

TD-500A VERTICAL DRILLING MACHINING CENTER TECHNICAL INFORMATION



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Part I Brief Introduction of Vertical drilling machining center TD-500A

1、 Subject Composing of TD-500A



2、 Main Performance and Features of TD-500A

TD-500A vertical machining center is introduced by Dalian Machine Tool Group Corporation to internationally advanced technology, with its own research and

development and production of a new generation of CNC machine tools, the machine is widely used in 3C industry, military, aerospace, automotive components, small mold processing, medical and other industries small and medium plate parts, disc-shaped part, housing class processing. Part to be completed after a fixture milling, boring, drilling, tapping and other machining processes, with high precision, high automation, high reliability, high degree of mechanical and electrical integration, simple operation, the overall shape of nice features. Especially for small batch or single parts; machine is equipped with automatic tool exchange system (ATC), automatic centralized lubrication system, water / air cooling system, automatic chip removal system, a portable manually operated device (MPG), fully enclosed protective cover.

1, the machine base, column, headstock, cross sliding table, working table and other basic parts are all made of high-strength cast iron casting resin sand process, the internal microstructure stability and ensure high stability of the base member. After casting machine structure dynamics analysis and finite element analysis to the geometric structure is more reasonable, and with appropriate stiffeners guarantee high rigidity base member. Wide machine base, a box-shaped cavity column, lengthened and widened the saddle, the full support of the design load, structural mechanics of materials in line with advanced design concepts to achieve the best rigidity and stability.

2, high-speed, high-precision spindle:

- (1) spindle and motor directly connected, can significantly improve the transmission efficiency, reduce noise transmission.
- (2) The spindle uses speed precision angular contact ball bearings of high precision, speed up to 20000r / min. (12000 r / min; 24000 r / min optional)
- (3) High-performance grease lubricated spindle bearings;
- (4) spindle use of IRD dynamic balance apparatus, direct correction of the dynamic balance of the spindle, the spindle at high speed to avoid resonance phenomenon, to ensure the best precision.

3, X, Y, Z axis feed are used in linear motion guide support, static and dynamic friction, high sensitivity, high speed, small vibration, low speed crawling, high positioning accuracy, excellent servo performance, combined with a high-precision ball screw, accuracy is more stable.

4, swing-style magazine (16T) mounted in front of the headstock, servo motor control, positioning faster and more accurate, the nearest cutter tool selection, tool change spindle mechanical linkage tool change, easy to maintain, tool change fast, and reliable.

5, the machine is equipped with fully enclosed protective cover, beautiful, safe,

leak-proof, protection of the environment. Sealed guard rails to buy brand-name manufacturers products, effective protection of moving parts, extending its life. Large flow automatic red chips means simple, environmentally friendly, practical and reliable, with a manual spray (water) gun (optional), especially easy to remove chips

6, CNC control system could configured Mitsubishi M70, FANUC CNC system, Siemens CNC system, Huazhong CNC system, DMTG CNC system. CNC system can be equipped with a fourth axis interface workpiece / tool measurement interface.

7, rail screw Lubrication uses centralized automatic lubrication oil supply system, all lubrication points with volume dispenser oiling, regular quantitative oil supply rail screw needed to ensure uniform lubrication points, effectively reducing friction, reducing waste lubricating oil, to avoid environmental pollution, to ensure that the ball screw and guide life.

8, electrical wiring box, are in compliance with safety regulations, to ensure that interference from external control system operation. And a heat exchanger (air conditioning optional), electrical box to make rapid discharge of hot air, maintaining a constant temperature box, the control system can be a long-term stable operation.

10, high-precision pitch compensation, each shaft are use high-precision laser measuring instrument to compensate the respective axis positioning accuracy is more accurate, more suitable for high-precision machining of parts.

3、TD-500A Main Technical Parameters

Items	Specification	Remark
Worktable Size (Length×Width) mm	650×400	OP: 700×420
Maximum load of work table kg	300 (均布载荷)	
X/Y/Z coordinate stroke mm	500/400/330	
Distance spindle center to column front mm	400	
Distance spindle nose to table flat mm	150~480	
X、Y、Z cutting speed mm/min	0~20000	
X、Y、Z rapid feed rate m/min	48/48/48 (optional 60/60/60)	

Spindle speed range r/min		50~20000		
Spindle taper		No. 30 (7:24)		
Tool magazine capacity/type		16 把摆动飞碟式 (选配 21 把)		
Shank/rivet type		BT30-45°		
Max. tool weight kg		2		
Max. tool diameter mm		φ 80/ φ 150 (Adjacent empty)		
Worktable Size (Length×Width) mm		200		
Tool change time (16T/21T) S		1.5/1.8		
Table T-slot (slot number×width×slot pitch)		3×14 mm×125 mm		
Positioning accuracy mm		X、Y、Z: 0.010		
Repeated positioning accuracy mm		X、Y、Z: 0.006		
Air pressure MPa		0.5~0.7		
Air flow rate L/min		200		
Overall dimension (L×W×H) mm		2146×1600×2210		
Machine weight kg		2750		
CNC system and all the drive motor	Mitsubishi ; M70VB (A)	20000r/min Spindle motor	SJ-DL5.5/200-01 (3.7/5.5kW) (11.7/17.5 Nm)	standard
		12000r/min Spindle motor	SJ-D5.5/120-01 (3.7/5.5kW) (23.5/35 Nm)	optional
		24000r/min Spindle motor	SJ-VL15-25FZT (F) (2.2/3.7kW) (7/23.6 Nm)	optional
		X/Y/Zdrive motor	X/Y: HF154S-A48/4000i Z: HF224BS-A48/4000i (1.5/1.5/2.2) (9/9/12 Nm)	standard
	FANUC 0i Mate	20000r/min Spindle motor	ai2/20000 (3.7/5.5kW) (11.7/17.5 Nm)	standard
		12000r/min Spindle motor	ai3/12000 (3.7/5.5kW) (23.5/35 Nm)	optional
		X/Y/Zdrive motor	X/Y: ais8/4000 Z: ais 12/4000 (2.5/2.5/2.7) (8/8/12 Nm)	standard
	SIEMENS 828D	20000r/min Spindle motor	1PH8083-1SN02-OMA1 (4.8/5.8kW) (10/12.3 Nm)	standard
		X/Y/Zdrive motor	X/Y: 1FK7063-2AF71-1RG1 Z: 1FK7083-2AF71-1RH1 (2.3/2.3/2.6) (8.9/8.9/12.5 Nm)	standard
	Huazhong	24000r/min Spindle	SVM-75L-30-24	standard

