

GRA200

5 Axis Graphite Mill

JINGDIAO's GRA200 5-Axis Graphite Mill is Specifically Designed for Electrode Machining.



JINGDIAO 5-AXIS HIGH-SPEED MACHINING CENTER

GRA200-5 Axis Graphite Mill

Thanks to the excellent machine design and compatibility between key components, the GRA200 is capable of high precision graphite die mold machining and "0.1 μ m feeding, 1 μ m" consistent machining. With reasonable configuration, the GRA200 graphite can be used to machine metal as well.



Travel (X/Y/Z) mm/(in)	500/280/300 (19.7/11.0/11.8)
B/C Rotation Angle (deg)	-120~90/360

Highlights

01 Vacuum Style Dust Collector - Optional

The optional vacuum style dust collector ensures the removal of graphite dust from the work area.

02 Full Enclosed Sealed Work Area

The work area is fully enclosed with sealed doors which prevents graphite dust from entering the shop work environment.

03 Guideways & Axis Drives Protection

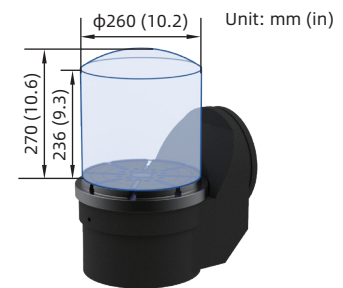
The machining area is completely isolated from the non-machining area. This design prevents dust from entering the axis drive systems.

04 Axis Protection from Graphite Dust

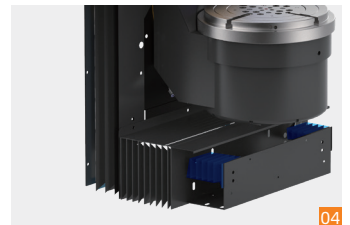
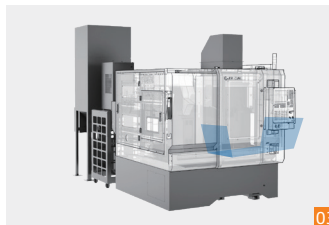
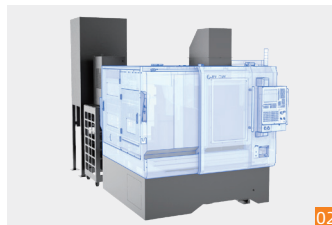
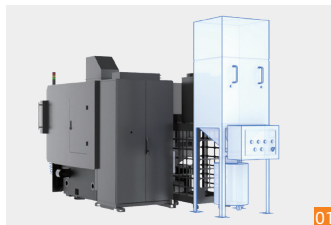
The machine is specifically equipped with a double layer X and Y axis flexible way cover protection. All ball screws, linear motion guideways, ball screw drives and rotary table are protected and the use of a positive air pressure adds an extra layer of protection.

Max. Workpiece Dimension

The machine design is the foundation of the machine tool. Through continuous optimization and manufacturing, the GRA200's compact, rigid, and stable structure is ideal for 5-axis high speed machining.



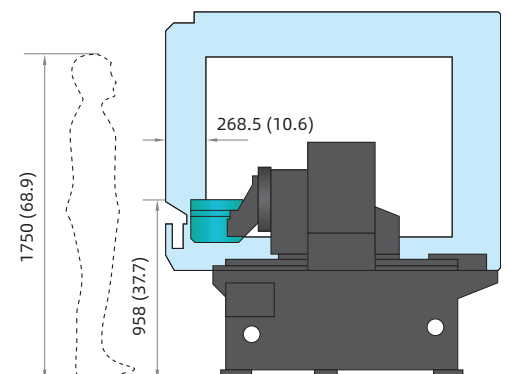
Max. Load (kg/lb): 50/110.2



Ergonomics

We design the machine based on ergonomics principles to provide convenient operation experience to our customers.

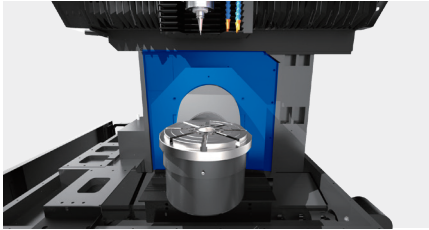
- + The panel of the CNC system can be adjusted to the appropriate angle according to the needs, while being operated in a comfortable position.
- + The distance between the worktable and the operator is ideal which is convenient for workpiece loading and unloading.
- + Pneumatic and lubricating components are installed on the right side of the machine, which is convenient for inspection and maintenance.
- + The machine tool door has a large-sized window, which makes it easy to view the machining process.



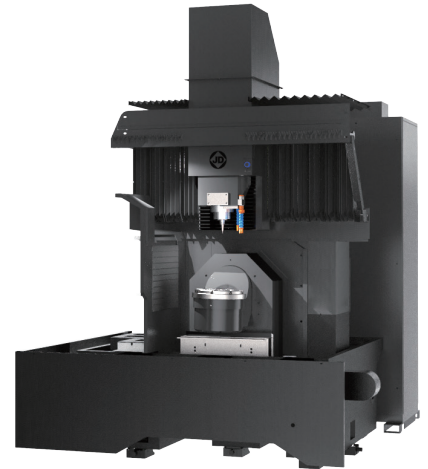
Machine Structure

Anti-Vibration Design

The gantry style design provides a strong machine structure which minimizes vibration during machining.

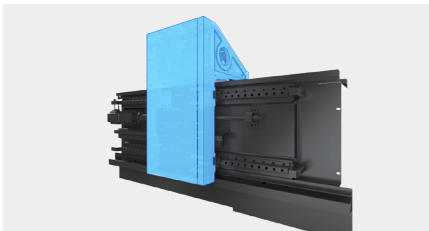


The feet of the machine tool are arranged at designated locations to improve the stability of the machine tool. The feet are also covered in a rubber material which reduces vibration.



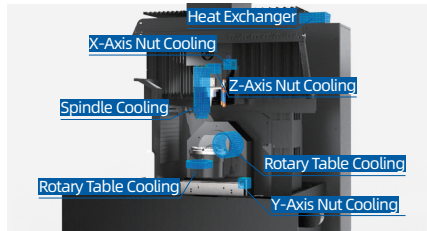
Good Rigidity

The inverted "L" structure design is good for force balance which makes the structure more compact in Z direction. This design also improves the rigidity and anti-vibration ability of machine tool.



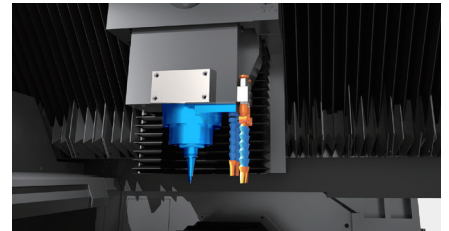
Thermal Stability

The all encompassing cooling design, includes rotary table cooling, bearing cooling, ball screw cooling technology, and is equipped with machine cover.



Designed for 5-Axis Graphite Milling

5.The sharp structure design at bottom of the machine head lengthens the nose end of the spindle and helps avoid 5 axis machining collisions.



Machining Samples

Graphite Electrode

Size (mm/in): 12.5×19×55 / 0.49×0.75×2.16

Material: Poco EDM-2

- Highlights:**
- + Cycle time is 2h26min;
 - + Dimensional accuracy is $\pm 0.015\text{mm}$;
 - + The ball end mill is R0.2 mm;
 - + Five - axis simultaneous machining with R0.2 mm ball end mill.



Graphite Bottle Electrode

Size (mm/in): 33.2×33.2×21.15 / 1.31×1.31×0.83

Material: Poco EDM-2

- Highlights:**
- + Cycle time is less than 40 min;
 - + The smallest R angle is R0.3 mm;
 - + Good surface consistency;
 - + Dimensional accuracy is within $\pm 0.01\text{ mm}$.



