

High Speed Bridge Type Five Axis Linkage

Gantry Machining Center

RY-GB8550BF5

Technology Agreement

1. Company Profile



YONGHUA:

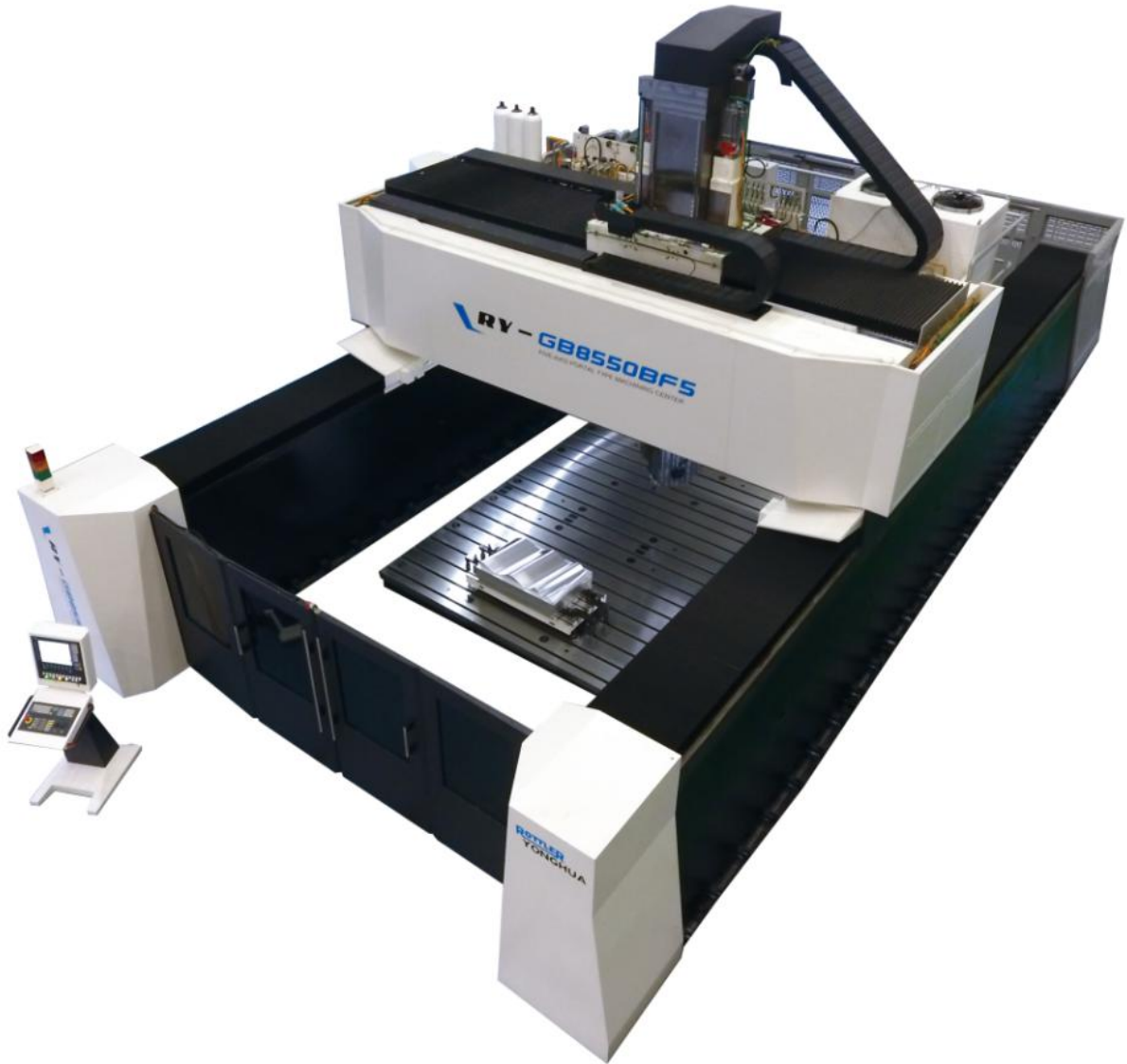
Shandong Yonghua Machinery Co.,Ltd was established in 2007 at Yanzhou, Shandong Province, covers an area of 100,000 square meters with a registered capital of 55.75 million yuan.

