

The background of the advertisement is a photograph of a 5-axis CNC machine. The machine's structure is primarily white and grey, with a large, circular, multi-segmented rotating table in the center. The segments of the table are arranged radially around a central hub. The machine is set against a dark, industrial background. The Pinnacle logo is in the top left, and the text 'Since 1976' is below it. The main headline 'High-Tech Expertise in 5-axis machining' is on the right, with '5-axis' in a larger font. Below the headline is the tagline 'Strategies for success in cutting edge technology'. In the bottom right corner, there is a Bureau Veritas certification logo and a CE mark.

*Pinnacle*  
Since 1976

High-Tech Expertise in  
**5-axis** machining  
Strategies for success in cutting  
edge technology

ISO 9001  
BUREAU VERITAS  
Certification



CE



*Pinnacle*

"exceeds your expectation"

## WIDE PRODUCT RANGE

Pinnacle Machine Tool Co., Ltd. was founded in 1976. With excellent experience in **Technology, Quality & Service**. We are specialized in manufacturing all kinds of machining centers such as 5-axis, double column, vertical, and horizontal. Furthermore, we have a wide range of CNC lathes as well. The complete product lines with outstanding quality satisfy the needs of our valuable customers worldwide.

## STRONG TECHNICAL SUPPORT & AFTER SERVICE

R&D is teamed up by experienced engineers with decades of expertise in machine tool industry. By means of applying up-to-date technologies such as CAD/CAM/CAE software and Finite Element Analysis, our machines are robustly constructed, assuring optimum rigidity and stability. Our reliable partnerships with dealers keep us connected closely with the latest technologies and market trends, hence ensuring Pinnacle product developments are upgraded constantly.

Well-trained service engineers are familiar with each step of assembly to ensure our quality service works and keep all machines running in the best status. Training courses to service engineers are held periodically to keep the team refreshed with the latest technology and skills.

Pinnacle's reputation is built on quality, it relies on an excellent quality control system and systematic management. The in-coming parts are inspected under the highest standard by using precision equipment during production, assembly and final test run processes.

The sales and service departments provide customers pre-sale and after-sale services. Prompt reaction is just our basic attitude to all customers only, accurate and effective technical solutions are provided within the shortest time.



The **A/C-axis** on models **AX170** are directly driven by motor, featuring no backlash and high speed. These features make the machine excellent for 5-axis simultaneous machining.





# High Rigidity • Stability • Precision

Suitable for precision micro workpieces, multi-curved molds and polyhedron processing

The X/Y/Z axis slideway is equipped 25 mm roller linear way.

The X/Y/Z axis is C3 grade Ø28mm ball screw.

## AX170

- Rotary table diameter Ø170 mm.
- Table rotation and tilting are directly driven by motor.
- A/C-axis rotating speeds 60/200 rpm.
- A/C-axis positioning accuracy (sec.): 5"/5".
- A/C-axis repeatability accuracy (sec.): 4"/4".
- X,Y,Z-axis travel 360 x 360 x 440 mm
- A-axis tilting degree 240° (-120°/+120°)
- C-axis swiveling degree 360°.
- X,Y,Z-axis rapid traverse rates 36/36/36 m/min.
- Spindle motor: 5.5/9.5 kw.
- Spindle taper: ISO 40.
- Linear ways on X,Y,Z-axis.



- 360 x 360 x 440 mm Travel
- A Axis Tilt 240°(±120°) .
- C Axis Rotary 360°.
- Rapid Feedrate 36/36/36 m/min.
- 5.5/9.5 kw Spindle Motor.
- ISO40 Spindle Taper.
- X, Y & Z Axis Linear Roller Guide way.

# High Speed 5-axis Machining Center

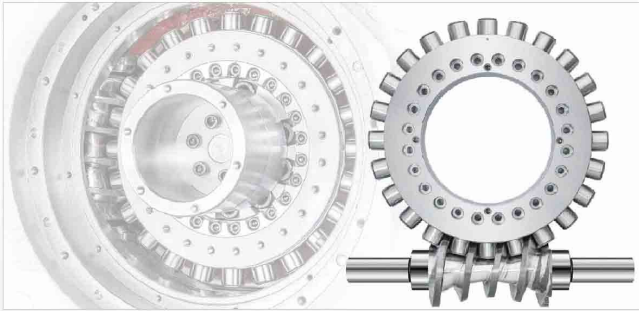
**A/C-axis** roller cam design, fast processing speed,  
suitable for mass production processing parts.