Graphite Electrode

Size (mm/in): 190×32×14 / 7.48×1.26×0.55

Material: ToYo ISO63

- Highlights:**
- + Radius of the smallest cutting tool is 1 mm;
 - + Dimensional accuracy is $\pm 10\text{ }\mu\text{m}$;
 - + Processing time is 5 h;
 - + Surface roughness $Ra < 0.6\text{ }\mu\text{m}$;
 - + Excellent surface consistency.



Key Components

JINGDIAO High-Speed Precision Spindle

The spindle is the key component for high speed machining. Different spindles give different machining performances. There are 4 types of JINGDIAO developed spindles (20,000-24,000-28,000-32,000 rpm) available on the GRA200 graphite mill. The 32,000 rpm spindle is ideal for precision machining using small tools. You can choose the most suitable spindle based on your machining needs.

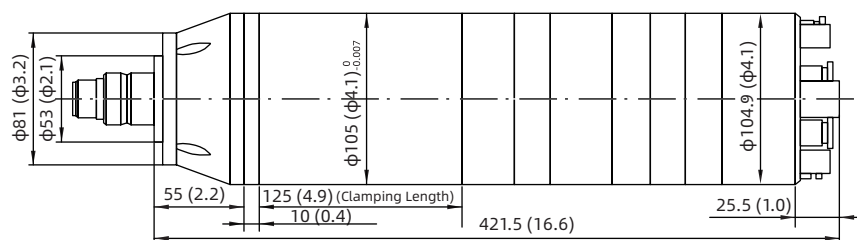


JD105E-32-HSK32

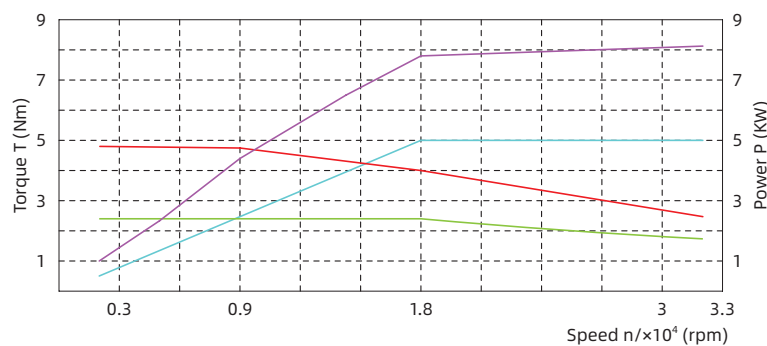
Basic Specification

Clamping Diameter (mm/in): $\Phi 105/\Phi 4.1$ (0, -0.007)
 Output Power (S6-60%) (KW): 5.0
 Output Torque (S6-60%) (Nm): 2.4
 Speed (rpm): 32,000
 Tool Holder: HSK-E32
 Weight (kg/lb): 14.5/32.0

Dimension Unit: mm (in)



Output Performance



— T_{max}
 — T_{S6}
 — P_{max}
 — P_{S6}

Performance

- + Taper Bore Radial Runout $\leq 1.5 \mu m$ (5.9×10^{-5} in)
- + Rotor End Face Axial Runout $\leq 1 \mu m$ (3.9×10^{-5} in)
- + Vibration at Maximum Speed ≤ 0.6 mm/s (1.44 ipm)



Optional

JD150S-20-HA50/A

Speed (rpm): 20,000
Tool Holder: HSK-A50



JD130S-24-BT30

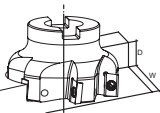
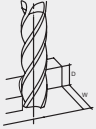


Speed: 24,000 rpm
Tool Holder: BT30



JD105S-28-HE32

Speed: 28,000 rpm
Tool Holder: HSK-E32

Cutting Test Results (Spindle Type JD105E-32-HSK, 32,000rpm)

Item	Material	Tool Size mm/in	Teeth Number	Cutting Width (mm/in)	Spindle Speed rpm	Cutting Feed Rate mm/min (in/min)	Cutting Capacity cm ³ /mm
				Cutting Depth (mm/in)			
 Face Mill	Aluminum	φ80/φ3.1	7	70/2.8	6000	2400 (94.5)	168
				1/0.04			
	Steel	φ50/φ2.0	4	45/1.8	1500	1000 (39.4)	18
				0.4/0.02			
 End Mill	Aluminum	φ10/φ0.4	4	2/0.08	10000	3200 (126.0)	128
				20/0.8			
	Steel	φ10/φ0.4	4	0.8/0.03	4200	2400 (94.5)	38.4
				20/0.8			
 Drill	Aluminum	φ16/φ0.6	2	/	1000	120 (4.7)	/
	Steel	φ12/φ0.5	2	/	1000	100 (3.9)	/
 Tap	Aluminum	M16×2	2	/	900	1800 (70.9)	/
	Steel	M10×1.5	2	/	500	750 (29.5)	/

JD50 CNC System

The JD50 CNC system developed by JINGDIAO is the brains of machine tools. It has the basic functions seen other control systems, but also includes several complete 5-axis modules developed by JINGDIAO's R&D department. This is how JINGDIAO 5-axis machine tools achieve high machining accuracy, and mirror finishes. Our machining modules are flexible and can be customized based on a customer's machining application.

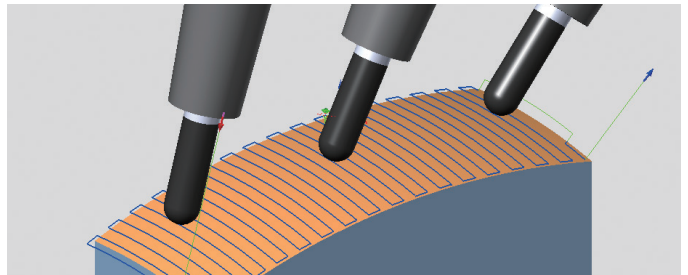


Basic Characteristics

- + The programming resolution and control resolution are $0.1\ \mu\text{m}$ ($3.9 \times 10^{-6}\ \text{in}$).
- + Supports linear, plane arc, space arc, spiral line, spline and involute interpolation methods.
- + Support pitch compensation and reverse clearance compensation.
- + Support RTCP multi-axis motion control.



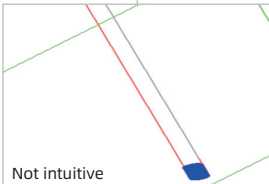
0.1 μm Feed, 1 μm Cutting



Fixed Point Cutting

Not RTCP Program

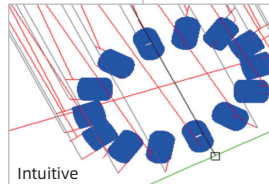
```
G91G28Z0
G90
G0X0.7883Y2.4874A-90.C-77.1431
M590 L1
G43H1
Z35.0874
Z30.6074
N102G1Z30.1074F189.
```



Not intuitive

RTCP Program

```
G91G28Z0
G90
G68.2X29.3331Y6.6949Z-6.1-77.143J-90.K0.
G53.1
G0X0.7883Y-3.5126
M590 L1
G43H1
Z5.
Z0.52
N102G1Z0.02F189.
```



Intuitive



RTCP

Five-Axis Programming Features

- + Tool center point control function.
- + Inclined plane machining function.
- + Cylinder interpolation function.
- + Polar coordinate interpolation function.



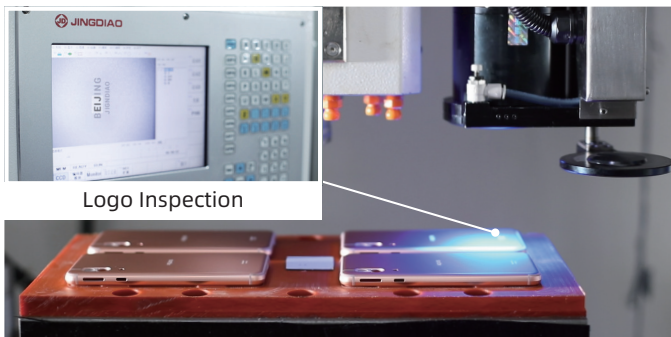


System Advantages

- + Various programming methods and flexible technical process design.
- + Abundant types of interfaces and buses, with strong peripheral expansion capabilities.
- + Unique external extended function instructions (G100), which can realize instruction-level peripheral control, human-computer interaction, and complex data operations.

