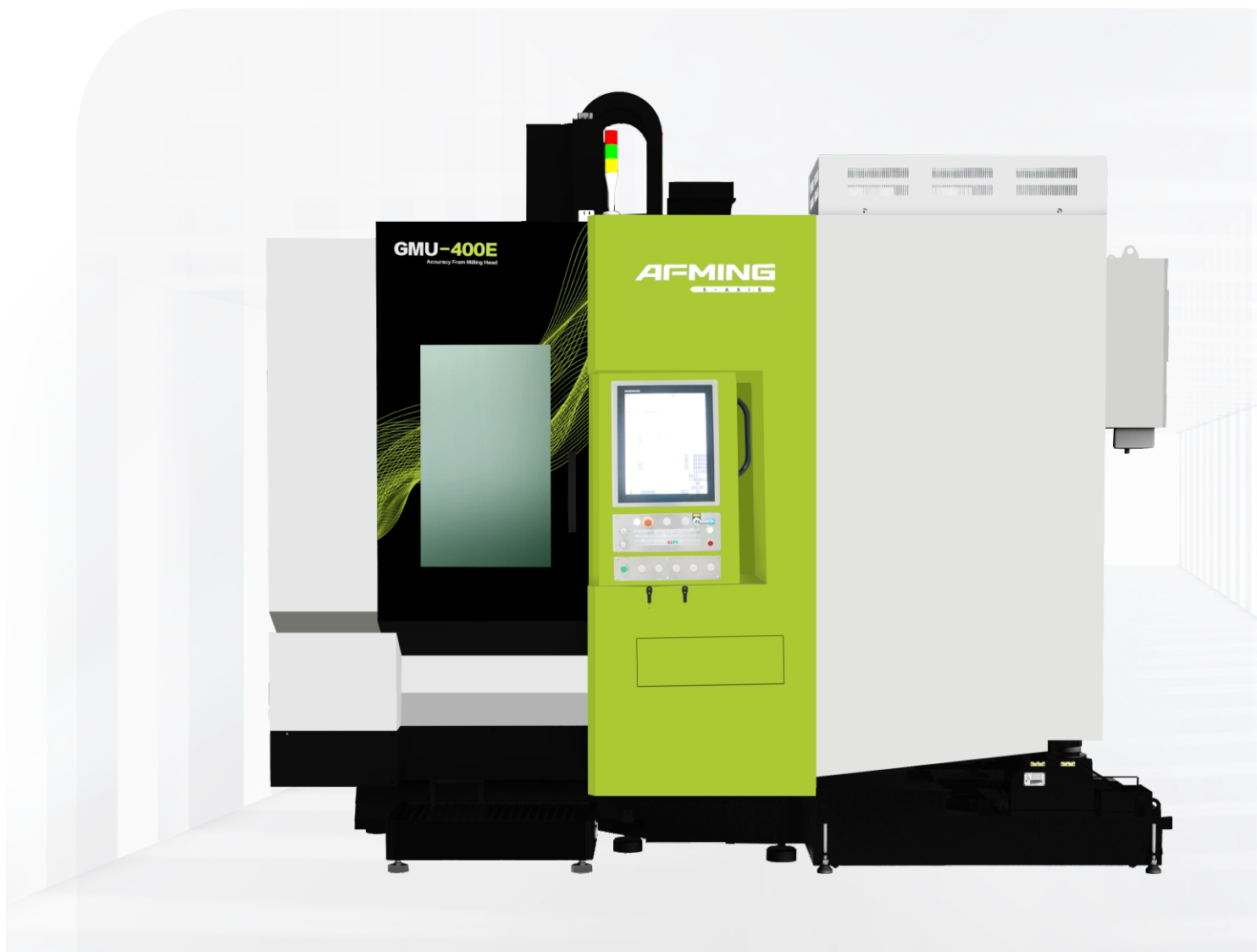


GMU-400E

Five-axis simultaneous machining center





Dongguan AFMING CNC Equipment Technology Co., Ltd. (abbreviated as AFMING) Founded in 2015, the company is a high-tech enterprise primarily engaged in high-end CNC machine tools, integrating R&D, production, sales, and services. It is a controlled subsidiary of Guangdong Topstar Technology Co., Ltd. (stock code: 300607), a leading listed robotics company in China, and has been awarded the title of "Specialized, Refined, Distinctive, and Innovative" SME in Guangdong Province. The company adheres to its corporate mission of "popularizing high-end five-axis CNC equipment," dedicating itself to five-axis technology to achieve domestic substitution of high-end five-axis equipment. It provides integrated high-efficiency machining solutions based on five-axis simultaneous machining centers for domestic industries such as aerospace, automotive, medical, mold making, and precision parts processing.



