and tear problems, can quickly adjust and locate performance checks, benchmark and monitor how complex machines change over time.

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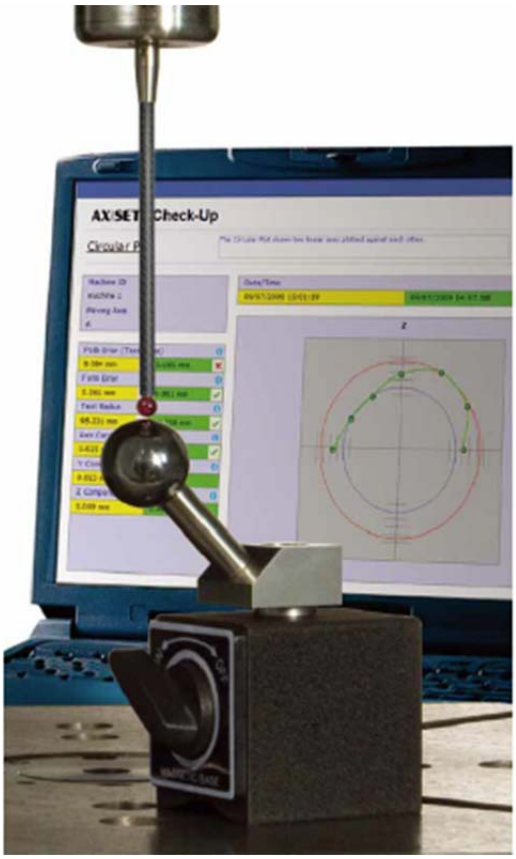

13. Machine protection
    The machine adopts a fully enclosed overall protective cover that meets safety standards to prevent splashing of coolant and chips, ensure safe operation, and have a pleasant appearance. The X-direction of the machine is equipped with an armored protective cover, which can effectively protect the guide rail and ball screw.
14. machine working conditions
    (1) Power supply: 380V±10% 50HZ±1HZ three-phase alternating current
    (2) Ambient temperature: 5℃-40℃
    (3) Best temperature: 20℃±2℃
    (4) Relative humidity: 20-75%
    (5) Air source pressure: 6±1 bar
    (6) Air source flow: 500 L/min
15. Function introduction of CNC system
    Siemens 840Dsl.730 CNC system configuration

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Item	Name	Remarks
System functions	Minimum pulse equivalent	Linear axis 0.001 mm, rotary axis 0.001°
	Feed rate per minute/revolution	
	Feed and rapid traverse	
	Feedrate override 0 ~ 120%	
	Spindle speed limit	
	Spindle constant speed cutting	
	Spindle monitoring	
	Spindle override 50 ~ 120%	
	Spindle speed display	
	FRAME	Realize coordinate system transformation and bevel machining
	Direct/indirect measurement system switching	
	Look-ahead function or look-ahead function	
	Lead screw pitch error compensation	
	Measurement System Error Compensation	
	Quadrant Error Compensation	
	Backlash compensation	
	Tool management	
Hardware Configuration	Number of control axes	X, Y, Z, A, C five coordinate axes and one main axis
	Simultaneous control of the number of axes	X, Y, Z, A, C five-axis linkage
	axis name	X, Y, Z, A, C, SP
	monitor	15" color LCD display, display text in Chinese/English
	Operation panel	OP015 full function CNC keyboard
	man-machine communication interface	Standard configuration TCU
	Machine control panel	SINUMERIK MCP 483C PN control panel, 50 mechanical keys with LED, with PROFINET, Industrial Ethernet interface

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	Handheld operating unit	
	Standard keyboard interface	
	Ethernet interface	Integrated on NCU (open workshop networking function)
	USB port	3 x 0.5 A USB integrated on TCU
	PLC program	PLC317-3PN/DP
Interpolation function	Feed pause	
	thread cutting	
	Simultaneous cutting	
	Three-coordinate linear interpolation	
	Arbitrary two-coordinate circular interpolation	
	Helical interpolation	
	Tapping / Rigid Tapping	
programming	Excessive chamfering/rounding	
	program editor	Comply with DIN66025 standard, with high-level language programming features
	Absolute or incremental programming	
	User variable, settable	
	Program jumps and branches	
	macro program	
	Coordinate system translation and rotation	
	Simultaneous programming and machining	
	Program instruction to return to the reference point	
	Contour programming and canned cycle programming	
	Mirroring and scaling	
	plane selection	
	Workpiece coordinate system	

