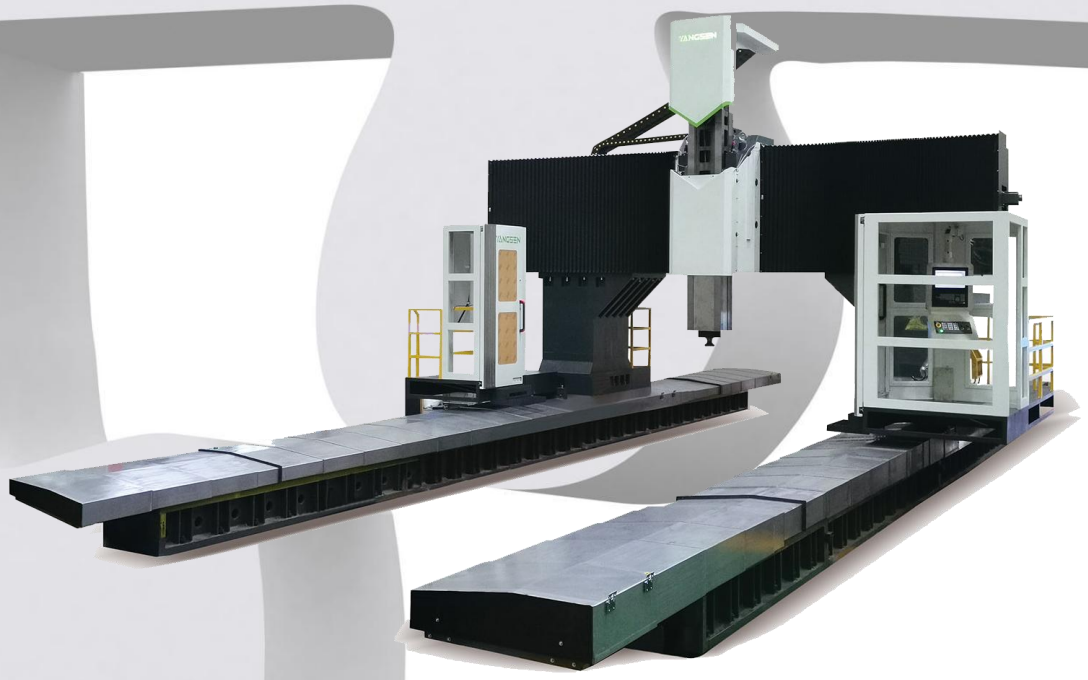
客户的需求就是我们所做的一切

All We Do Are Clients Demand



厦门扬森机械科技有限公司

Xiamen YANGSEN Machinery Technology Co., Ltd

Pre-sales technical information

Five-Axis Machining Center CNC Machining

YSMD32042-5A-HSKA100

Xiamen Yangsen NC Equipment Co., Ltd.

Add: No.586-590 Shanbian Rd.Dongfu Industrial Zone Haicang Dist, Xiamen, FujianProvince, China 361027

T: +86-592-6682467

Website: www.cncyangsen.com

Contents

1、YSMD32042-5A General introduction of gantry CNC machining center

1 Overview

1.1 Narrative

This technical task book is used for the ordering, design, manufacture, installation, commissioning and acceptance of the CNC gantry type machining center and auxiliary equipment of the user.

1.2 Installation position of gantry type CNC machining center

The gantry type CNC machining center described in this technical task book is installed in the workshop of the user.

2. Basic environment

2.1 Power supply voltage: AC 380V+-10%, 50Hz+-5%, 3-phase 5-wire system.

2.2 Use environment: The user is responsible for the power supply from the workshop to the equipment control cabinet.

3. Color of gantry CNC machining center

The color of the gantry type CNC machining center is painted with an international standard model.

4. The standards that the gantry type CNC machining center meets

The ambient temperature detected by GB/T shall comply with the provisions of GB1093-89

Accuracy implementation standard: GB/T19362.2-2017

Machine tool electrical conforms to GB 5226.1-2008 electrical standard

2、YSMD32042-5A The main structure and technical characteristics of the gantry CNC machining center

The overall layout of the machine tool is a synchronous moving gantry frame structure, the workbench is fixed, and the gantry frame moves back and forth; the left and right columns and the bed are distributed on both sides of the workbench. The gantry frame moves forward and backward on the X axis, the encircling ram moves vertically on the slide plate in the Z direction, and the slide plate and the ram move horizontally on the beam in the Y direction.