	818AM	motor	(3.7/5.5kW) (12/20.8 Nm)	standard
		X/Y/Z drive motor	X/Y: 130ST-M0961530LMDD Z: 180ST-MM18020HMBB-Z (1.5/1.5/3.1) (9.6/9.6/18 Nm)	
	DMTG . α	24000r/minSpindle motor	SVM-75L-30-24 (3.7/5.5kW) (12/20.8 Nm)	standard
		X/Y/Z drive motor	X/Y: 130ST-M0961530LMDD Z: 180ST-MM18020HMBB-Z (1.5/1.5/3.1) (9.6/9.6/18 Nm)	standard

Note: Huazhong 818 AM and DMTG α CNC system Three-phase fast moving 48m / min; no optional 60m / min. The rest of the system has 48m / min; and 60m / min in two configurations.

4、TD-500A Standard Configuration Table

No.	Item	No.	Item
1	Automatic tool changer (ATC)	8	
2	Workpiece cooling system	9	Shaft gas seal
3	Fully enclosed protection	10	Large flow chips
4	working lamp	11	Portable blow crumbs air gun
5	Automatic lubrication system	12	Spindle taper blowing device
6	Rigid tapping	13	Warning Light
7	Anchor bolts and pads	14	Tool box

5、TD-500A Selected Configuration Table

No.	Item	No.	Item
1	The fourth axis CNC turret	6	Heightening column (200)
2	Center of the water and high	7	Work piece detecting system
3	Flushing gun	8	Tool blow system
4	Tool measuring system	9	Door interlock switch
5	Electrical cabinet temperature control device (air		M30 automatic power-off device

* Users choose other special configuration, you need to contact with the technical department.

6、TD-500A List of Main Parts

No.	Item	Quantity	Manufacturer	Remarks
1	CNC system	1 set	Mitsubishi 、FANUC SIEMENS、huazhong 、	

			dmt g	
2	Spindle servo motor	1 set	Mitsubishi 、FANUC SIEMENS、shengchang	
3	X、Y、Z servo motor	1 set	Mitsubishi 、FANUC SIEMENS、huada	
4	Gear spindle	1 set	NSK	
5	Direct spindle	1 set	NSK	
6	Spindle front bearings	1 set	NSK	optional: NTN
7	Spindle rear bearings	1 set	HPS	optional: THK/PMI
8	X、Y、Z axis linear rolling guide	1 set	HPS	optional: rolex/taiwan
9	Spindle unit	1 set	DMTG	
10	16 swing type ATC	1 set	Deta/shengjie	
11	X、Y axis protection	1 set	Heiniger (Sino-US joint venture)	optional: keyarrow
12	Z axis protection	1 set	Keyarrow	
13	Coolant pumps	1 set	walrus	
14	Automatic lubrication system	1 set	Yongjia liubian	
15	main electrical components	1 set	Import and domestic famous brands	
16	Main pneumatic components	1 set	SMC/AirTAC	

* In the premise of ensuring the quality of the machine, in order to ensure delivery time, after consultation can be adjusted with the level of purchased parts manufacturers.

7、TD-500A Accessories List

Ser. No. (序号)	Name (名称)	Specification or Mark (规格或标记)	Qty (数量)	Remarks (备注)		
1	Foundation bolts assembly (地脚螺钉组件)	1	TD500A-69101	4	For machine installation (安装机床时用)	
		2	M24X1.5; GB/T6173	4		
		3	TD500A-69702	4		
2	Bracket assembly for fixing headstock (固定主轴箱支架组件)	1	M10×25; GB/ T70	1	For fixing spindle box (运输时固定主轴箱)	
		2	10; GB/T 97.1	3		
		3	10; GB93	3		
		4	TD500A-69701	1		
		5	M10;GB/T 6170	2		
		6	M10X45;GB37	2		
		7	TD500A-69501	1		
3	Tools supplied with machine (随机工具)	Fork wrench(叉口扳手)	1	12×13; S91-1A	1	Packed in tool kit (装在工具箱内)
		Fork wrench(叉口扳手)	2	16×17; S91-1A	1	
		Fork wrench(叉口扳手)	3	36; S91-2A	1	
		Allen Key(内六角扳手)	4	6; GB5356	1	
		Allen Key(内六角扳手)	5	8; GB5356	1	
		Allen Key(内六角扳手)	6	10; GB5356	1	
		Allen Key(内六角扳手)	7	12; GB5356	1	
		Allen Key(内六角扳手)	8	14; GB5356	1	
		Toolkit(工具箱)	10	CH555		

When this product quantities, random accessories supporting in proportion (percentage negotiated)