Compact high-efficiency five-axis simultaneous machining center

Ergonomic design

Compact Structure

- Machine floor space: 3535×3200×3275mm
- Machining diameter: 500mm
Machining height:400



High Precision / High Productivity

- X/Y/Z axis rapid traverse: 30/30/30 m/min
- Maximum cutting feed rate: 10 m/min
- A/C axis rapid traverse speed: 20/30 rpm/min
- Tool change time: 2.5 s

- Standard with hollow screw cooling;
- X/Y/Z axis positioning accuracy / repeatability: 0.005/0.003 mm (Heidenhain linear scale optional)
- A/C axis positioning accuracy / repeatability: 6/4 arcsec (standard with Heidenhain rotary encoder)
- Worktable optional with fixture port



GTRT Gear-Driven Rotary Table

A/C Axis: Servo motor + helical gear (patented dual anti-backlash technology)

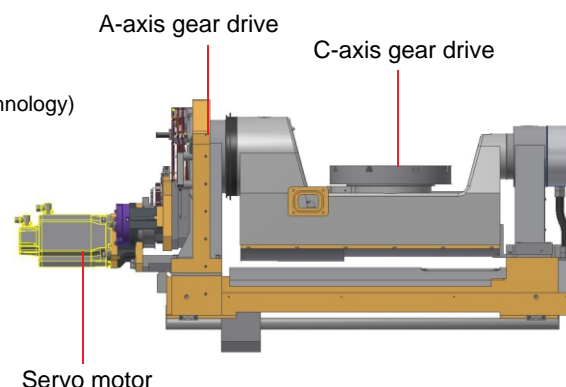
Travel (A/C): $\pm 120^\circ / 360^\circ$

Max. speed (A/C): 20/30 rpm

Max. torque (A/C): 1080/430 N·m

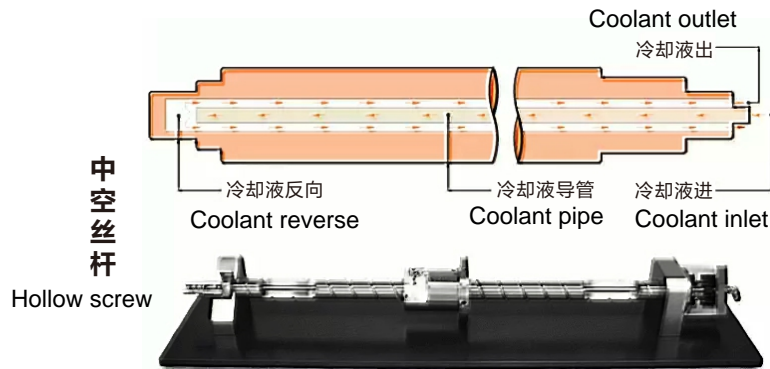
Accuracy (A/C): 6 arcsec / 4 arcsec

Load capacity: 150 kg



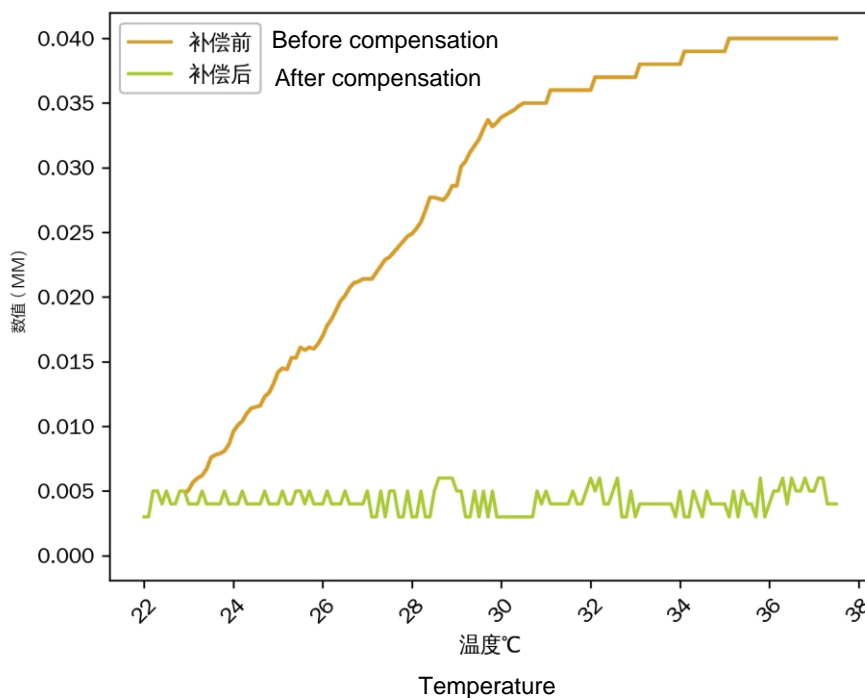
Technical Advantages

The GMU-400E adopts a fixed-beam high-rigidity gantry frame and P-class high-rigidity 35 mm roller guideways. Equipped with a high-performance electric spindle and a high-rigidity AC tilting rotary table with dual-gear anti-backlash drive (featuring a unique torsional damping mechanism to reduce torsional vibration), combined with hollow screw cooling technology, it ensures versatility in machining various materials, providing a reliable guarantee for efficient and high-precision machining in the mold, precision part, and automotive component industries.

