

THINK HEAD



Profile Grinding Machine

成形磨

找星合



3 R&D AND PRODUCTION BASE

16⁺ INVENTION PATENT

6⁺ SOFTWARE COPYRIGHT

70⁺ UTILITY MODEL PATENT

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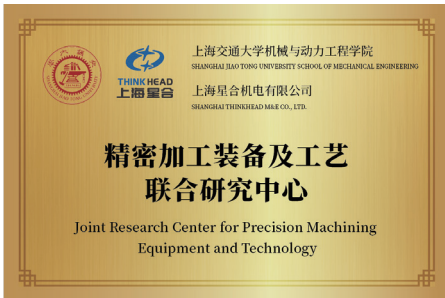
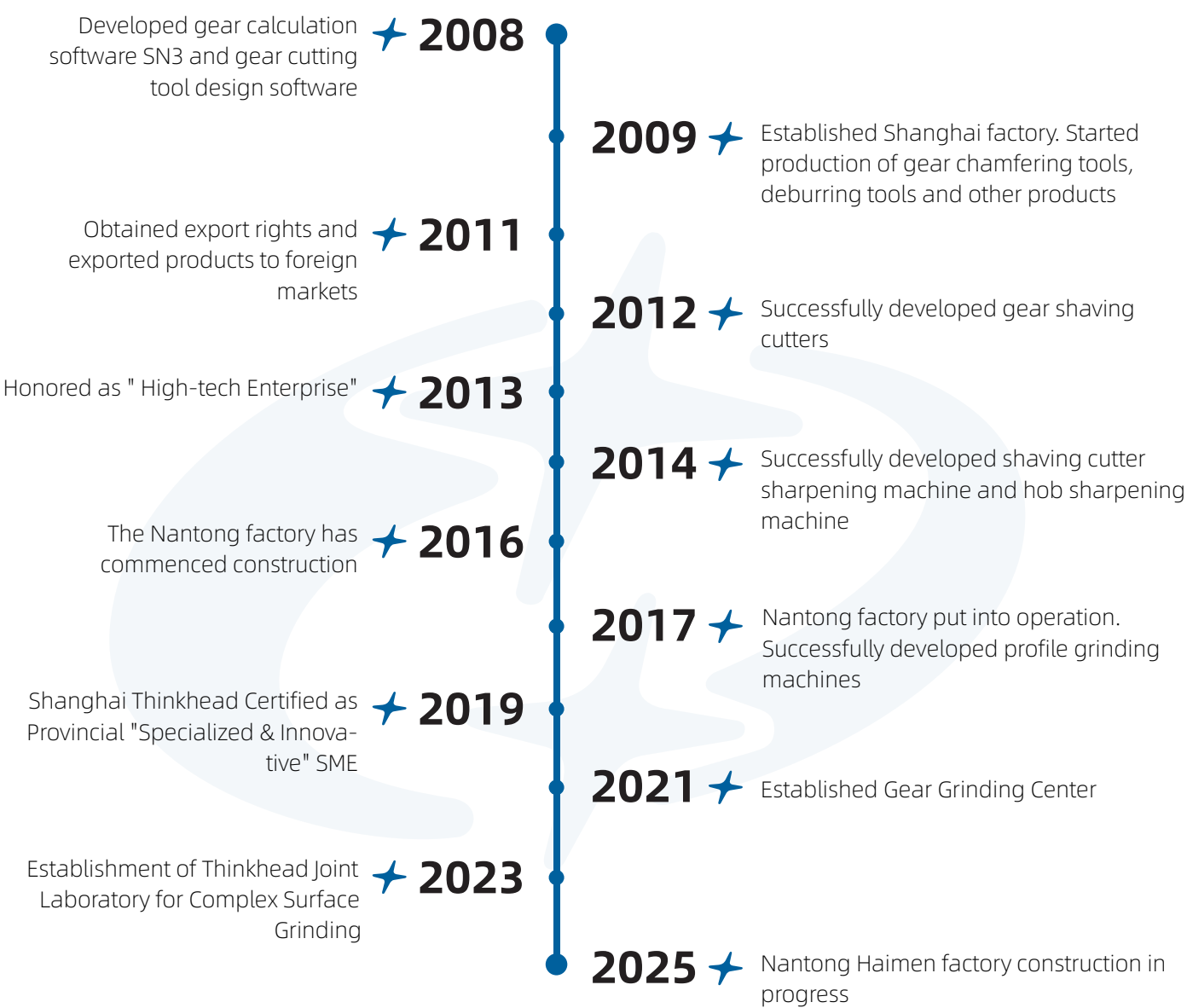
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Company Milestones



Overview Of the Company's Development

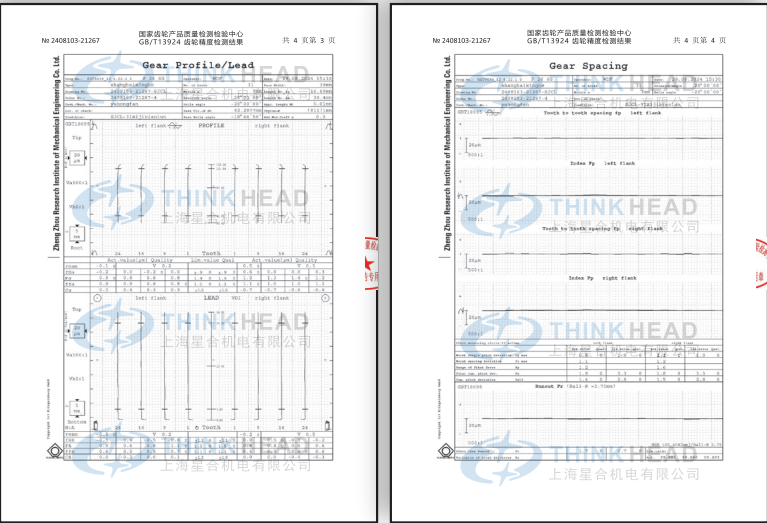


Shanghai Thinkhead M&E Co., Ltd. which was established in 2009 as a leading enterprise in profile gringding machine, dedicates to the research and manufacture of precision machine tools. Its products cover a precision machine tool matrix including three series of profile grinding machine,CNC thread grinding machine, and machining centers. It can be widely applied in industries such as automobile manufacturing, robotics, wind power, semiconductor components, precision reducers, etc. Three major R&D and production bases that are situated in Baoshan in Shanghai, Tongzhou Bay&Haimen in Nantong, with a total area of over 100 thousand square meters have composed a complete supply chain "research-development-production-sales service".

Currently, Thinkhead has mastered the key technologies of multiple core components including high-speed spindles, high-precision indexing heads, numerical control systems and so on, and has realized mass production,possessing independent and controllable full-process R&D and production capabilities. Thinkhead also participated in major national science and technology project of "High end CNC machine tools and basic manufacturing equipment", set up joint research centers with Shanghai Jiao Tong University and Donghua University,and established the" Joint Laboratory for Complex Surface Grinding" with Spanish Fagor to push the limits of technology continuously.

In future, Thinkhead will continue to be being guided by Integrated design of electromechanical control and software, supported by micron-level grinding and low-stress manufacturing, high-lighted by high-speed spindles and direct-drive heavy cutting, and take numerical control systems and machine tool materials as the underlying breakthrough directions.Thinkhead possesses comprehensive technology system. It iterates quickly to advance toward the world-class level.

Shanghai Baoshan Gear Grinding R&D Center



Located in Shanghai's Baoshan District.

Gear Grinding R&D Center conducts hardware validation testing, software algorithm optimization and functional enhancement development.

Machine Tool Demonstration Center is Open for customer visits with live machining show-cases.

Technical Training Center covers machine operation certification, maintenance & warranty protocols and precision gear machining techniques.

Prototype grinding services, NVH improvement R&D, Trial production machining.

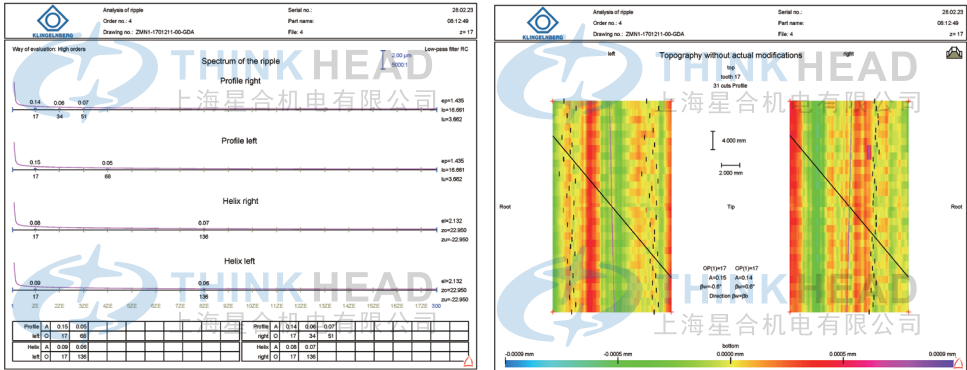
Co-establishment of "Joint Research Center for Precision Machining Equipment and Technology" with Shanghai Jiao Tong University school of Mechanical Engineering.

Co-creation of "United Laboratory for Complex Surface Grinding" with Fagor Automation España.

Thinkhead features a Gear Grinding Center that collaborates with clients on trial grinding operations, pioneers exploration in advanced fields, and undertakes corporate R&D missions including hardware testing and software optimization.

The facility houses a Training Center delivering comprehensive programs covering machine operation, maintenance, warranty services and related technical training.

- Efficient production management
- Full-cycle R&D Capabilities
- Technical management team
- Robust Production Capacity Reserves



Nantong Tongzhou Bay Production Base



The Nantong production base encompasses the vast majority of manufacturing processes related to machine tool production, including casting processing, casting tempering, spindle manufacturing, oil tank manufacturing, turning, milling, drilling and grinding.

ThinkHead always emphasizes the application of advanced equipment, and now possesses a range of world-class measuring and machining equipment, including Klingelnberg measuring centers, Zeiss coordinate measuring machines, Mitutoyo roundness testers, Nicolas gantry type five-face machining centers, and high-end industrial machine tools from Japan.

ThinkHead has achieved the first-class capability in low-stress manufacturing. The machine tool castings apply four steps of stress-relief treatment, which can guarantee the stability and durability of machines.

Nantong Haimen Production Base

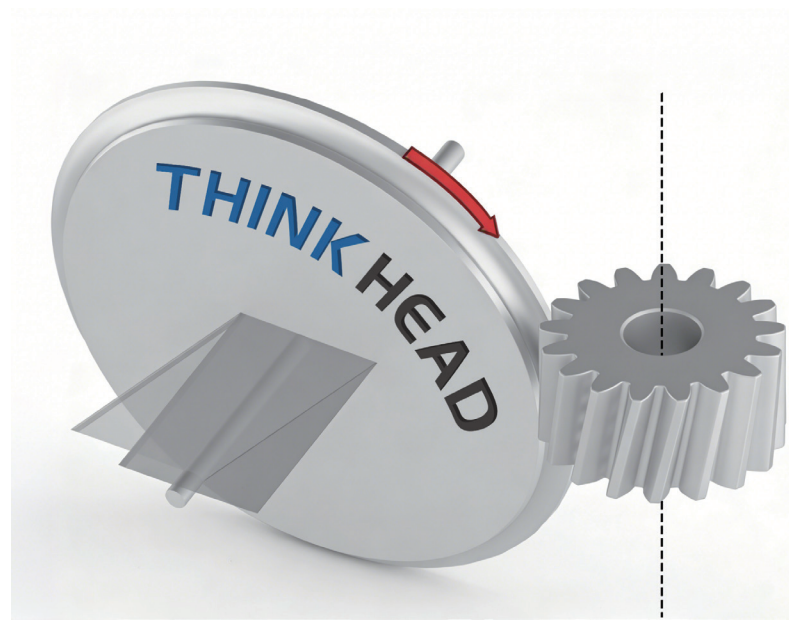


Haimen Production Base is under construction. As Thinkhead's third production base, the 150-acre facility has the capacity to increase its output to satisfy market demands in premium gear manufacturing machines.

Phase I covers an area of 50 mu (approximately 3.33 hectares) and can achieve an annual production capacity of 200 light machine tools and 100 heavy machine tools. It will start production in May 2026, with an annual production capacity of 800 high-end machine tools.

The facility utilizes solar power and ground-source heat pumps to achieve low-carbon operations, certified as a green factory.

Profile Grinding Characteristics

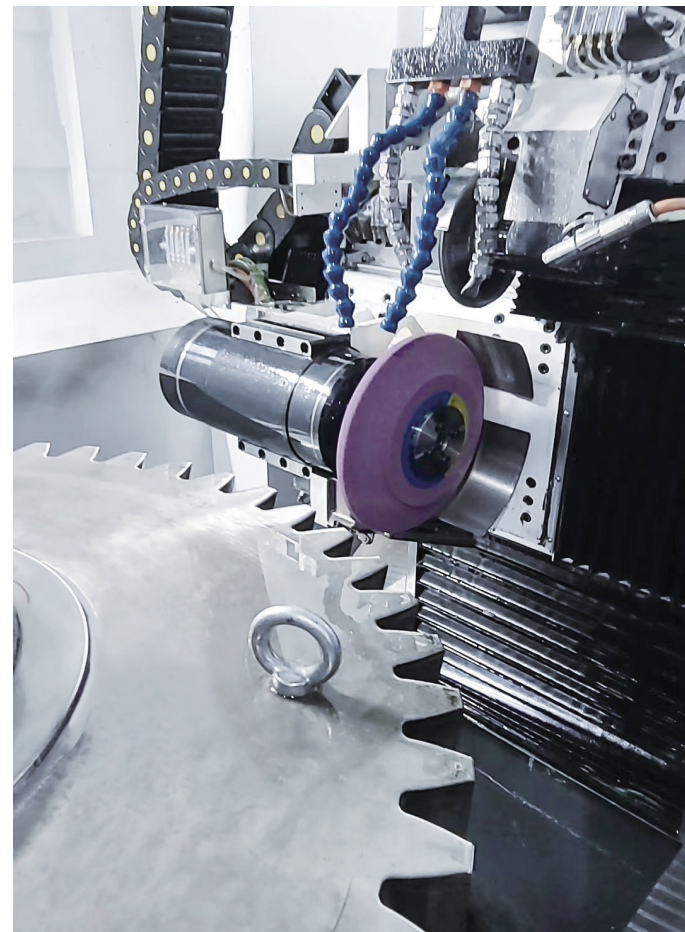
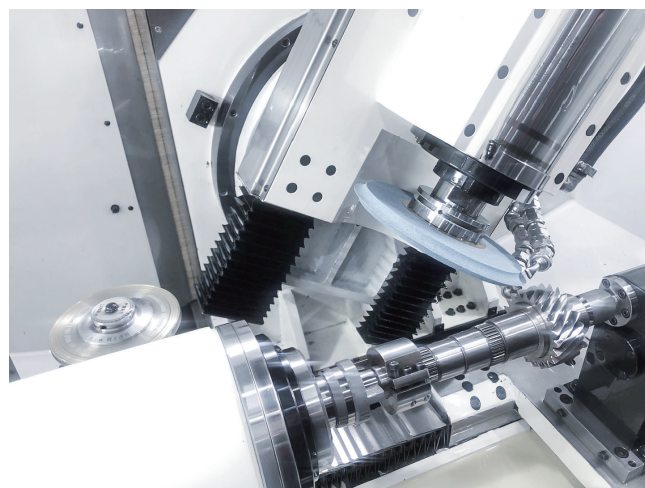


Precise modification of grinding wheel, strong machine control capability, and high adjustment feasibility promise high-level grinding accuracy.

Equipped with powerful control software, which offers the various non-standard modification of gear leads($fH\beta$, $C\beta$ etc.) and profiles (fHa , Ca etc) included free twist arbitrary modification.

Large scope of grinding processing, satisfy the demands of large, medium, and small modules.

It is not necessary to customize the dresser, grinding wheel, and fixture, which can improve the efficiency of multi category processing.