(Note: This picture is for reference only,

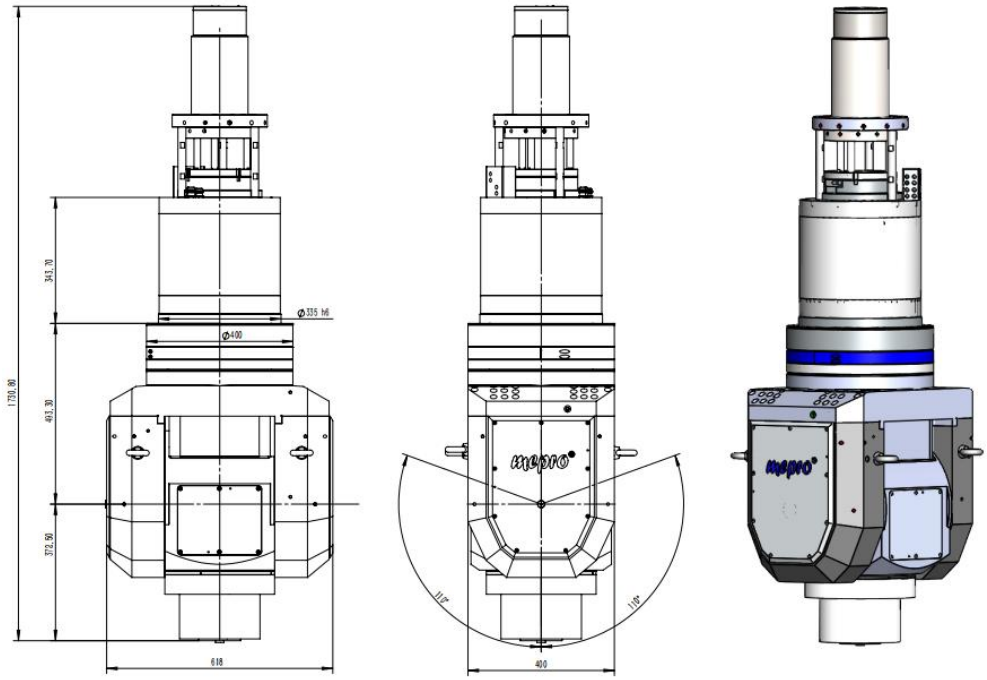
not as a contract basis)

1、Machine tool spindle

The spindle adopts HSKA100 high-speed electric spindle. The spindle has a water-cooled internal cooling method to reduce the thermal deformation of the spindle, improve the stability of the spindle precision and the machining accuracy of the machine tool. The machine tool has the functions of spindle orientation and rigid tapping. The headstock parts adopt double nitrogen liquid balance cylinder mechanism to ensure the stability of the headstock movement.

Five-axis linkage double pendulum milling head: A/C mechanical axis + electric spindle, fork type integrated structure, with high rigidity characteristics, A/C axis adopts unique anti-backlash structure transmission.

List of main accessories SMD32042-5A



参数表		
A轴最大扭矩	Nm	1060
A轴最大转速	rpm	60
A轴抱紧扭距	Nm	4000 (60bar)
A轴转角范围	°	±110
A轴编码器类型	–	绝对式
A轴定位精度	"	8 VDI3441
A轴重复定位精度	"	4 VDI3441
C轴最大扭矩	Nm	1350
C轴最大转速	rpm	60
C轴抱紧扭距	Nm	4000 (60bar)
C轴转角范围	°	±360
C轴编码器类型	–	绝对式
C轴定位精度	"	8 VDI3441
c轴重复定位精度	"	4 VDI3441
主轴参数		
主轴S1扭矩	Nm	200
主轴最高转速	rpm	10000
主轴额定转速	rpm	2580
主轴额定功率	kW	54
主轴额定电流	A	110(S1)/153(S6)
刀柄	–	HSK-A100
润滑方式	–	油脂润滑
铣头自重	kg	965 (约)

2. Feed transmission of each axis

The X-axis adopts double-sided double-drive, that is, the left and right sliding seats are equipped with a set of double-motor rack and pinion drive structure, which can effectively eliminate the transmission gap and improve the positioning accuracy and repeat positioning accuracy of the machine tool.