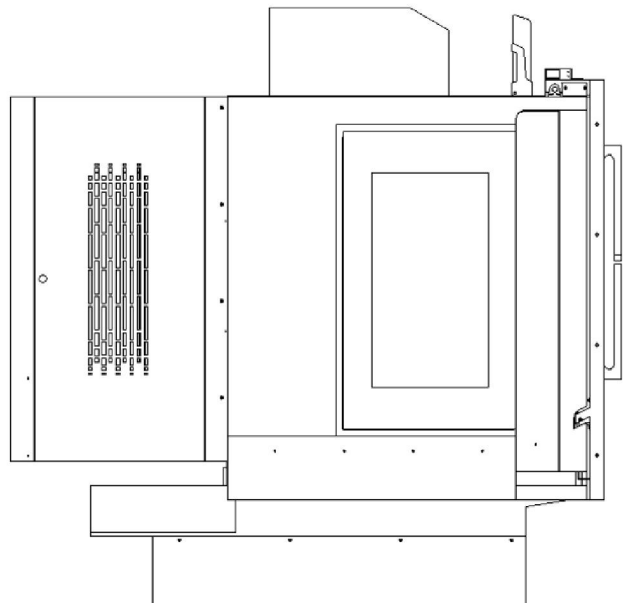
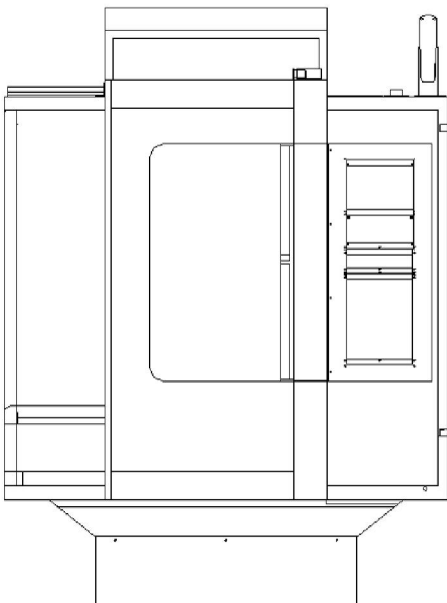
8、TD-500A Tool List

No.	Item	Specifications or marks	Quantity	Remarks
1	Operating instructions (mechanical)	TD500A-010	1	
2	Instruction manual (electric)	TD500A-016	1	
3	Certificate of qualification	TD500A-020	1	
4	Packing list	TD500A-035	1	
5	CNC system profile	Manufacturer logo	1	
6	Tool magazine instructions	Manufacturer logo	1	

9 TD-500A Working Conditions

- 1、 Three-phase AC power supply: $380V \pm 10\%$, -15% ; $50Hz \pm 1Hz$
- 2、 Environment temperature: $8 \sim 40C^{\circ}$
- 3、 Relative humidity: $\leq 80\%$
- 4、 Air pressure: $0.5 \sim 0.7$ Mpa

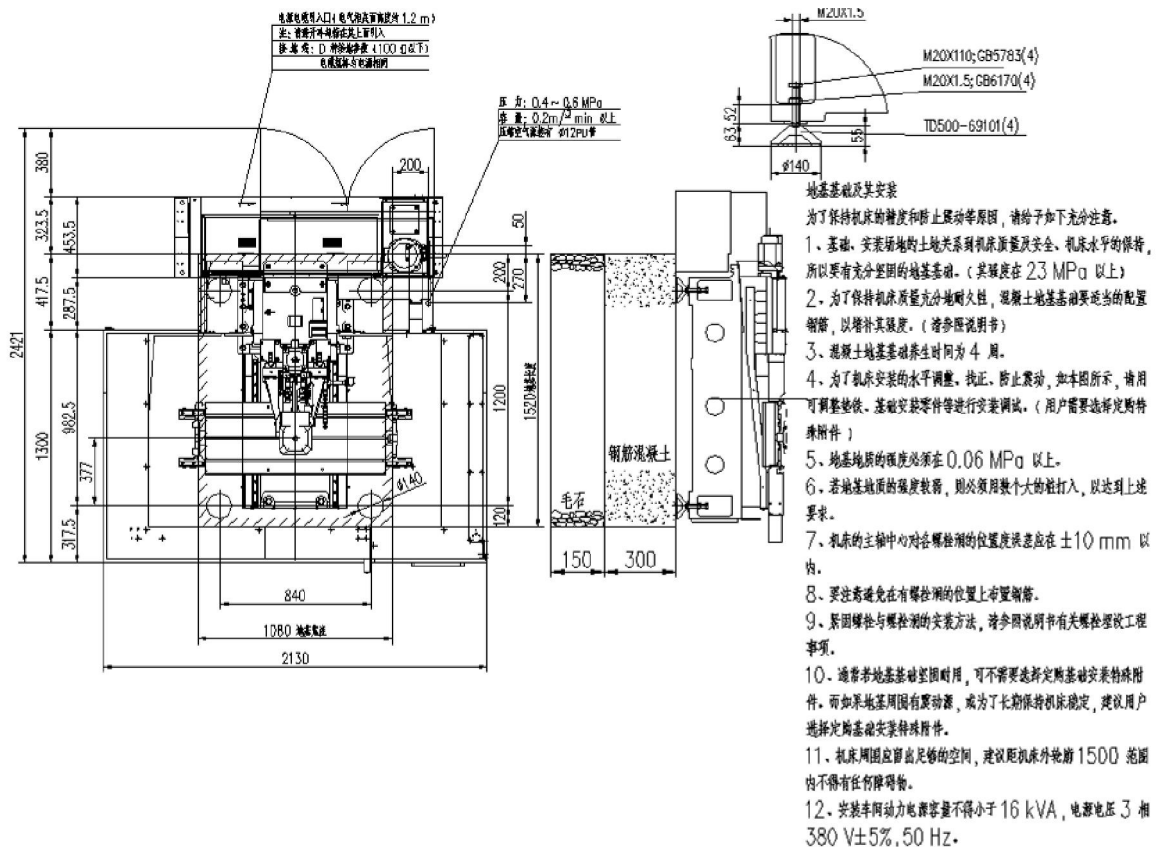
Part II Machine Appearance and Transport Dimensions



机床轮廓和包装箱尺寸

Size (L×W×H) mm	Domestic package (L×W×H) mm	Abroad package (L×W×H) mm
2146×1600×2210	2665×1750×2430	2665×1750×2430