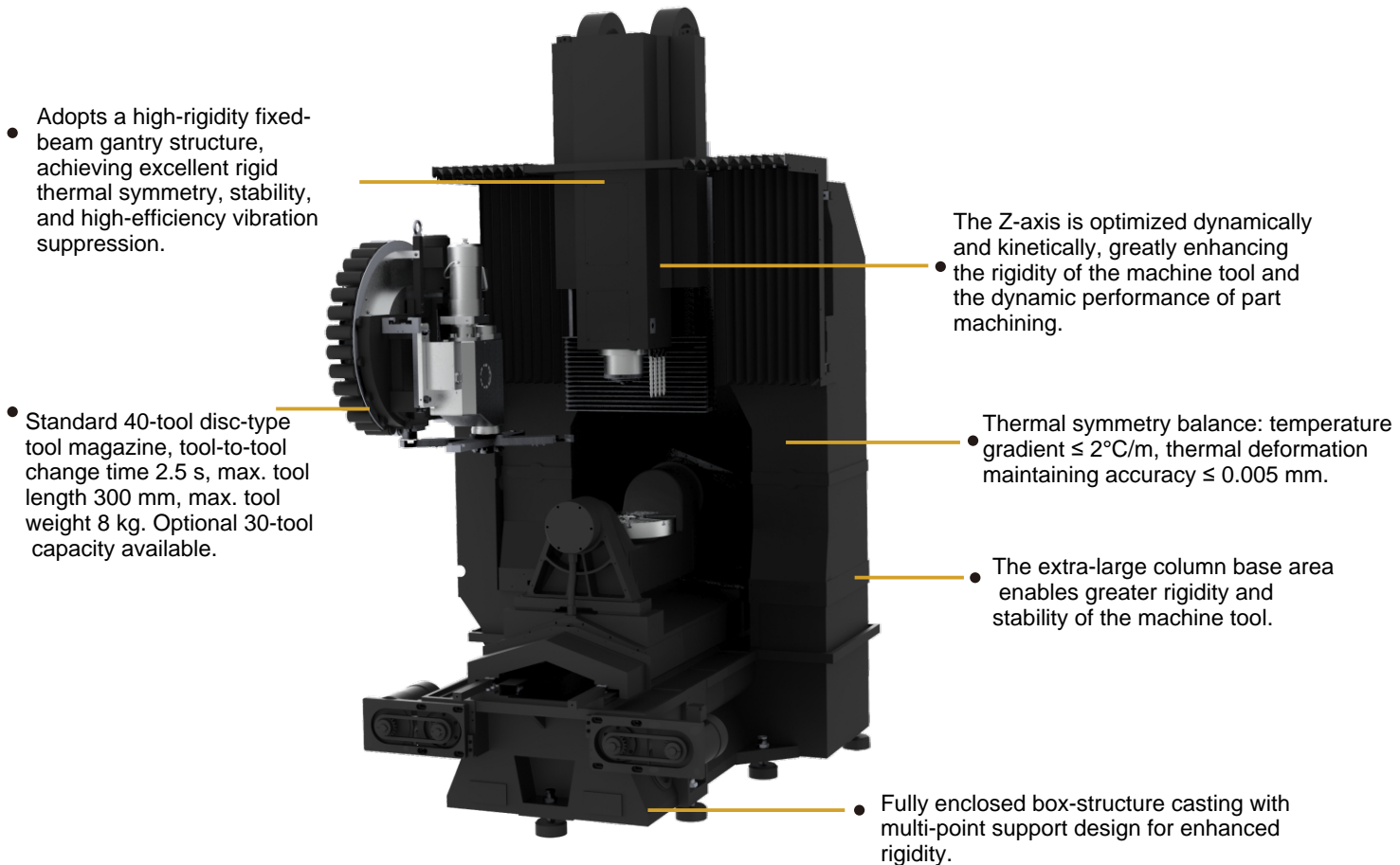


Line Chart of GMU-400E Machine Tool Before and After Temperature Compensation

By monitoring temperature changes in real time and dynamically adjusting output parameters, the issue of systematic errors caused by thermal drift is resolved, ensuring the system's stability and accuracy across the full temperature range. This significantly enhances the machine tool's reliability and environmental adaptability.



The GMU-400E is designed using finite element analysis and dynamic optimization, greatly enhancing the static and dynamic characteristics of each machine component to ensure the overall rigidity, stability, and dynamic accuracy of the machine bed structure.