Both Y and Z drive adopt AC servo motor as the power source, and ball screw as the transmission part. The ball screw is fixedly supported at both ends, supported by imported special precision bearings and pre-stretched in two directions to ensure the feed rigidity and life of the screw. The Y-axis screw is equipped with an advanced auxiliary support structure, which can effectively avoid the accuracy error caused by the sag of the center of gravity of the large-stroke screw. The Z-axis motor has an automatic brake function. In the event of a power failure, the automatic brake will hold the motor shaft tightly so that it cannot rotate.

系统	828D	额定功率 kw	额定扭矩N.m	最大扭矩N.M
X1/X2轴	1FK7103	5.2	36	108
Y轴	1FK7103	5.2	36	108
Z轴	1FK7103	5.2	36	108

3. Rail form

The X-axis guide rail pair adopts four heavy-duty linear guide rails, with small friction coefficient and high sensitivity; small high-speed vibration and no crawling at low speed. The positioning accuracy of the drive shaft is high, and the servo drive performance is excellent; at the same time, the bearing capacity is large, and the cutting vibration resistance is good, which can improve the dynamic characteristics of the machine tool, improve the precision stability and service life of the machine tool;

The Y-axis beam guide pair adopts two heavy-duty linear guide rails; the guide rails are arranged in steps,

with a large span, and sufficient bending rigidity and torsional rigidity.

The Z-axis guide rail pair adopts four heavy-duty linear guide rails to ensure stable cutting during processing.

4. Basic parts of machine tools

The bed, columns, beams, and spindle boxes are all cast with high-strength cast iron materials and resin sand technology. In order to meet the heavy-duty cutting of the machine tool, the cross-beam adopts a large cross-section, which has sufficient bending rigidity and torsional rigidity. These large pieces are designed with computer-assisted three-dimensional software, and the arrangement of ribs is reasonable to improve the rigidity of the large pieces.

5. Machine tool lubrication

There are two types of lubrication for machine tools: grease lubrication and automatic thin oil lubrication.

Grease lubrication part: Three coordinate bearings

Automatic thin oil lubrication parts: ball screw pair, linear guide rail, cast iron-friction guide rail pair composed of plastic paste

Automatic thin oil lubrication is a timing and quantitative automatic method, the action is automatically controlled by the numerical control system, and can detect and alarm

6. Cutting cooling chip removal system

The cutting cooling of the machine tool adopts the external cooling method, and the cooling liquid is emulsified and non-corrosive liquid. The chip removal is sent to the trolley through the two-measuring chain plate chip removal machine on the bed.

7. Machine tool protection device

The bed guide rail (X-axis) of the machine tool adopts an anti-rust metal telescopic protective cover; the beam guide rail (Y-axis) adopts an organ-type protection; the whole machine tool adopts simple

protection to prevent iron filings and coolant from splashing, so that the operator can work in a safe and comfortable environment.

3、Main technical parameters of gantry CNC machining center

Subject	Specification	unit	
Travel	X/Y/Z axis	mm	32000x4200x800
	Spindle nose to the worktable surface	mm	200-1000 (including head)
	Gantry width	mm	4200
Worktable	worktable (L*W)	mm	32000x3500
	Worktable max load	t/㎡	10
	T SLOT	mm	36*200
Spindle	Spindle type	mm	HSK 100A
	Spindle speed	rpm	10000
	Spindle delivery type		Electric spindle
	Spindle power (S1/S6), not less than	кВт	54
	Moment (S1/S6), not less than	Нм	200
Feed rate	Feed rate (X/Y/Z)	m/min	8/8/8
	The max cutting feed rate	mm/min	6000
ATC(optional)	Tool change method		side mount
	Knife handle specifications	type	HSKA100
	Tool capacity	tools	30
	Maximum tool diameter (temporary tool)	mm	112
	Maximum tool diameter (without critical tool)	mm	200