## AX260

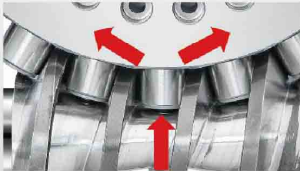
- Rotary table diameter  $\varnothing 260$
- Table rotation and tilting are driven by roller cam
- A axis speed 44.4 rpm
- C axis speed 75 rpm
- Positioning accuracy A/C axis(Sec.): 15"/10"
- Repeatability accuracy A/C axis(Sec.): 10"/8"
- Minimum positioning index : 0.001



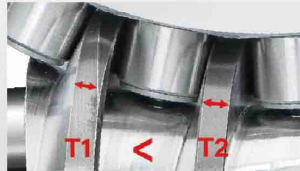
## Zero backlash roller gear cam drive



### Dual lead cam shaft mechanism



Preload adjustment can completely eliminate the engagement of roller and cam shaft to reach zero backlash and to ensure at least 4 rollers contacting cam shaft during rotation for high rigidity performance.



Dual lead cam shaft ( $T1 < T2$ ) ensures the meshing performance between the roller and the cam shaft, which significantly reduces vibration and improves surface processing accuracy.

### Reliable clamping force



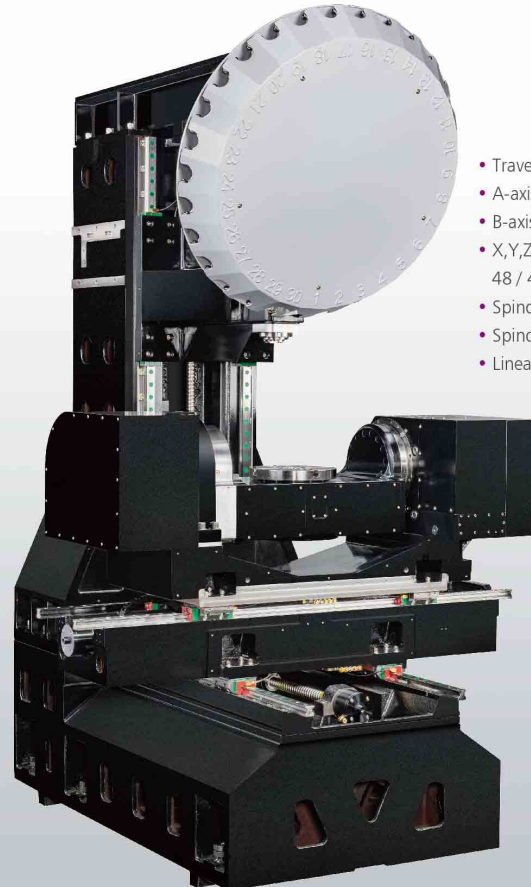
**Hydraulic Model:**  
Special design of drum brake system



**Pneumatic Model :**  
Exclusive patented dual pistons design



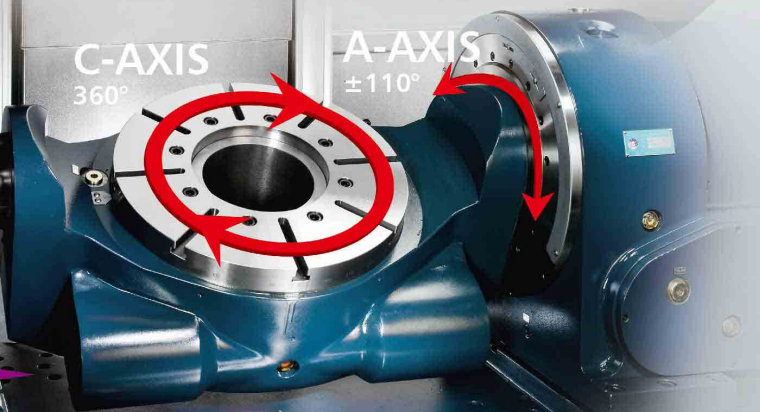
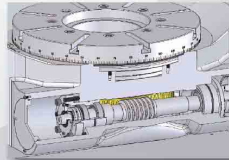
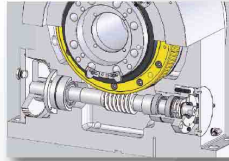
YRT bearing integrated in consolidated spindle with least separate elements & premium rigidity