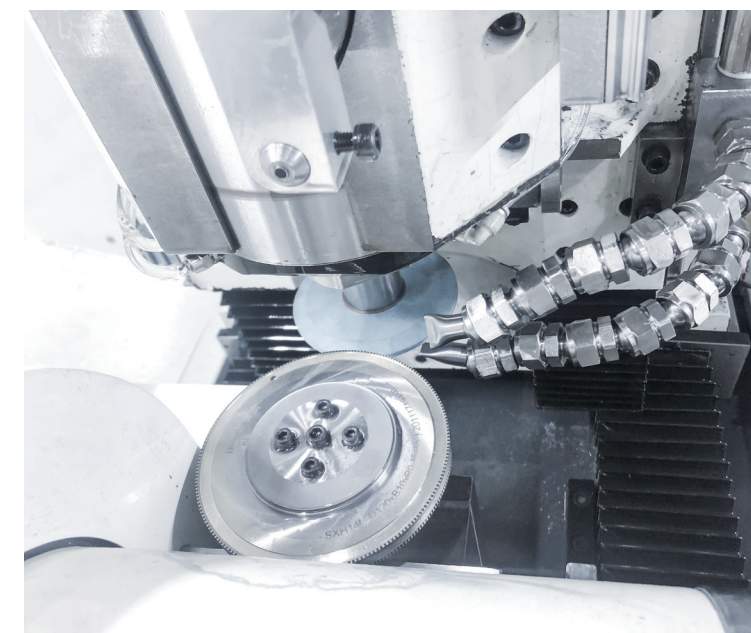


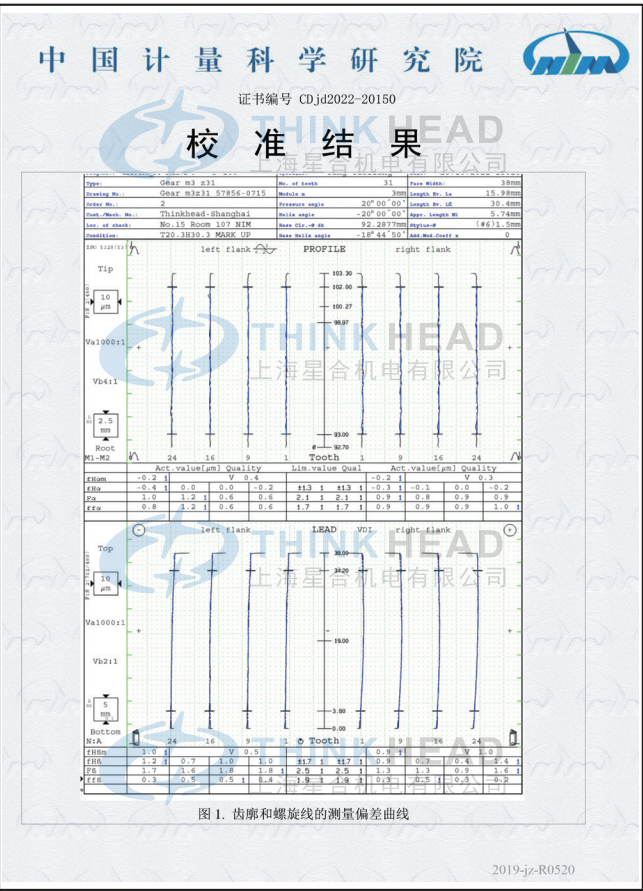
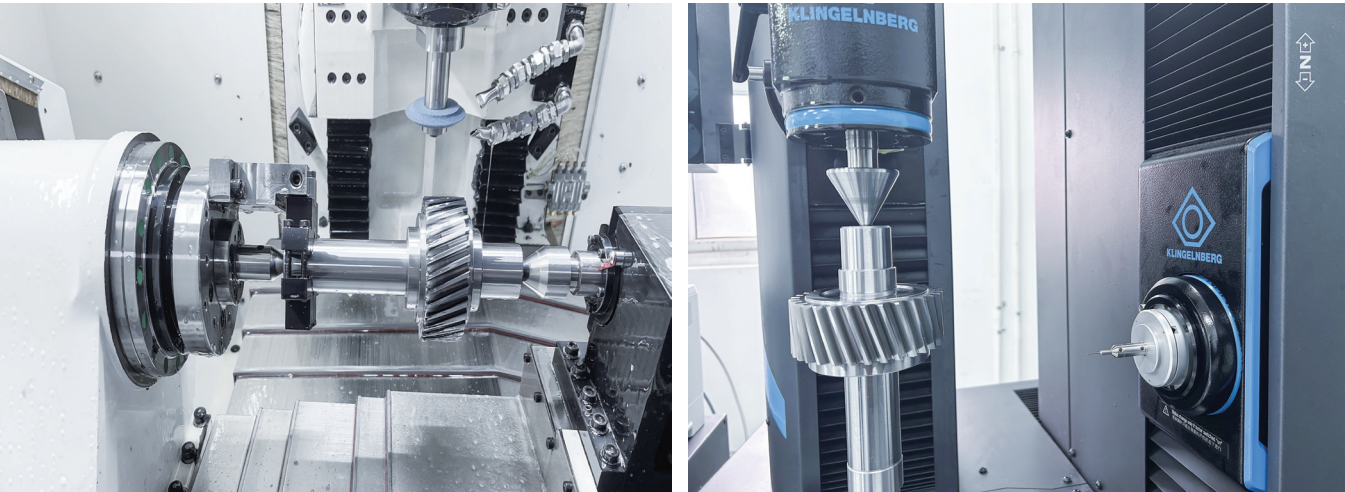
ThinkHead Profile Grinding Solutions



Advantages of the Machine Tool

1. Specialized and independent R&D and innovation capabilities offers optimal gear grinding solutions to customers continuously.
2. The self-developed control software enables automatic machine compensation and various gear modifications.
3. Gear grinding accuracy reaches DIN1, moving towards DIN0, reaching the top level around the world.





Past

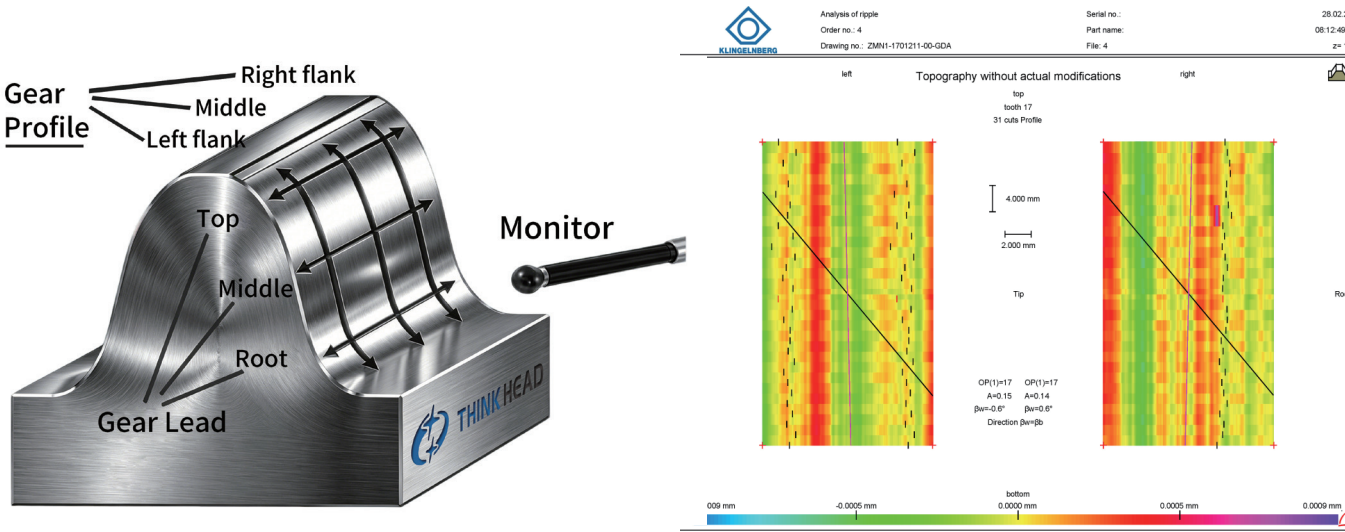
The imported machine tools accounted for 70% in Chinese market. The machines from German, Swiss, U.S., Italy and Japan dominated the premium market.

The premium market of grinding machine in China relied on foreigner machines.

Present

Thinkhead's Profile grinding machines have successfully resolved the "bottleneck" issue in new energy vehicle (NEV) gear grinding.

- 6-axis CNC control, achieving DIN1, reaching top standard in the world.
- Succeed in research and application of free twist modification and Fourier-based control, which has filled in the domestic shortcoming and become the imported substitution.



Low-Stress Manufacturing

Traditional machine tool castings suffer from high residual stress, leading to accuracy degradation over time—a key factor in the precision durability gap between Chinese and foreign machine tools.



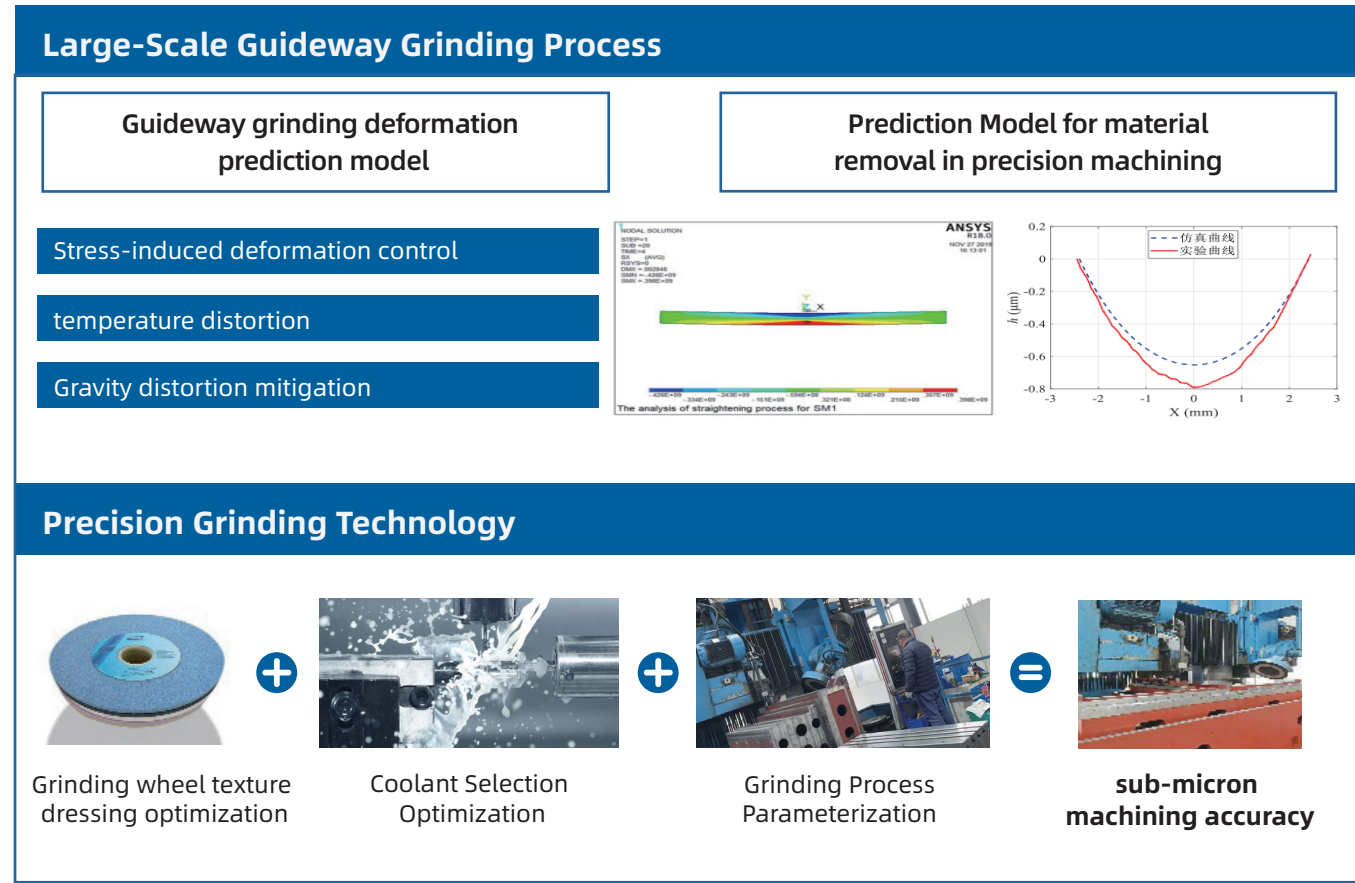
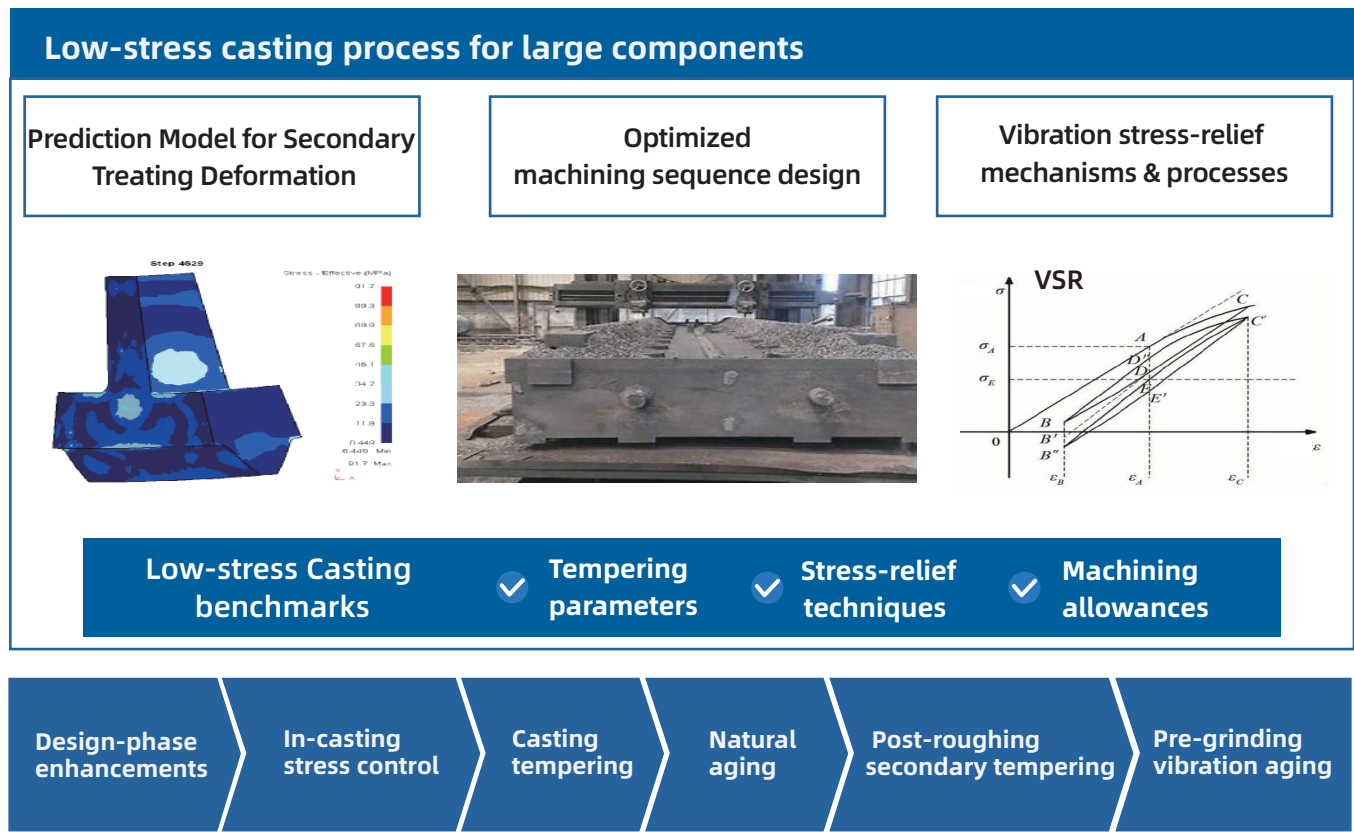
Thinkhead's independently developed low-stress manufacturing system controls residual stress below 30 MPa, matching global top-tier benchmarks. This technology also applies to machining center castings.