The company insist on manufacturing middle to high end CNC machine tools such as large gantry machining centers, high-precision horizontal machining centers and high-speed vertical machining centers. The products are widely used in many fields such as aviation, weaponry, automobile, shipbuilding and mold manufacturing.

Since the year 2014, we cooperated deeply with German famous Machinery Company Horst Rottler Maschinenbau Gmbh on R&D.We achieved design in Germany and made in China.Most machine components are imported from other developed countries.Product quality and service level are in the leading position of machinery industry.ISO9001 international quality system certificate and CE certificate are both achieved .

Uphold the "product first, sincere cooperation" business philosophy,We aim to bring more efficient and superior products as well as service to every customer all the time.During these years effort, we gained a very good reputation in domestic market. Besides,We have already exported machining centers to some European customers. Now there are more than 500 workers with high education and high-quality . Annual sales value has reached 150 million RMB.

2.GB8550BF5 Five Axis Linkage Gantry Machining Center Profile



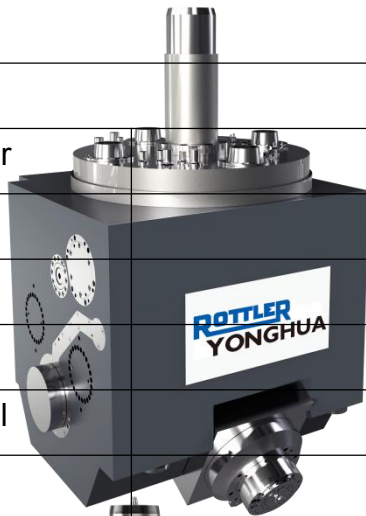
The series is a high-speed bridge five-axis gantry machining center jointly developed and manufactured by ROTTLER (Horst Rottler Maschinenbau GmbH) and Shandong Yonghua Machinery Co., Ltd. The product has high speed, high precision, high rigidity and high reliability characteristics. It can keep continue normal work with stable accuracy under the required environmental conditions . It is mainly used in automotive, aerospace, electric power and large molds and other industries for

precision machining or aluminum processing. It is especially suitable for high precision and high speed milling of various space surfaces and continuous surfaces of which parts are heavier and work pieces are longer.

3. Main parameter

Table :	
Table size (W×L)	3500mm×9000mm
Width between column (not contain protection cover)	5000mm
T slot width	36mm
T slot pitch	250 mm
Table load capacity	157500kg
Movable beam (X axis) :	
travel	8500 mm
Cutting Feed rat	10~20000mm/min
Rapid feed rat	28000mm/min
Positioning accuracy	0.01mm
Repeat ability	0.005mm
The horizontal cross slide (Y axis) :	
Travel	4000mm
Cutting Feed rat	10~20000mm/min
Rapid feed rat	28000mm/min
Positioning accuracy	0.01mm
Repeat ability	0.005mm
spindle (Z axis) :	
travel	1500mm
Cutting Feed rat	10~15000mm/min
Rapid feed rat	20000mm/min
Headstock ram cross	600mm×600mm

section	
Positioning accuracy	0.01mm
Repeat ability	0.005mm
C axis speed	12rpm
C axis rotation angle	±185°
Positioning accuracy	8"
Repeat ability	3"
Milling head:	
B axis swing head	
Spindle motor power	56Kw
Spindle Max speed	12000rpm
Spindle Max torque	89Nm
B axis speed	6rpm
B axis rotation angel	-110°/+5°
Spindle taper	HSKA63
Vertical milling head	
Motor power	60KW
Max speed	6000rpm
Max torque	1830Nm
Right angle milling head	
Power	60KW
Max speed	4000rpm
Max torque	1830Nm
ATC:	
Tool capacity	60 pieces
Tool type	HSK-A100 20pieces、 HSK-A63 40 pieces



Components	Country	Brand
Control system	Germany	SIEMENS
servo motor	Germany	SIEMENS
linear scale	Germany	HEIDENHAIN
Spindle drive unit	France	REDEX
Ram part	Germany	ROTTLER
Functional milling head	Germany	ROMAI
Rack	Germany	ATLANTA
Ball screw	Spain	SHUTON
Three axis reducer	France	REDEX
Main hydraulic components	Germany	REXROTH/HYDAC
Ball Screw Bearing	Germany	FAG
Roller Linear guideway	Germany	INA
Additional milling head tightening mechanism	Germany	BERG
Protection cover	Germany	HEMAZHAO
Cooling system	Germany	SCHIMPKE
Lubrication system	Switzerland	SKF
ATC	Taiwan	GIFU
Towline	Germany	IGUS
Pad iron	Italy	SPINELLI
Electrical cabinet	Germany	RITTAL
Pressure and flow switch	Germany	SUCO/IFM
Pneumatic system	Germany	FESTO