	Maximum tool length	mm	350
	Maximum tool weight	kg	18
	Fastest tool change time	sec	4.9
Motor	Spindle motor	kw	54
	x/y/z axis motor	kw	5.2*4/5.2/5.2
	Cutting water pump motor	m/h-m	4-60
Accuracy	Positioning	mm	0.035/2000，0.035,0.02
	Repeatability	mm	0.03/2000,0.025,0.015
Power requirement	Power requirement	kva	60
	Air pressure requirement	Kg/cm	6
others	L*W*H	mm	45600*8130*5920

4. List of main purchased parts of gantry CNC machining center

No.	Product name	Qty	Manufacture	Specification
1	Controller	1 pcs	Siemens	ONE
2	Five-axis linkage double swing milling head	1 set	IBAG	54KW
3	X、Y、Z servo motor	1set	Siemens	1FK7103*4/1FK7103/1FK7103
4	Spindle bearing （Front）	1set	NSK	
5	Spindle bearing （Back）	1set	NSK	
6	X、Y、Z bearing of ball screw	1set	NSK	
7	X linear guide way	1set	TAIWAN	Double gear rack
8	X、Y、Z ball screw	1set	THK	YZ：8020/6316
9	X linear guide way	4pcs	THK	55 gauge heavy-duty roller rail

10	Y linear guide way	3pcs	THK	55/45/55 specification heavy-duty roller rail
11	Z linear guide way	4pcs	THK	55 gauge heavy-duty roller rail
12	Spindle	1set	IBAG	HSKA100
13	Coolant pump	1set	YANGSEN	LDPB4V-60-1350W
14	Automatic lubrication system	1set	Japan Masawa/SKF	4L
15	Main pneumatic components	1set	Japan SMC	
16	Main electric components	1set	France	schneider
17	Electric cabinet air conditioning	1set	Riko	
18	Three Shaft-driven bicycle mode and	1set	JapanNidec	
19	Chip removal device	1set		Double chain plate chip removal
21	Oil cooler	1set	Riko	
22	Five-axis linkage double swing milling head (Optional)	1set	IBAG	T70-200
24	Three-axis grating ruler(Optional)	1set	Heidenhain/Fagor	

Note: The manufacture preserve the rights to exchange parts at equivalent values.

5、YSMD32042-5A The main function table of the electrical system of the gantry type CNC machining center

CNC system: SIUMERIK ONE

NO	Function	Explanation	Remark
Hardware Configuration			
1	Number of control axes	5 axis	Standard configuration
2	Simultaneously control the number of axes	5 axis	Standard configuration
3	Axis name	X、Y、Z、A/C	Standard configuration
4	CNC system		Standard configuration
5	Operating area		Standard configuration
6	Machine operator panel		Standard configuration
7	Handheld operating unit		Standard configuration
8	Ethernet interface		Standard configuration
9	USB port	2x USB 2.0	Standard configuration
10	PLC program	Built-in SIMATIC S7-200	Standard configuration
11	PLC function	Up to 4096 flags, 128 timers, 64 counters	Standard configuration
12	PLC peripheral module	PP72/48D PN	Standard configuration
13	CF card interface	1pcs	Standard configuration
14	Raster scale interface	3 axis	Standard configuration
System functions			
1	Minimum pulse equivalent	Linear axis 0.001 mm, rotational axis 0.001 °	Standard configuration
2	Feed rate per minute/revolution		Standard configuration
3	Feed and rapid feed		Standard configuration
4	Feed rate adjustment 0~120%		Standard configuration
5	Spindle speed limit		Standard configuration
6	Spindle constant speed cutting		Standard configuration
7	Spindle monitoring		Standard configuration
8	Spindle orientation accurate stop		Standard configuration
9	Spindle magnification 50-120%		Standard configuration
10	Spindle speed display		Standard configuration
11	Acceleration with impact limitation		Standard configuration