Advanced Features

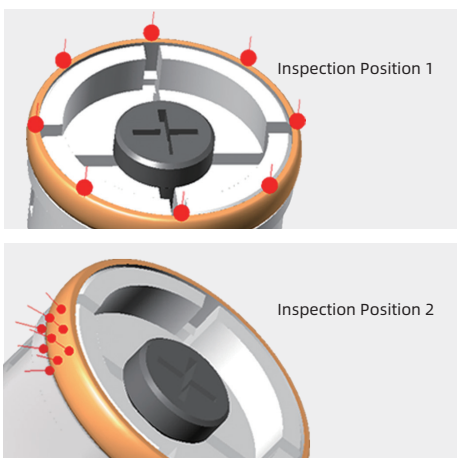
- + Supports on-machine contact and non-contact measurement, which can realize high-precision 2D and 3D measurement.
- + Built-In CAM technology and intelligent modification technology supports the on-machine tool-path deformation compensation machining.
- + Supports multiple communication protocols including remote monitoring.



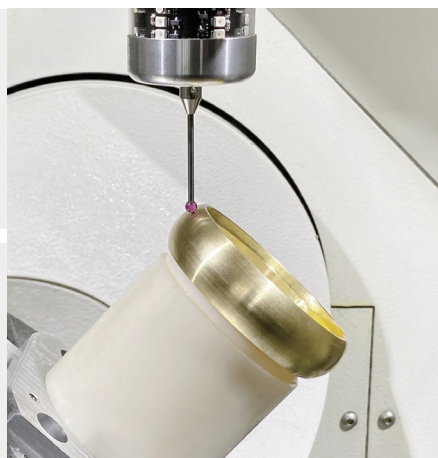
Non-Contact Measurement



Contact Measurement



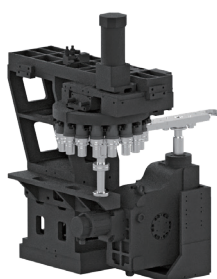
Surface Deformation Compensation



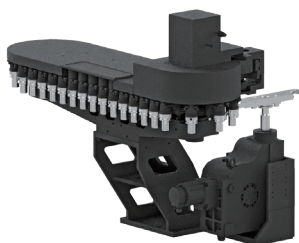
Remote Monitoring of Machines

Tool Magazine

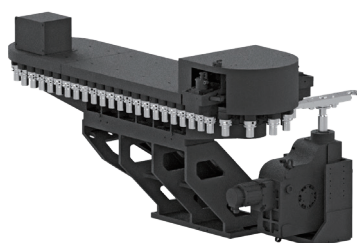
To meet your production needs, we have a variety of tool magazines to choose from.



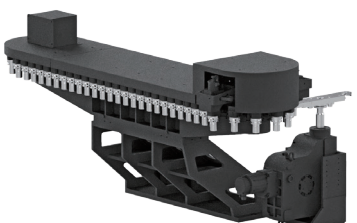
Type	Disc Type Tool Magazine with Manipulator		
Capacity	16		
Tool Holder	HSK-A50	BT30	HSK-E32
Allowable Maximum Tool Length (mm/in) (From End of Spindle)	170/6.7	155/6.1	155/6.1
Maximum Diameter of Contiguous Tools (Full) (mm/in)	50/2.0	50/2.0	50/2.0
Maximum Diameter of Contiguous Tools (Vacant) (mm/in)	90/3.5	90/3.5	90/3.5
Max. Load of Each Position (kg/lb)	3.5/7.7	3/6.6	1.5/3.3
Max. Load of Tool Magazine (kg/lb)	/	/	/



Type	Chain Type Tool Magazine with Manipulator		
Capacity	36		
Tool Holder	HSK-A50	BT30	HSK-E32
Allowable Maximum Tool Length (mm/in) (From End of Spindle)	170/6.7	155/6.1	155/6.1
Maximum Diameter of Contiguous Tools (Full) (mm/in)	50/2.0	50/2.0	50/2.0
Maximum Diameter of Contiguous Tools (Vacant) (mm/in)	90/3.5	90/3.5	90/3.5
Max. Load of Each Position (kg/lb)	3.5/7.7	3/6.6	1.5/3.3
Max. Load of Tool Magazine (kg/lb)	61/134.5	61/134.5	61/134.5



Type	Chain Type Tool Magazine with Manipulator	
Capacity	53	
Tool Holder	HSK-A50	HSK-E32
Allowable Maximum Tool Length (mm/in) (From End of Spindle)	170/6.7	155/6.1
Maximum Diameter of Contiguous Tools (Full) (mm/in)	50/2.0	50/2.0
Maximum Diameter of Contiguous Tools (Vacant) (mm/in)	90/3.5	90/3.5
Max. Load of Each Position (kg/lb)	3.5/7.7	1.5/3.3
Max. Load of Tool Magazine (kg/lb)	61/134.5	61/134.5



Type	Chain Type Tool Magazine with Manipulator	
Capacity	63	
Tool Holder	HSK-A50	HSK-E32
Allowable Maximum Tool Length (mm/in) (From End of Spindle)	170/6.7	155/6.1
Maximum Diameter of Contiguous Tools (Full) (mm/in)	50/2.0	50/2.0
Maximum Diameter of Contiguous Tools (Vacant) (mm/in)	90/3.5	90/3.5
Max. Load of Each Position (kg/lb)	3.5/7.7	1.5/3.3
Max. Load of Tool Magazine (kg/lb)	61/134.5	61/134.5

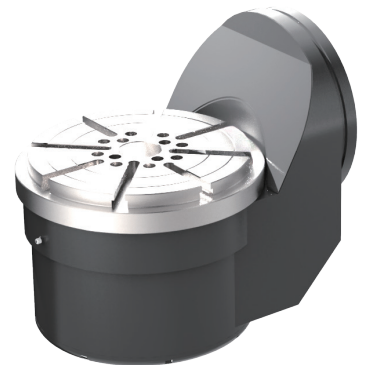
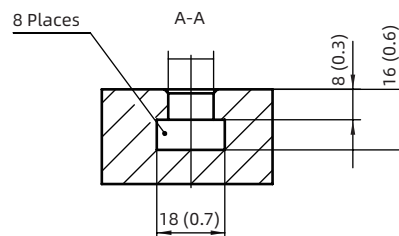
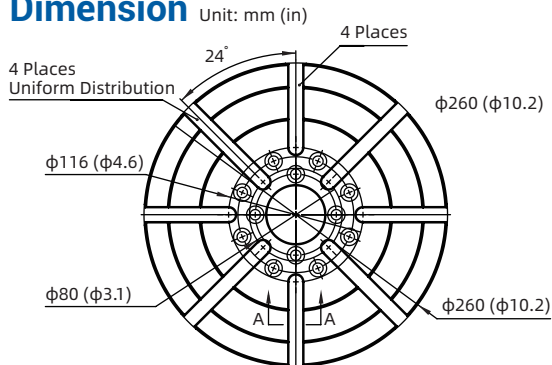
Double Direct Drive Trunion Style Table

Assures high-precision multi-axis machining.

Features

- + The double-axes are driven by a high precision responsive torque motor;
- + The compact rotary table adopts a cantilever structure, which occupies a space small resulting in convenient operation;
- + Circulating water cooling technology reduces thermal deformation;
- + 5-Axis synchronous machining, multi-surface positioning machining;
- + The hollow design of C-axis is conducive to the configuration of a variety of pneumatic fixtures.