Basic Environmental Requirements

Temperature and Humidity

Ambient temperature: $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$

Humidity: 80%

Power Supply

Supply voltage: 380V (+10%, -10%), 3-phase, 4-wire system

Supply frequency: 50Hz ($\pm 1\text{Hz}$)

Air medium: Non-corrosive medium

Air Source

Air source filtration accuracy: 100 μm ; inner diameter of air pipe: 10 mm; pressure: 6 – 10 kgf/cm^2

The air source must be equipped with a drying and filtration device

Foundation Requirements

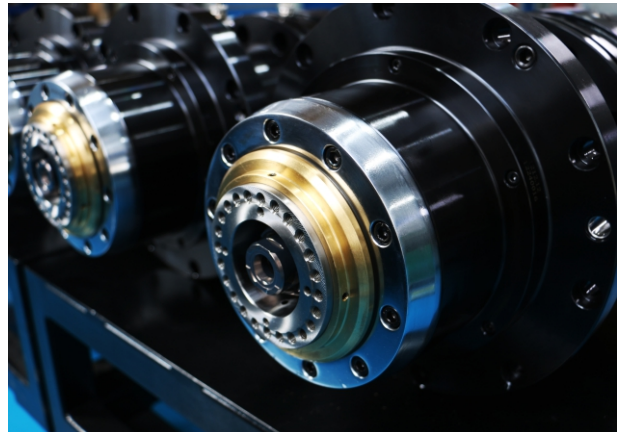
The machine tool must be installed on an independent foundation base, away from vibration sources. Temperature change within 30 minutes shall be $\leq 1^{\circ}\text{C}$ at an acceleration below $4.9\text{ m}/\text{s}^2$.

Dust particle density: $\leq 0.3\text{ mg}/\text{m}^3$

SUPER POWER Direct-Drive Spindle / Electric Spindle

Leveraging its high-end spindle R&D technology and proficient spindle maintenance skills in the industry, AFMING can quickly resolve user issues such as spindle maintenance, minimizing the user's operating costs.

- High rigidity, stability, and running accuracy of the spindle achieved through finite element analysis and optimized bearing span
- AFMING's spindle cooling and thermal elongation control technology ensures spindle performance, accuracy, and service life
- Innovative spindle bearing arrangement significantly increases spindle rigidity while effectively reducing thermal elongation
- Equipped with multiple spindle monitoring devices to effectively protect safe spindle operation
- Built-in power-enhanced drawbar mechanism greatly extends spindle service life
- Industry-leading spindle maintenance technology: timely, fast, and cost-effective

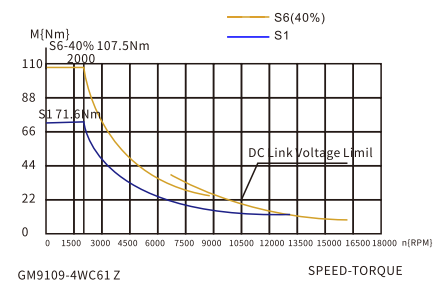
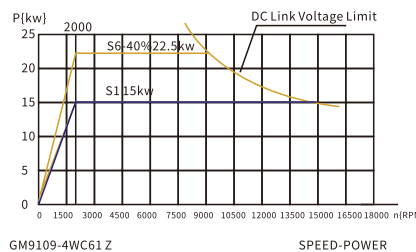


15000 rpm Direct-Drive Spindle HSK-A63

High-rigidity, high-torque spindle offers excellent heavy-duty milling and high-efficiency machining capabilities

22.5 kW
Power (max. output power)

107.5 N.m
Torque (max. output torque)

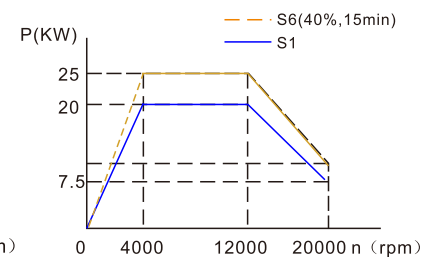
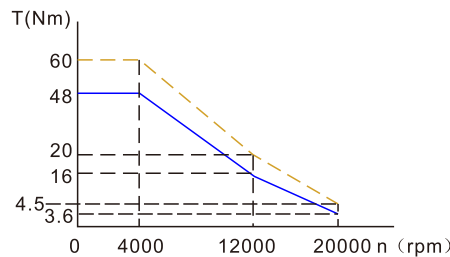