4.Machining Center Main structure

The overall structure of the series of machine tools: table fixed to the ground, the viaduct bed were placed on both sides of the table, the beam through two sets of rack and pinion along the bed moves back and forth (X axis), double servo motor backlash, each side has two roller guides

The horizontal cross slide and vertical ram are equipped on the moving beam, and the horizontal slide moves left and right along the four roller guides of the beam (Y axis).

The vertical ram moves up and down along the vertical guide rail through two ball screws (Z-axis).

C-axis is driven by the torque motor and built-in ram internal.

Machine equipped with three functions milling head,vertical milling head, right angle milling head and B-axis swing head. Through the claw fixed on the C-axis spindle can achieve functional head automatic replacement. Vertical milling head, right angle milling head through the spindle drive unit to achieve the main cutting movement, B-axis swing head through the built-in electric spindle to achieve the main cutting movement. Tool magazine can achieve automatic tool change of three functions milling heads.

5. Machining center main parts

The main structural components of the bridge type machine base are mineral castings. The beam, horizontal cross slide and vertical ram apply steel welding technology. The bridge, beam, cross slide, vertical ram consist of the overall framework of the structure.

5.1 Machine base

On the two sides of machine base are X1 and X2 axis, each side of the base is spliced by 3 pieces of mineral castings, its good thermal stability and shock absorption to ensure high-speed machining process and higher accuracy requirements. The guide rail of the base is made of grinding and finishing after the stitching is completed.

Bed and foundation connection using imported adjustable cushion iron.

5.1.1 Beam and horizontal cross slide

Beams, horizontal cross slide apply advanced steel welding technology, to ensure high rigidity and low flexibility, reducing weight and ensure high-speed operation of the machine.

Beam and horizontal cross slide apply box box structure, ensuring the rigidity of all directions and thermal deformation of the symmetry, increase the stability and reliability.

5.1.2 Ram

The ram is made of advanced steel plate welding technology. On the basis of ensuring high rigidity and low flexural deformation, the ram is reduced in weight and ensures the high-speed operation, and the cross section size of the ram 600 × 600mm improves the ram suspension Stretch cut rigid. C-axis built-in vertical ram, torque motor drive, apply cooling by constant temperature water and stepless positioning technology.

5.2 Spindle drive

Spindle drive through the spindle motor and 2-stage reducer ($i=1;i=5$)。

Motor - reducer unit uses a world-class French company REDEX products.

5.3 ATC and milling head storehouse

Machine configure automatic change tool magazine and milling head storehouse, located on the back of the workbench, to meet the user's various processing requirements.

3.1 ATC

Tool magazine can accommodate 60 knives, 20 HSK-A100 and 40 HSK-A63 .

It can achieve vertical and horizontal milling head automatic change.

3.2 Function milling head

Function milling head library can accommodate three functional milling head (milling head, right angle head, B-axis swing head), It can automatically replace milling heads.

6.The machine axis drive and position feedback

X axis: beam along the fixed bed rail longitudinal reciprocating motion. Both sides driven by two sets of AC servomotors , after the gear box is decelerated, the rack and pinion drive the beam to move along the longitudinal direction of the bed vertically to achieve X-axis linear motion. Both sides of the bed synchronous drive, to maintain the same movement.

The guide rail adopts 4 European original imported roller type linear guide structure, which has large bearing capacity, strong anti-seismic ability, high motion precision and stable and durable precision.

Feedback method: both sides of the bed use the European original imported grating ruler to carry out full closed loop feedback in synchronous operation to achieve high precision positioning.

Y axis: horizontal slider is move back and forth along the rail of the beam. 2 sets of AC servo motors are adopted on both sides of the drive. After reducing speed through the gearbox, the Y transmission is achieved by the rack and pinion drive, and the lateral

sliding plates on both sides are driven synchronously, so as to keep the motion consistent.

The guide rail adopts 4 European original imported roller type linear guide structure, which has large bearing capacity, strong vibration absorption ability, high and stable motion precision .