Dimension



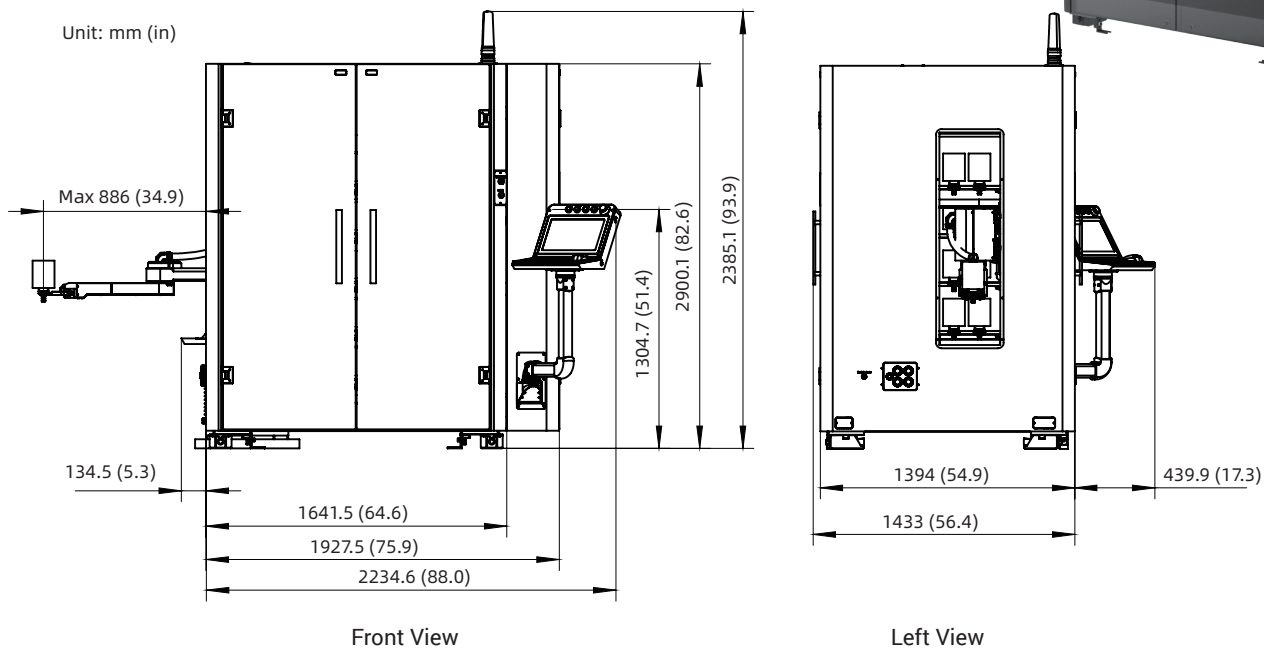
Specification

Item	Tilt Axis	Rotation Axis
Position Accuracy (")	8	8
Repeatability (")	5	5
Rapid Feed Rate (rpm)	60	100
Cutting Speed (rpm)	60	100
Cooling Mode	Circulating Water Cooling	Circulating Water Cooling
Positioning Locking Mode	Pneumatic Locking	Pneumatic Locking
Positioning Locking Air Pressure (MPa/PSI)	0.6/8.8	0.6±0.02/8.8±2.9
Safety Brake	√	--

Accessories

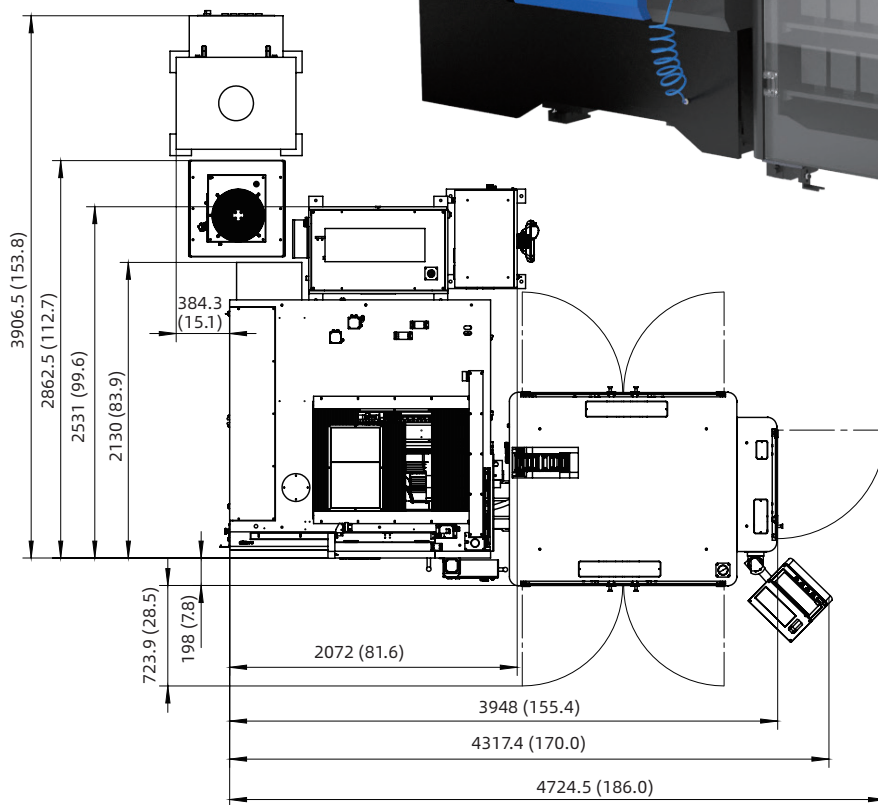
Material Handling System—MHS25

JINGDIAO material handling systems are viable to increase your production capacity. The automatic workpiece loading and unloading reduces set up time. JINGDIAO technologies like OMIM, easy start, and virtual manufacturing further improves safe and continuous machining. JINGDIAO's own MHS25 material handling systems are available to increase your working capacity.



Specification

MHS25 Specifications				
Feeding System	MHS25-SF42	MHS25-SF96B	MHS25-SF63A	MHS25-SF110A
Load (kg/lb)	25 (55.1)			
Storage Capacity	42	96	63	110
Workpiece Dimension (mm/in)	120×120×120 (4.7×4.7×4.7)	Φ60×100 (Φ2.4×3.9)	120×100×100 (4.7×3.9×3.9)	120×120×150 (4.7×4.7×5.9)
Machine Dimension	1280×1100×1970 (50.4×43.3×77.6)			1927.5×1394×2100 (75.9×54.9×82.6)
Weight (kg/lb)	1000 (2204.6)			2200 (4850.1)



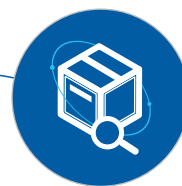
Requirement Analysis



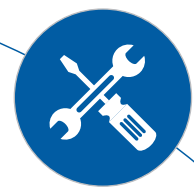
Project Design



Debug Verification



Project Delivery



Maintenance Training



Customized Service

We Can Design and Develop the Structure According to Your Actual Production Needs.

Accessories

Graphite Dust Collector

The GRA200 is available with a powerful optional dust collector. The pulsed back shot ash system is suitable for dry graphite machining, cast iron and ceramic dust. It effectively filters machined dust particles from the air.