20000 rpm Electric Spindle HSK-A63

Maximized high speed and high rigidity for a wide range of applications

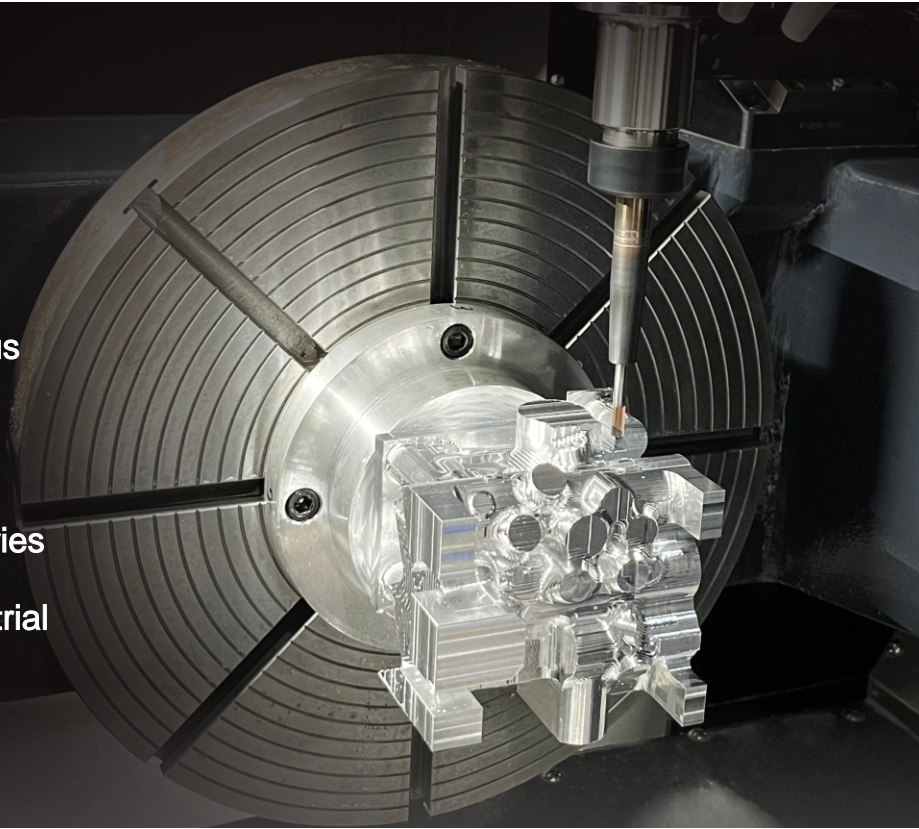
25 kW
Power (max. output power)

60 N.m
Torque (max. output torque)



Application Solutions

The GMU-400E five-axis simultaneous machining center features excellent rigidity, fast response, and stable accuracy. It is particularly suitable for multi-face and five-axis simultaneous machining of complex parts in industries such as small molds, automotive components, civil aviation, and industrial machinery.



Application in the Medical Device Field

In the field of medical device part machining, orthopedic implants cover multiple subcategories such as trauma, joints, spine, and sports medicine, as well as the machining of orthopedic surgical instruments.



fully milled bone plate



meniscus



heart pump impeller



medullary cavity retractor

Application in Robotics

Right Hip Rotating Actuator Exoskeleton

Dimensions: 95x96x84.5mm

Material: 6061 aluminum alloy

Machining time: 3h18min

Machining characteristics: Cylindricity of holes $<3\mu\text{m}$, concentricity of paired holes $<15\mu\text{m}$, perpendicularity between hole and face $<10\mu\text{m}$; continuous and stable batch production process, product yield exceeding 98%.



Control System

High-end CNC system for safe machining and high precision

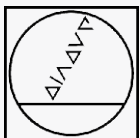
The GMU-400E is equipped with world-leading CNC system suppliers: HEIDENHAIN TNC620 and SIEMENS ONE high-end five-axis simultaneous CNC machine tools, enhancing machine data performance. In addition, an optional configuration of five-axis four-linkage is available, offering customers a variety of choices.



SIEMENS Control System

Powerful CNC machine control platform

- Simple interactive programming method
- No additional documentation required during programming
- Rich cycle support
- Pre-machining simulation ensures high reliability
- High-efficiency tool management



HEIDENHAIN

海德汉

This machine tool adopts the HEIDENHAIN iTNC 620 system. The spindle drive unit, feed drive unit, AC spindle motor, and AC feed servo motor are all original feed components, featuring advanced performance, stability, and reliability.