- Travel 510 x 455 x 410 mm
- A-axis tilting degree 150° (-30°~+120°)
- B-axis swiveling degree 360°
- X,Y,Z-axis rapid traverse rates 48 / 48 / 48 m/min
- Spindle motor 5.5 / 7.5kw
- Spindle taper BBT30
- Linear ways on X,Y,Z axis

# High-Tech Expertise in 5-axis Rotary Table

- Rotary Table diameter Ø320/Ø450mm
- Table rotation and tilting are driven by servo motor
- Positioning accuracy, A/C-axis: 15" / 10"
- Repeatability accuracy, A/C-axis: 10" / 8"



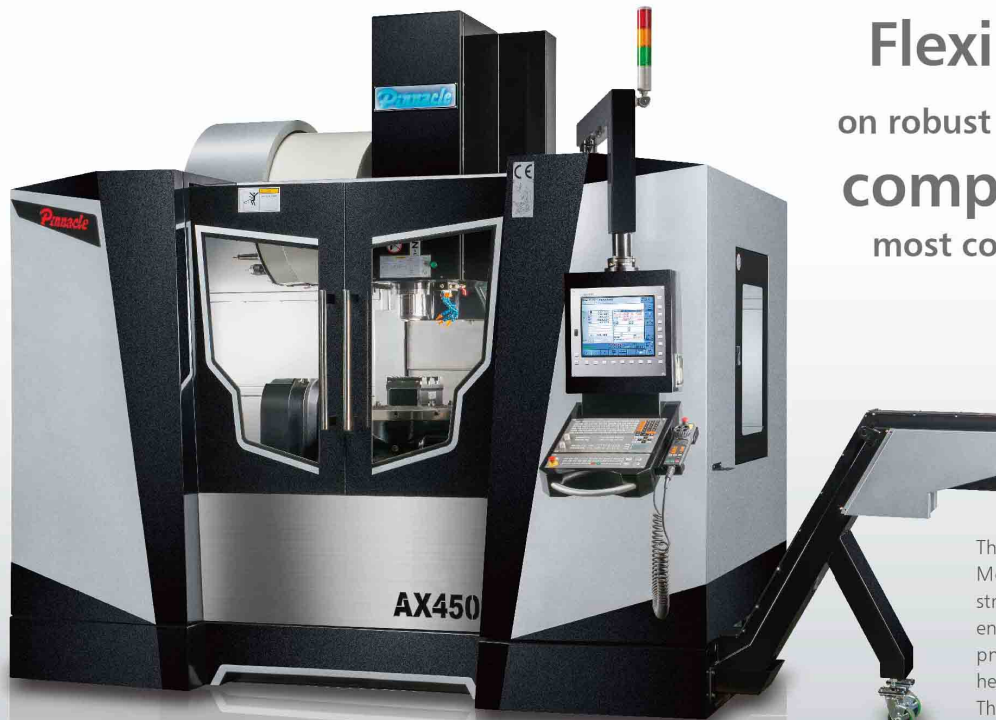
Each Pinnacle machine is subject to dynamic and static accuracy tests. Pinnacle machine accuracy meets ISO 10791 VDI 3441, ISO 230, JIS B6388 and ASMEB5 standards.



## AX320

- 660 x 610 x 610 mm Travel
- A Axis Tilt 150° (-120°~+30°)
- C Axis Rotary 360°
- Rapid Feedrate 30/30/24 m/min
- 9/12 Kw Spindle Motor
- ISO40 Spindle Taper
- X, Y & Z Axis Linear Roller Guideway





**Flexible application**  
on robust structure **Simple** and  
**compact** design to solve your  
most complicated machining jobs.

## High-Tech Expertise in 5-axis Machining

### 5-AXIS MACHINING CENTER

The main components are made from high quality Meehanite cast iron, which are annealed and stress-relieved before machining. The spindle with entire headstock assembly is counter-balanced by pneumatic system to minimize the column and headstock vibration during acceleration / deceleration. The 5-axis synchronized machining allows complicated work pieces to be finished in just one setup, and it increases machining efficiency and accuracy, also reduces machine idle time.

Pinnacle AX 320 / AX 450 are your best choice for producing aerospace components, medical equipment and any parts with multiple curved faces.

