

Technical Sheet

CNC Single Column Vertical Lathe

Model: CK5120



(Pictures are shown for illustrative purpose only. The real machine may vary with pictures shown.)

1. Brief introduction

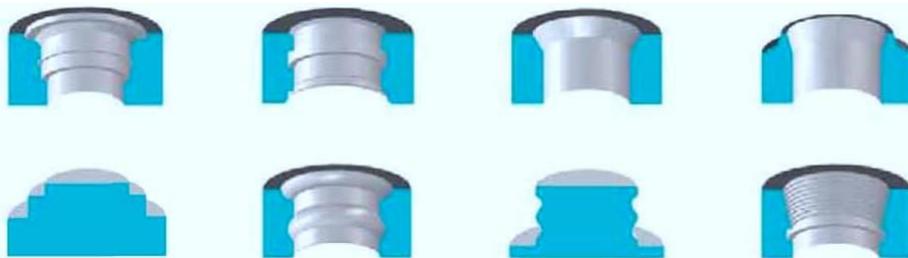
The Single Column Vertical Lathes model CK51 series are combination of modern advanced mechanics, electrics and hydraulics basing on extensive experience, special focus and professional skills in the design and manufacturing of large scale vertical lathes. It is designed and manufactured with latest technology know-how, optimized design, quality material, fitting and best process for manufacturing and assembly.

It features,

- ★ High rigid thermo-symmetrical structure for superb stability even at severe cutting conditions
- ★ Heavily ribbed base and table with hydrostatic axial bearing for big load capability
- ★ Modular design easily to be customized to suit customer's diverse machining needs, ie. turning, milling, drilling, threading and grinding

It is designed and manufactured to meet modern machining requirements with high speed cutting tools and carbide cutters on workpieces of cast iron, cast steel, alloy steel, fabricated steel and other materials.

- Cutting permits:
- | | |
|------------------------------------|---------------|
| 1. I.D. & O.D. cylindrical turning | 2. End-facing |
| 3. I.D. & O.D. cone turning | 4. Grooving |



Basing on its super rigid & stable structure, big machining capacities, efficient cutting yield, heavy table load capacity, it has a wide application in,

- Valve / pump / bearing industries
- Aerospace, automotive, wind power, oil industries

- Hydro / steam turbine generators
- Foundry, casting, metallurgy
- Mining, railway, earthmoving equipment, heavy electrics
- General engineering, outsourcing workshops, etc

2. Machine specifications

Specifications	Unit	Model CK5120
Max. cutting diameter	mm	2000
Table diameter	mm	1800
Max. workpiece height	mm	1400
Max. table load	ton	8
Speed range of table	rpm	3.2 – 100
No. of speed range of table	step	4
Feedrate of tool head	mm/min	1 – 500
No. of feeds	kinds	Infinite variable
Vertical travel of ram	mm	1000
Tool post type		Electrical 4 position tool turret
Power of main motor, AC	kW	37
Net weight of machine (appr.)	ton	18

Note: Manufacturer reserves the right to improve & modify without prior notice.

3. Main features

- ★ Suitable for **400V/50HZ/3Ph** local power supply
- ★ High grade cast iron structure for super stability, reliability & longer machine life
- ★ **NSK main bearing** guarantee high precision and steady
- ★ Table with manual **4-jaw chuck with chucking jaws**
- ★ 4 spindle speed steps, auto speed change and variable speeds in each gear
- ★ **Hardened & ground gears** in table speed change gearbox for smooth running
- ★ Forged shafts used in the table speed change gear box
- ★ Anti-wear industrial **Zinc-Aluminum alloy (ZnAl10-5) lining** on sliding guideways and wear-resistant **Zinc-Aluminum alloy (ZnAl10-5) lining** engraved on table guideways for longer machine life
- ★ **Telescopic steel guide ways covers** to avoid intrusion of chips, dust and oil
- ★ Powerful **Siemens SINUMERIK 828D** CNC control
- ★ **Mitsubishi frequency inverter** supply stable and high torque control
- ★ Centralized **pendent operation button panel**
- ★ **CNC controlled tool head** with electrical 4 position tool turret
- ★ Electrical 4 position tool turret in ram end, especially suitable for quick tool changing
- ★ Reliable **PLC control** integrated in the electrical system for easier control
- ★ **Siemens servo feeding motors & ballscrews** are used for feeding of tool head and ram (**X / Z axes**)
- ★ **Automatic centralized compulsory** lubrication system for tool heads and cross rail guideways
- ★ **Industrial air conditioner** for electrics, especially suitable for tropic climate
- ★ Work lamps for sufficient lighting
- ★ Reliable **hydraulic power pack unit**, easier for adjustment & maintenance
- ★ **Hydrostatic bearing** ensuring big table load capacity
- ★ **Automatic clamping of cross rail** onto the column for heavy duty cutting
- ★ **Hydraulic balancing mechanism on ram** for high precision rigid heavy cutting
- ★ Affluent safety & protection setting-ups & **interlocks** are integrated in the machine, etc.