Part III Installation Drawing



Part IV Spindle Motor Characteristic Curve

图 4-1----4-5 为各系统主轴电机的特性曲线。

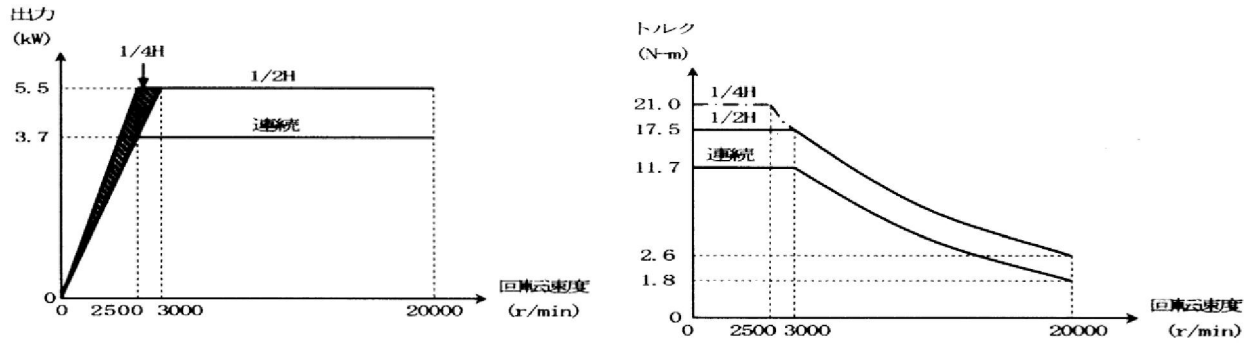


图 4-1 SJ-DL5.5/200-01 主轴电机的特性曲线

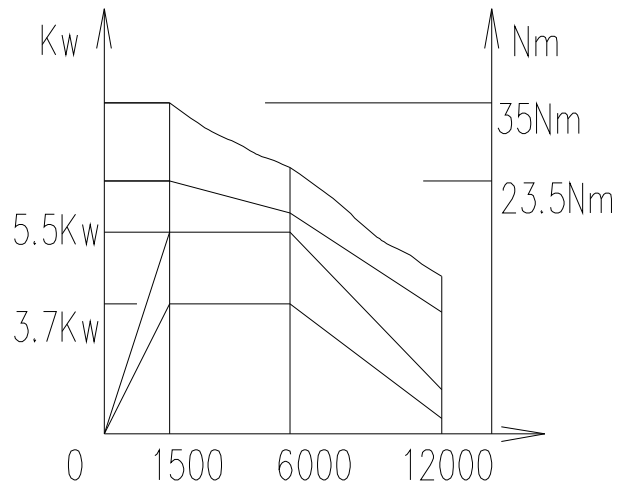


图 4-2 SJ-D5.5/120-01 主轴电机的特性曲线

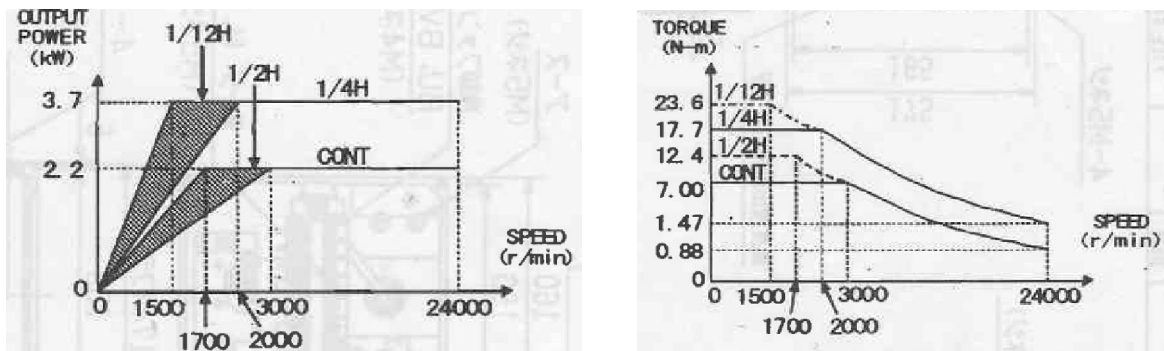


图 4-3 SJ-VL15-25FZT(F) 主轴电机的特性曲线

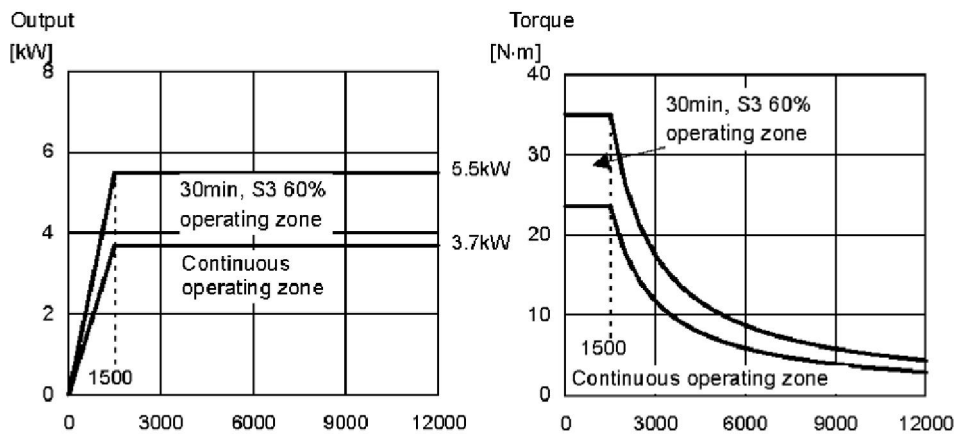


图 4-4 FANUC aiI3/12000 主轴电机特性曲线

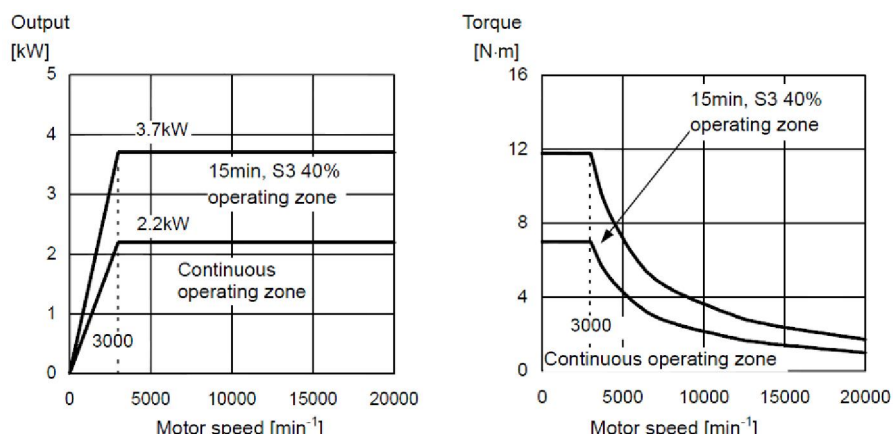


图 4-5 FANUC aiI2/20000 主轴电机特性曲线

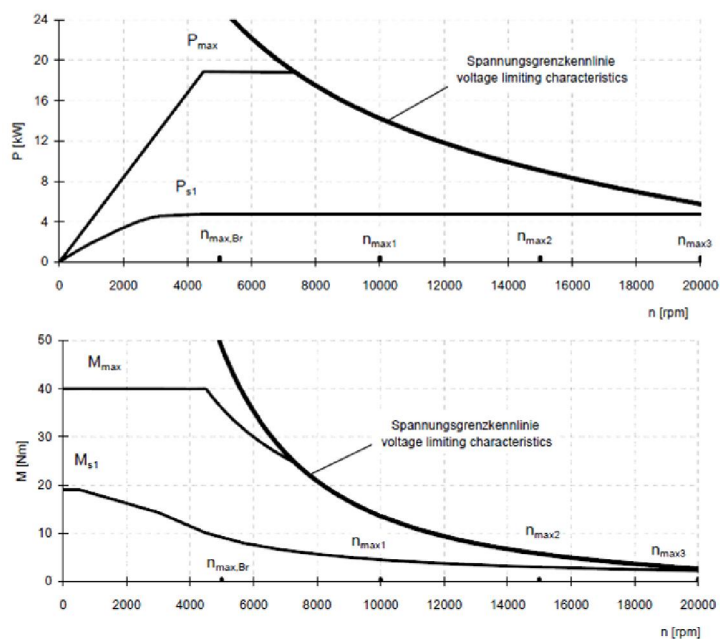


图 4-6 西门子 1PH8083-1SN02-0MA1 主轴电机特性曲线

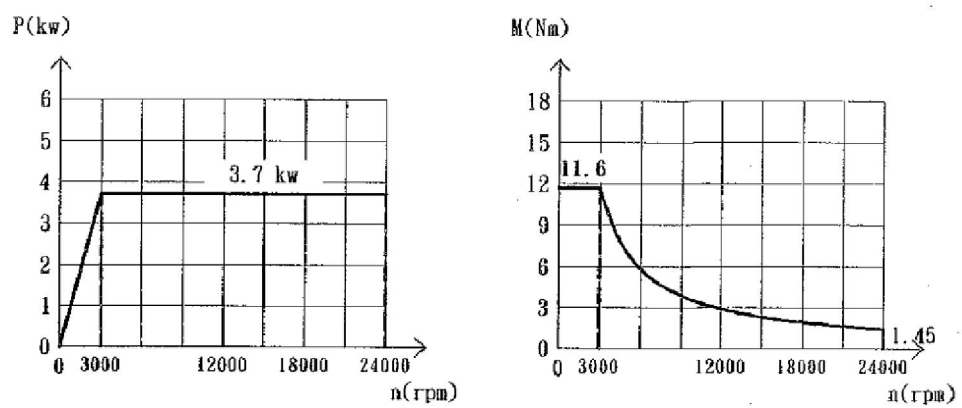


图 4-7 盛昌 SVM-75L-30-24 主轴电机特性曲线

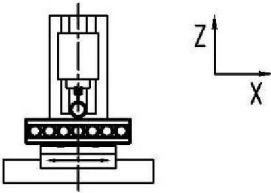
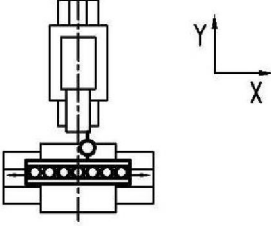
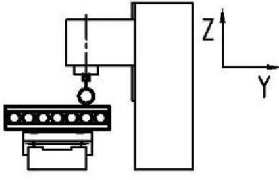
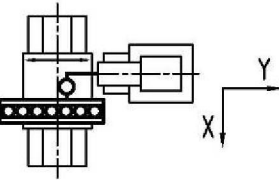
Part V System Function

CNC system FANUC0i- MD	
Type of control	Type of control
Measurement system	Measurement system
Input system	Input system
Data input	Data input
Input accuracy	Input accuracy
Interpolation and the interpolation scope	Interpolation and the interpolation scope
Feed input	Feed input
Magnification	Magnification
Feed range	Feed range
Servo hand wheel	Servo hand wheel
Reduce rapid traverse	Reduce rapid traverse
Spindle speed	Spindle speed
Spindle speed ratio	Spindle speed ratio
coordinated system	coordinated system
Cycle speed constant control	Cycle speed constant control
Tool programming	Tool programming
Tool profile	Tool profile
Cutter radius compensation	Cutter radius compensation
Processing time record	Processing time record
processing time	processing time
zero drift	zero drift
NC working memory	NC working memory
program management	program management
subprogram	subprogram
subroutine repeat	subroutine repeat
Process input/output	Process input/output
display	display
program copy	program copy
circulation	circulation
Block find	Block find
parameter	parameter
technical materials	technical materials
Basic outline principle	Basic outline principle
straight line	straight line
Arc	Arc