NO	Function	Explanation	Remark
12	Programmable acceleration		Standard configuration
13	FRAME	Implement coordinate system transformation and bevel machining	Standard configuration
15	Forward looking function or forward looking function	Implementing frequent motion control in high-speed machining	Standard configuration
16	tool radius compensation		Standard configuration
17	Length Compensation		Standard configuration
18	Compensation for screw pitch error		Standard configuration
19	Measurement system error compensation		Standard configuration
20	backlash compensation		Standard configuration
21	Quadrant error compensation		Standard configuration
22	Tool Management	The machine tool needs to be equipped with a tool magazine	
Interpolation function			
1	Accurate stop		Standard configuration
2	feed hold		Standard configuration
3	cutting		Standard configuration
4	Three coordinate linear interpolation		Standard configuration
5	Arbitrary two coordinate arc interpolation		Standard configuration
6	D+N spiral interpolation (arc interpolation+up to two axis linear interpolation)		Standard configuration
Program			
1	Tapping		Standard configuration
2	Chamfering/rounded corners		Standard configuration
3	Metric, English or mixed size programming		Standard configuration
4	Programming	Comply with DIN66025 standard, with High-level programming language programming features	Standard configuration
5	Absolute or incremental programming		Standard configuration
6	Variable and parameter operation		Standard configuration
7	Dynamic Program Caching (FIFO)		Standard configuration
8	7-level subroutine nesting		Standard configuration
9	Program Jumps and Branches		Standard configuration
10	Macro program		Standard configuration
11	Translation and rotation of coordinate systems		Standard configuration

NO	Function	Explanation	Remark
12	Simultaneous programming and processing		Standard configuration
13	Program instruction returns reference point		Standard configuration
14	Profile programming and fixed loop programming		Standard configuration
15	Mirroring and scaling		Standard configuration
16	Plane selection		Standard configuration
17	Workpiece Coordinate System		Standard configuration
18	Fixed cycle of drilling and milling process		Standard configuration
19	Zero offset		Standard configuration
20	Program segment retrieval		Standard configuration
21	Program number retrieval		Standard configuration
22	Background editing		Standard configuration
23	PROGRAM PROTECT		Standard configuration
24	Select program through directory		Standard configuration
25	3MB user memory (RAM)	Can be used for part programs, tool compensation, and data offset	Standard configuration
Safety protection function			
1	Programmable machining area limitations		Standard configuration
2	Program testing function		Standard configuration
3	Emergency stop		Standard configuration
4	Software limit monitoring		Standard configuration
5	Hardware limit monitoring		Standard configuration
6	Contour monitoring		Standard configuration
8	Static monitoring		Standard configuration
9	Location monitoring		Standard configuration
10	Speed monitoring		Standard configuration
11	Processing area restrictions		Standard configuration
13	Safety function clock monitoring measuring circuit, overheat, voltage, memory, Limit switch		Standard configuration
Operating mode			
1	AUTOMATIC (Automatic)	Including program operation, program interruption, idle operation, single program segment, etc	Standard configuration
2	JOG (manual) adjustment	Including REF mode, incremental mode (x1, x10, x100, x1000, x10000, and any incremental)	Standard configuration

NO	Function	Explanation	Remark
3	MDA manual data input		Standard configuration
4	TEACHIN	Interactive program generation in conjunction with machine tools	Standard configuration
Operation and display			
1	Diagnostic function and screen protection with text display for NC and PLC		Standard configuration
2	Self diagnostic function display		Standard configuration
3	Current position display		Standard configuration
4	Graphic display		Standard configuration
5	Program display		Standard configuration
6	Software bug display		Standard configuration
7	Operation error display		Standard configuration
8	Actual cutting speed display		Standard configuration
9	Chinese and English menu display		Standard configuration
10	Alarm information display		Standard configuration
11	Multiple sets of M-code instruction sets		Standard configuration
Data Communication			
1	USB port	Backup NC data, PLC data, and programs to a USB flash drive for input and output data	Standard configuration
2	CF card interface	Data input and output transmission through CF card	Standard configuration