

THINKHEAD



成形砂轮磨齿机床

PROFILE GRINDING MACHINE

成形磨

找星合



3⁺ 研发生产基地

6⁺ 软件著作权

16⁺ 发明专利

70⁺ 实用新型专利

成形磨齿解决方案!



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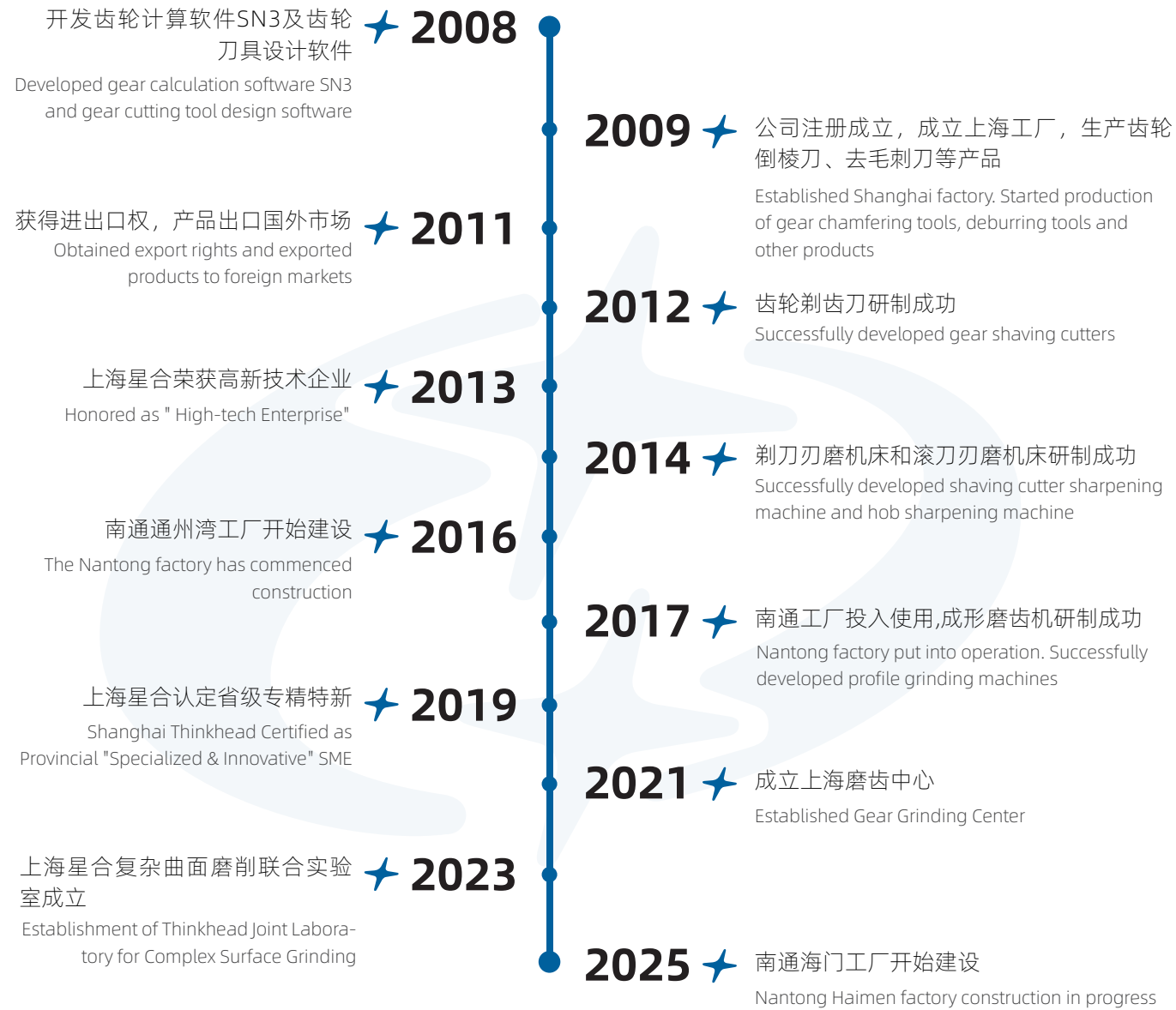
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公司大事记