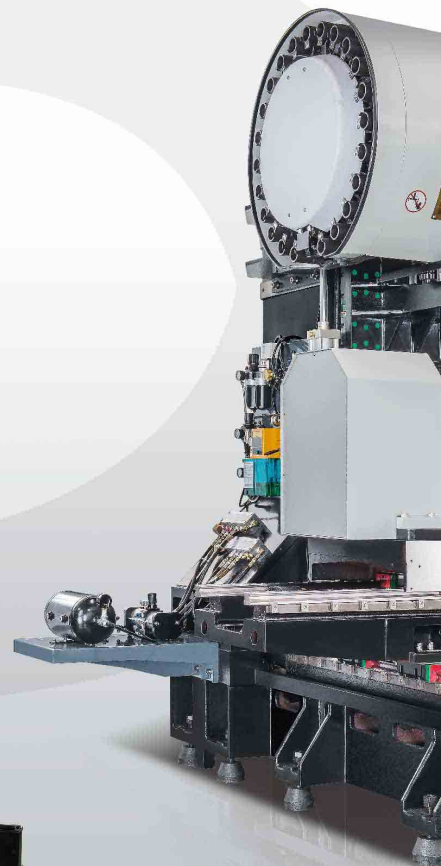
### AX450


- 760 x 610 x 560 mm Travel
- A Axis Tilt 220° ( $\pm 110^\circ$ )
- C Axis Rotary 360°
- Rapid Feedrate 30/30/24 m/min
- 9/12 Kw Spindle Motor
- ISO40 Spindle Taper
- X, Y & Z Axis Linear Roller Guideway

The **A/C-axis** on models **AX500** are directly driven by motor, featuring no backlash and high speed. These features make the machine excellent for 5-axis simultaneous machining.

## AX500

- 760 x 610 x 560 mm Travel.
- A Axis Tilt  $220^{\circ}(\pm 110^{\circ})$ .
- C Axis Rotary  $360^{\circ}$ .
- Rapid Feedrate 30/30/24 m/min.
- 11/15 Kw Spindle Motor.
- ISO40 Spindle Taper.
- X, Y & Z Axis Linear Roller Guide way.




$$3 + 2 = \infty$$

## Infinite Solutions

### Rigid • Stable • Accurate

3 linear axes X/Y/Z plus rotary and tilting axes A/C offers almost infinite solutions to your 5-axis or multiple faces machining jobs. The two-in-one rotary/tilting table features easy maintenance and low service cost. AX320 A-axis swivels 150° and AX450 & AX500 swivels 220° to optimize machining space and allows complex workpieces to be finished in just one setup and reducing cycle time.

#### AX500

- 760 x 610 x 560 mm Travel
- Table Size: Ø500 mm.
- A Axis Tilt 220°(±110°)---DD motor.
- C Axis Rotary 360°----DD motor.
- Rapid Feedrate 30/30/24 m/min.
- 9/12 Kw Spindle Motor.
- ISO40 Spindle Taper.
- X, Y & Z Axis Linear Roller Guide way.
- Rotary Table diameter Ø500.
- Table rotation and tilting are DD motor.
- Positioning accuracy, A/C-axis: 8"/8".
- Repeatability accuracy, A/C-axis: 4"/4".

AX500



## It is all about Temperature control

The machine's actual cutting quality and accuracy relies on the temperature control techniques. No machine can be called precision machinery without mastering this critical know-how. Pinnacle 5-axes machines employ chiller to keep the headstock in a constant and stable temperature level, and depend on customer's work shop condition, coolant through ball screws are available to minimize the temperature variation.

# Temperature = Accuracy



# Outstanding craftsmanship



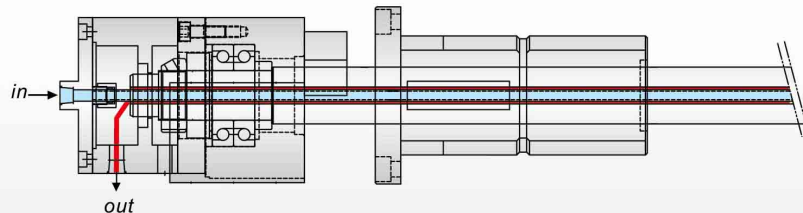
## Pneumatic Balance System

The Z-axis is pneumatic counter-balanced via high response pneumatic cylinders. Plus an air reservoir tank to boost the balancing performance, ensuring fast and stable Z-axis movement, giving high surface finish.