4. Castings

Main bodies of the machine are made of high rigid resin sand castings with thermal / vibratory stress relief (VSR) aging treatment. Steel parts are thermal refined.

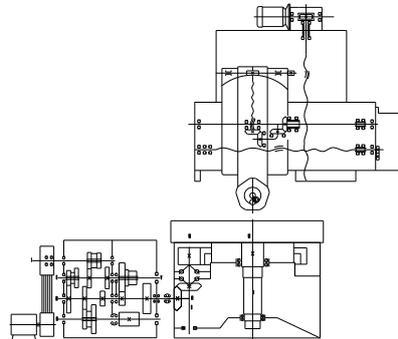
- Resin sand casting,
- High grade, high intensity and low stress
- Stress relieved castings to absorb the stresses and dampen the vibration during cutting



5. Machine structure

★ Thermo-symmetrical rigid structure

The machine adopts a stable thermo-symmetrical rigid structure and consists mainly of base, table, column, cross rail, tool head, hydraulic system and electric system. Column and cross rail are of box-shaped castings with numerous reinforced ribs. The column is of mono-block (one-piece) solid structure and bolted to the base at the bottom so to form a superb rigid and stable structure that is qualified for stable and heavy cutting even at severe cutting conditions.



★ Layout of components

One AC main motor and a speed change gearbox are fitted at the back of machine to drive the table. Cross rail moves up and down along front guideways of the column. The tool head is seated on the guideways of cross rail and can move horizontally and vertically. The vertical tool head is composed of carriage, swivelling base & ram. Ram is induction hardened and precision ground. The jib strip is made of wear-resistant industrial alloy material and hand scraped for precision matching. Compulsory lubrication systems are used in main drive system and on sliding guideways.

6. Base with spindle and bearing

The base is made of heavily reinforced ribbed grey cast iron and stress-relieved after rough machining. Heavy load short-shaft type spindle is placed in the center. High precision NSK preloaded double row cylindrical roller thrust bearing is equipped to support the spindle radically. Inner conic ring of the bearings can eliminate the radial clearance effectively for high precision positioning of spindle and stable rotating at high speed. Big size hydrostatic bearings are adopted axially on the base for improved loading capacity. Hydrostatic guideways are Zinc-Aluminum alloy lined and matched. Hydraulic oil flows in through regulating distribution mechanism.

Hydraulic oil is pumped into slots in the guideways on the base for bearing of the table axially. An oil pressure relay is equipped. Once oil pressure is less than the rated value, alarm will be given and rotation of the working table will not be allowed.

Hydrostatic bearing features:

- a). low friction for smooth rotation and long life of table,
- b). heavy load capacity on table,
- c). oil film between machine base and table absorbs cutting vibration & loads,
- d). safety system regulating the hydrostatic pressure for optimum safety.



7. Table

The table is made of high grade cast iron with numerous reinforced ribs for superb rigidity. Four heavy duty jaws are fitted on the table. A ring gear is fitted under the table. Surfaces under the table are engraved with wear-resistant Zinc-Aluminum alloy lining.

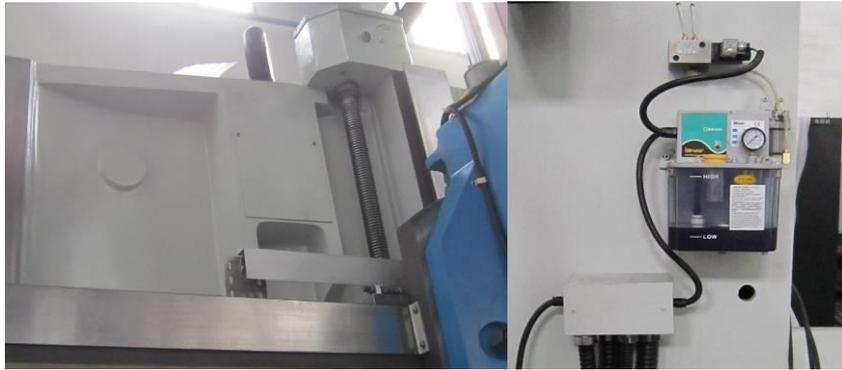


8. Cross rail

Cross rail moves up and down along guideways of the column. Elevation of the cross rail is through a mechanism that consists of an asynchronous motor, worm gear box, trapezoidal leadscrews, etc.