Micron-Level Grinding Technology

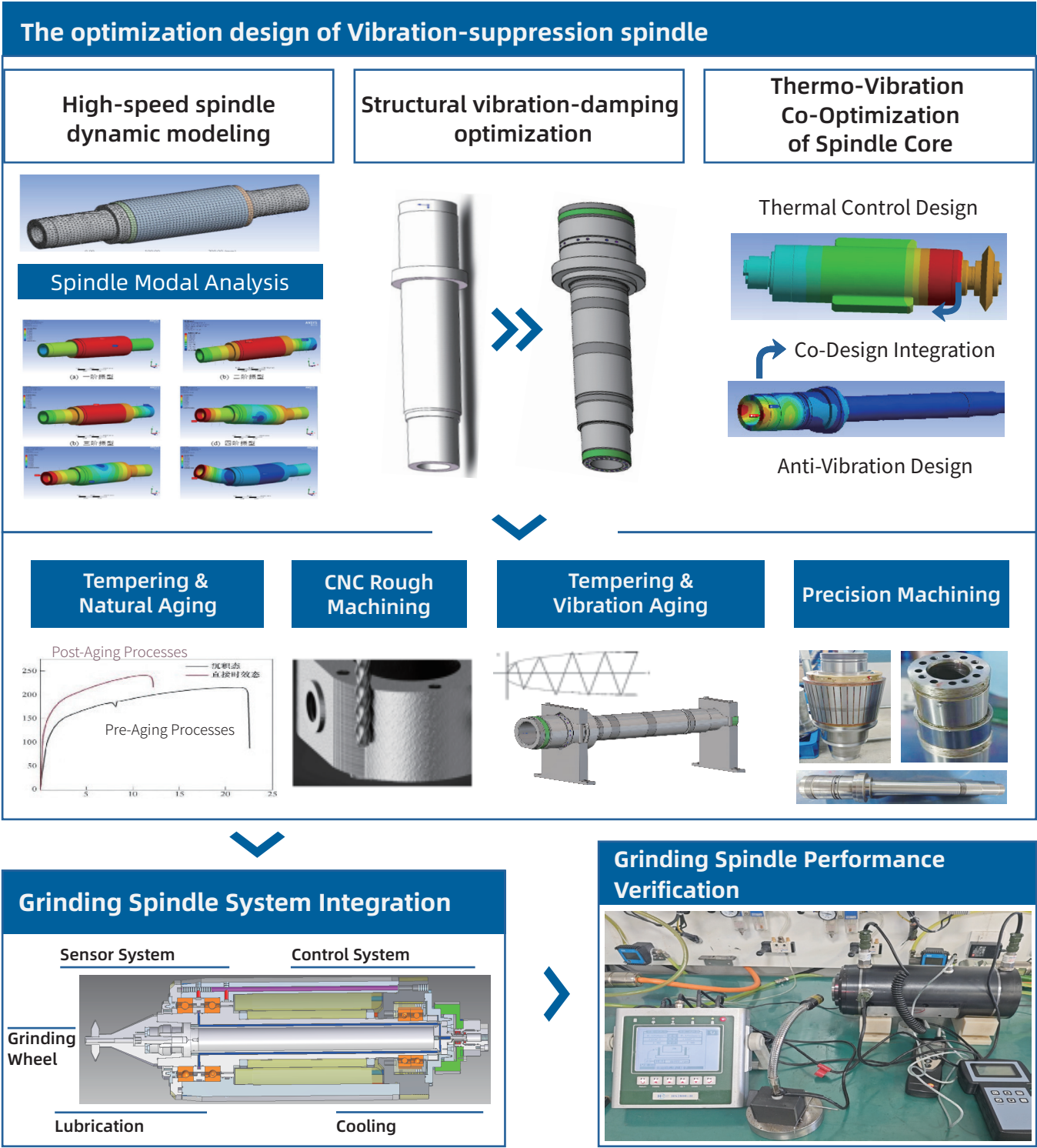


This technology can also be used to manufacture components for machining centers.

The guideway mounting surfaces, characterized by large dimensions and low rigidity, are prone to vibration, clamping force distortion, and gravity-induced deformation during machining, making it exceptionally difficult to achieve micron-level precision. Thinkhead's independently developed micron-level grinding technology achieves $\leq 4\mu\text{m}$ straightness and parallelism on 1-meter-long guideway surfaces, providing critical support for ultra-precision gear grinding requirements.

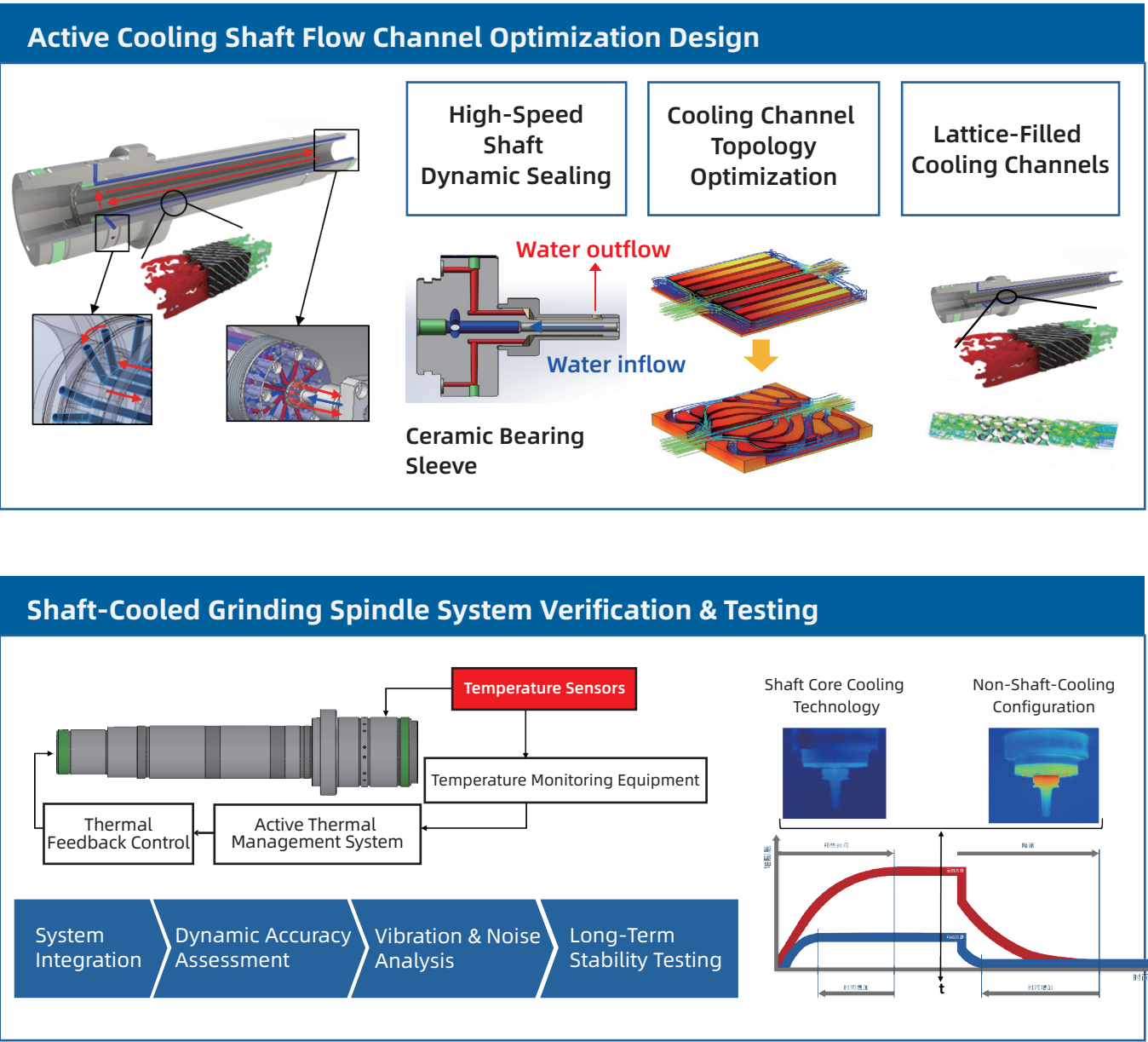


High-Speed Spindle



Key Metrics: HSK63 spindle with grease lubrication: 20,000 rpm max
Grinding spindle rigidity: $\geq 25 \text{ kg}/\mu\text{m}$ (radial/axial)
Milling spindle rigidity: $\geq 35 \text{ kg}/\mu\text{m}$ (radial/axial)
Reaching internationally leading standards

Shaft Core Cooling



Results: The core-cooling feature has been implemented on manual tool-changing spindles and is now in mass production, being applied to high-end version profile grinding machines.

$\leq 8\mu\text{m}$ axial thermal expansion after 20-minute operation at 10,000 rpm.

Forward Design

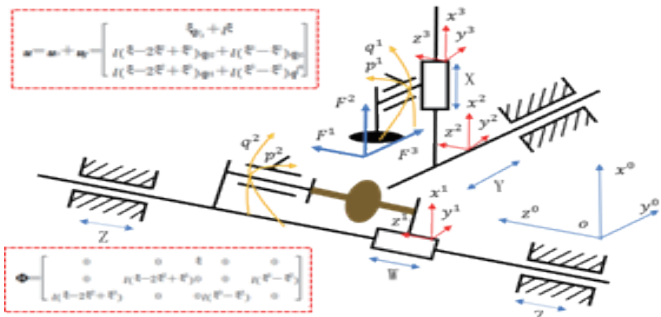
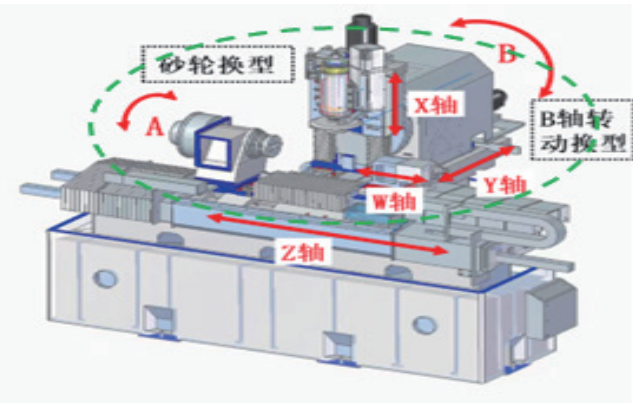
Forward design understands not just the 'how', but the 'why', requires profound expertise in mathematics, mechanics, and mechanical design.

Rare domestic machine tool manufacturers have mastered comprehensive forward design methodologies.

Thinkhead is committed to forward design. While forward design entails higher initial costs, its mastery unlocks universal adaptability – enabling customized machine tools for diverse applications through iterative optimization, ultimately achieving engineering excellence.

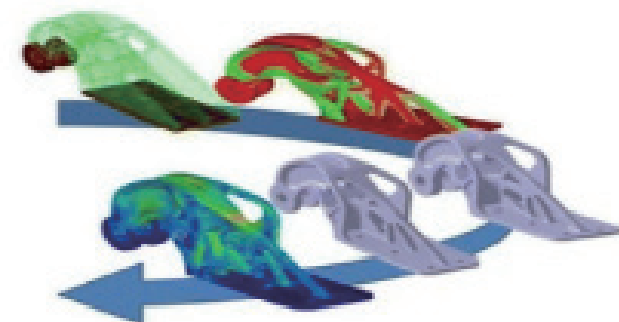
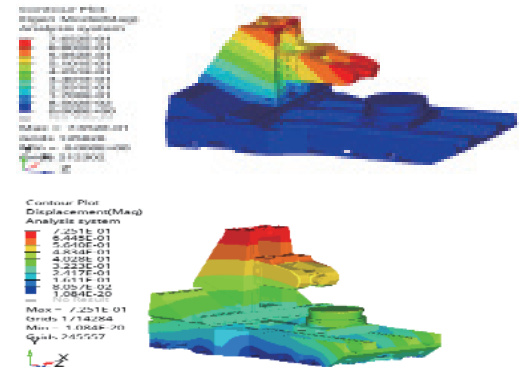
Flexible Co-Design of Moving Components

Machine Tool Dynamics Model



Simulation Analysis

Structural Topology Optimization

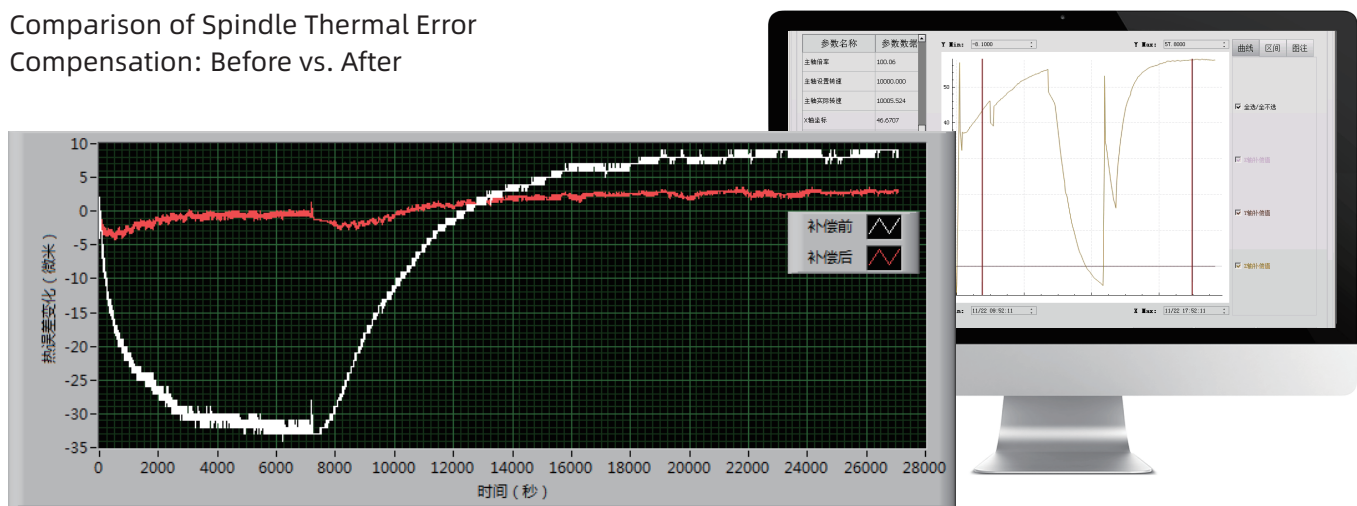


Thermal Compensation Technology

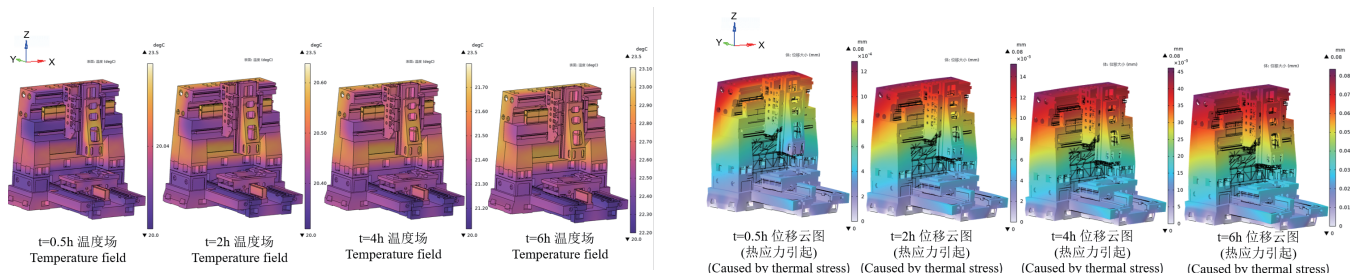
Proprietary thermal compensation system includes functions such as spindle thermal expansion compensation and structural compensation.

By utilizing high-precision, highly sensitive temperature sensors distributed across the machine tool body and spindle, the system monitors real-time temperature variations in the spindle, machine structure, and surrounding environment. Combined with a tailor-made thermodynamic compensation algorithm for each machine, it dynamically corrects structural deformations caused by thermal effects through real-time CNC system adjustments. This ensures consistent positioning accuracy despite temperature fluctuations, maintaining the tooltip's dynamic precision within specified tolerances at all times and across all working conditions to meet customers' machining accuracy requirements.