Company Milestones



公司发展概况

Overview Of the Company's Development



上海星合机电有限公司成立于2009年，为成形磨齿机的头部企业，致力于研发制造精密机床。产品范围覆盖齿轮磨床、螺纹磨床、加工中心三大系列的精密机床矩阵，可广泛应用于汽车制造、机器人、风电、半导体零部件、精密减速机等行业领域。在上海宝山、南通通州湾、南通海门设有三大研发生产基地，总面积超10万平方米，形成"研发-生产-销售-服务"全产业链闭环。

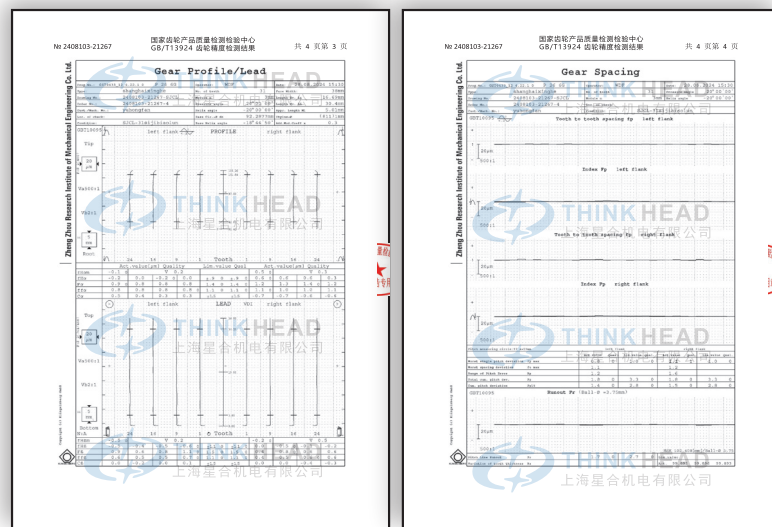
目前，上海星合已掌握高速主轴、高精度分度头、修整轴、伺服尾座、数控系统等多项核心零部件的关键技术并实现量产，具备全流程自主可控的机床研发实力及生产能力。上海星合始终以研发创新为引擎，深度参与“高端数控机床与基础制造装备”国家科技重大专项，携手上海交通大学、东华大学成立联合研究中心，与西班牙发格自动化有限公司成立“复杂曲面磨削联合实验室”，不断突破技术极限。

展望未来，上海星合将始终坚持以机电控软一体化设计为主导，以微米级磨削和低应力制造为依托，以高速主轴、直驱重切为亮点，以数控系统和机床材料为底层突破方向，技术体系完整而系统，并快速迭代，向世界一流水平的方向高速推进。

Shanghai Thinkhead M&E Co., Ltd. which was established in 2009 as a leading enterprise in profile grinding 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 guided by Integrated design of electromechanical control and software, supported by micron-level grinding and low-stress manufacturing, highlighted 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.



与上海交通大学机动学院共建“精密加工装备及工艺联合研究中心”。

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

与西班牙发格自动化联合成立“复杂曲面磨削联合实验室”。

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

设有磨齿中心，配合客户试磨加工，在前沿领域探索，并承担公司硬件测试、软件优化等研发任务。

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.

设有培训中心，覆盖机床操作，维护保养等多项培训内容。

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

位于上海市宝山区。

Located in Shanghai's Baoshan District.

磨齿研发中心，承担公司硬件测试、软件优化、功能完善等研发任务。

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

机床展示中心，面向客户开放参观。

Machine Tool Demonstration Center is Open for customer visits with live machining showcases.

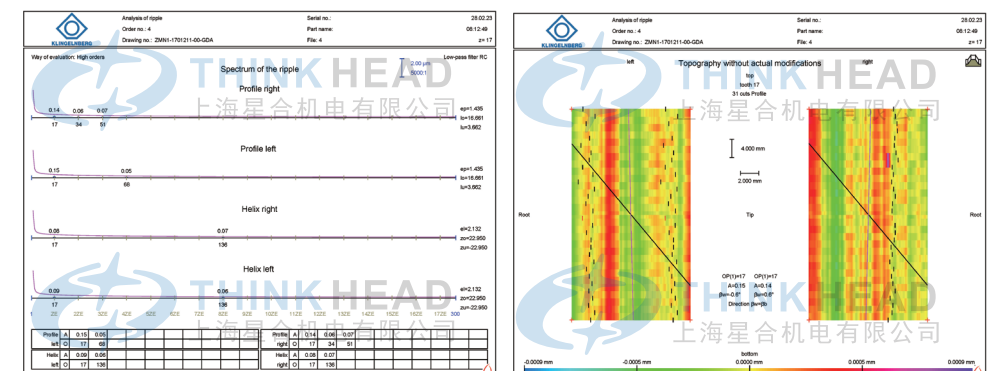
培训中心，覆盖机床操作，维护保养，齿轮加工等多项培训内容。

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

客户试磨加工，NVH改善研发，产品试制磨齿。

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

- 精益生产管理
Efficient production management
- 强大的研发支持
Full-cycle R&D Capabilities
- 专业高效的生产团队
Technical management team
- 充足的产能储备
Robust Production Capacity Reserves