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	Drilling and milling canned cycle	
	Zero offset	
	block search	
	Program number search	
	Background editing	
	program protection	
	Select program by directory	
	Arithmetic and trigonometric functions	
	Comparison and logical operations	
	Five-axis machining software package	Five-axis transformation; five-axis tool compensation; rotation function around the tool center (RTCP)
Safety protection function	Programmable machining area limits	
	Program test function	
	emergency stop	
	Software limit monitoring	
	Contour monitoring	
	Contour collision detection	
	Static monitoring	
	Location monitoring	
	speed monitoring	
	Processing area restrictions	
	torque limit	
	Safety functions Clock monitoring measurement circuits, overheating, battery, voltage, memory, limit switches, fan monitoring	
Operation method	AUTOMATIC	
	JOG (manual) adjustment	
	Handwheel operation	
	MDA manual data entry	
	NC and PLC diagnostics with text display, screen saver	
operation and display	Self-diagnostic function display	Including REF mode, incremental mode (x1, x10, x100)
	Current location display	
	Graphical display	
	program display	
	program error display	
	Operation error display	
	Actual cutting speed display	
	Chinese and English menu display	
	Alarm information display	
	Multiple sets of M-code instruction sets	
	Support PROFINET bus data transfer	
data communication	USB port	NC data, PLC data and programs are backed up to U disk for input and output data
	Ethernet data transfer	Via the Ethernet interface

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Main parameters:

Item			Specifications	Unit
workbench	working desk size		φ1000×800	mm
	allowable maximum load		2000	kg
	T-slot size		5×18	个×mm
processing scope	X axis		1150	mm
	Y axis		1300	mm
	Z axis		900	mm
	A-axis		-150～+130	°
	C axis		360	°
	Distance from spindle end face to work table	Max	1080	mm
		Min	180	mm
Spindle	Cone hole		BT50	
	Rated speed		1500	r/min
	maximum speed		10000	
	Output torque S1/S6		191/236	N.m
	Spindle motor power S1/S6		30/37	kW
Axis	move quickly	X axis	25	m/min
		Y axis	25	
		Z axis	25	
	Turntable maximum speed	A-axis	15	rpm
		C axis	30	rpm
	X/Y/Z axis motor power		3.1/4.4/2	kW
	A/C axis Motor power		6.3 *2/ 9.4	kW
	A-axis	Rated torque	4000×2	N.m
	C axis	Rated torque	3000	N.m
	maximum feed rate	X/Y/Z	25	m/min
		A/C	15/30	rpm
Tool magazine	Tool magazine form		horizontal	
	tool selection method		Two-way nearest tool selection	
	Tool magazine capacity		30	T

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	Maximum tool length		400	mm
	Maximum tool weight		20	kg
	Maximum cutter head diameter	full of knives	φ125	mm
		Adjacent empty tool	φ180	mm
position precision	Executive standard		GB/T20957.4 (ISO10791-4)	
	X-axis/Y-axis/Z-axis		0.008/0.008/0.008	mm
	B axis / C axis		8"/8"	
repeat position precision	X-axis/Y-axis/Z-axis		0.006/0.006/0.006	mm
	B axis / C axis		6"/6"	
Machine weight			33000	kg
total electrical capacity			80	KVA
machine outline size			7420×4770×4800	mm

Standard configuration list:

	1. Main components (including base, column, beam, slide plate, spindle box)
	2. X, Y, Z three-axis feed system
	3. Cradle type turntable AC1000
	4. Electric spindle
	5. Electrical control system (including electrical cabinet, power module, servo module, PLC, operation panel, display, hand-held unit, electric cabinet air conditioner, etc.)
	6. Hydraulic system
	7. Pneumatic system
	8. Centralized lubrication system
	9. Water cooler
	10. Chip conveyor, water tank, chip collector
	11. Grating ruler
	12. Rail protection cover
	13. machine overall protective cover
	14. Workpiece measuring system
	15. Tool setting instrument
	16. Five-axis precision calibration function
	1. 1 certificate of conformity 2. Packing list 1 copy 3. 1 set of machine manual (electronic version) 4. machine backup data 1 set (U disk) 5.840D alarm diagnosis manual 1 set (electronic version)/828D diagnosis guide 1 copy (electronic version) 6.840D milling operation manual 1 copy (electronic version)/828D operation manual 1 copy (electronic version) 840D programming manual 1 basic part (electronic version) / 828D programming manual 1 (electronic version)

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Item	Brands
X/Y/Z axis motor and drive	Siemens, Germany
energy chain	germany igus
screw bearing	Japan NSK/NACHI
Linear Guides	Schneeberg, Germany
Tool magazine	Okada
reducer	STOBER, Germany
Centralized lubrication	Japan
Ball screw	SHUTON, Spain
Pneumatic Components	Japan SMC
Electric cabinet air conditioner	China
water cooler	China
grating ruler	HEIDENHAIN, Germany
Workpiece measuring system	Renishaw, UK
Tool measuring system	Renishaw, UK

Patrs with machine	Specifications	Quantity
Machine mattress iron		8 sets
Anchor bolts		8 sets
rings	M30	2 pieces
rings	M36	2 pieces
suspenders		1 set
Allen key	10	1
Allen key	12	1
Allen key	14	1
Allen key	19	1
Z-axis mount		1
X-axis mount		1
Y-axis fixing		1

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