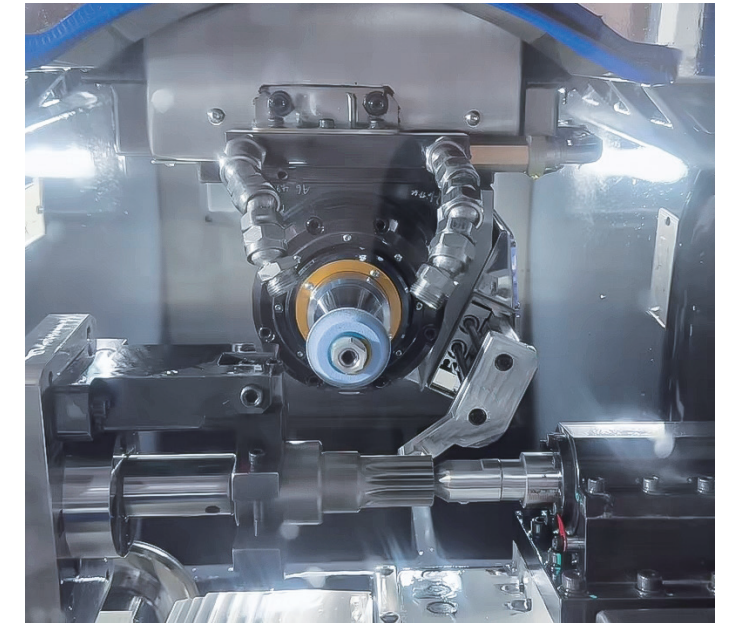
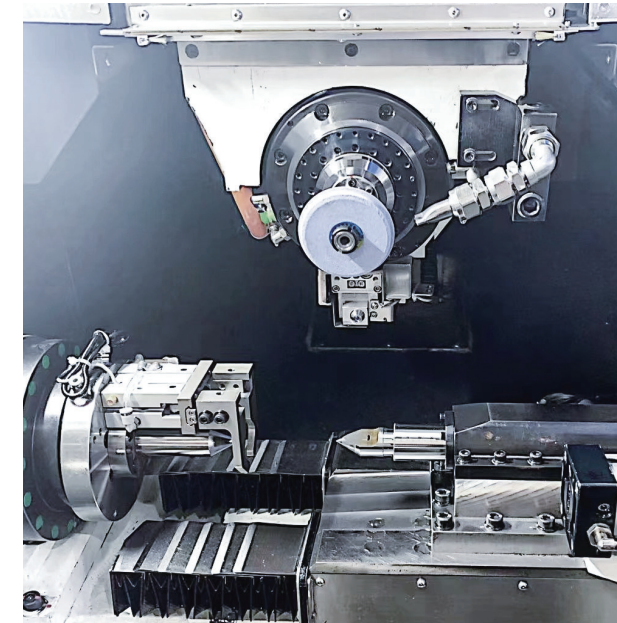
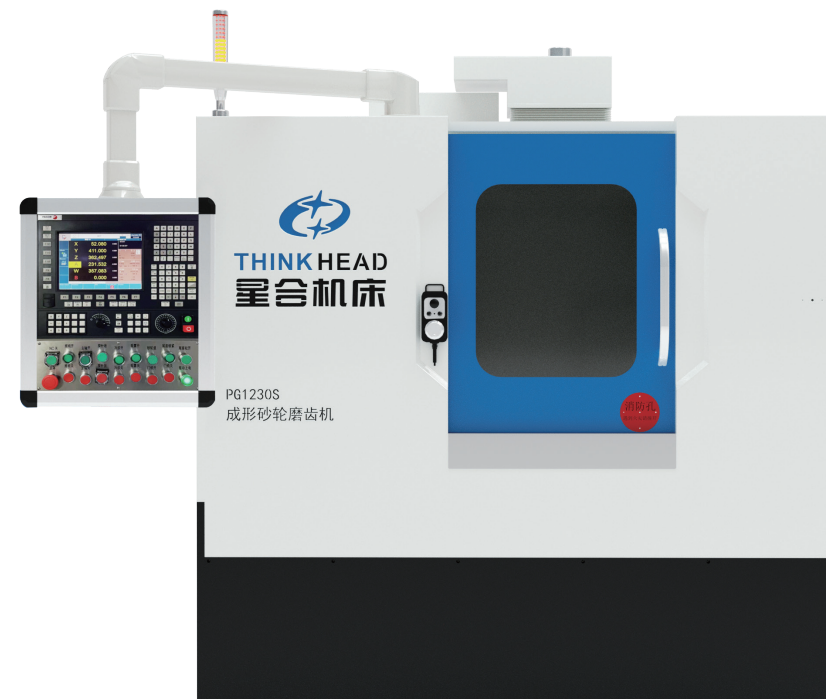
Comparison of Spindle Thermal Error Compensation: Before vs. After



Thermal imaging comparison



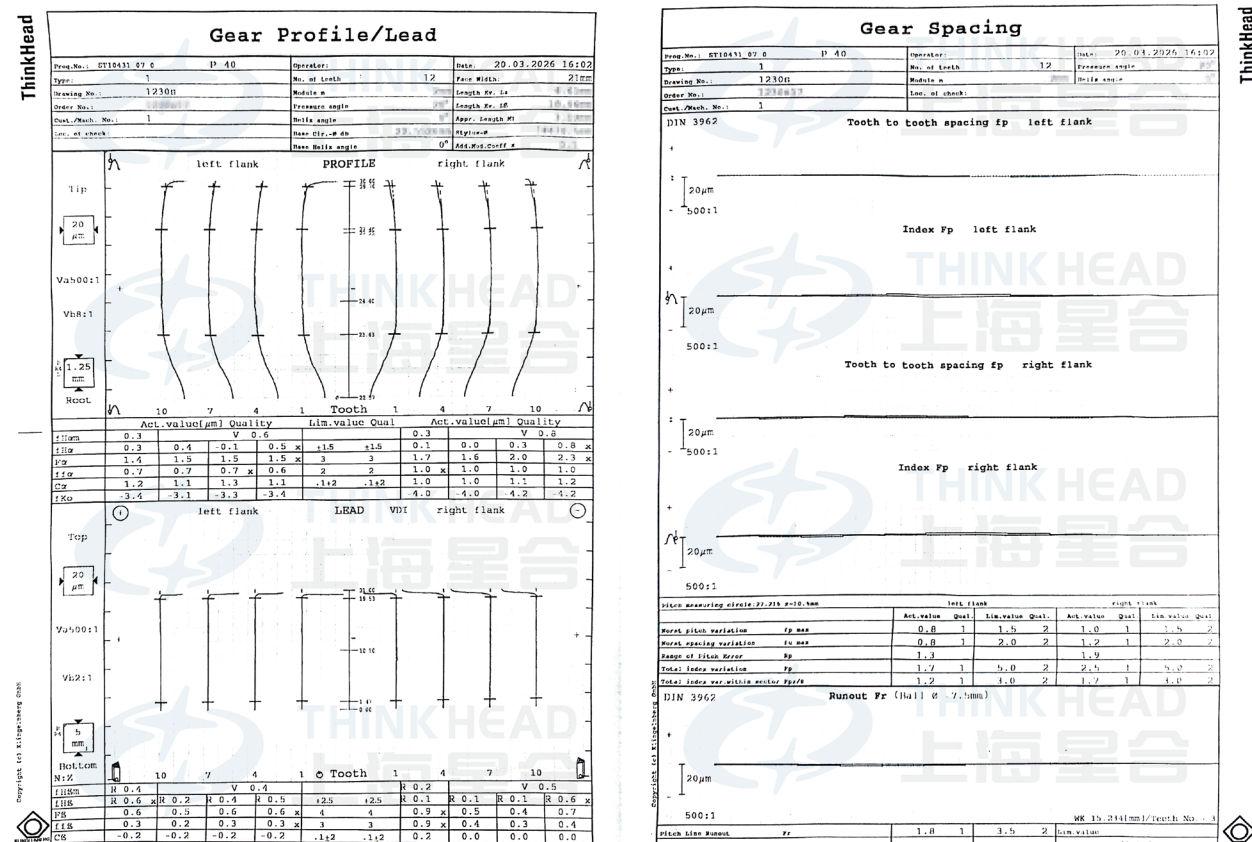
Profile Grinding Machine



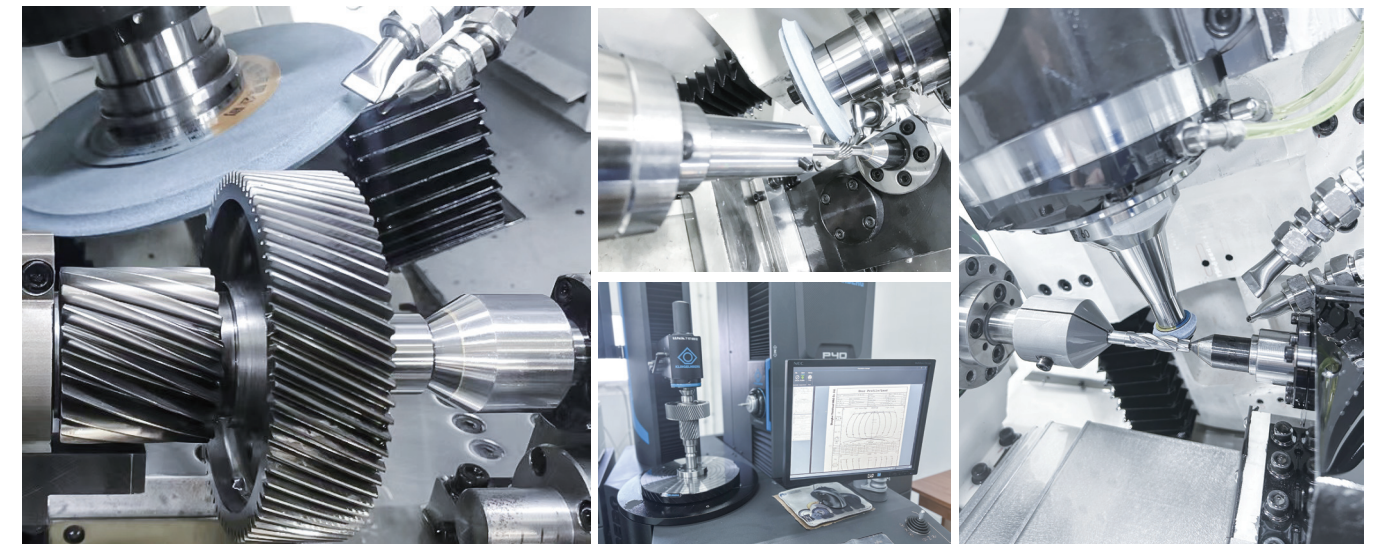
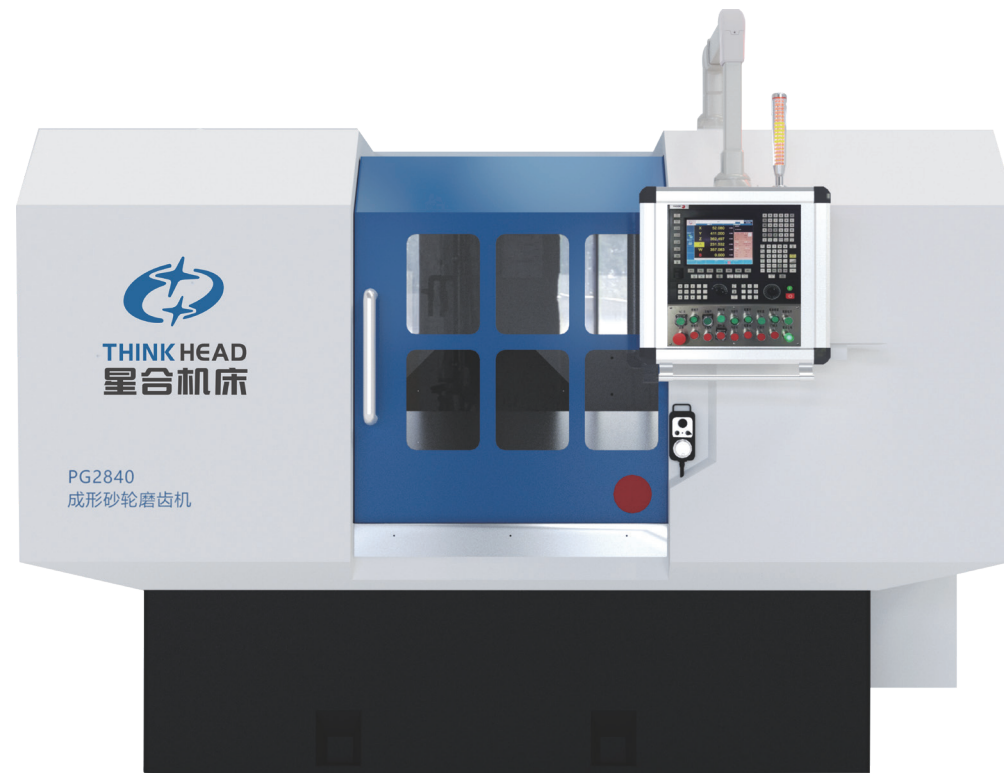
Grinding Outer Diameter	φ3-φ150 mm
Grinding Length	300 mm
Module	0.2-3 mm
Number of teeth	Arbitrary
Helix Angle	0°
Highest Accuracy	DIN3
Mass Production Accuracy	DIN5
Grinding Wheel Diameter	φ20-150 mm
Maximum Linear Speed of Grinding Wheel	45 m/s
Maximum Speed of Grinding Wheel	25000 rpm
Workpiece Weight	10 kg

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	4
Machine Tailstock	Electric Tailstock
Main Machine Dimensions	2000x1500x2701mm
Weight	5 T
Power Rating (Excluding Filtration System)	25 KVA