- Cross rail will be clamped automatically on to the column after reaching the required position and will be relieved for movement. Clamping pads are equipped to assure stable & reliable clamping of the cross rail for preparation of heavy cutting.
- Automatic compulsory lubrications units are equipped for lubrication of the guideways.
- Contacting surfaces at the back of the cross rail are lined with wear-resistant industrial alloy material for smoother travels and longer machine life.

- Telescopic stainless steel guide ways covers to avoid intrusion of chips, dusts, oil, etc.



10. Main transmission system

High torque AC frequency main motor and one 16-step gearbox are fitted at the back of machine to drive the table (optional High torque AC main motor with a VDF unit and one 4-step gearbox are fitted at the back of machine. Within each of the 4 speed steps, variable speeds can be achievable). Gear change is done by pressing buttons on the control panel to activate hydraulic cylinder to shift the gears.

- AC main motor adopted for more reliability and less maintenance
- Hardened & ground gears in spindle speed change gearbox
- Easy gear change by pressing buttons on operation panel station



11. Axial feeding system

X axis: horizontal travel of too head

Z axis: vertical travel of ram

- Siemens servo motors are adopted to drive the ballscrews horizontally and vertically.
- Variable feed rates can be achieved both horizontally and vertically.



12. Hydraulic system

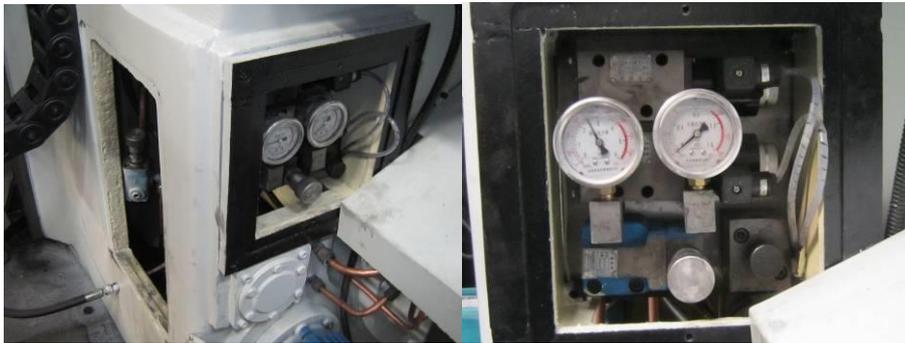
Hydraulic system of the machine is adopted for table hydrostatic system, table speed change, ram balancing system, cross rail clamping & unclamping and lubrication system. The hydraulic system is a combination of high quality hydraulic components, optimized hydraulic circuit with an integrated manifold module, advanced design, reliable functioning and easy maintenance. High quality & reliable hydraulic valves are used for

reliable performance.

The hydraulic power pack is composed of pumps, motors, solenoid valves, directional valves, pressure relay, pressure gauges, etc.

Oil pumping systems are integrated in the machine for reliable functioning and easier maintenance.