Highlights

01



Powerful Dust Collection

02



Health Protection

03



Reduce Production Cost

04



Long Life and
Convenient Maintenance

05



Improve Workshop
Environment



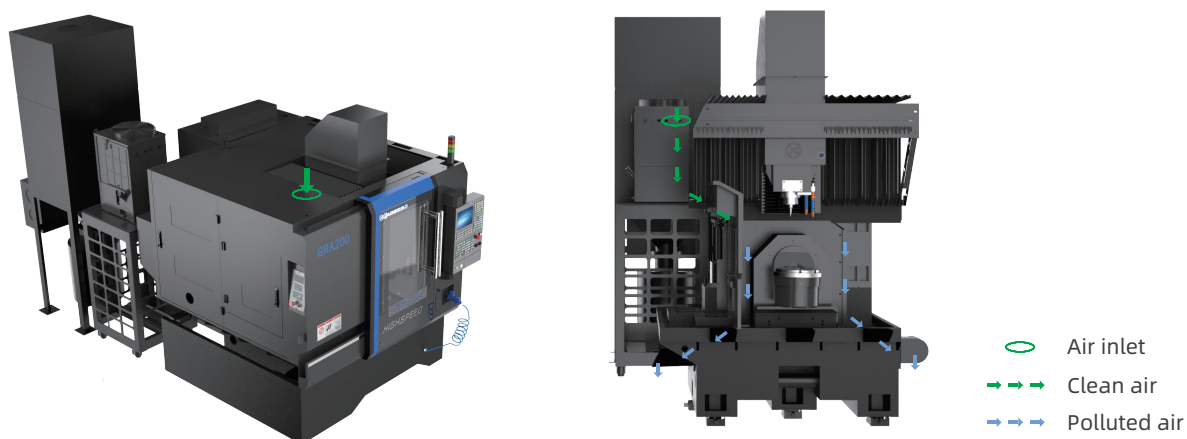
Features

- + **Powerful Suction:** It can automatically bounce off the dust from the filter while the dust collector is running continuously and quickly collect dust particles generated in the processing process.
- + **Stable Collection Efficiency:** It can effectively prevent dust accumulation is prevented from collecting in the body of the unit, which is sanitary and convenient for the dust treatment process. A optional dust collection bag can be used together to ensure a stable and efficient collection effect.
- + **Easy Installation and Maintenance:** The filters can be quickly installed or removed and maintenance of of the unit is minimal.

Specifications

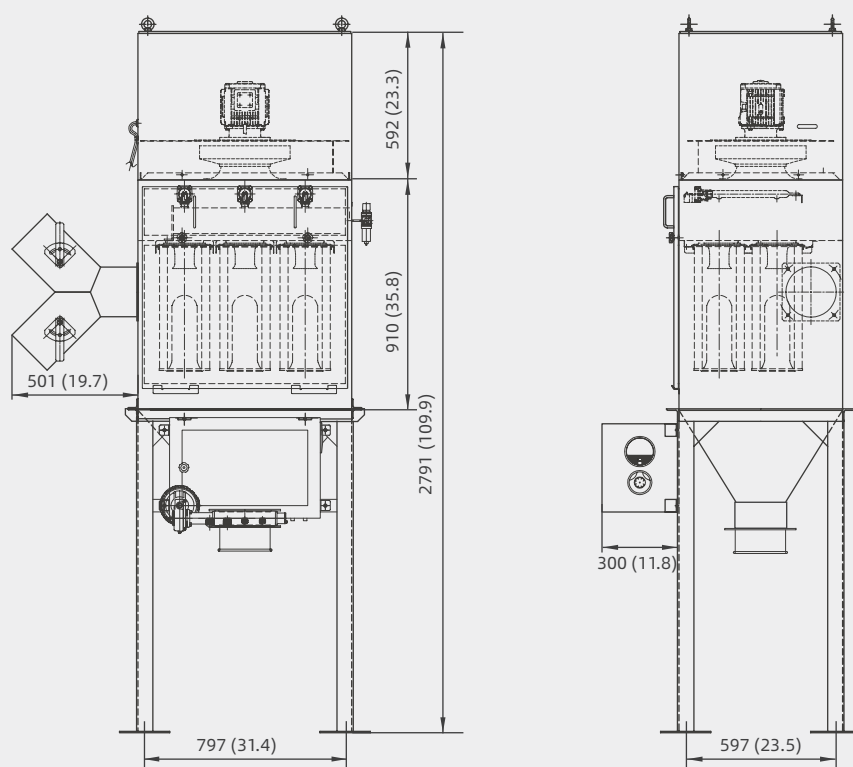
Item	Spec
Air Volume m ³ /h (gal/h)	1800m ³ /h (395944.47)
Static Pressure (Pa/Psi)	-1960/-0.28
Rated Power (KW)	2.2
Filtering Accuracy (μm/in)	3/0.0001183
Noise (dB)	70±2
Dimension (mm/in)	1430×1030×2791/56.30×40.55×109.88

Dust Collection Path



Negative pressure is generated under the high speed motor drive, and the graphite dust is sucked into the graphite dust-collector. This protects workshop environment from airborne and also ensures the health of the operators.

Dimension Unit: mm (in)



Distinctive Technologies

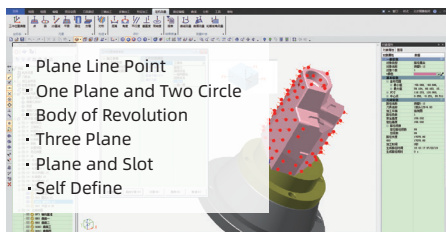
On-Machine Measurement and Intelligent Modification Technology(OMIM)

JINGDIAO's innovative on-machine measurement and intelligent modification technology (OMIM) is a ideal solution that integrates CAD/CAM programming technology, numerical control processing and precision inspection technology. Its intelligent application can effectively shorten the production cycle of the workpiece, streamline the processing flow, and improve quality and efficiency for production and machining.

JINGDIAO'S OMIM is Reflected in Three Areas

+ Intelligent Workpiece Alignment

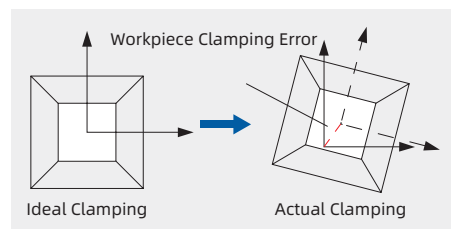
This feature automatically corrects the workpiece alignment by probing workpiece position which automatically adjusts the program accordingly. This reduces workpiece setup time, improves machining quality and increases production.



01-Support Multiple Workpiece Position Compensation Methods



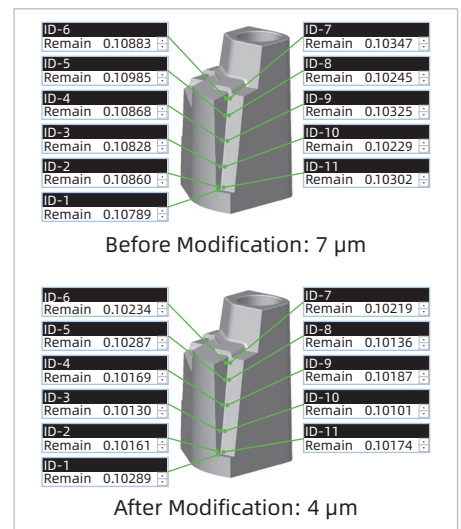
02-Obtain Actual Position on the Machine



03-Workpiece Position Compensation



04-Verification of Position Compensation Accuracy

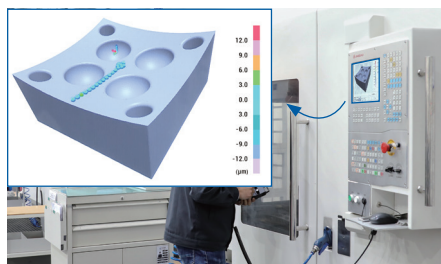


+ Machining Step Remaining Stock Inspection

With this feature, the remaining stock at each step can be measured in real time, and the inspection results will be feedback on the screen of the control system. The operator can analyze these results to make sure every step is removed at the right amount of material.



Inspect the Remaining Stock on the Machine



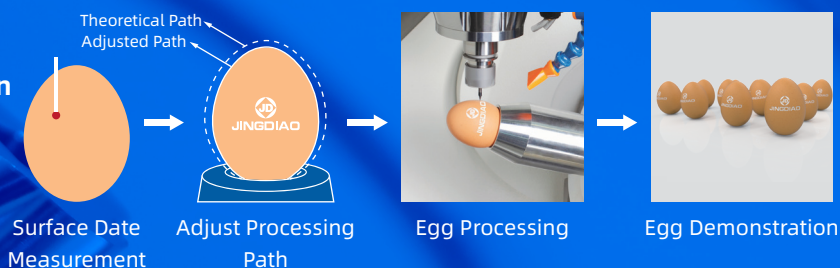
Real Time Display of CNC System



Achieve Stable Precision Machining

+ 5-Axis Path On-Machine Compensation

The CAM function embedded in the CNC system can compensate for the inaccurate machining path, which is created by a irregular workpiece shape, clamping deformation and clamping deviation.