Spline Grinding
Top center Resharpening



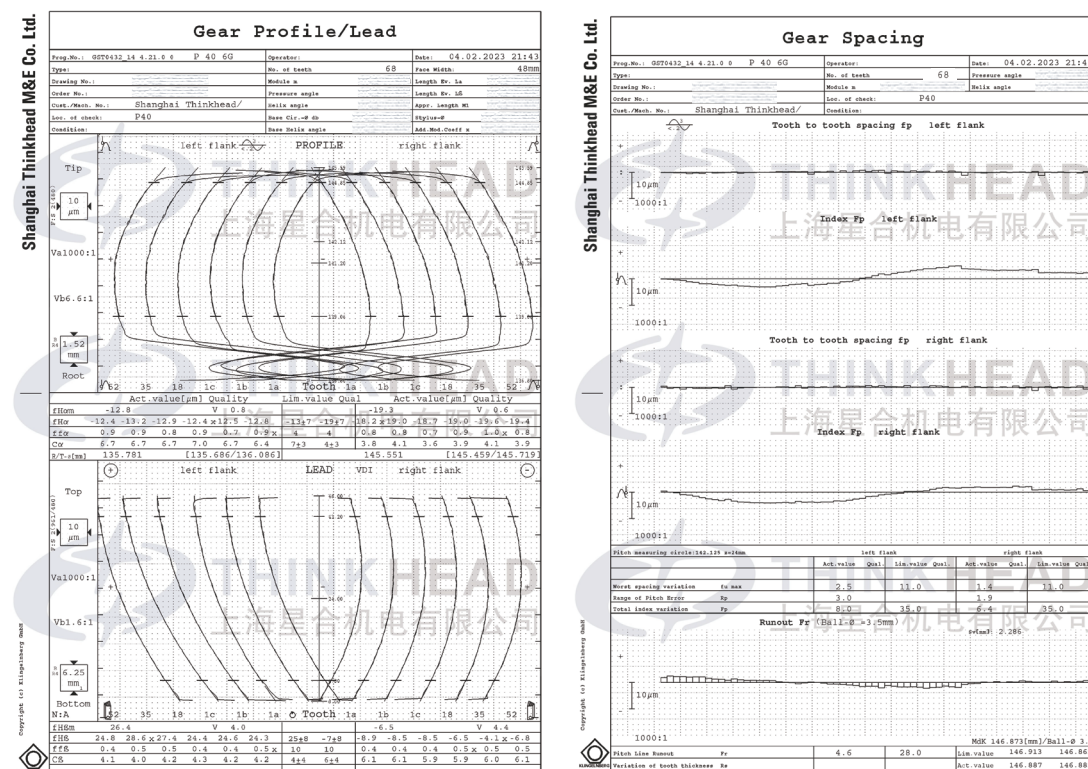
Profile Grinding Machine



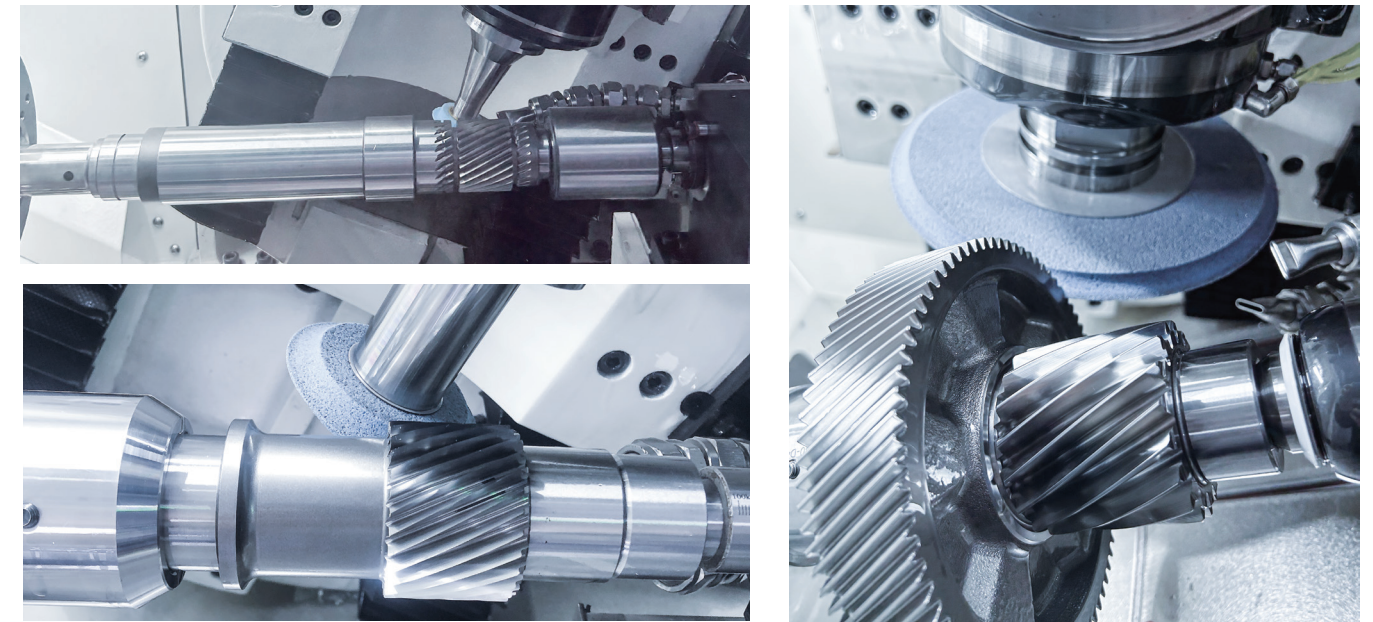
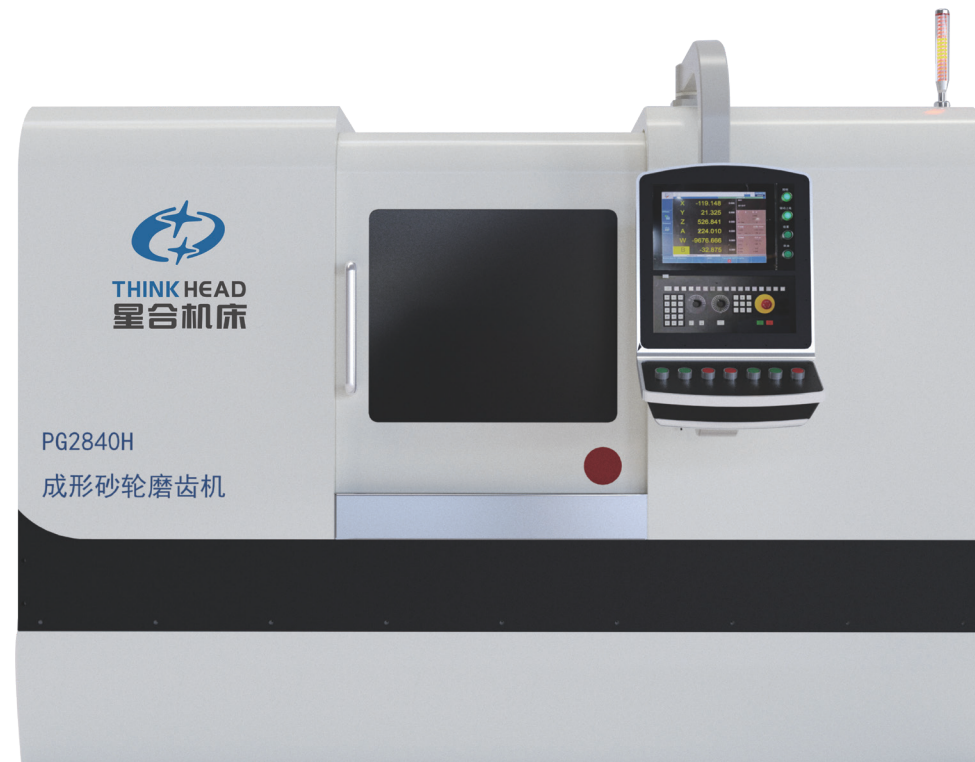
Grinding Outer Diameter	φ2-φ280 mm
Grinding Length	400 mm
Module	0.2-4 mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN2
Mass Production Accuracy	DIN4
Grinding Wheel Diameter	φ30-250 mm
Maximum Linear Speed of Grinding Wheel	50 m/s
Maximum Speed of Grinding Wheel	15000 rpm
Workpiece Weight	30 kg

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	6
Machine Tailstock	Servo Tailstock
Main Machine Dimensions	3237 x 2252 x 2404 mm
Weight	6.5 T
Power Rating (Excluding Filtration System)	30 KVA

Free twist modification
Hob Resharpener
Spline Grinding
Top center Resharpener
Worm Thread Grinding



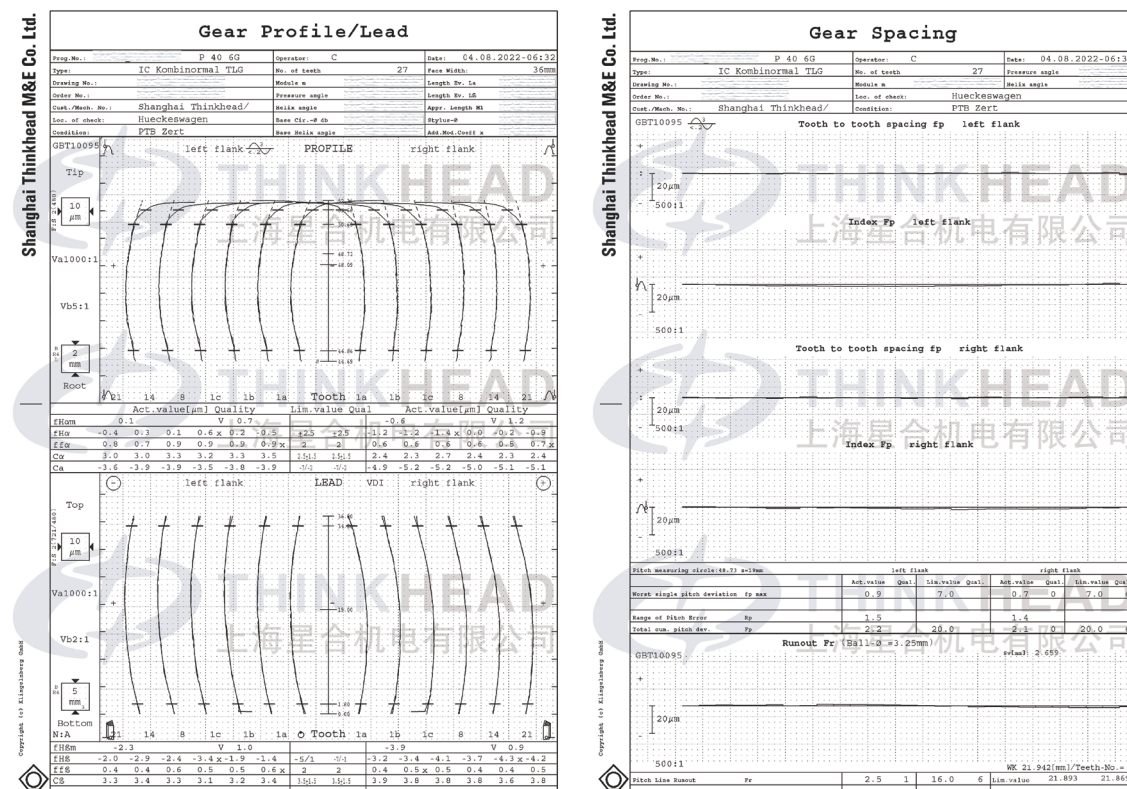
Profile Grinding Machine



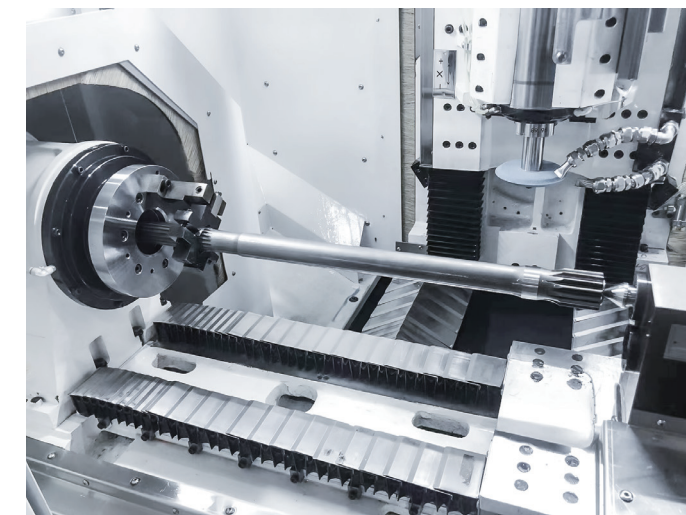
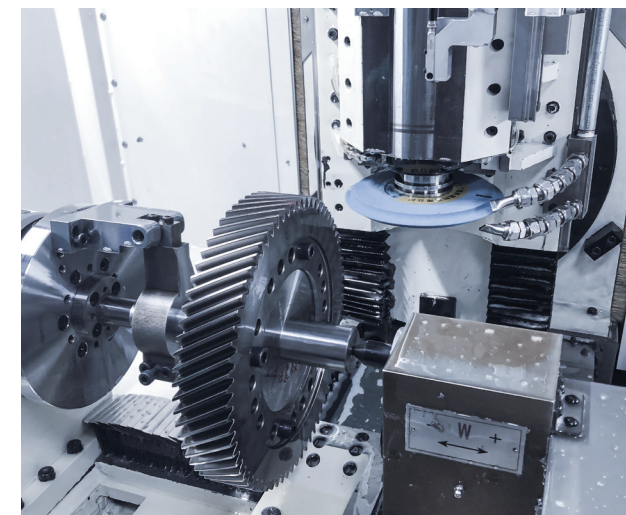
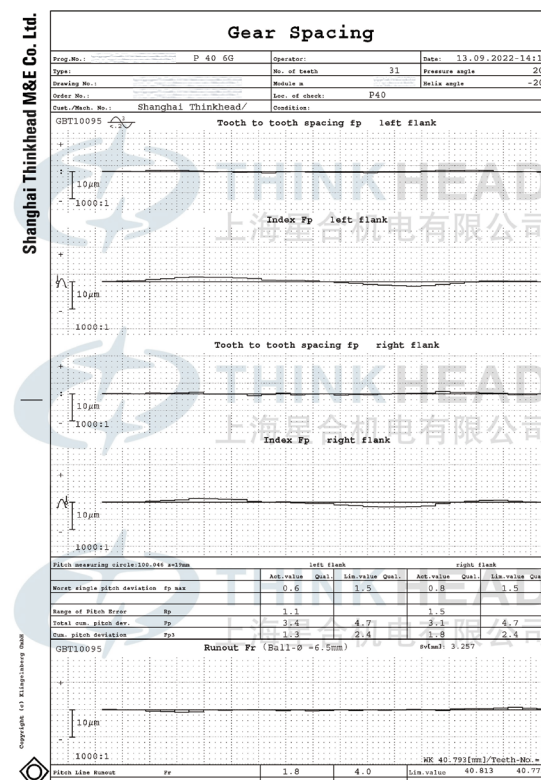
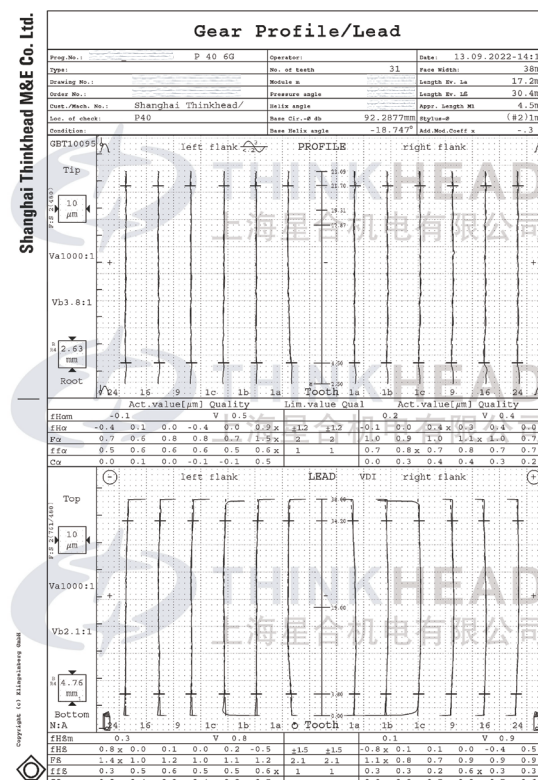
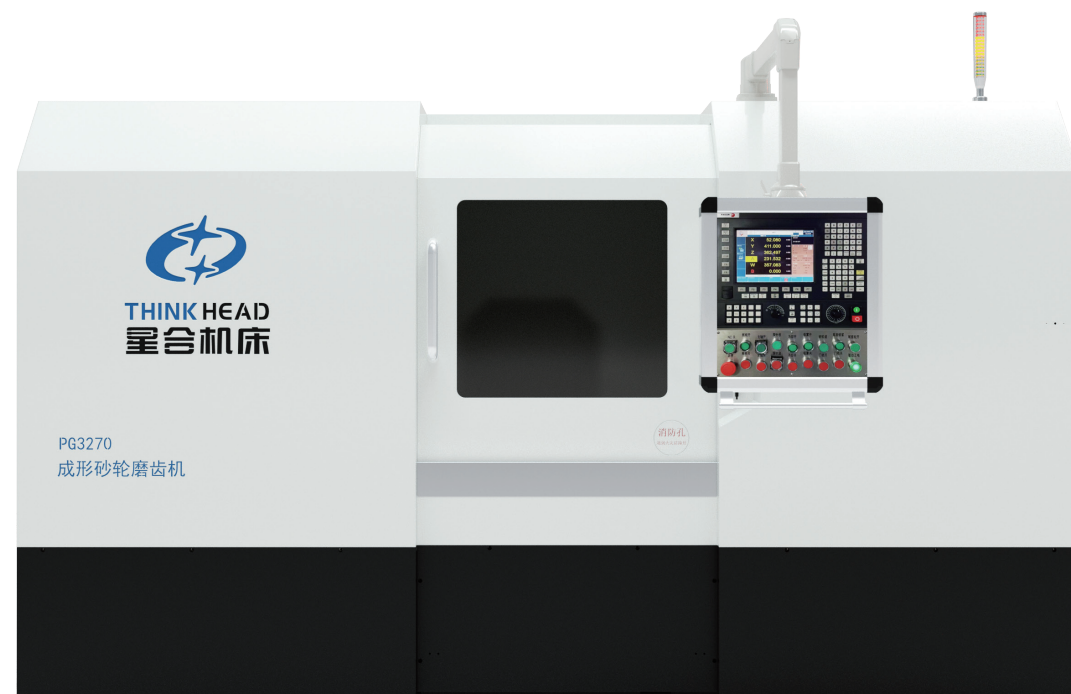
Grinding Outer Diameter	φ3-φ280 mm
Grinding Length	400 mm
Module	0.2-4 mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN2
Mass Production Accuracy	DIN3
Grinding Wheel Diameter	φ30-250 mm
Maximum Linear Speed of Grinding Wheel	50 m/s
Maximum Speed of Grinding Wheel	18000 rpm
Workpiece Weight	30 kg

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear motor	Z +Y axis
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	6
Machine Tailstock	Servo Tailstock
Main Machine Dimensions	3150 x 2293 x 2390 mm
Weight	7 T
Power Rating (Excluding Filtration System)	40 KVA

Free twist modification
Hob Resharpening
Spline Grinding
Top center Resharpening
Worm Thread Grinding