HEIDENHAIN iTNC 640 System

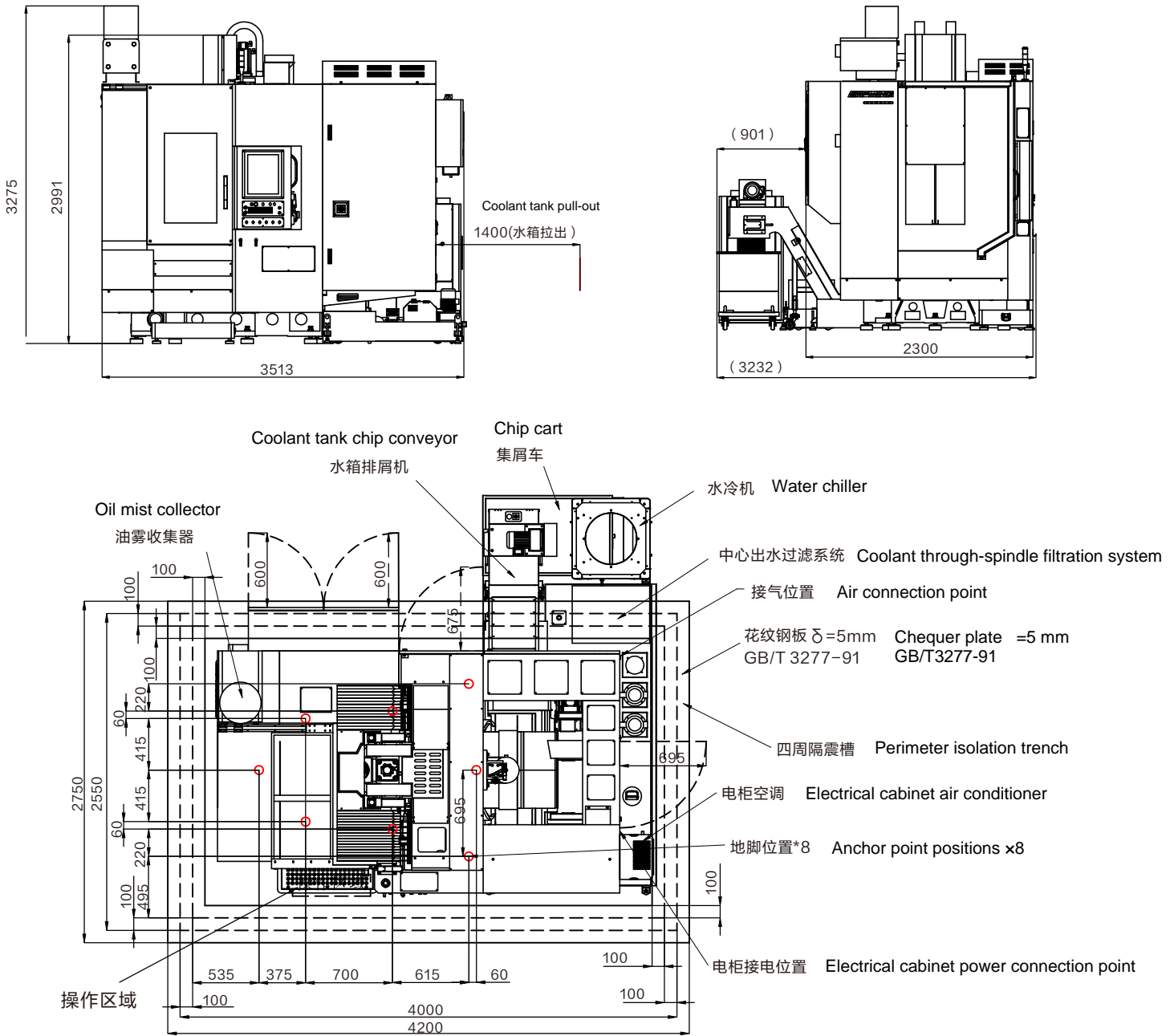
This CNC system ensures comprehensive automation of the machine tool and provides a wealth of functions required for easy and efficient programming, e.g., the host unit and TNC keyboard, as well as a clear 19-inch large TFT color flat-panel display. It offers comprehensive information on program editing, operation, CNC system, and machine inspection, including program blocks, comments, and error messages. Graphics during program input, test run, and actual machining provide even more information. Optional split-screen display shows the part program block on one half of the screen and graphics or status information on the other. While a program is running, the status bar displays tool position, current program, coordinate transformations, etc.