南通通州湾生产基地
Nantong Tongzhou Bay Production Base



南通生产基地囊括了铸件加工，铸件回火，主轴制造，油箱制造，车铣钻磨等机床制造相关的绝大部分制造工艺。
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.

星合一直重视先进设备的引进，现已拥有克林贝格测量中心、蔡司三坐标、三丰圆度仪、尼古拉斯龙门五面体加工中心、日本高端工业母机等世界一流的测量设备和加工设备。
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.

机床铸件经过四道去应力时效处理，实现了可与国外一流机床相媲美的低应力制造，确保设备经久耐用。
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.

南通海门研发生产基地
Nantong Haimen Production Base



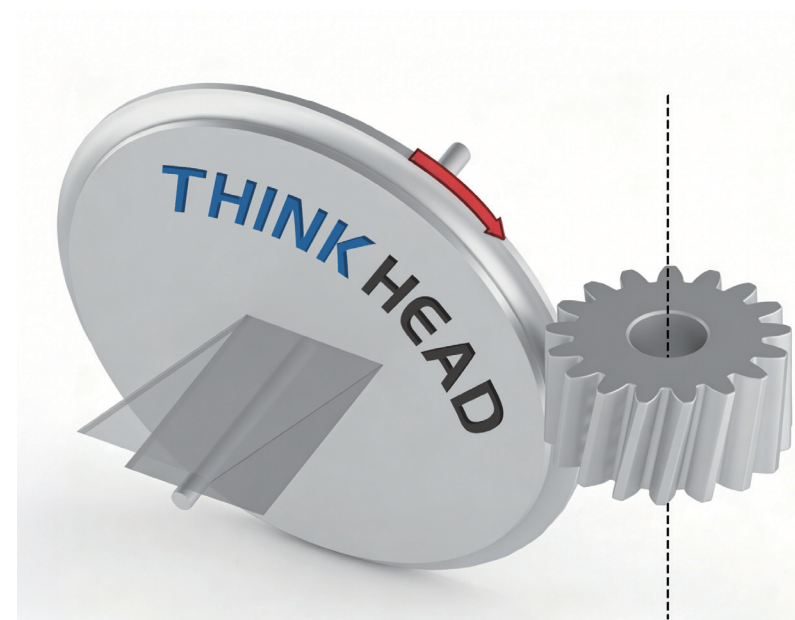
海门生产基地在建，为星合第3个生产基地，占地150亩。可进一步扩大产能，满足客户对高端工业母机的市场需求。
Haimen Production Base is under construction. As Thinkhead's third production base, the 150-acre facility has the capacity to increase its output to satisfy market demands in premium gear manufacturing machines.

一期占地50亩，可实现200台轻型机床和100台重型机床的年产能。2026年5月开始投产，可实现800台高端机床的年产能。
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.

厂区采用太阳能和地源热泵，实现低碳排放，成为绿色工厂。
The facility utilizes solar power and ground-source heat pumps to achieve low-carbon operations, certified as a green factory.

成型砂轮磨齿特点

Profile Grinding Characteristics



砂轮修整动作精准，机床控制能力强，调整可行性高，可获得非常高的磨削精度。

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

搭载强大的控制软件，可以对齿轮的齿形($fH\alpha, C\alpha$ 等)齿向($fH\beta, C\beta$ 等)进行各种非标修形，包括齿轮三截面任意修形扭曲修正。