Profile Grinding Machine

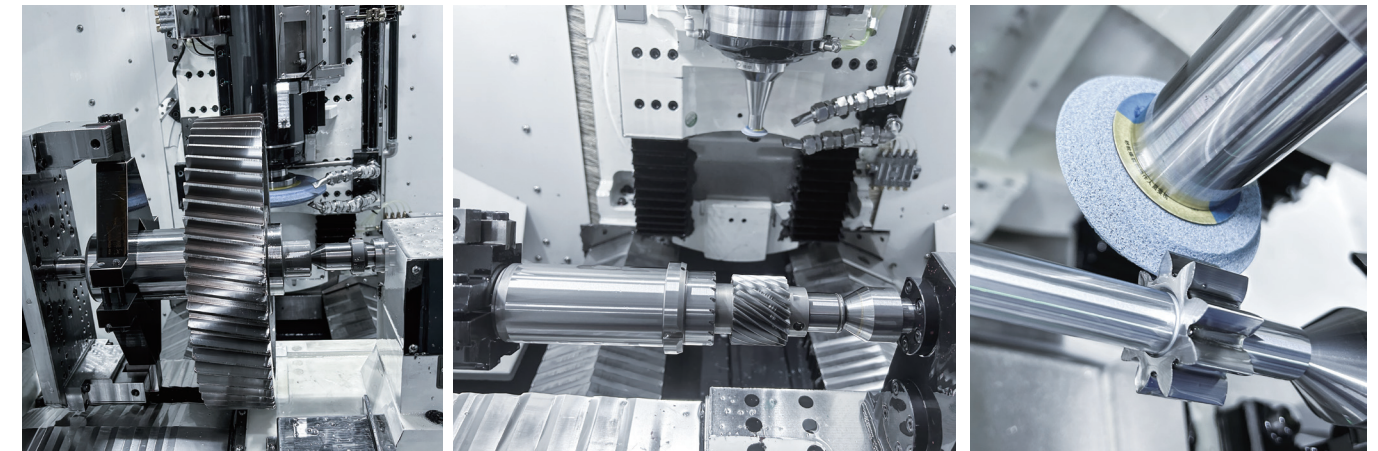


Grinding Outer Diameter	φ10-φ320 mm
Grinding Length	700 mm
Module	0.5-8 mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN3
Mass Production Accuracy	DIN4
Grinding Wheel Diameter	φ40-250 mm
Maximum Linear Speed of Grinding Wheel	50 m/s
Maximum Speed of Grinding Wheel	15000 rpm
Workpiece Weight	50 kg

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	6
Machine Tailstock	Servo Tailstock
Main Machine Dimensions	3718 x 2323 x 2437 mm
Weight	7 T
Power Rating (Excluding Filtration System)	30 KVA

Free twist modification
Hob Resharpener
Spline Grinding
Top center Resharpener
Worm Thread Grinding

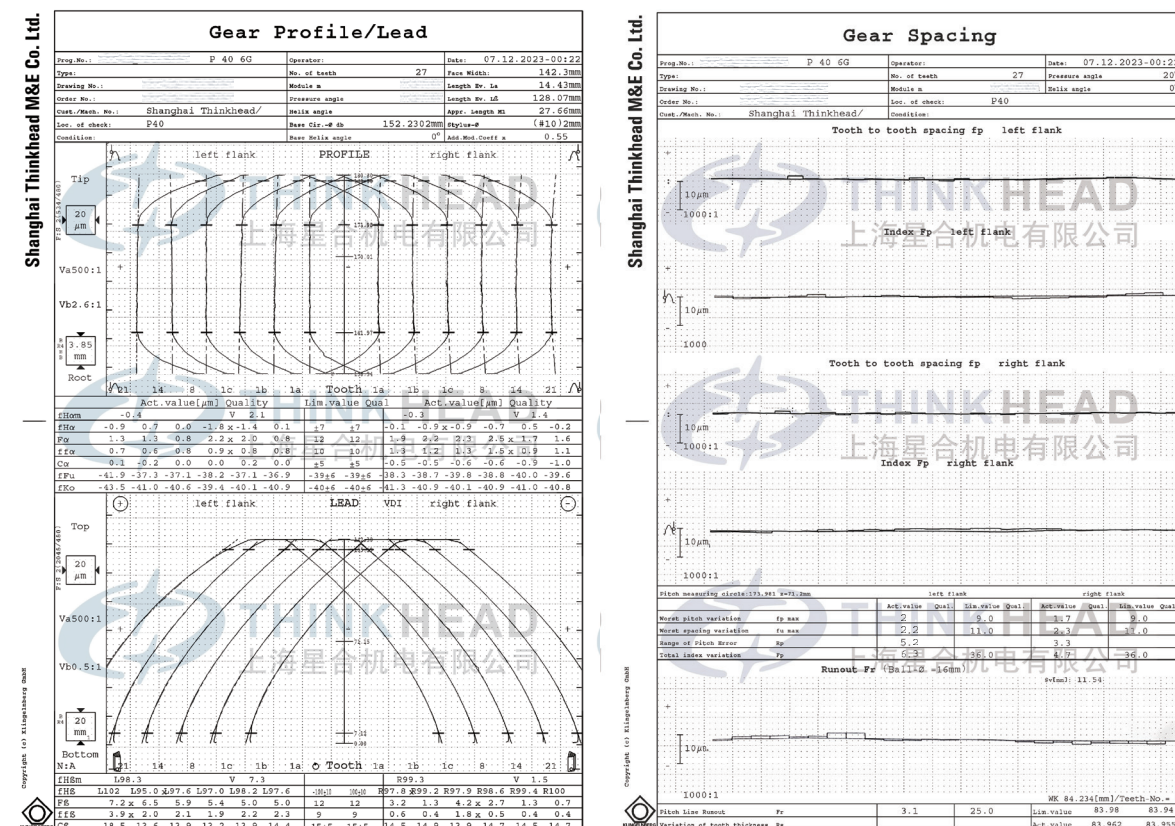
Profile Grinding Machine



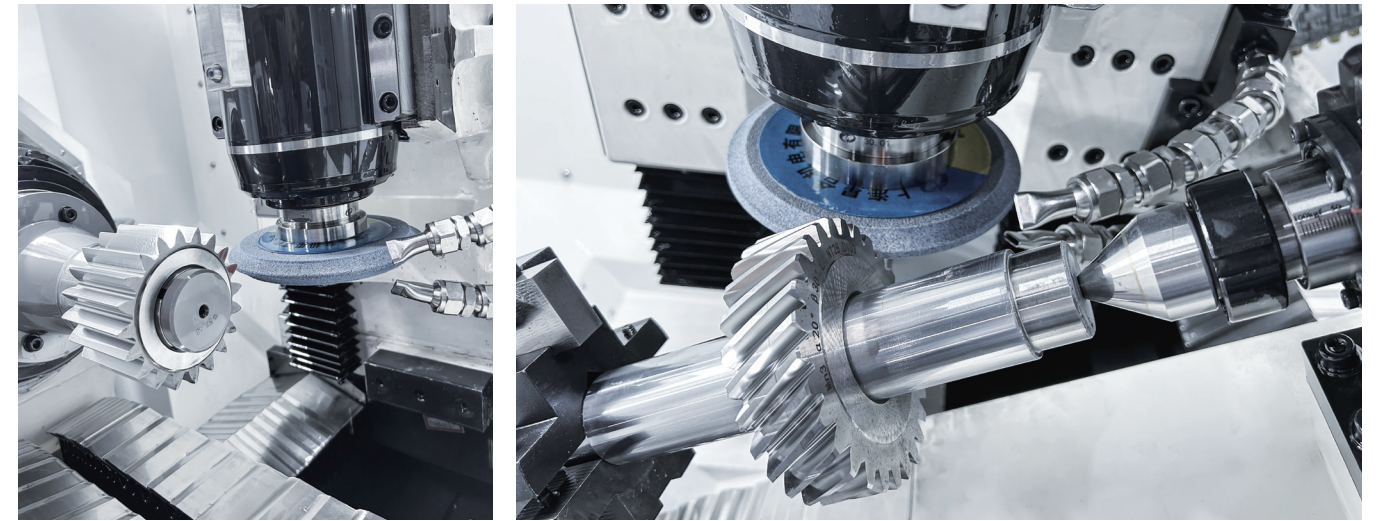
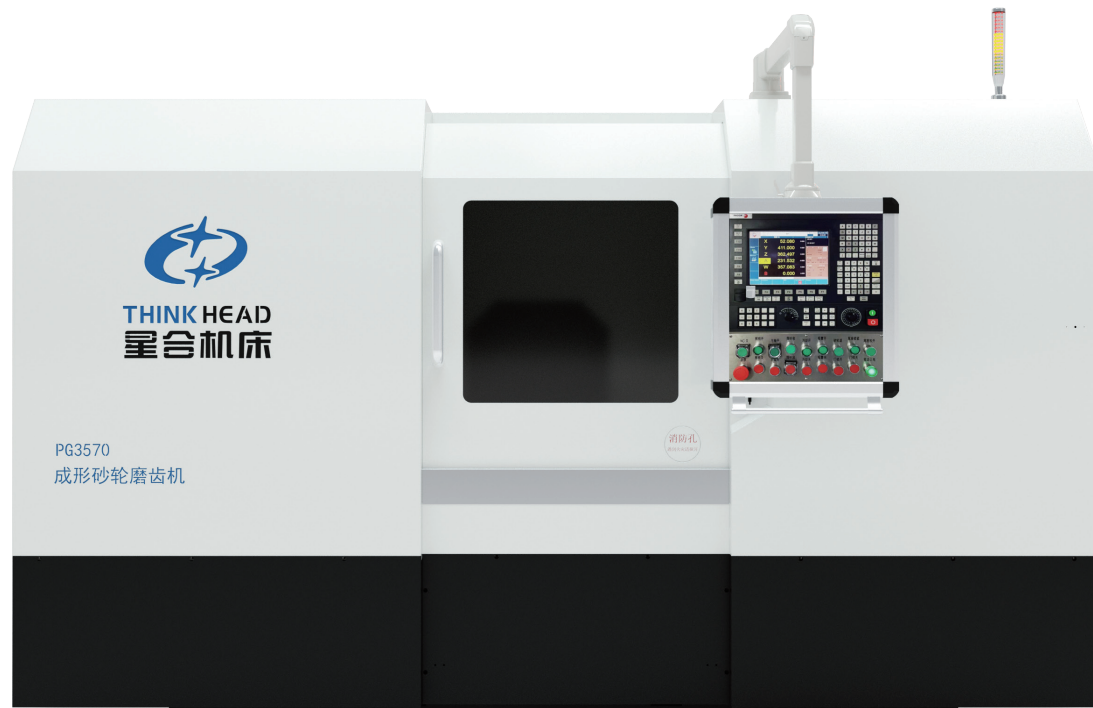
Grinding Outer Diameter	φ10-φ320mm
Grinding Length	700mm
Module	0.5-10mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN2
Mass Production Accuracy	DIN3
Grinding Wheel Diameter	φ30-300mm
Maximum Linear Speed of Grinding Wheel	50m/s
Maximum Linear Speed of Grinding Wheel	18000rpm
Workpiece Weight	50kg

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear motor	Z +Y axis
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	6
Machine Tailstock	Servo Tailstock
Main Machine Dimensions	3581 x 2363 x 2450 mm
Weight	7.5T
Power Rating (Excluding Filtration System)	40KVA

Free twist modification
Hob Resharpener
Spline Grinding
Top center Resharpener
Worm Thread Grinding



Profile Grinding Machine



Grinding Outer Diameter	φ10-φ400 mm
Grinding Length	700 mm
Module	0.5-10 mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN4
Mass Production Accuracy	DIN5
Grinding Wheel Diameter	φ50-250 mm
Maximum Linear Speed of Grinding Wheel	40 m/s
Maximum Speed of Grinding Wheel	10000 rpm
Workpiece Weight	80 kg

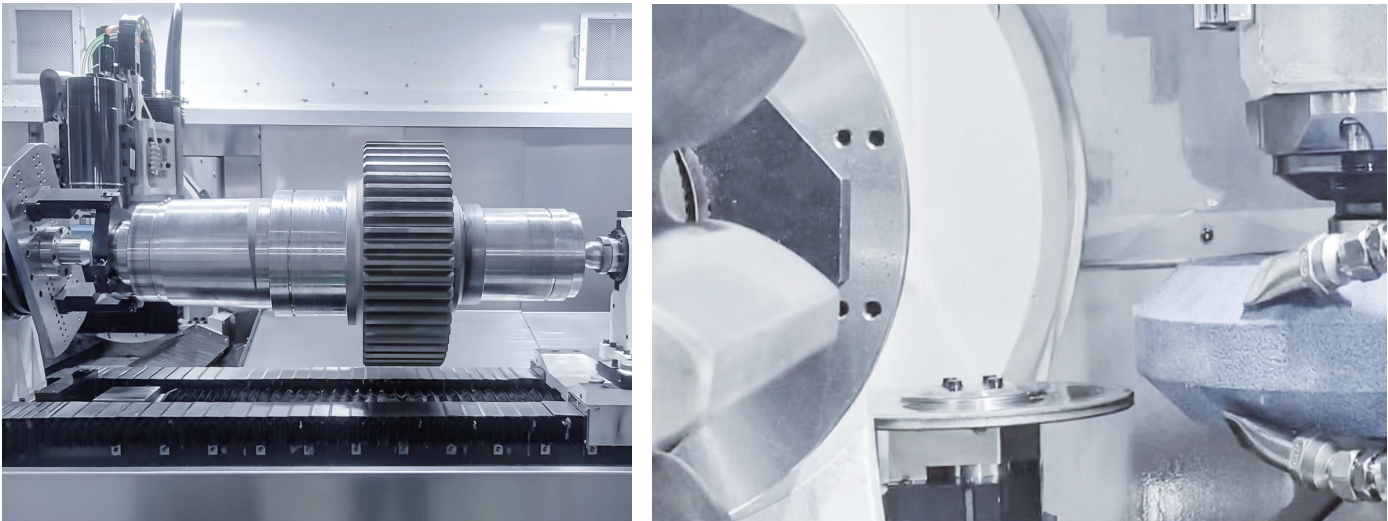
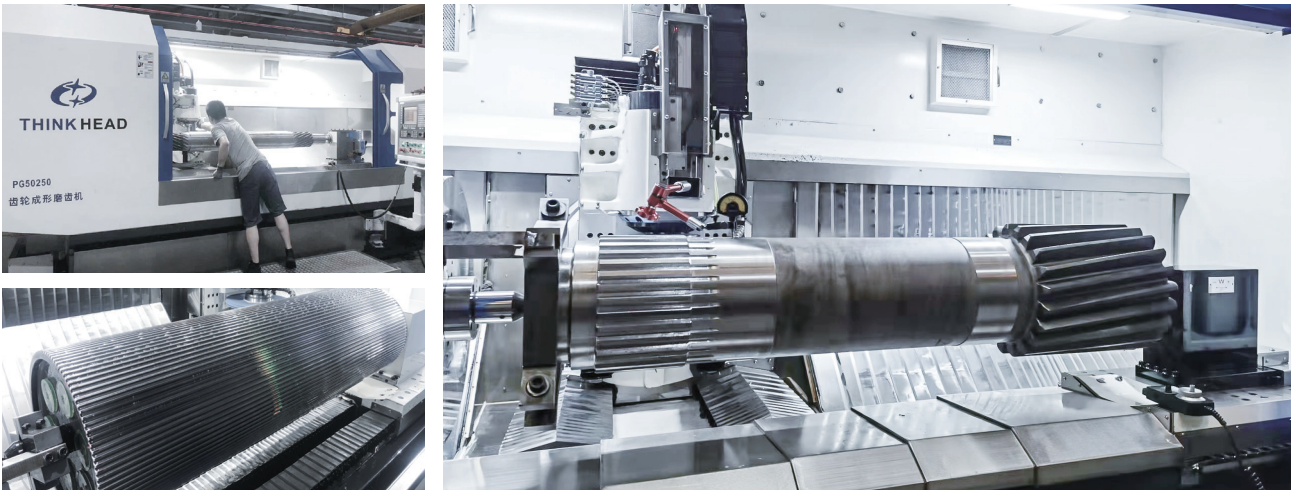
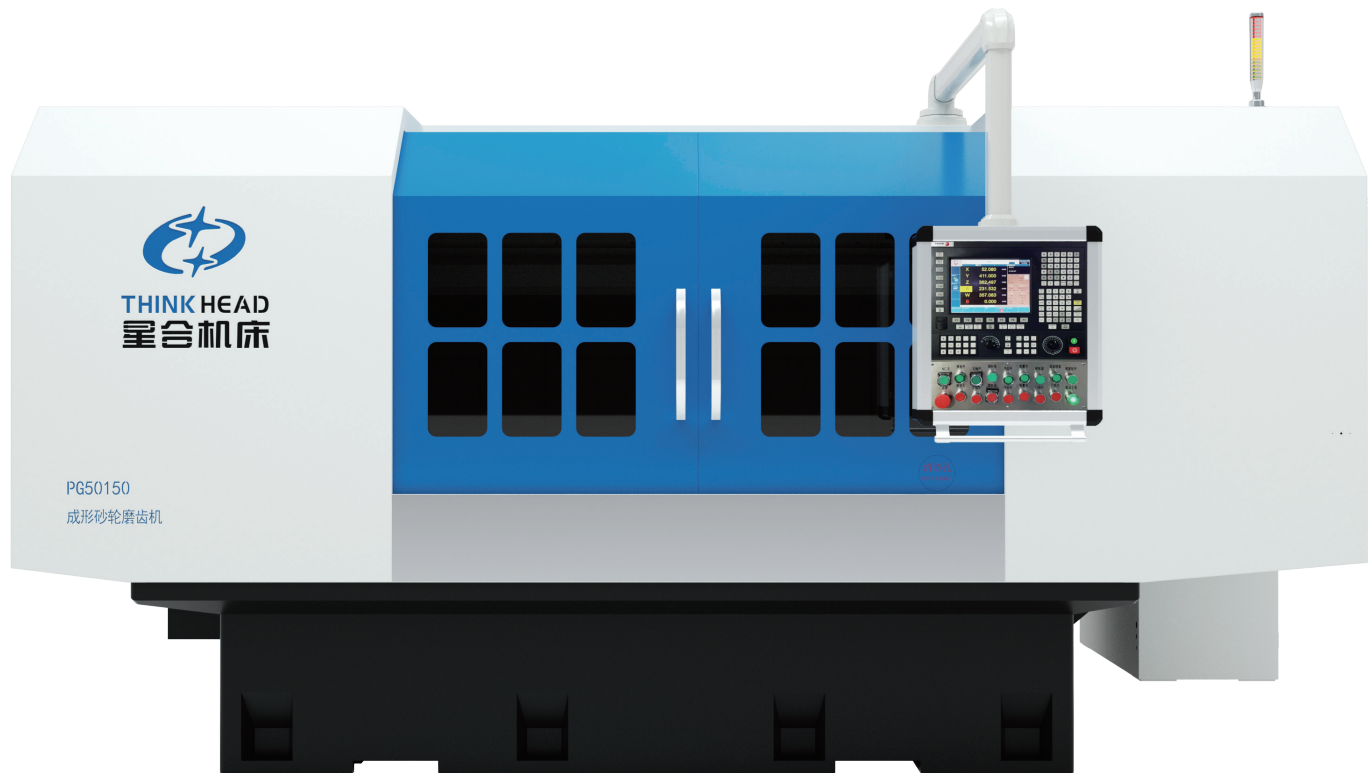
Workpiece Drive Method	Direct Drive
Control System	Fagor 8060
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	5
Machine Tailstock	Electric Tailstock
Main Machine Dimensions	3718 x 2323 x 2437 mm
Weight	7 T
Power Rating (Excluding Filtration System)	30 KVA