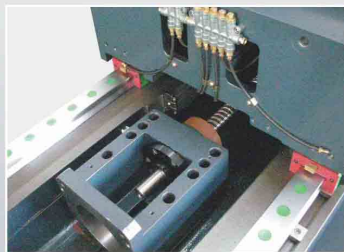
## Cooling System to Spindle

The spindle oil cooler permits the spindle to keep a constant temperature running and ensures long service life. It also provides high efficiency machining and high accuracy.

## Hollow Ball Screw with Cooling System

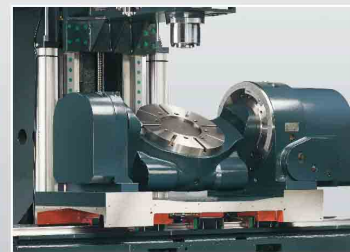


Oil cooling through ball screws on X, Y, Z axis minimizes thermal deformation and backlash, while ensuring smooth motion during rapid traverse.



## Linear Roller Guideway

X/Y/Z axes adopt roller guideways for optimum rigidity and speed. 6 rolling shoes on X/Z axes minimize damping effect.



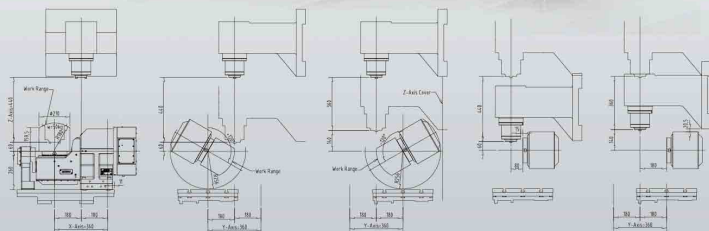
## Rigid Machine Base and Saddle

Drive motors direct coupled with pretensioned and oversized ballscrews to ensure cutting quality.

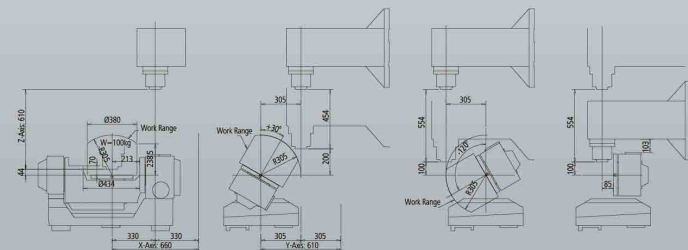
# WORKING CAPACITY



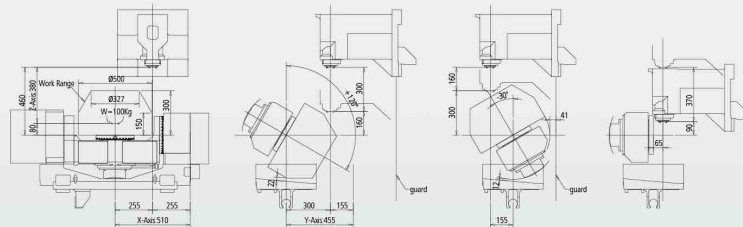
**AX170**



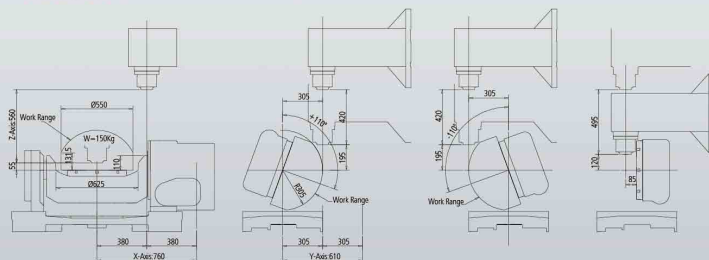
**AX320**



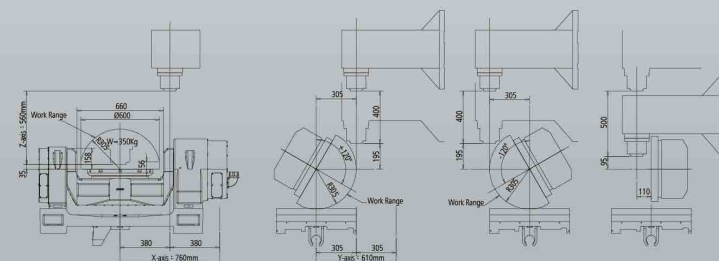
**AX260**



**AX450**



**AX500**



discovery II

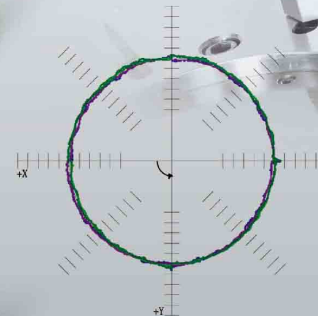
**Quality** is not a  
job, it is our attitude.