数控系统 Siemens 828D	
控制类型	路径控制 3 轴 1 个主轴

测量系统	公制
输入系统	公制或英制
数据输入	增值/绝对值
输入精度	0.001mm
插补及插补范围	线性+99999.999mm 圆弧+99999.999mm
进给输入	mm/ min
倍率	0-120%
进给范围	0.001 mm/ min.到 20000 mm/ min
伺服手轮	用于滑台的精调，手轮上可选择范围： 0.1mm,0.01 mm 和 0.001 mm
降低快移速度	通过输入参数
主轴转速	以 rev./min 输入
主轴转速倍率	从 50 到 120%
坐标系统	直角坐标，极坐标
周速恒定控制	以 m/min 输入
刀具编程	通过跟在地址 T 之后的 2 位的数值来指令刀具号
刀具/刀沿数量	80/160
切削半径补偿	通过 G40,G41 和 G42 编程
加工时间	剩余运行时间及零件计数
零点漂移	G54 到 G59, G507 到 G549 共 50 个
数控工作内存	1024KB
程序管理	NC 存储 400 个程序
子程序	11 级嵌套
子程序重复	重复循环 1-9999
程序输入/输出	通过网口或 U 盘
显示器	8.4"LCD 彩色显示器
程序复制	通过扩展程序编辑器（复制）
循环	钻削、铣削循环
块查找	在所选程序中查找程序和块的号码
参数	机床，设置和工作参数可在控制系统中编辑 通过 U 盘进行读取与输出
技术资料	Siemens 828D 操作手册
基本轮廓原理	
直线	X/Y/Z
圆弧	能用半径/端点或中心点来表示
钻循环	中心深孔钻
CNC 编程高级语言扩展	

Part VI Certificate of Qualification

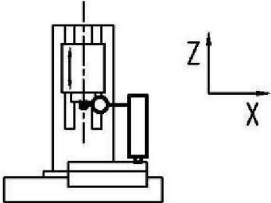
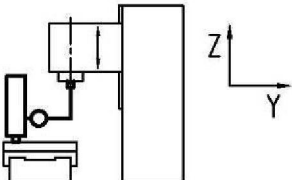
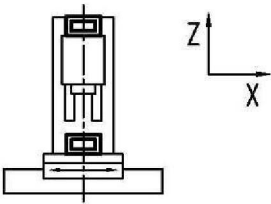
合格证明书		TD500A-020		
		共 16 页	第 2 页	
1 机床几何精度检验单 (GB/T18400.2-2010)				
序号	检验项目	简图	允差 mm	实测 mm
G1	X 轴轴线运动的直线度: a) 在 Z-X 垂直平面内	<p>a)</p> 	0.01	a)
	b) 在 X-Y 水平平面内	<p>b)</p>  <p>局部公差: 在任意 300 测量长度 上 0.007</p>		b)
G2	Y 轴轴线运动的直线度: a) 在 Y-Z 垂直平面内	<p>a)</p> 	0.01	a)
	b) 在 X-Y 水平平面内	<p>b)</p>  <p>局部公差: 在任意 300 测量长度 上 0.007</p>		b)

合格证明书

TD500A-020

共 16 页

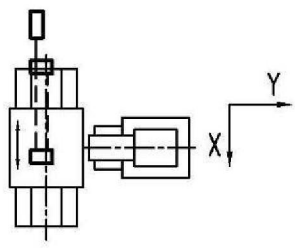
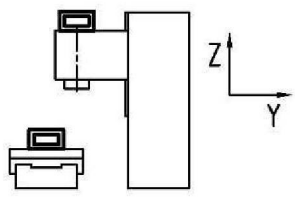
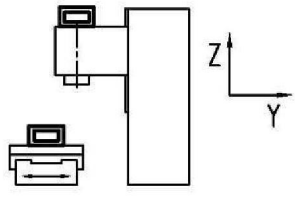
第 3 页

序号	检验项目	简图	允差 mm	实测 mm
G3	Z 轴轴线运动的直线度: a) 在平行于 X 轴轴线的 Z-X 垂直平面内	a) 	a) 和 b) 0.01 局部公差: 在任意 300 测量长度 上 0.007	a)
	b) 在平行于 Y 轴轴线的 Y-Z 垂直平面内	b) 		b)
G4	X 轴轴线运动的角度偏差: a) 在平行于移动方向的 Z-X 垂直平面内 (俯仰)	a) 	a), b) 和 c) 0.060/1000 (或 12")	a)

合格证明书

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共 16 页 第 4 页

序号	检验项目	简图	允差 mm	实测 mm
G4	b) 在 X-Y 水平面内(偏摆)	b) 		b)
	c) 在垂直于移动方向的 Y-Z 垂直平面内(倾斜)	c) 		c)
G5	Y 轴轴线运动的角度偏差: a) 在平行于移动方向的 Y-Z 垂直平面内(俯仰)		a), b) 和 c) 0.060/1000 (或 12")	a)

合格证明书

TD500A-020

共 16 页 第 5 页

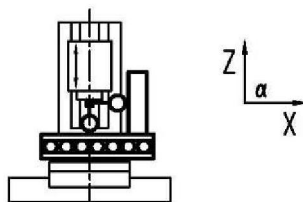
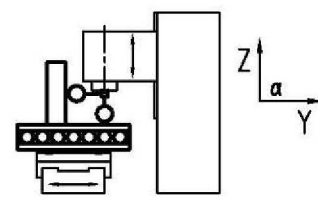
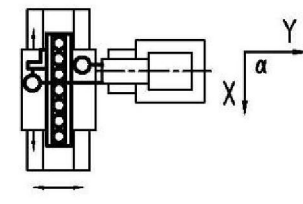
序号	检验项目	简图	允差 mm	实测 mm
G5	b) 在 X-Y 水平平面内(偏摆)			b)
	c) 在垂直于移动方向的 Z-X 垂直平面内(倾斜)			c)
G6	a) 在平行于 Y 轴轴线的 Y-Z 垂直平面内		a),b) 和 c) 0.060/1000 (或 12")	a)
	b) 在平行于 X 轴轴线的 Z-X 垂直平面内			b)
	c) 在平行于 X 轴轴线的 XY 垂直平面内			c)

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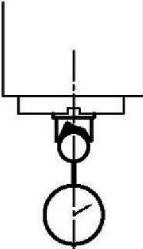
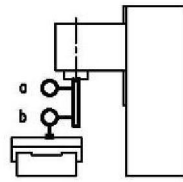
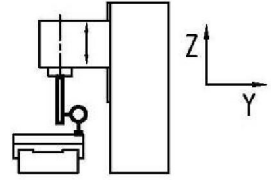
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序号	检验项目	简图	允差 mm	实测 mm
G7	Z 轴轴线运动和 X 轴轴线运动间的垂直度	 <p style="text-align: center;">记录 α 值是小于, 等于还是大于 90°</p>	0.02/500	
G8	Z 轴轴线运动和 Y 轴轴线运动间的垂直度	 <p style="text-align: center;">记录 α 值是小于, 等于还是大于 90°</p>	0.02/500	
G9	Y 轴轴线运动和 X 轴轴线运动间的垂直度	 <p style="text-align: center;">记录 α 值是小于, 等于还是大于 90°</p>	0.020/500	