Hob Resharpener
Spline Grinding
Top center Resharpener
Worm Thread Grinding



PG50150

Profile Grinding Machine



Technical Parameters

Grinding Outer Diameter	φ40-φ500 mm
Grinding Length	1500 mm
Module	1-20 mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN3
Mass Production Accuracy	DIN5
Grinding Wheel Diameter	φ60-350 mm
Maximum Linear Speed of Grinding Wheel	45 m/s
Maximum Speed of Grinding Wheel	6000 rpm
Workpiece Weight	300 kg

Standard

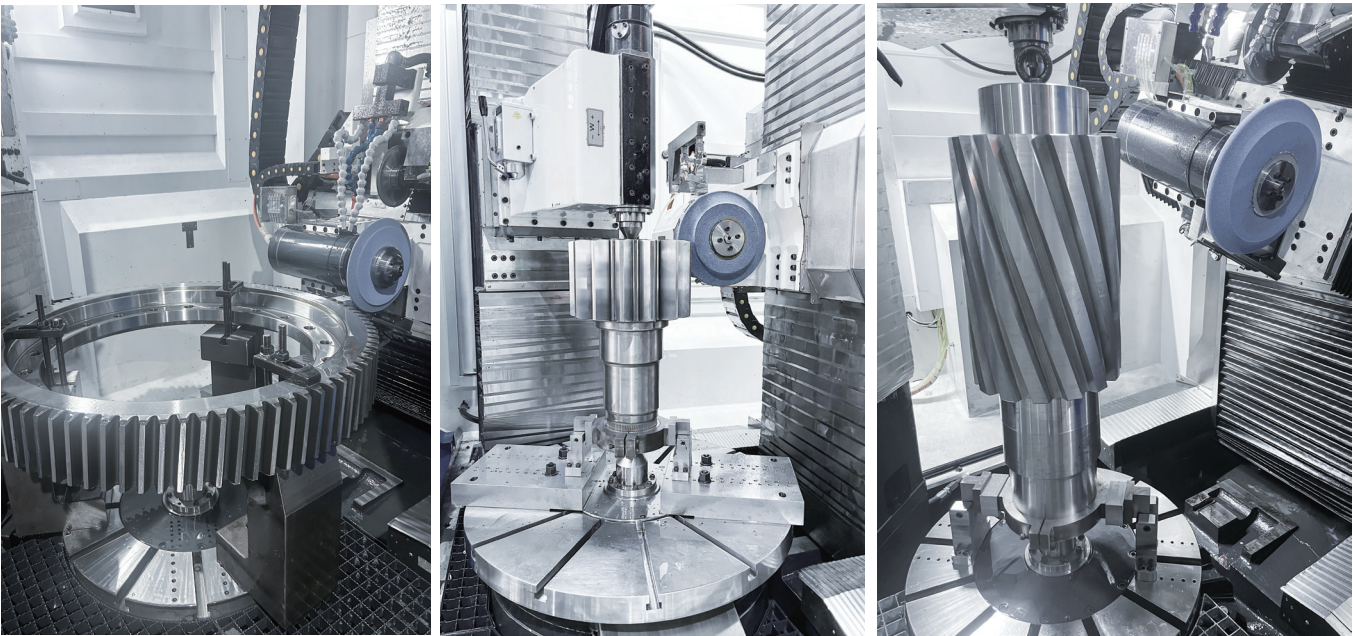
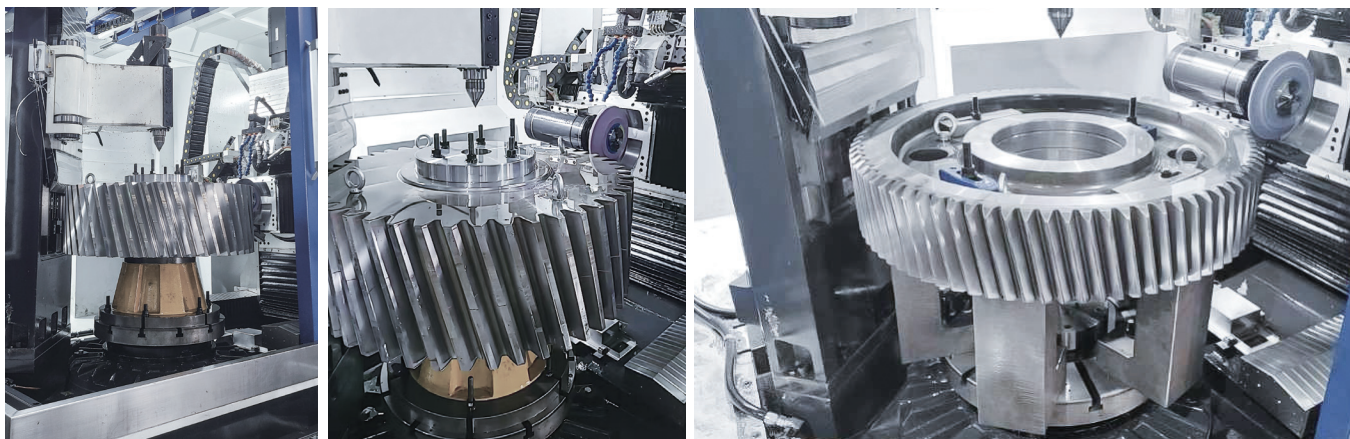
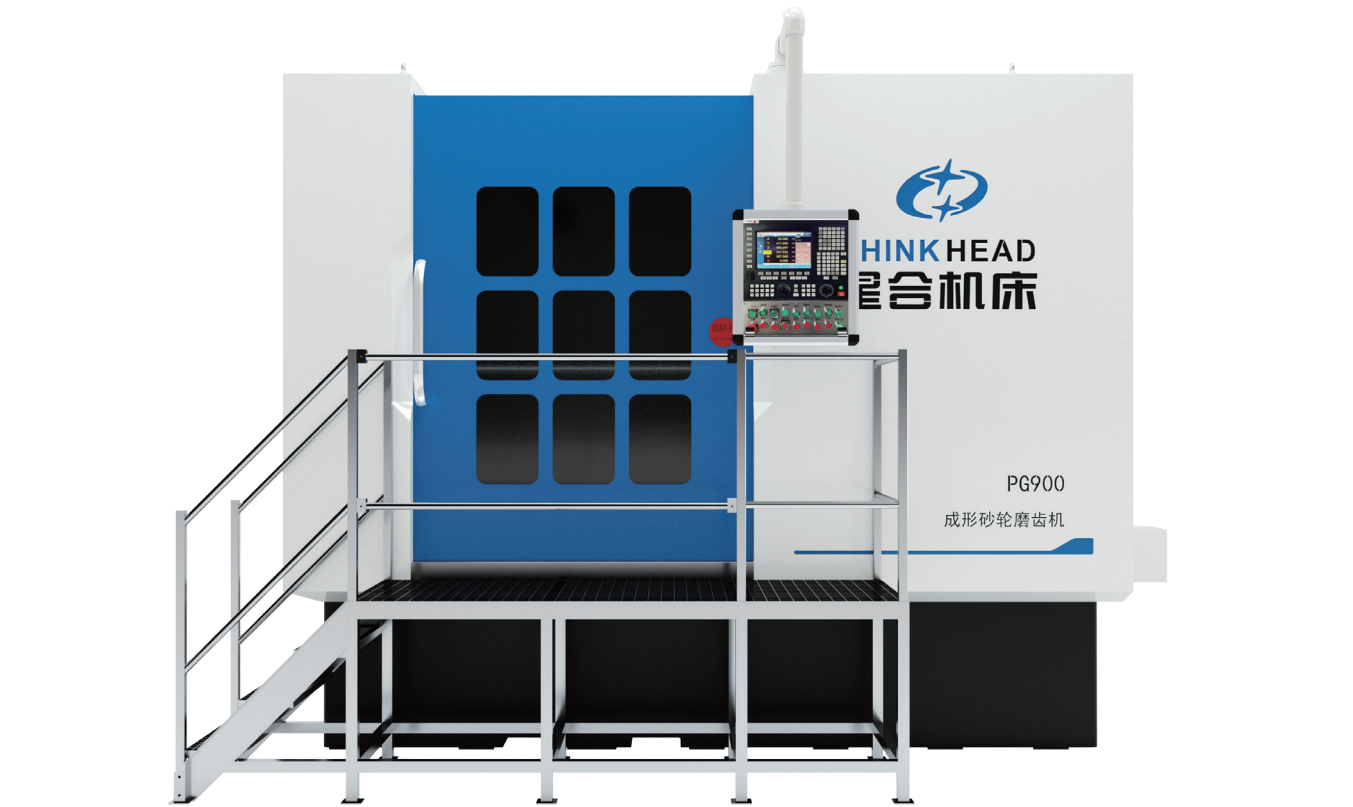
Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	6
Machine Tailstock	Servo Tailstock
Main Machine Dimensions	4622 x 2360 x 2641 mm
Weight	14T
Power Rating (Excluding Filtration System)	45 KVA

Optional

Free twist modification	
Hob Resharpener	
Spline Grinding	
Top center Resharpener	
Worm Thread Grinding	
Online measurement	

PG900

Profile Grinding Machine



Technical Parameters

Grinding Outer Diameter	φ40-φ900mm
Grinding Length	600mm
Module	2-20mm
Number of teeth	Arbitrary
Helix Angle	±45°
Highest Accuracy	DIN4
Mass Production Accuracy	DIN5
Grinding Wheel Diameter	φ60-350mm
Maximum Linear Speed of Grinding Wheel	40m/s
Maximum Speed of Grinding Wheel	6000rpm
Workpiece Weight	2000kg

Standard

Workpiece Drive Method	Direct Drive
Control System	Fagor 8070
Servo Motor and Drive	Fagor
Linear Encoder	Fagor
Control Software	Embedded Thinkhead profile grinding software
Number of CNC Axes	7
Machine Tailstock	Electric Tailstock
Main Machine Dimensions	4230 x 2586 x 3484 mm
Weight	19 T
Power Rating (Excluding Filtration System)	50KVA

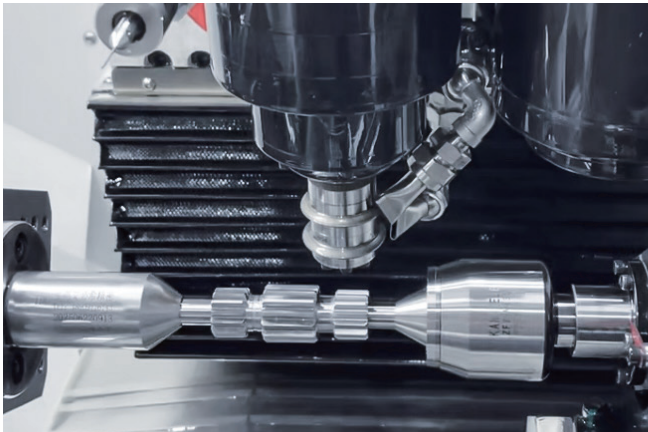
Optional

Spline Grinding	
Top center Resharpener	
Internal gear grinding	
Online measurement	

Optional

To accommodate diverse customer requirements, Thinkhead engineers adopt a design-first approach, delivering configurable options that enable precision enhancement packages and cost-optimized configurations . Our engineering team stands ready to develop personalized systems addressing your specific needs in machine tool configurations and control system programming.