Feedback method: the European original imported grating ruler is equipped with full closed loop feedback to achieve high precision positioning.

Z axis: the ram reciprocate vertically along the horizontal slider . Using 2 sets of AC servo motor direct connect with imported high precision planetary gear reducer, without backlash coupling, driving high precision Europe imported double nut preload ball screw with large guide to realize Z axis linear motion, while the balance cylinder balance, eliminate the due to weight under unbalanced moment fast response, improve machine.

C axis: directly driven by torque motor.

Feedback method: the European original imported grating ruler is equipped with full closed loop.

7.Cooling and chilling system

The internal and external cooling methods are adopted in the machine cooling system while cutting, and the cooling flow is large enough to meet the cooling needs of the workpiece.

A chip remover is provided on both sides of the fixed work table. The chip remover has the cooling liquid, Iron chip separation and Coolant filtrationr and transportation devices .

The spindle and C axis are cooled by constant temperature water to ensure the precision of the spindle and C axis, and have the function of CTS.

8.Lubrication

The lubrication system of the central integrated self-determination is used for the lubrication of the guide rail. The system is automatically lubricated with the safety protection of oil deficiency.

9.Safe protection form

The machine tool X, Y, Z axes drive all have stroke switch for hard limit protection and system program for soft limit protection .

The X and Y axes of the machine tools are protected by the organ type telescopic protective cover.

X, Y, Z axis adopts chain protection device.

Z axis AC servo motor with holding brake protection device, automatic clamping when electrical power off, can prevent the milling head and ram "decline" and "slip" phenomenon.

Z axis also has a balance cylinder. Balanced cylinder using high-quality piston-type cylinder,the entire balance of the system is designed after a detailed calculation ,the output force ,flow and so on all can meet the requirements. Balance system has a pressure gauge, pressure relay, automatically fill pressure through the PLC control .Balance system has a cut-off type pressure-maintaining valve, when the power is off for a long time, it can also ensure that the pressure of the balance system is stable and does not leak.

10.hydraulic control system

Machine hydraulic system is used to control the component head grabbing and spindle to loose and clamp tools, the machine equipped with pressure testing, give pressure feedback at real-time.

11.Electrical parts

The electrical equipment of this machine is composed of control cabinet, operation station, handheld unit and so on. The whole machine uses an AC three-phase power

supply . The power circuit has over current, short circuit protection, and the related action of the machine tool has the corresponding interlock, so as to protect the safety of the body and equipment.

Electric control cabinet with 5 TS 8206.500 group of Rittal electrical cabinets which is a world famous high-end brand . Electric cabinet protection grade is IP55, good sealing performance, strong electromagnetic compatibility, bigger the unit volume bearing . Control cabinet with 3 group of Rittal air conditioner, ensure the normal work of electrical equipment.

The working environment conditions of the control device:

Power supply: three-phase AC 380V, voltage range 370V to 420V; 50HZ + 1HZ. If the power supply fluctuates greatly, it is suggested that the user should configure the automatic AC voltage regulator.

Ambient temperature: 5 ~ 40 C (finishing temperature 20 + 1).

Relative humidity: less than 80%

Ambient air: in the environment with high concentration of conductive dust, dust, cutting oil and organic solvents, the cabinet for machine needs to be placed in a clean thermostat room.

CNC system configuration:

The CNC system uses SIEMENS SINUMERIK 840Dsl CNC system with 5 axis control function . Equipped with 15 "color LCD display, Chinese display interface, beautiful and generous, equipped with HT2 liquid crystal display handwheel, convenient operation, real-time location observation, equipped with SIEMENS full digital AC servo drive system, dynamic response is good, positioning accuracy is high.

SIEMENS 840DSL CNC system is a kind of CNC system suitable for various fields and high technical requirements. It has a high degree of modularization and openness. It forms a fully digital control system with S120 digital drive system and SIMATIC

S7-300 programmable controller. It is used for various complex parts processing tasks, and has better dynamic quality and control accuracy than other systems.

The machine tool has three CNC axes X, Y, Z. X, Y and Z position measurement system adopts HEIDENHAIN grating ruler as closed loop control, C axis circle grating closed loop control, and can do four axis linkage. By configuring B axis swing head, five axis linkage is realized. Each servo drive shaft uses a SIEMENS AC servo motor, and the numerical control axis resolution is 0.001mm.