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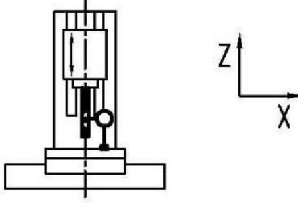
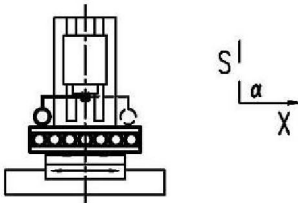
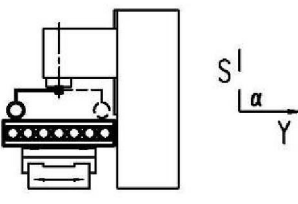
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序号	检验项目	简图	允差 mm	实测 mm
G10	主轴的周期性轴向窜动		0.005	
G11	主轴锥孔的径向跳动: a) 靠近主轴端部 b) 距主轴端部 300mm 处		a) 0.007	a)
			b) 0.015	b)
G12	主轴轴线和 Z 轴轴线运动间的平行度: a) 在平行于 Y 轴轴线的 Y-Z 垂直平面内	a) 	在 300 测量长度上为 0.015	a)

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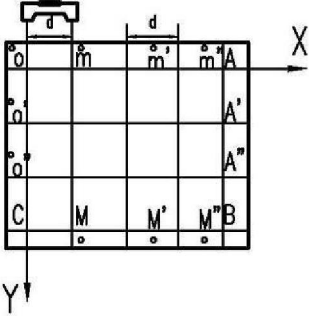
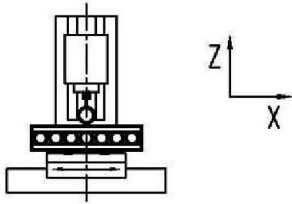
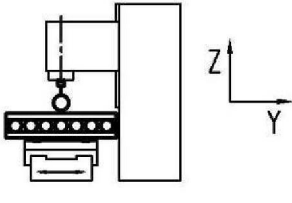
序号	检验项目	简图	允差 mm	实测 mm
G12	b) 在平行于 X 轴轴线的 Z-X 垂直平面内		在 300 测量长度上为 0.015	b)
G13	主轴轴线和 X 轴轴线运动间的垂直度	 <p style="text-align: center;">记录 α 值是小于, 等于还是大于 90°</p>	0.015/300	
G14	主轴轴线和 Y 轴轴线运动间的垂直度	 <p style="text-align: center;">记录 α 值是小于, 等于还是大于 90°</p>	0.015/300	

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序号	检验项目	简图	允差 mm	实测 mm
G15	工作台面的平面度	 <p style="text-align: center;">X 轴轴线和 Y 轴轴线置于其行程的中间位置</p>	0.02	
G16	工作台面和 X 轴轴线运动间的平行度		0.02	
G17	工作台面和 Y 轴轴线运动间的平行度		0.02	

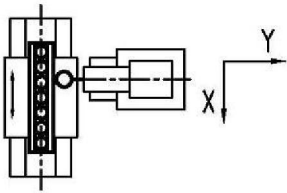
局部公差：
在任意 300 测量长度
上为 0.008

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序号	检验项目	简 图	允 差 mm	实 测 mm
G18	工作台纵向中央或基准 T 形槽和 X 轴轴线运动间的平行度		在 300 测量长度上为 0.01	

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2 位置精度检验单 (GB/T 18400.4-2010)

序号	检验项目	简 图	允 差 mm	实 测 mm
D1	双向定位精度 A		X向: 0.012	
			Y向: 0.012	
			Z向: 0.012	
D2	单向定位精度(正向) A ↑ 单向定位精度(负向) A ↓	同 D1	X向: 0.01	A ↑
				A ↓
			Y向: 0.01	A ↑
				A ↓
			Z向: 0.01	A ↑
				A ↓
D3	双向重复定位精度R	同 D1	X向: 0.010	
			Y向: 0.006	
			Z向: 0.006	
D4	单向重复定位精度(正向) R ↑ 单向重复定位精度(负向) R ↓	同 D1	X向: 0.006	R ↑
				R ↓
			Y向: 0.006	R ↑
				R ↓
			Z向: 0.006	R ↑
				R ↓

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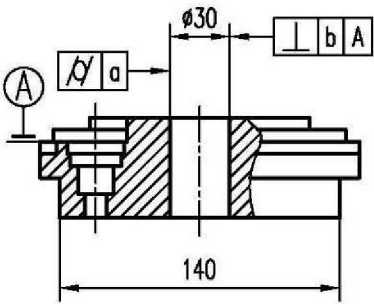
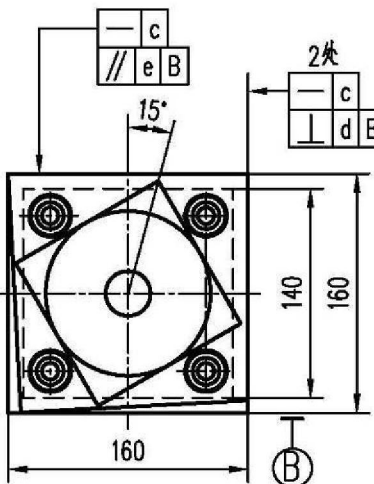
序号	检验项目	简 图	允 差 mm	实 测 mm
D5	轴线的反向差值 B	同 D1	X向: 0.01	
			Y向: 0.01	
			Z向: 0.01	
D6	平均反向差值 \bar{B}	同 D1	X向: 0.006	
			Y向: 0.006	
			Z向: 0.006	
D7	双向定位系统偏差 E	同 D1	X向: 0.015	
			Y向: 0.015	
			Z向: 0.015	
D8	单向定位系统偏差(正向) E↑ 单向定位系统偏差(负向) E↓	同 D1	X向: 0.01	E↑
				E↓
			Y向: 0.01	E↑
				E↓
			Z向: 0.01	E↑
				E↓
D9	轴线的平均双向位置偏差范围 M	同 D1	X向: 0.01	
			Y向: 0.01	
			Z向: 0.01	