A New Model of Numerical Control Processing

- + Machining and inspection are achieved on one machine, forming a new model of "integration of machining and inspection".
- + The digitalization of CNC machining experience enables a entry-level operator to complete precision machining.
- + The actual processing time proportion of CNC machines has increased from **25% -45% to 45% -70%**.



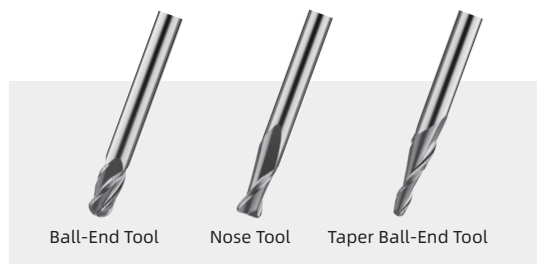
Before Using Integration of Machining and Inspection



After Using Integration of Machining and Inspection

Tool Inspection System

During the 5-axis machining process, JINGDIAO tool inspection system can inspect the errors of different positions of the tool contour of the ball nose tool, ball-end tool and other tools for precision machining and compensate intelligently. This can effectively reduce the unqualified workpiece accuracy caused by the tool inaccuracy.

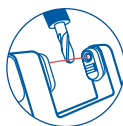


* Tool Type

Realization



JINGDIAO CAM Software



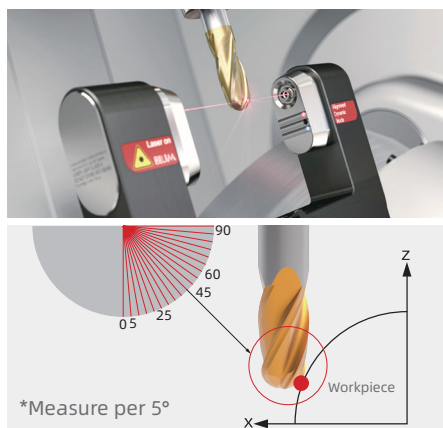
Standard Laser Tool Set



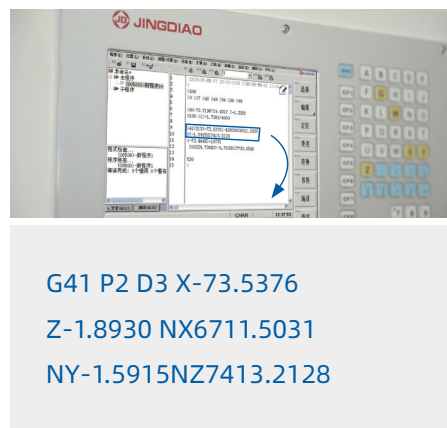
JINGDIAO CNC System

Path Verify	All
Shank Collis...	0.2
Holder Colli...	0.5
Path Edit	No Edit
Avoid Settings	
Set start point	<input type="checkbox"/>
Set end point	<input type="checkbox"/>
Motion Settings	
Safe area	Auto.
Clearance plane	5
Retract mode	Optimized mode
Relative retract	2
Plunge distance	0.5
Coolant	Air
Wear comp. mode	Tool Contour Compensation

3D Tool Contour Compensation Function



Inspect Tool Contour on the Machine



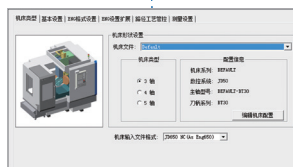
Compensate Tool Contour Deviation

JINGDIAO Virtual Manufacturing Technology

With JINGDIAO's software, the actual production materials and process parameters are digitized to ensure the correct information is selected by the process personnel, material preparation personnel and the operator. This creates a seamless integration process development, material preparation and machine operation, and improves the accuracy and fluency of the machining Process.



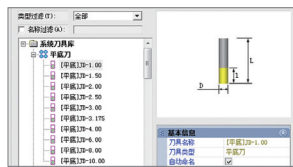
Machine



Machine Bank



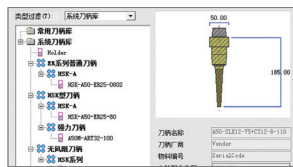
Tool



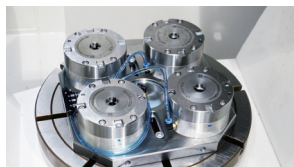
Tool Bank



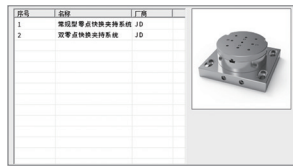
Tool Holder



Tool Holder Bank



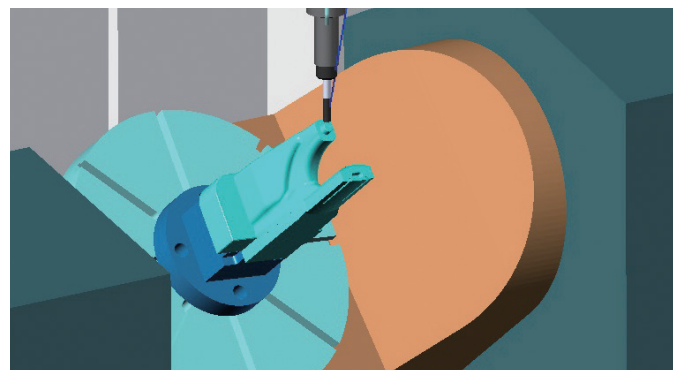
Fixture



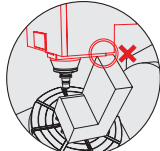
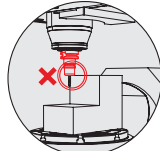

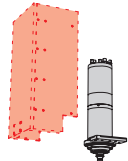
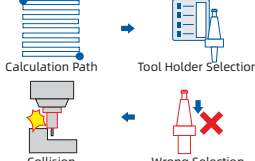
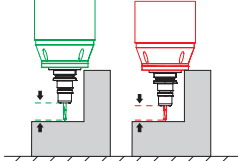
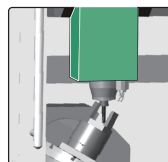

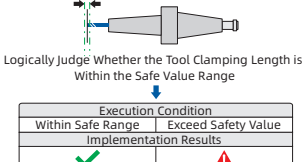
Fixture Bank

Ensuring the Safety of 5-Axis Machining

Five-axis milling is a complex machining process. During the machining there is the risk of collisions between tools, tool holders and the workpiece. JINGDIAO uses its SurfMill software to establish the connection between production materials, CAM programming and actual processing in a virtual environment. The user can build the same digital scene in the software, simulate the machining process, analyze and adjust the process, and eliminate the machining risk in the software programming stage.