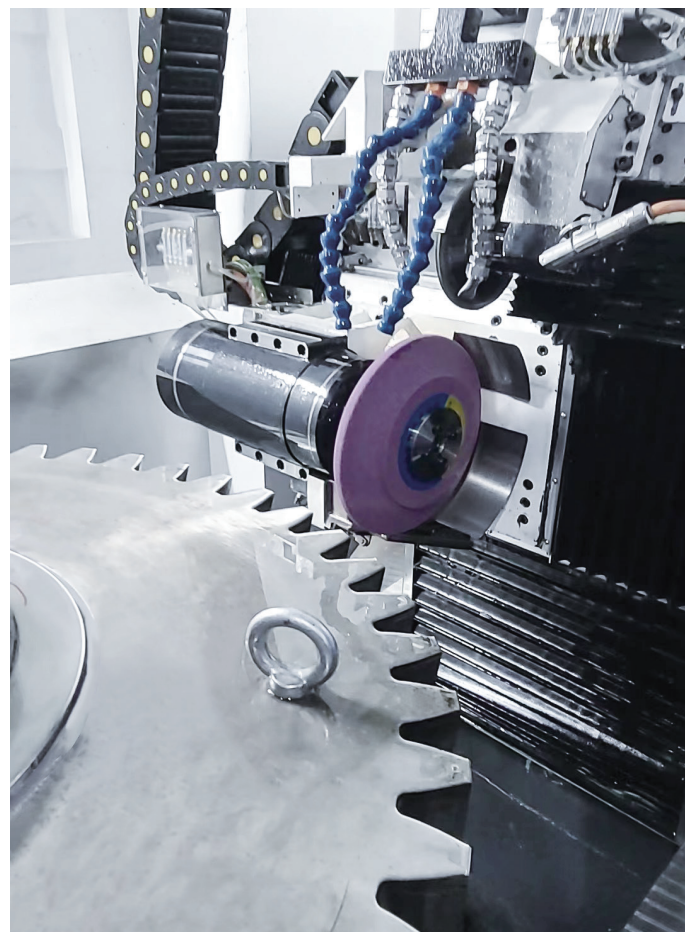
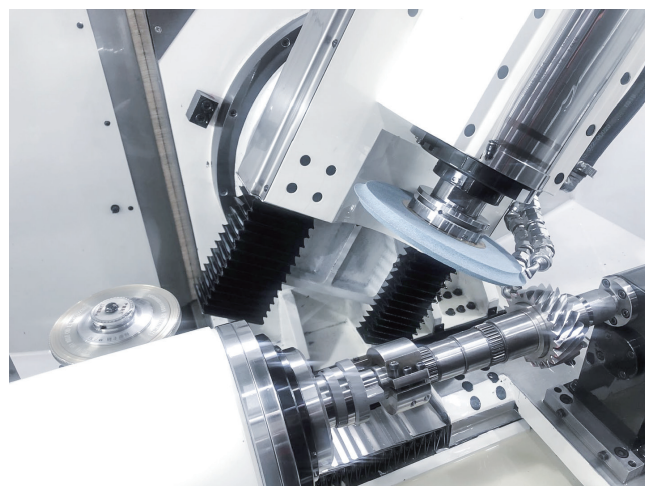
Equipped with powerful control software, which offers the various non-standard modification of gear leads($fH\beta, C\beta$ etc.) and profiles($fH\alpha, C\alpha$ etc.) included free twist arbitrary modification.