ISO certification

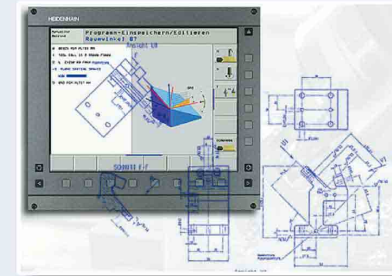


CE certification



### All Aspect Quality System

Quality comes not from inspection but from every Pinnacle staffs' mentality. The state-of-the-art inspection equipments only help us to prove our attitude and accuracy results.

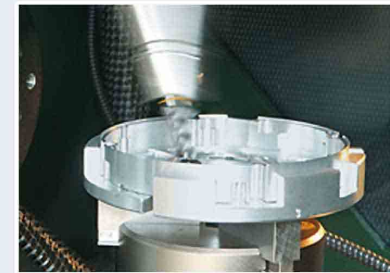


### PLANE Function

The PLANE feature makes it easy to define a tilted working plane.

## CNC CONTROLLER SYSTEM

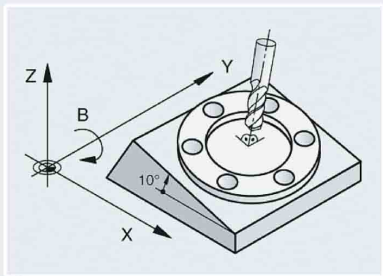
AX series is high speed, high accuracy with HEIDENHAIN TNC640 5-axis simultaneously controlled machining center. Equips 10000(12000/15000) rpm direct drive spindle, or optional 18000/20000 rpm built-in spindle.



### DCM (Dynamic Collision Monitoring)

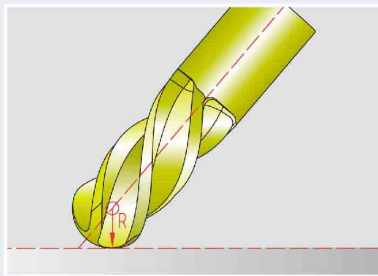
DCM enables you to check for collisions in the test run mode before actually machining a part. To avoiding machine down times. Simulation for a safety process.





### Tilting the Working Plane

With Cycle 19 with swivel heads or tilting tables, you program the operation as usual in the working plane, for example in *XY*. The machine runs the program in a plane that has been tilted by one or more rotary axes with respect to the main plane.



### TCPM function (Tool Center Point Management)

In five-axis operations, TCPM function to move the tool reliably on the contour and ensure that the work surface is not damaged. Maintain the position of the tool tip when positioning with tilted axes. With the aid of the TCPM function, the TNC640 automatically corrects the tool path for the machine geometry and the tool length as well as compensates the tool radius in three dimensions.



### Chip Flushing System

Chip flushing system is equipped to remove cutting chips inside of enclosure, which prevents chip accumulation and any possible damage to the linear guideways and ball screws.



### Coolant Through Spindle (Option)

20 Bar high pressure pump and sub tank assure CTS system offers the highest efficiency of chip disposal.



### Chip Conveyor (Option)

Hinge type or scraper type chip conveyor in front side of machine (able head to left or right) removes chips from machine.



### Kinematics Opt. (Option)

Kinematics Opt is an important component to help you meet these high requirements: With a HEIDENHAIN touch probe inserted, a 3-D touch probe cycle measures your machine's rotary axes fully automatically. The results of measurement are the same, regardless of whether the axis is a rotary table, a tilting table or a swivel head.