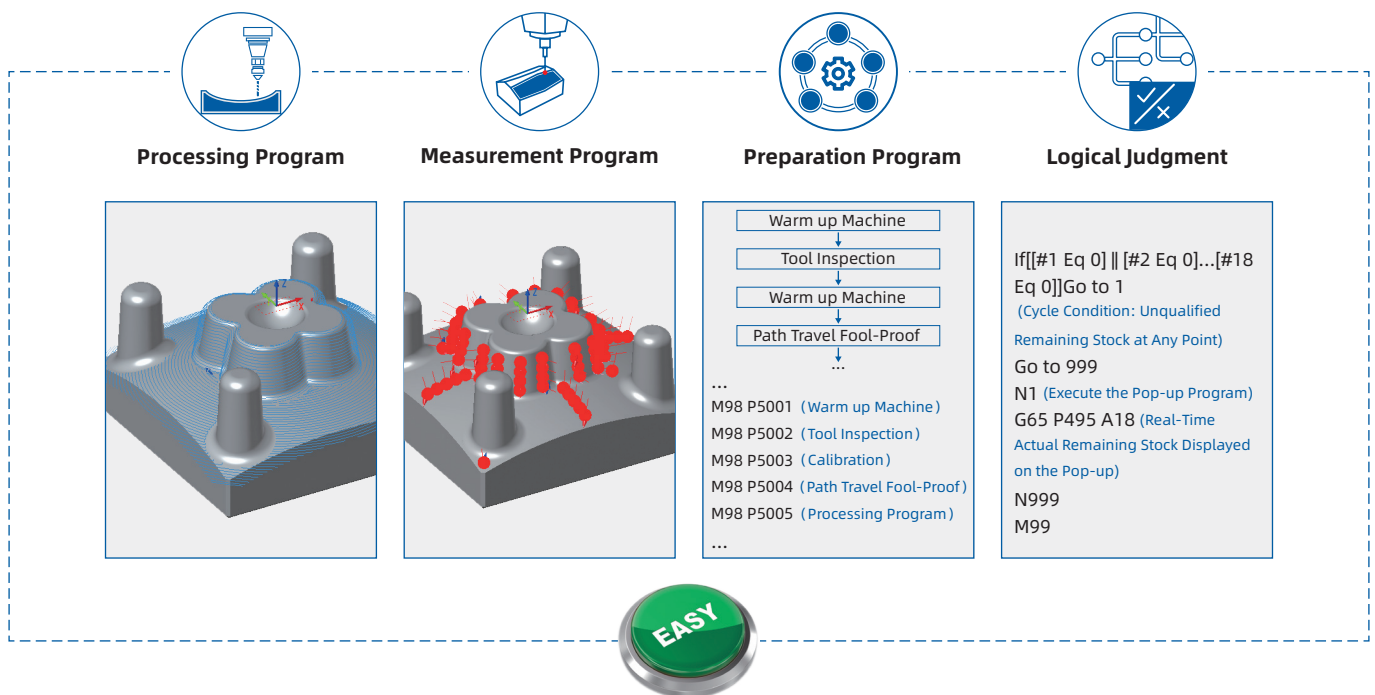


Application Scenarios of JINGDIAO Virtual Manufacturing Technology

Technical Points	Mirror the Actual Machining Environment to Ensure the Accuracy of Interference Risk Inspection	Informatization of Production Materials to Avoid Risks Caused by Wrong Selection of Materials	The Macro Program Fool-Proof to Avoid Risk Caused by Mis-Operation by Personnel
Risk Type	 Z-Axis and Workpiece	 Tool Holder and Workpiece	 Spindle and Workpiece
Cause Of Risk	 Ignore Z-Axis	 No Informatization of Production Material	 Tool Clamping Length Error
Solutions	 Complete Machine Model	 Informatization of Production Materials	 Tool Setup Foolproof

Easy Start

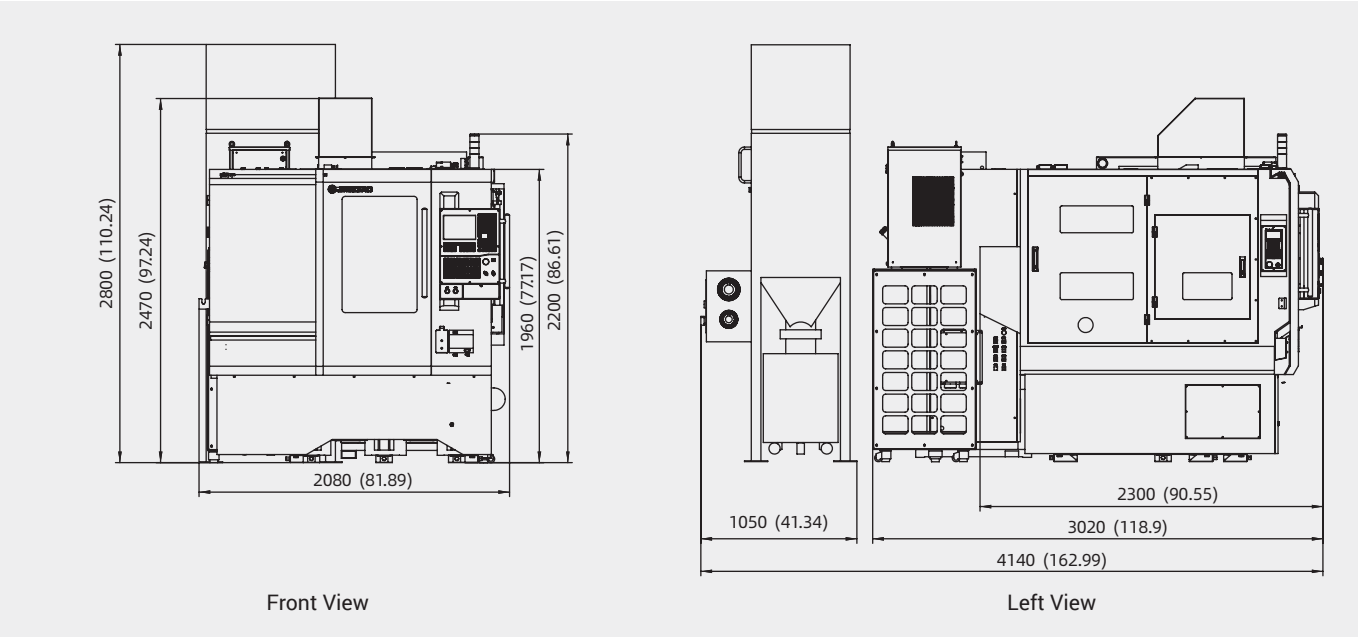
With this software, the program processing, measurement, preparation and logical judgment are combined into one program. The operator only needs to press the start button to begin the processing of the part which reduces machine setup time.



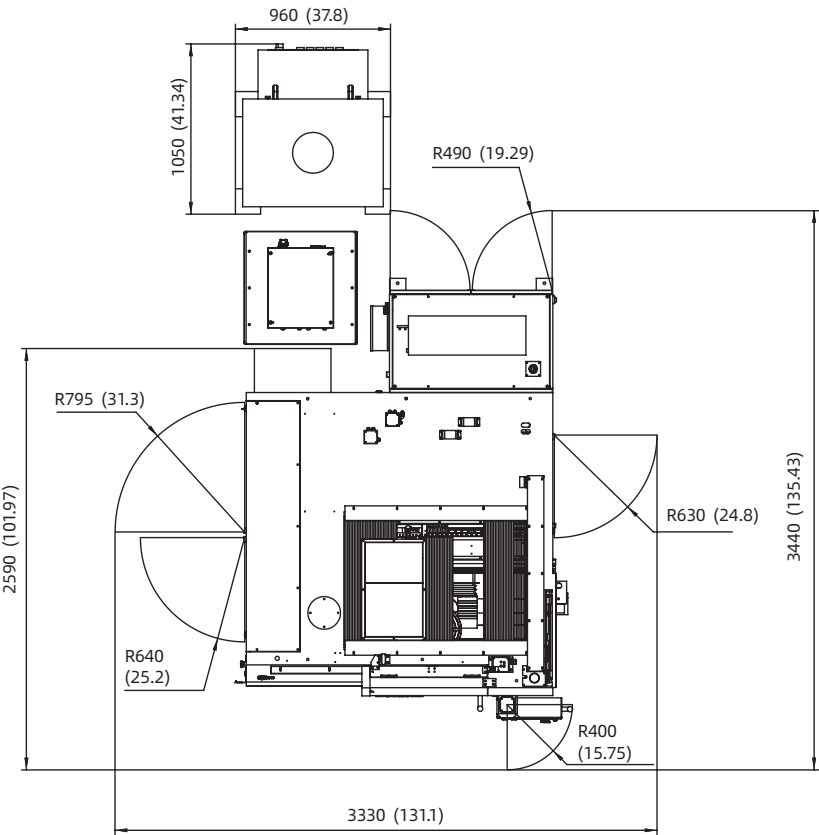
Processing Easy Start

Technical Specification

Dimension Unit: mm (in)