加工范围广，适用于大中小各种模数齿轮的磨齿需求。

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

不需要定制滚轮，砂轮，夹具，不同种类工件的切换工作方便快速。

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



星合成形磨优势

ThinkHead Profile Grinding Solutions

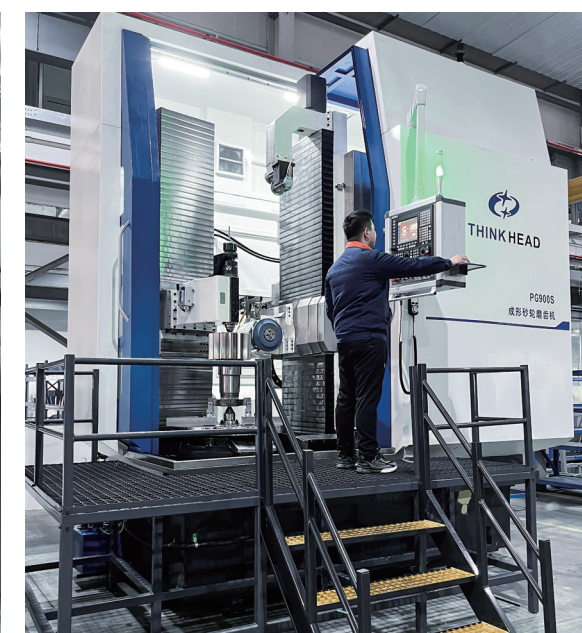
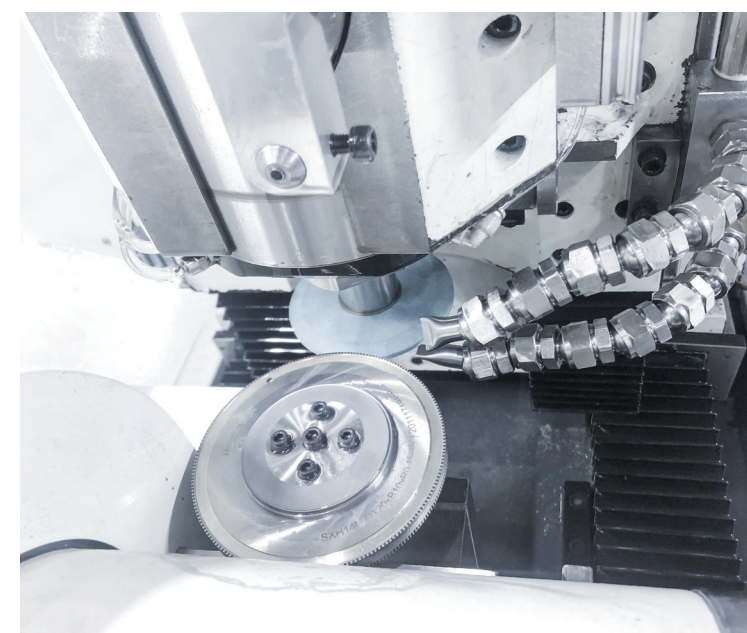


机床优势

Advantages of the Machine Tool

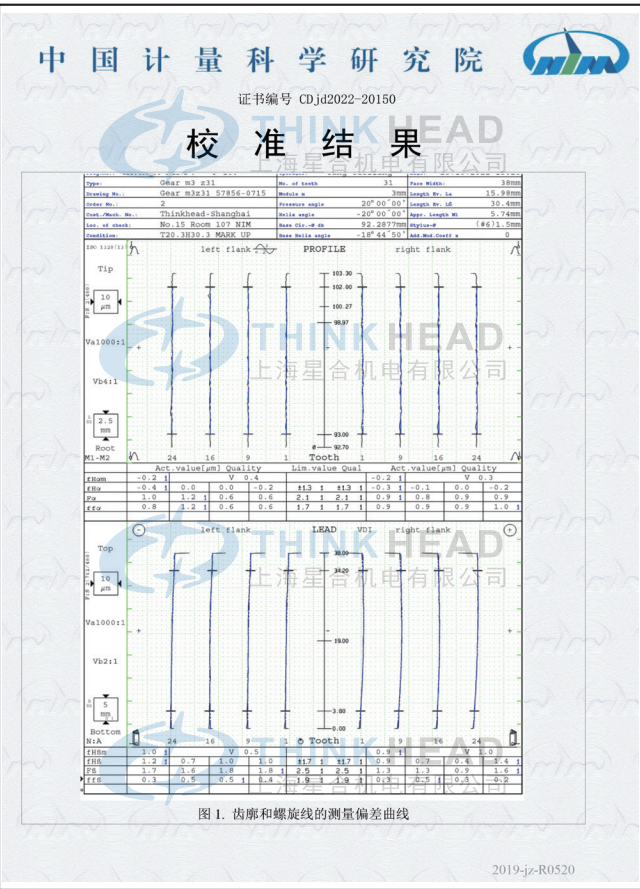
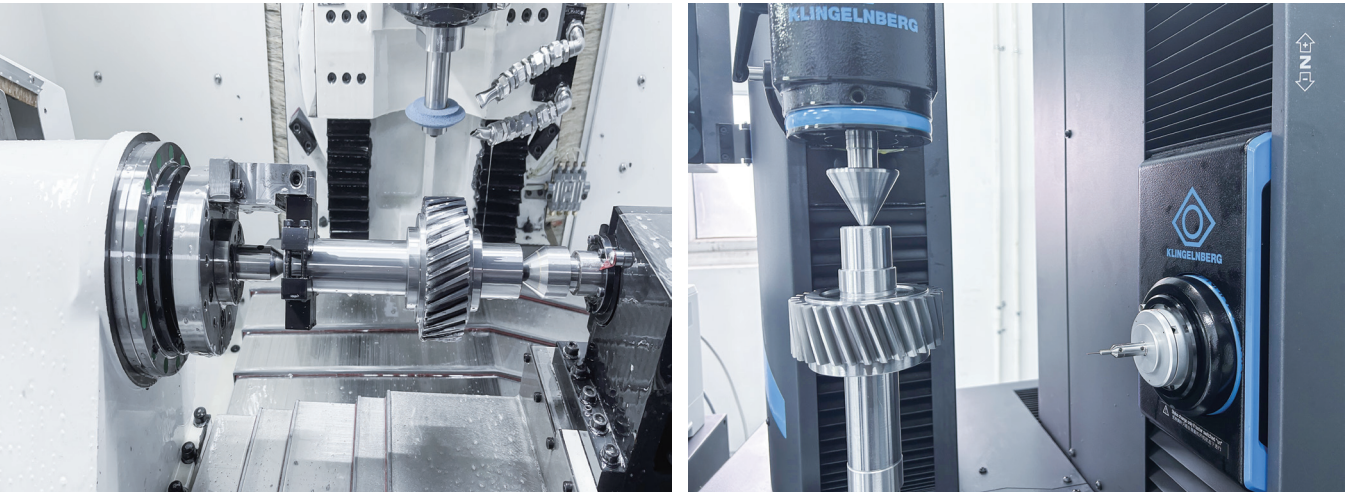
1. 强大的自主研发创新能力，不断地为客户提供最优磨齿解决方案。
2. 拥有完全自主开发的控制软件，轻松实现机床的自动补偿及各种修形能力。
3. 磨齿精度达到1级，正向0级迈进，达到国际领先水平。