## ■ FLOOR SPACE:

TABLE SIZE: AX170

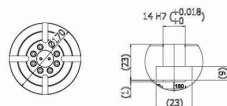


TABLE SIZE: AX260

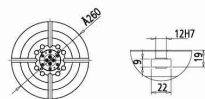


TABLE SIZE: AX320

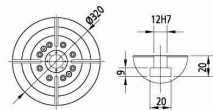


TABLE SIZE: AX450

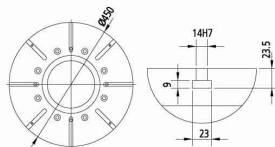
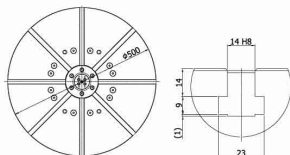
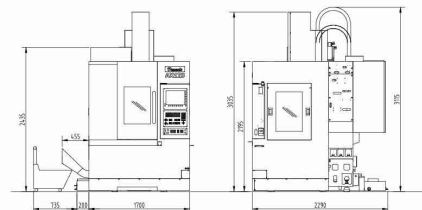
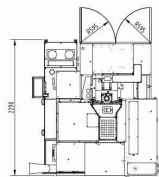


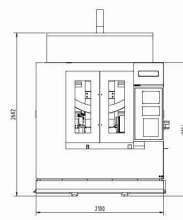
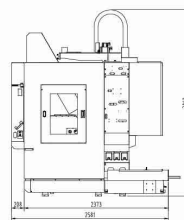
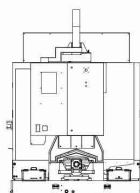
TABLE SIZE: AX500



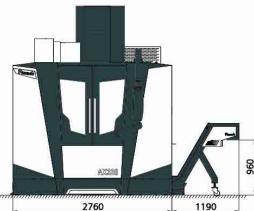
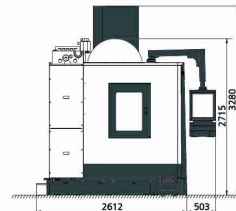
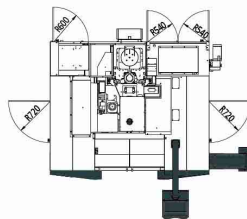
FLOOR SPACE: AX170



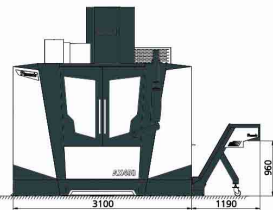
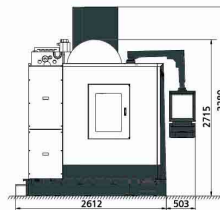
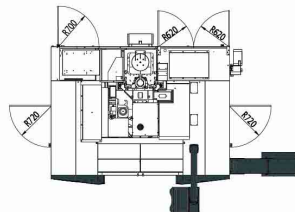
FLOOR SPACE: AX260