Machine Tool CNC System – Operating System

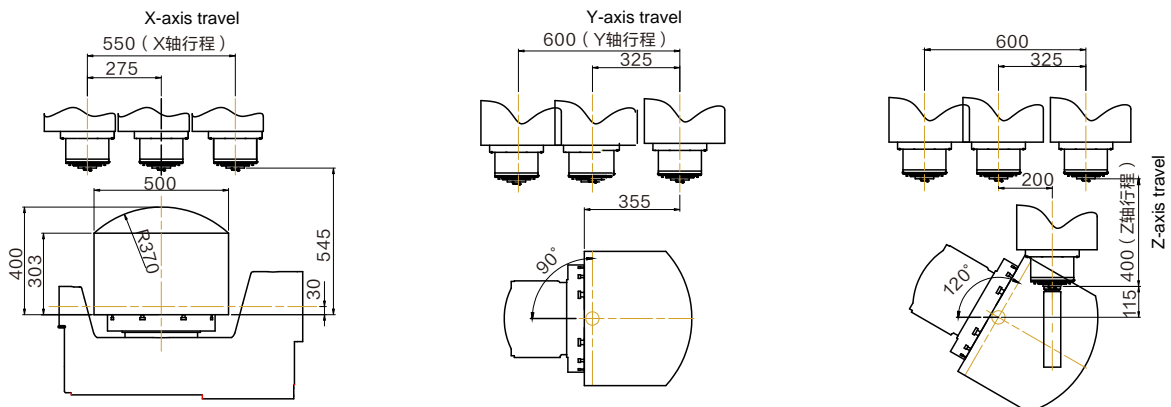
HEROS Real-Time Operating System

- Input resolution and display step for linear axes: to 1 μm
- Rotary axes: to 0.001°
- Input range: max. 9,999,999,999 mm or 999,999,999°
- Interpolation: 4-axis linear interpolation, including spindle
- Option 9: 2-axis circular interpolation
- Block processing time: 0.5 ms (3-D straight line without radius compensation)
- Error compensation: linear and non-linear errors, backlash, reversal peaking for circular motion, thermal expansion, and static friction
- Data interfaces: one RS-232-C/V.24 and one RS-422/V.11, max. speed 115 Kbps
- Diagnostics: built-in diagnostic tools for fast and convenient troubleshooting

整机布置图

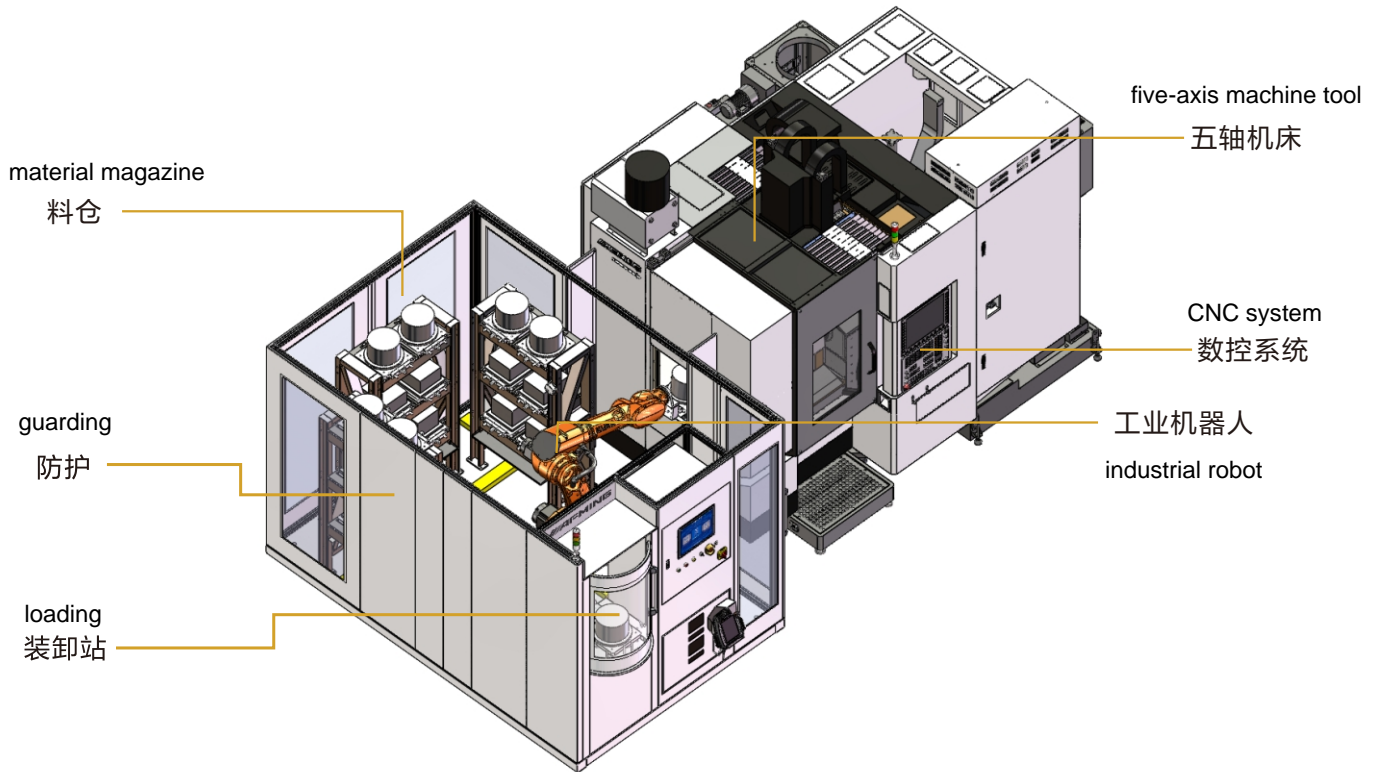


Machining interference diagram



Automation Solution

In the field of high-end precision manufacturing, efficiency and accuracy are the eternal core competitiveness. The perfect integration of five-axis machining centers and industrial robots for automated loading and unloading aims to create an unmanned, highly flexible smart production cell, leading you into a new era of intelligent manufacturing.