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.



磨齿精度

Gear Grinding Precision



三截面和傅里叶

Free twist modification and Fourier

曾经

Past

国内高端机床每年进口占比率高达70%以上, 其中德国, 瑞士, 美国, 意大利、日本机床设备占据大部分高端市场容量。

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

高端磨齿机, 精度高, 功能复杂, 进口依赖严重。

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

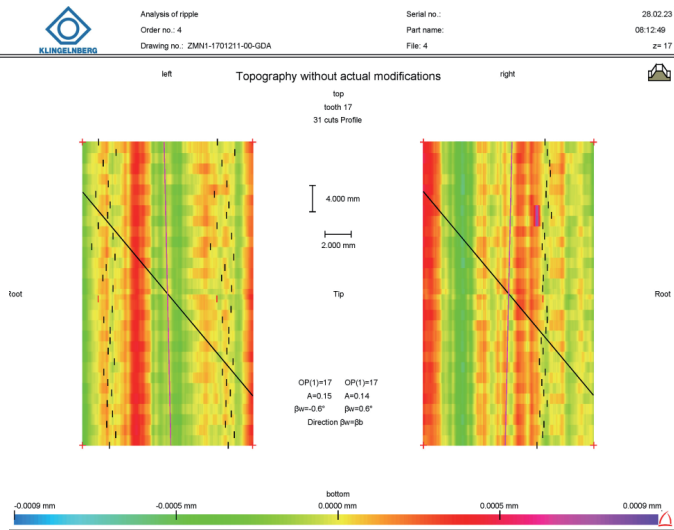
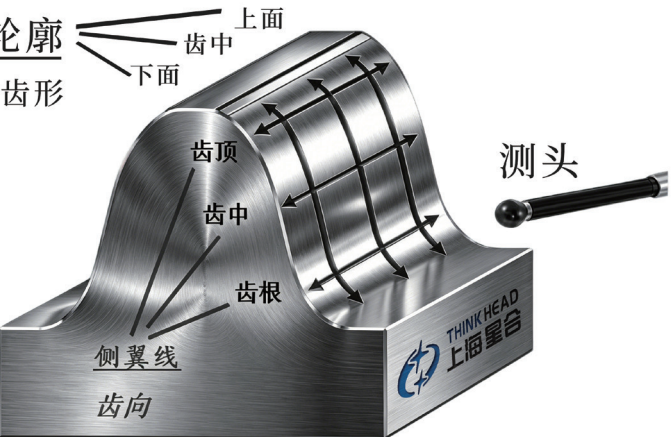
现在

Present

星合磨齿机成功解决新能源汽车齿轮磨齿的“卡脖子”问题。

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

- 6轴数控, 磨齿精度达到一级, 达到国际领先水平。
6-axis CNC control, achieving DIN1, reaching top standard in the world.
- 成功实现三截面扭曲修形功能和傅里叶控制功能, 填补国内短板, 实现替代进口。
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.