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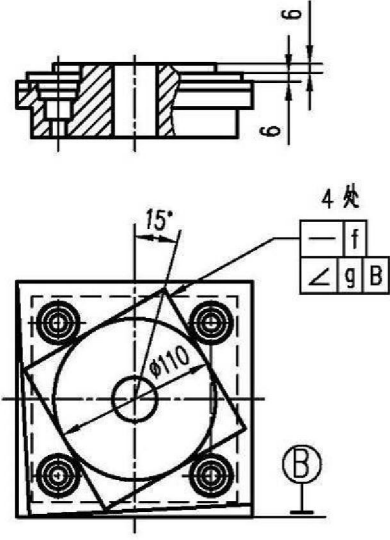
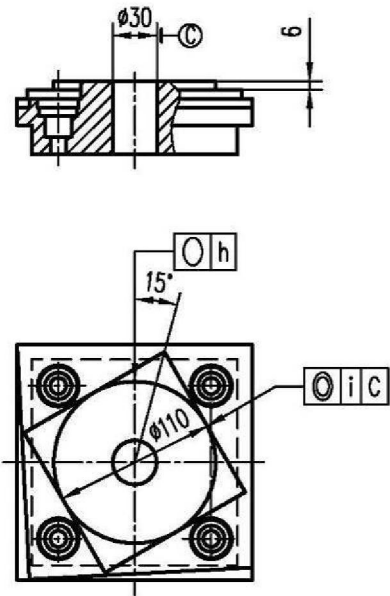
3 加工精度检验单 (GB/T 18100.7-2010)

序号	检 验	简 图	切 削 条 件	允 差 mm	实 测 mm
P1	中心孔： 立轴沿 X-Y 座 标方向进行定位 加工 $\phi 30$ 孔 a) 圆柱度 b) 孔中心轴线与基面 A 的垂直度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05\sim 0.10 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	a 0.01	
P2	正四方形： 端铣刀铣削 (X-Y) 平面的精度： 沿 X, Y 座标方向对 平面四周进行精铣 c) 侧面的直线度 d) 相邻面与基面 B 的 垂直度 e) 相对面对基面 B 的 平行度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05\sim 0.10 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	c 0.01	
				d 0.01	
				e 0.01	

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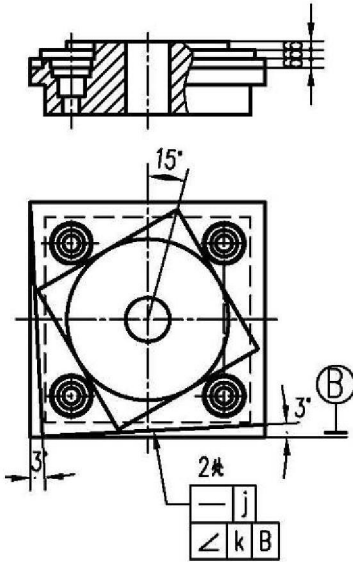
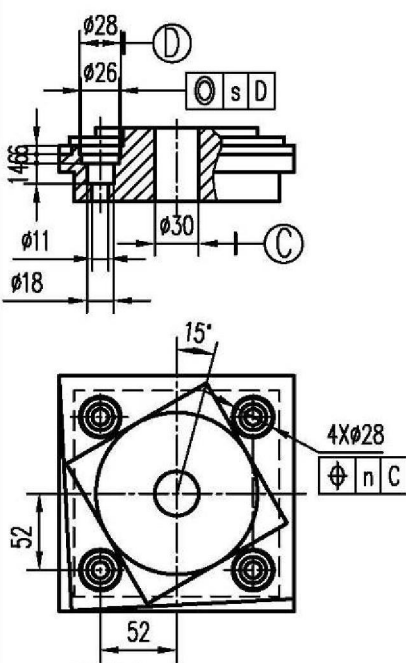
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序号	检 验	简 图	切 削 条 件	允 差 mm	实 测 mm
P3	菱形： 立铣刀进行直线插补铣削菱形四边 f) 侧面的直线度 g) 侧面对基面 B 的倾斜度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05 \sim 0.10 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	f 0.01	
P4	圆： 立铣刀进行圆弧插补铣削的精度 沿 X Y 座标方向的圆周面进行精铣 h) 圆度 i) 外圆和内圆孔 C 的同轴度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05 \sim 0.1 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	h 0.015	i $\phi 0.025$

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序号	检 验	简 图	切 削 条 件	允 差 mm	实 测 mm
P5	斜面： 立铣刀进行直线插补铣削斜面 j) 面的直线度 k) 侧面对基面 B 的 倾斜度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05 \sim 0.10 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	j 0.01	
P6	镗孔： 镗孔的孔距精度沿 XY 座标方向定位按镗孔路线依次对四孔进行精镗 n) 孔相对于内孔 C 的位置度 s) 内孔与外孔 D 的同心度	 <p style="text-align: center;">试件符合 GB/T18400.7-A160</p>	试件材料: HT200 切削速度: $V=50 \text{ m/min}$ 进给量: $0.05 \sim 0.10 \text{ mm/齿}$ 切深: $t < 0.2 \text{ mm}$	n ϕ 0.05	
				s ϕ 0.02	

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序号	检 验	简 图	切 削 条 件	允 差 mm	实 测 mm
P7	平面： 精加工表面的平面度	<p style="text-align: center;">试件符合 GB/T18400.7-B80</p>	试件材料：HT200 刀具： 可转位套式面铣刀 直径： $\phi 50$ 齿数：4 切削速度： $V=98 \text{ m/min}$ 进给量： 0.12 mm/齿 切深： 0.2 mm	0.015	