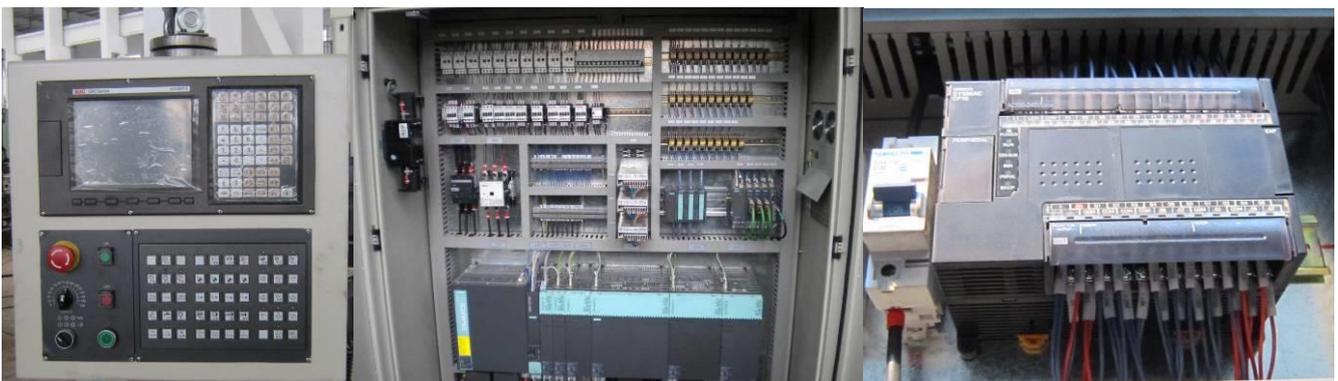
- Provide hydraulic power for hydrostatic table.
- Provide hydraulic power for lubrication of spindle, gearbox.
- Provide hydraulic power for table speed change cylinder.
- Provide hydraulic power for ram balancing.
- Provide hydraulic power for clamping cylinder of cross rail.



13. Electrical system

A reliable & optimized electrical system is adopted on the machine. All the electrical components, except the travel limit switches, high / low range feed switches, braking switch of the tool head, locate in the electric cabinet. All other operations, like movement, lubrication, lightening, CNC system, etc locate on the operation panel for easier operation.

- Big electric cabinet for easier operation and maintenance.
- Heat exchanger for electric cabinet, especially suitable for tropic climate,
- Neat wiring and enclosed cabinet to keep away of intrusion of dusts, humidity, etc.



14. Interlock & protection

An interlock is set in the PLC software for interlock of the table and feed of the tool head. Oil pump starts before rotation of the table. Table stops firstly and then the oil pump. When the table rotates continuously, feed of the tool head can only be allowed. When the spindle breaks down, stop the feed firstly and then stop the spindle after time lapsing.

An interlock is set in the PLC software for interlock of the table and the cross rail. When the table rotates,

movement of the cross rail is not allowed. There are limit switches that give signals for unclamp / release of the cross rail. No feed is allowed when the cross rail is unclamped / released. No moving up / down is allowed when the cross rail is clamped / braked. An alarm indicator is fitted on the control panel.

An interlock is set in the PLC software for interlock of the speed change and movement of the table. During the speed change of the table, other movement of the table is not allowed.

15. Manufacturing standards

Accuracy: as per China standards JB4116-85 (basically equivalent to ISO 3655-1986)

16. Working conditions

- a). Power supply: 400V \pm 10%, 50Hz \pm 1Hz, 3Ph
- b). Lighting: 24V, 50W
- c). Ambient temperature: 5°C - 40°C
- d). Relative humidity: \leq 85% (at 20°C)
- e). Machine noise: \leq 85dB @ idle running
- f). Environment: clean from harmful gas, liquids, dusts, etc

17. Main components

No.	Item	Mfgs	Remarks
1	AC main motor	Dandong Huanghai Motor Co., Ltd., Weihai Taifuxima Motor Co., Ltd., Shanghai Electric Group or other China maker www.shanghai-electric.com	
2	Spindle bearing	NSK LTD www.nsk.com	Japan brand
3	CNC system	Siemens AG www.siemens.com	German brand
4	Servo drive system	Siemens AG www.siemens.com	German brand
5	Servo motor	Siemens AG www.siemens.com	Japan brand
6	VFD unit (opt.)	Mitsubishi Electric www.mitsubishielectric.com	Japan brand
7	Electrics	Siemens/ABB/Schneider	Mainly switchgear
8	Electrical 4 position tool turret	Yantai Universal Machine Tool Accessory http://en.yt-ma.com	
9	Main hydraulic parts	Compass	Taiwan

18. Standard accessories

No.	Item	Qty.	Remarks
1	Chuck jaws	4 pcs	
2	Tool holders	2 pcs	
3	Foundation wedges & bolts	1 set	In accessory box
4	Special spanners	1 set	In accessory box
5	Operation manual	1 copy	English version

19. Easy worn consumable parts & components (available at chargeable basis)

No.	Item	Remarks
1	Oil sealing ring	

Mitglied im



WERKZEUGMASCHINEN

2	Oil filter	
3	Pressure gauge	

(Note: It may vary with m/c with different configuration.)