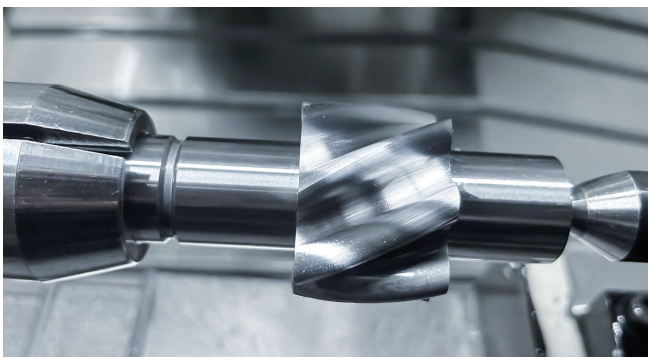
✓ CBN Wheel Grinding



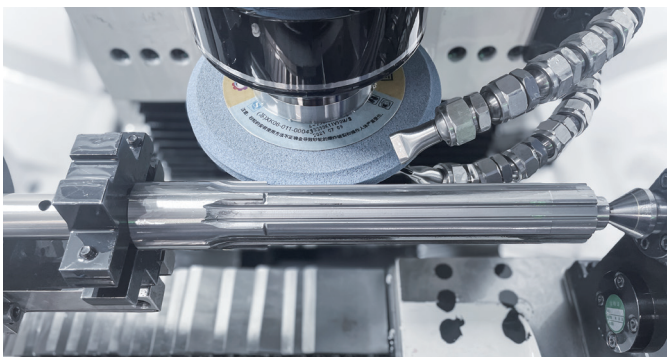
✓ Gauge Template Grinding



✓ Full Profile Gear Grinding



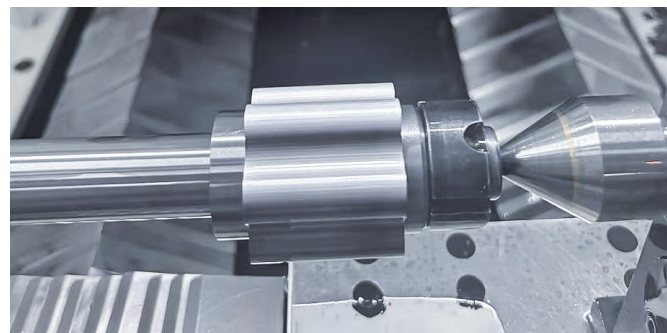
✓ Rectangular Spline Grinding



✓ Triangular Spline Grinding



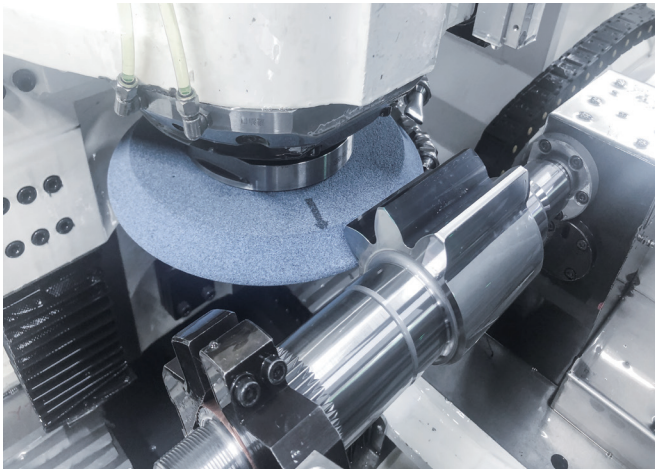
✓ Circular Spline Grinding



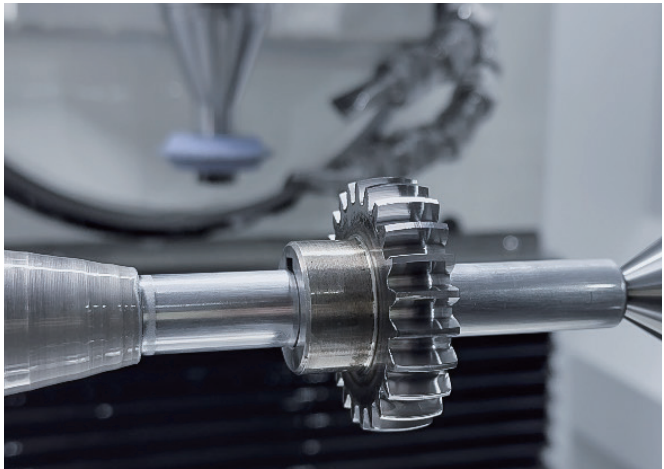
Optional



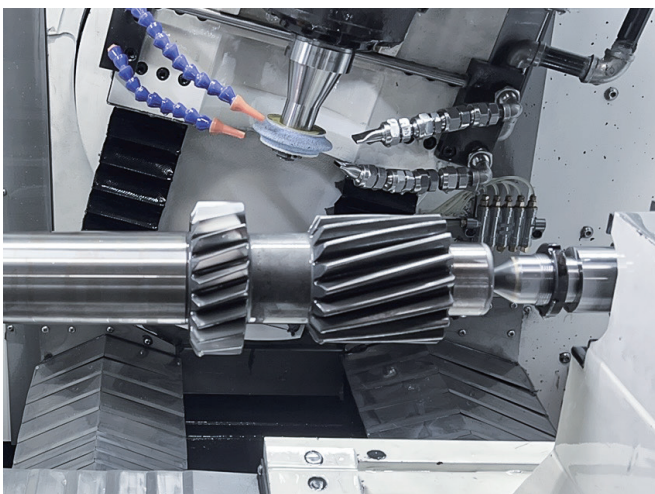
✓ Segment Gear Grinding



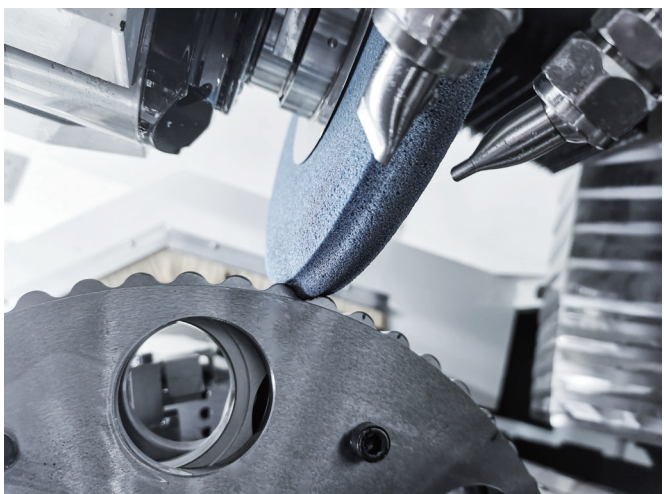
✓ Crowned Tooth Grinding



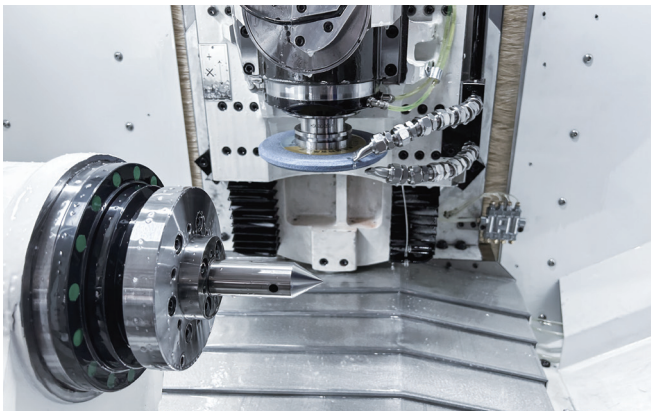
✓ Coaxial Gear Grinding



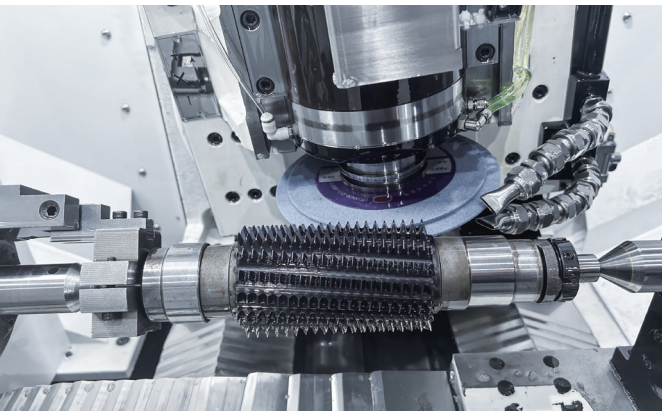
✓ Cycloidal Grinding



✓ Top center Resharpener



✓ Hob Resharpener

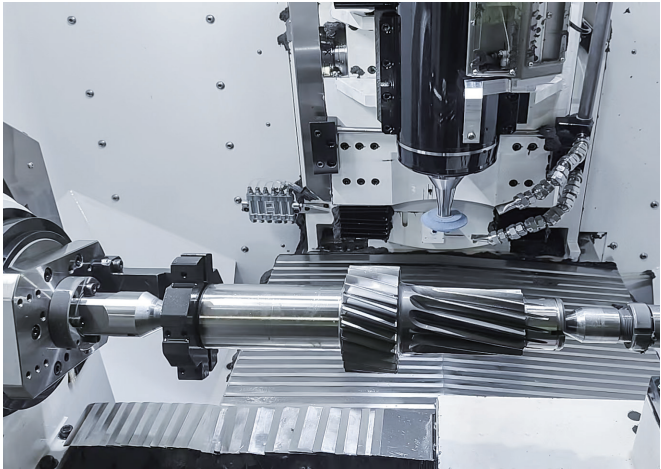


Optional

✔ Monitor-assisted Tooth Alignment



✔ Scan-matching Tooth Alignment



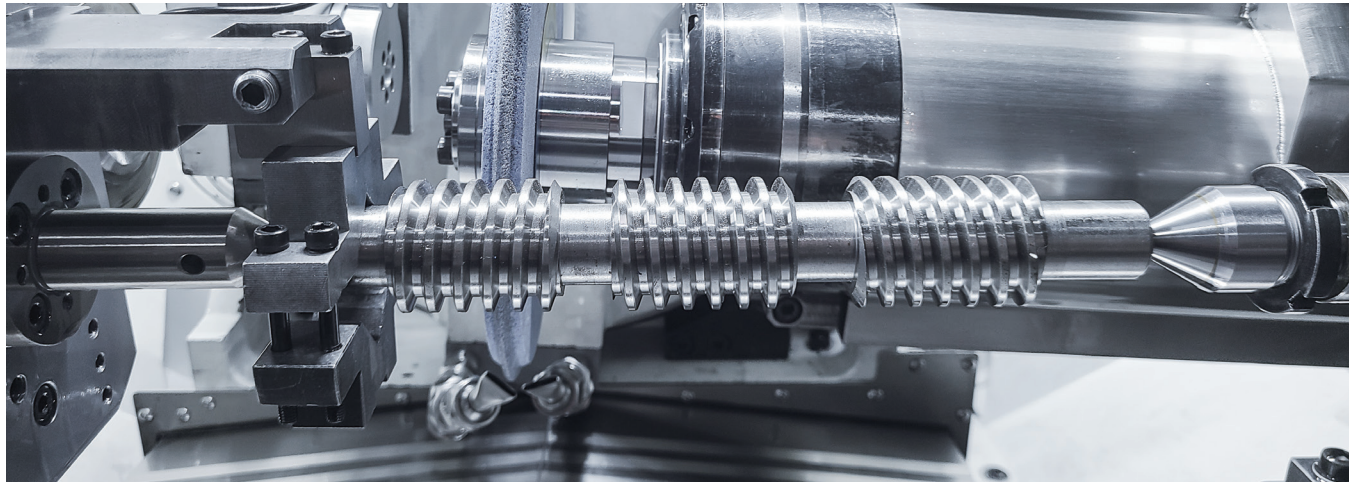
✔ Online measurement



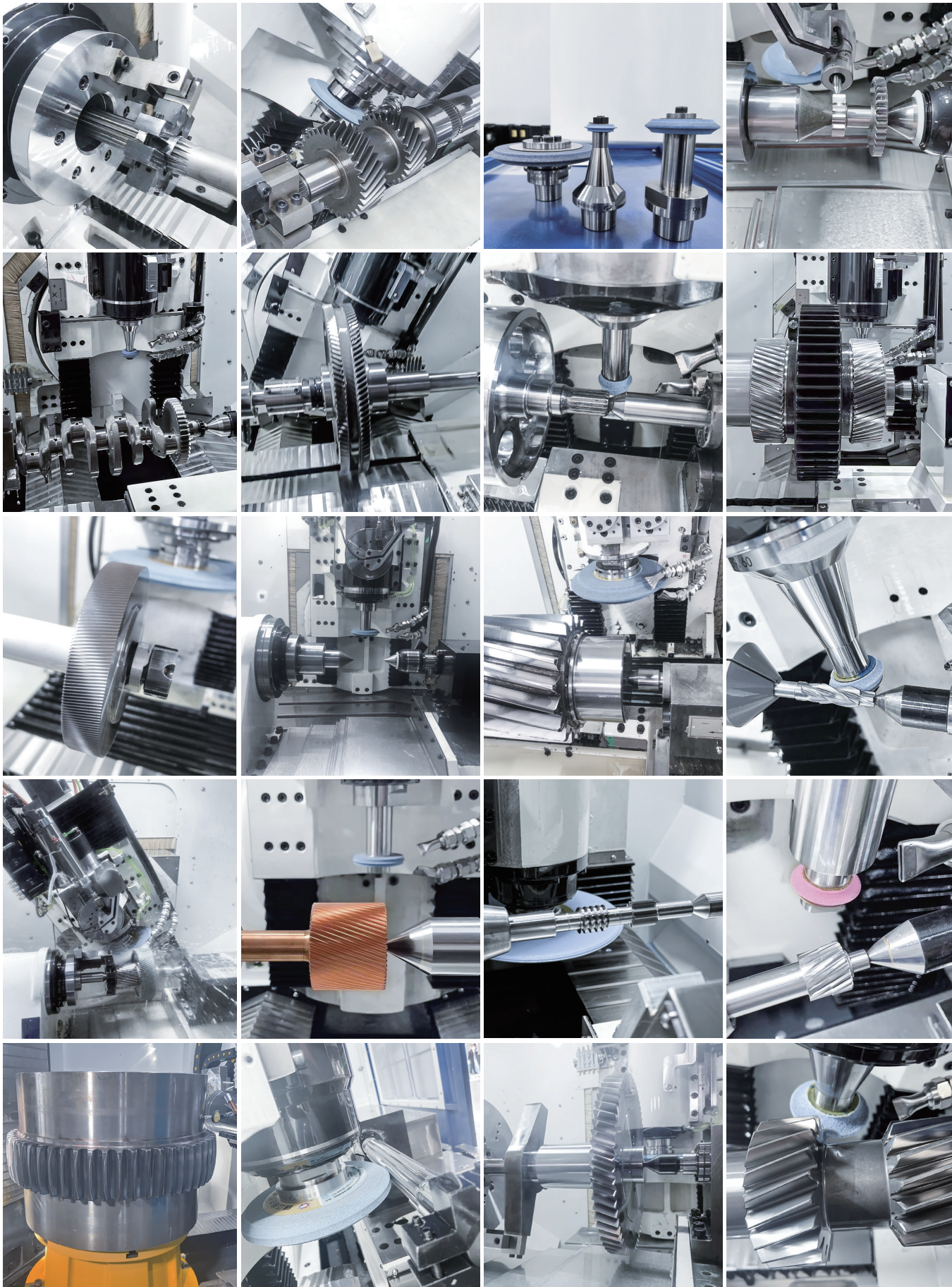
✔ Automation



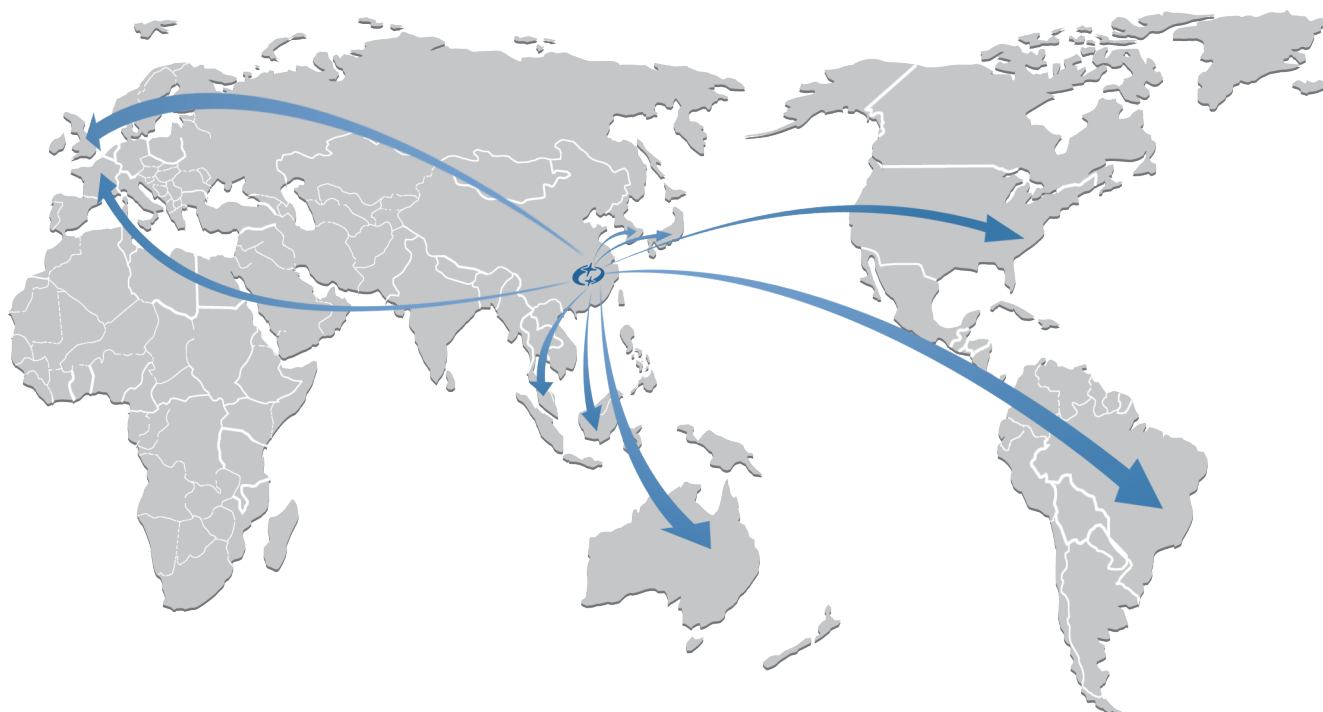
✔ Worm Thread Grinding Function



Processing Cases



 *Think ahead, beyond times*



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V1_202607

Disclaimer: Pictures and literal aren't bind.
We reserve the right to change the parameters
in this manual at any time without prior notice.