It has various compensation functions: reverse gap compensation, pitch compensation, tool radius compensation, tool length compensation, and so on. It has many display functions, self diagnosis function and safety function. The machine tools are equipped with perfect detection, monitoring and protection functions.

Controller:

Numerical control system NCU720.3

CNC user memory (buffer) 3M

Maximum configuration of control shaft number (feed shaft and spindle) 31 axis

5 axis of maximum interpolation axis

5 axis function

ShopTurn/ShopMill work step program (P17)

Residual material detection and processing for contour milling and contour turning (P13)

3D finished product program simulation (P25)

Processing real-time analog synchronous parallel recording (P22)

Fine surface function (S07)

Spline interpolation (A, B and C sample) (S16)

End face conversion and cylindrical surface conversion (M27)

Measurement cycle of drilling / milling and turning (P28)

3D tool radius compensation (M48)

Program function

The concept of coordinate transformation (FRAME concept) includes: offset, rotation, magnification, and mirror image

Inclined-surface machining with frame using frame structure

Using this function, it is easy to realize drilling and milling on the workpiece surface without the requirement of coordinate system plane. We can use the rotation of the coordinate system to define the location of the space slope.

Axis function

The rate of feed rate is 0%~120%

Feed shaft monitoring: the limitation of the processing area, the monitoring of the limit of the software, the contour monitoring and the zero speed monitoring.

Spindle function

Operation mode

Speed control mode for milling

The oscillation mode is used for the spindle shift, and the machine tool is 2 gear transmission.

The positioning mode is used to stop the accurate position of head, change the knife, knife back.

The spindle multiplying ratio is 50%~120%

Gear shift, instruction S automatic shift

Monitoring of spindle with various functions (zero speed, maximum speed, speed in setting range, etc.)

Interpolation function

Universal interpolator NURBS (uncongruent rational B spline)

Linear interpolation, arc interpolation, spiral interpolation

programming

Programming language (DIN66025 and advanced language extensions)

Main program calls from the main program and subroutine, subroutine number less than 11, the interrupt path is less than or equal to 4

Skip the program segment number is less than 8, less than 9999 times of routine operation

Polar coordinates programming

Metric / British size conversion (can be switched by operation input or program)

Auxiliary function output (through M word, H word)

NC advanced language programming

In order to meet the requirements of modern machine process, an advanced numerical control language has been developed and used in SINUMERIK to provide free high level programming, including: system variables; user variables; read / write procedures and transfer system variables; branch; arithmetic and trigonometric function; comparison of arithmetic and logic operations; macro control; structure (IF-ELSE-ENDIF, WHILE, FOR, REPEAT, LOOP); string function

Outline definition programming

It allows users to easily quickly input simple contour figures. Through the specified Descartes coordinate values and / or various angles, users can program various curves defined at one point, two points or three points under the help of program editor.

Program management: can manage NCK, hard disk program; the system provides a large number of milling / drilling standard cycle

Simulation of milling and drilling: multi faceted 2 dimensional view (dynamic) simulation

Fine surface (Advanced Surface)

High speed setting

Operation mode

Point movement (handwheel selection, British / metric switching, zero point offset manual knife)

MDA (input and save the MDA program in a text editor)

Instruction (Teaching location, teaching record in MDA buffer memory)

Automatic (from NC, hard disk execution, program control, program editing)

Breakpoints return (REPOS) (return to contour)

tool

Tool magazine management

Tool types are turning, drilling / milling, grinding, groove sawing, etc.

Tool radius compensation in the plane can avoid collisions by choosing the way of moving and returning the contour.

Tool length compensation

Tool bias selection through T and D numbers

Communication, compensation, and other functions

Communication: with Ethernet, RS232C, USB interface, the data can be backed up and transmitted.

Compensation: reverse clearance compensation, screw pitch error compensation, measurement system error compensation.

PLC function:

The system integrates SIMATIC S7-300 integrated PLC, memory 128KB

The alarm and information provided by the machine tool factory can be displayed on the display in real time

Operating parts:

The front end of the operation panel: OP015A, 15 inches, LCD display.

Man-machine interface unit: PCU50, with 40G hard disk, large storage capacity; with USB interface, backup program is convenient.

Machine control panel 19 ', MCP483, plus standard PC general keyboard KB483, easy to operate.

The multi-function liquid crystal display handwheel HT2 can be controlled by two places.