FLOOR SPACE: AX320



FLOOR SPACE: AX450 / AX500



## SPECIFICATIONS:

MODEL	AX170	AX260	AX320	AX450	AX500
<b>TABLE</b>					
TABLE SIZE & NUMBER (mm)	Ø170	Ø260	Ø320	Ø450	Ø500
TRAVEL RANGES (X/Y/Z mm)	360 x 360 x 440	510 x 455 x 410	660 x 610 x 610	760 x 610 x 560	760 x 610 x 560
SCREW SIZE	14 x 90° x 4	12 x 90° x 4	12 x 90° x 4	14 x 45° x 8	14 x 45° x 8
MAX. TABLE LOAD (Kg)	50	100	100	150	350
MAX. WORKPIECE SIZE (WxH mm)	Ø210 x 180	Ø500 x 300	Ø380 x 305	Ø550 x 305	Ø600 x 305
DIAMETER OF TABLE HOLE (mm)	Ø40	Ø40	Ø50	Ø171	Ø50
SPINDLE NOSE TO TABLE SURFACE (mm)	50~430	50~460	44~654	55~615	35~595
A Axis, Tilt (deg)/(0.001°)	240°(± 120°)	150° (-30°~+120°)	150° (-120°~+30°)	220°(± 110°)	220°(± 110°)
C Axis, Rotary (deg)/(0.001°)	360°	360°	360°	360°	360°
<b>SPINDLE</b>					
DISTANCE BETWEEN COLUMN (mm)	ISO40	BBT30	ISO40	ISO40	ISO40
SPINDLE INNER DIAMETER (mm)	Ø60	Ø40	Ø70	Ø70	Ø70
SPINDLE SPEED (rpm) Belt	-	-	10000	10000	10000
SPINDLE SPEED (rpm) Direct drive	12000 (15000)	12000 (24000)	10000 (12000/15000)	10000 (12000/15000)	10000 (12000/15000)
SPINDLE SPEED (rpm) Built-in	-	-	20000	20000	20000
MAIN MOTOR (con/30min kW)	5.5 / 9.5	5.5 / 7.5	9 / 12	9 / 12	9 / 12
<b>AXIS SERVO MOTOR</b>					
RAPID FEED RATE (X/Y/Z m/min)	36 / 36 / 36	48 / 48 / 48	30 / 30 / 24	30 / 30 / 24	30 / 30 / 24
FEED RATE (X/Y/Z m/min)	20	20	10	10	10
FEED RATE (A/C rev/min)	60 / 200	26.3 / 84.3	25 / 25	5.5 / 11.1	60 / 90
X-Axis Rated Torque (Nm)	1.5	14.3	10	10	10
Y-Axis Rated Torque(Nm)	1.5	14.3	10	10	10
Z-Axis Rated Torque(Nm)	2.1	14.3	10	10	10
A-Axis Rated Torque(Nm)	205	4.8	5	10	860
C-Axis Rated Torque(Nm)	35	3.2	3.8	10	430
<b>AUTO TOOL CHANGER</b>					
ATC TYPE	DISK	TP TYPE	DISK (CHAIN)	DISK (CHAIN)	DISK (CHAIN)
CAM TYPE	ARM	ARM	ARM	ARM	ARM
TOOL SELECTION (Bi-direction)	RANDOM	RANDOM	RANDOM	RANDOM	RANDOM
TOOL STORAGE CAPACITY (pcs)	20	30	24 / 30(40)	24 / 30(40)	24 / 30(40)
MAX. TOOL DIAMETER (mm)	Ø75	Ø100 / Ø140	Ø90 / Ø76(Ø76)	Ø90 / Ø76(Ø76)	Ø90 / Ø76(Ø76)
MAX. TOOL LENGTH	250	250	250	250	250
MAX. TOOL WEIGHT	8	3	8	8	8
<b>MISCELLANEOUS</b>					
AIR REQUIREMENT (Kg/cm <sup>2</sup> )	6	6	6	6	6
VOLTAGE	380	220	220	220	380
POWER REQUIREMENT (KVA)	40	40	40	40	40
COOLANT TANK CAPACITY (L)	150	200	250	300	300
MACHINE WEIGHT (KGs)	3800	4000	6500	7000	7100
MACHINE HEIGHT (mm)	3110	3032	3280	3280	3280
FLOOR SPACE (LxW mm)	1700 x 2290	2100 x 2580	2760 x 2390	3100 x 2390	3100 x 2390

● ALL SPECIFICATIONS AND DESIGNS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

## Standard Accessories:

Air Blast Through Spindle  
 Air Blast for Workpiece (nose)  
 Coolant Flushing System  
 3 Axes Telescopic Covers  
 Full Splash Guard  
 Automatic Lubrication System  
 Working Lamp  
 Operation Status Light  
 Arm Type 24-tool ATC  
 Z Axis Pneumatic Balance System  
 Cooling System  
 Air Gun/Water Gun  
 MPG Handwheel  
 Heat Exchanger  
 RS-232 Interface  
 Rigid Tapping  
 Spindle Oil Cooler  
 Hollow Ball Screws with Cooling System  
 A-axis Rotary Encoder  
 C-axis Rotary Encoder  
 Adjusting Tools and Box  
 Leveling Bolts and Pads  
 Operation and Programming Manual  
 Chain Type Chip Conveyor

## Options:

Transformer  
 Coolant Through Spindle  
 3 Axes Linear Scales  
 Auto Tool Length Measurement  
 Auto Workpiece Measurement  
 Fagor: CNC 8065  
 Fanuc: 31i-B5 Plus  
 Siemens: 840D sl

Founded in 1976, Pinnacle is specialized in manufacturing all kinds of machining centers with excellent experience in technology, quality and service. Pinnacle machining centers range from 5-axis, double column, vertical and horizontal types, to CNC lathes as well as conventional milling machines.

Well-trained service engineers are familiar with each step of assembly to ensure our quality service works and keep all machines running in the best status. The sales and service departments provide customers pre-sale and after-sale services. Prompt reaction is just our basic attitude to all customers only, accurate and effective technical solutions are provided within the shortest time.

**Product, Quality and Service, Pinnacle exceeds your expectations!**



***Pinnacle Machine Tool Co., Ltd.***

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