Layout Unit: mm (in)



Items	Standard Value
Position Accuracy (X/Y/Z) mm/ (in)	0.002/0.002/0.002 (0.00008/0.00008/0.00008)
Position Accuracy (B/C) sec	8/8
Repeatability (X/Y/Z) mm/ (in)	0.0018/ 0.0018/ 0.0018 (0.00007/0.00007/0.00007)
Repeatability (B/C) sec	5/5
Travel (X/Y/Z) (mm/in)	500/280/300 (19.7/11.0/11.8)
A/C Rotation Angle deg	-120~90/360
Table Diameter (mm/in)	φ260/φ10.2
Max. Load (kg/lb)	30/66.1
Max. Spindle Speed rpm	32,000rpm (HSK-E32)
	24,000rpm (BT30)
	20,000rpm (HSK-A50)
Tool Magazine/Capacity	HSK-E32/BT30/HSK-A50: 16 Disc Type Tool Magazine with Manipulator
	HSK-E32/BT30/HSK-A50: 36 Chain Type Tool Magazine with Manipulator
Rapid Speed (X/Y/Z) m/min (in/min)	15 (590.6)
Rapid Rotation Speed (A/C) rpm	60/100
Max. Cutting Feed Speed (X/Y/Z) m/min (in/min)	10 (393.7)
Max. Cutting Feed Speed (A/C) rpm	60/100
Drive System	AC Servo
Voltage	3-Phase, 480V/60Hz
Air Pressure (MPa/PSI)	≥0.52/75.4
Machine Weight (kg/lb)	5600/12345.9

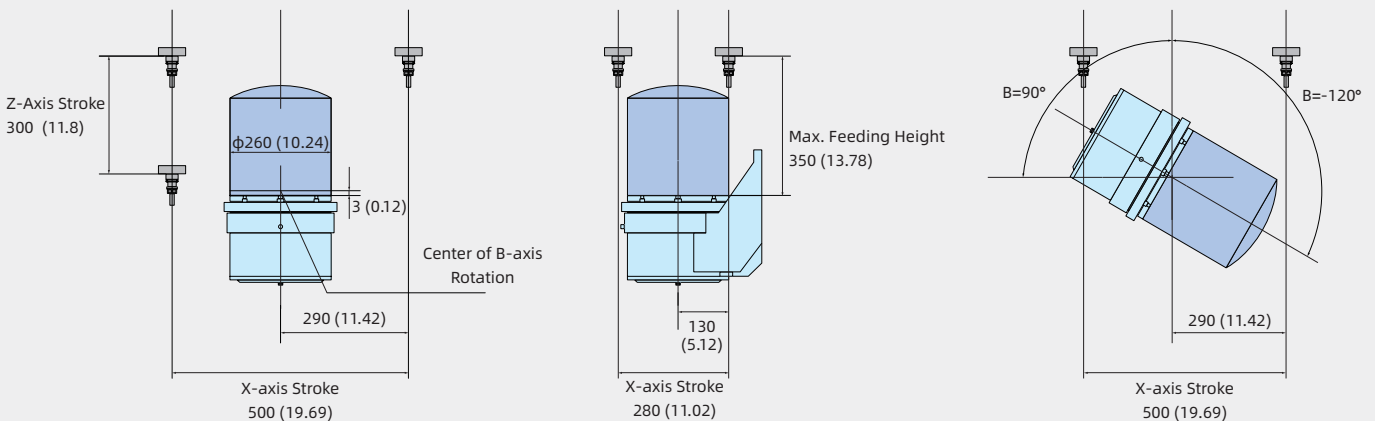
Standard Features and Options

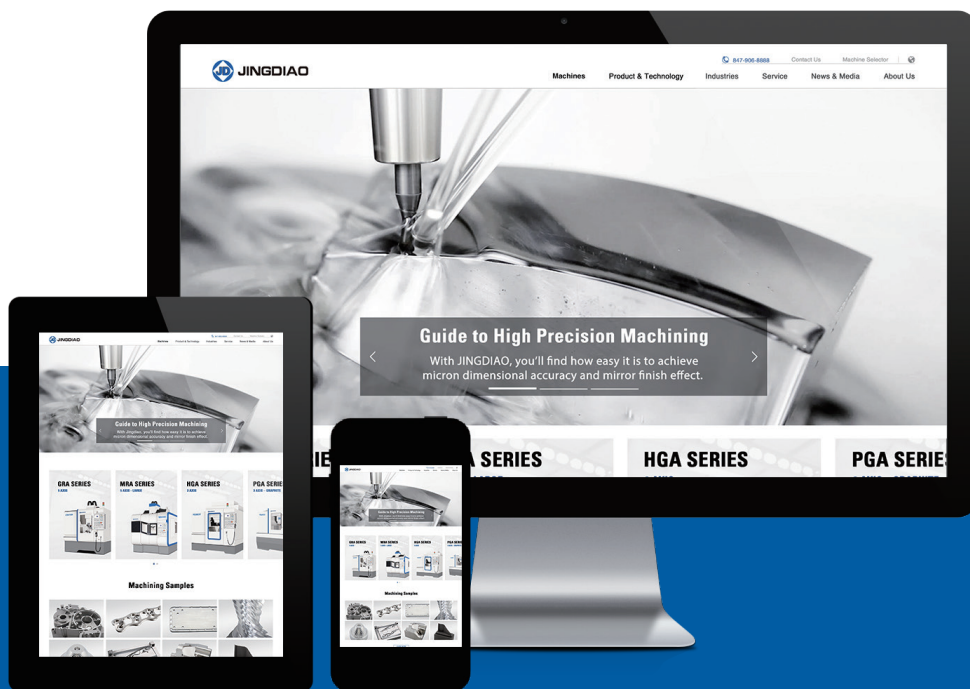
Items	Configuration
Control System	
JD50 CNC System	●
CAM Software	
JDSoft SurfMill 8.0	○
Spindle	
JD105E-32-HSK32	●
JD150S-20-HA50/A (HSK-A50)	○
JD130S-24-BT30 (BT30)	○
JD105S-28-HE32 (HSK-E32)	○
JD130-32-HE32/A(HSK-E32, Precision Machining)	○

Items	Configuration
Tool Magazine	
Chain Type Tool Magazine with Manipulator (63 Tools)	○ (HSK-A50)
Chain Type Tool Magazine with Manipulator (53 Tools)	○ (HSK-A50)
Chain Type Tool Magazine with Manipulator (36 Tools)	●
Disc Type Tool Magazine with Manipulator (16 Tools)	○
Cooling System	
Cutting Air Cooling System	●
Spindle Cooling	●
Rotary Table Cooling	●
Screw Cooling	●
Control Cabinet Cooling	●
Micro Mist Lubrication	○
Chip Conveyor	
Dust Collector	○
Dust Collector	○
Measurement System	
Contact-Type Tool Set	○
Laser Tool Set	●
JINGDIAO On-Machine Measurement System	●
Standard Calibrating Ball	○
Others	
MPG (Manual Pulse Generator)	●
Front Door Safety Lock	●
Low Oil Pressure Inspection Device	○
Low Air Pressure Inspection Device	●
Ground Protector of Power Leakage	●
Machine Foot	●
Alarm	●
Lubricating Oil Inspection	●
Auto Power off Function	○
Internal Lighting Switch	●
Dynamic Balance Holder	○

●: Standard ○: Optional

Stroke Diagram Unit: mm (in)





You can find more information at
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The Pictures of the Equipment are for Your Reference Only. The Configurations and Parameters are Subject to Change Without Notice.
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 Print Date: 2020.09