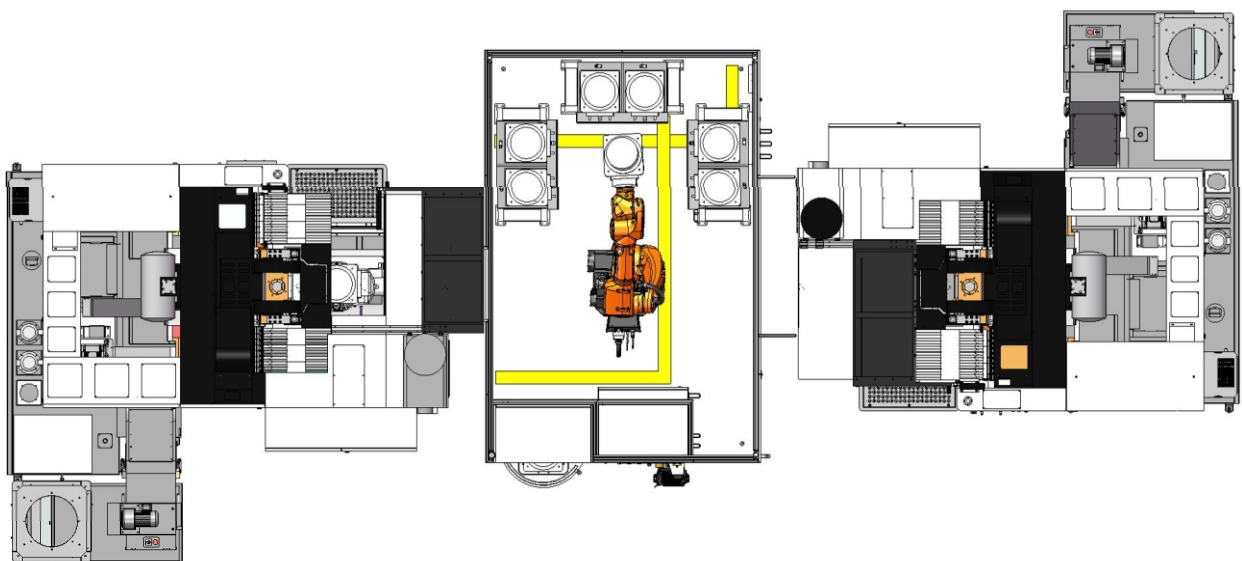
ultimate
precision

unattended
operation

high flexibility

consistent
quality

safety
upgrade



GMU-400E Machine Technical Specification Sheet

Description	Unit	GMU-400E
Travel		
X/Y/Z axis travel	mm	550/600/400
A/C axis travel	deg	±120/360
Distance from spindle end to worktable (A-axis at 0°)	mm	145~545
Worktable size	mm	Φ400
Max. load capacity	kg	150
Spindle		
Max. spindle speed / taper (standard)	rpm	15000 / HSK-A63 (direct-drive spindle)
Spindle power (S6-40%)	kW	22.5
Torque (S6-40%)	N·m	107.5
Max. spindle speed / taper (optional)	rpm	20000 / HSK-A63 (electric spindle)
Spindle power (S6-40%)	kW	25
Torque (S6-40%)	N·m	60
Feed System		
X/Y/Z rapid traverse	m/min	30/30/30
Max. cutting feed rate	m/min	10
Acceleration	m/s ²	5
A/C axis rapid speed	rpm	20/30
Positioning / repeatability accuracy (with linear scale)	(GB17421.2-2000)	
X/Y/Z	mm	0.005/0.003
A/C	<u>arcsec</u>	6/4
Automatic Tool Changer		
Number of tools	<u>pcs</u>	40T
Tool change time (tool-to-tool)	sec	2.5
Max. tool length	mm	300
Max. tool diameter / adjacent empty	mm	Φ65/Φ130
Max. tool weight	kg	8
Machine Dimensions		
Overall height	mm	3275
Floor space (L × W)	mm ²	3535×3200
Net weight	kg	8500
Power requirement	kW	40
Description	Unit	GMU-400E

Standard Configuration

1.CNC system: HEIDENHAIN 620/640
Five-axis calibration package

2.AFM direct-drive spindle 15000 rpm / HSK-A63
Spindle chiller
Spindle air curtain dust prevention system

3.40T disc-type tool magazine

4.Chip removal system
Scraper-type chip conveyor
Machine cleaning water gun
Full splash guarding
Coolant system
Machining air blow

5.A/C axis rotary encoders (Heidenhain)

6.Automatic lubrication (grease)

7.Work light, warning light, electrical cabinet air conditioning system, tool kit, anchor bolts, operation manual

8.Hollow ballscrew

※ As the company's R&D continues to innovate, the actual machine configuration may differ from this sample table. Please refer to the actual sales for confirmation.