低应力制造

Low-Stress Manufacturing

机床铸件残余应力大。使用时间一长，应力释放导致精度下降。这已经成为中外机床精度保持性的关键差距之一。

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.

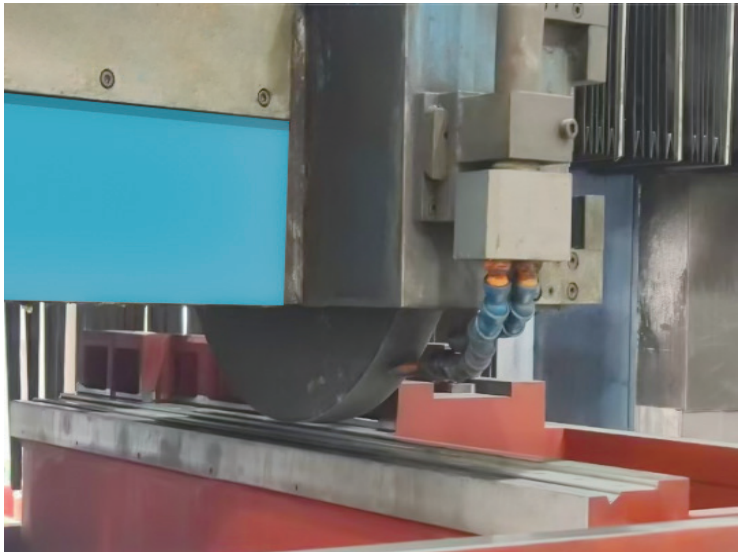


星合自主开发的低应力制造成套技术，将残余应力控制在 30MPa 以内，达到世界一流水平。该技术同样可以用来制造加工中心的铸件。

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.

微米级磨削

Micron-Level Grinding Technology



该技术同样可以用来制造加工中心的零部件。

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

导轨安装面尺寸大、刚度低，加工过程中易受振动，装夹力和重力变形的影响，难以达到微米级的精度。

星合自主开发的微米级磨削技术，可将1米长导轨面的直线度和平行度控制在4μm以内，有力地支撑磨齿机的高精度要求。

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.

大型铸件低应力制造工艺技术

Low-stress casting process for large components

二次回火变形预测模型

Prediction Model for Secondary Treating Deformation

精加工过程优化设计

Optimized machining sequence design

振动去应力机理及工艺

Vibration stress-relief mechanisms & processes

铸件低应力指标

Low-stress Casting benchmarks

✓ 回火参数

Tempering parameters

✓ 去应力工艺

Stress-relief techniques

✓ 加工余量

Machining allowances

设计阶段优化

Design-phase enhancements

铸造过程应力控制

In-casting stress control

铸件回火

Casting tempering

自然时效

Natural aging

粗加工后二次回火

Post-roughing secondary tempering

磨前振动时效

Pre-grinding vibration aging

大尺寸导轨安装面磨削工艺技术

Large-Scale Guideway Grinding Process

导轨磨削变形预测模型

Guideway grinding deformation prediction model

应力变形

Stress-induced deformation control

受热变形

Temperature distortion

自重变形

Gravity distortion mitigation

精加工材料去除量预测模型

Prediction Model for material removal in precision machining

精磨磨削工艺技术

Precision Grinding Technology

砂轮纹理修整

Grinding wheel texture dressing optimization

冷却液选取

Coolant Selection Optimization

磨削工艺参数

Grinding Process Parameterization

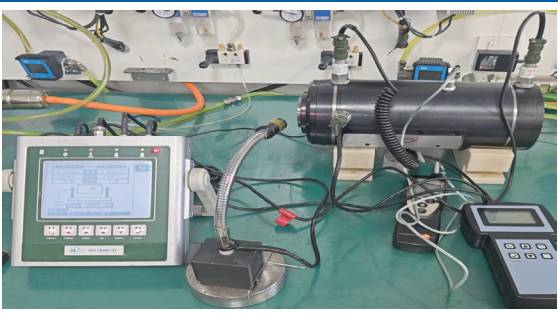
微米级精度

sub-micron machining accuracy

高速主轴
High-Speed Spindle



砂轮主轴性能测试验证
Grinding Spindle Performance Verification



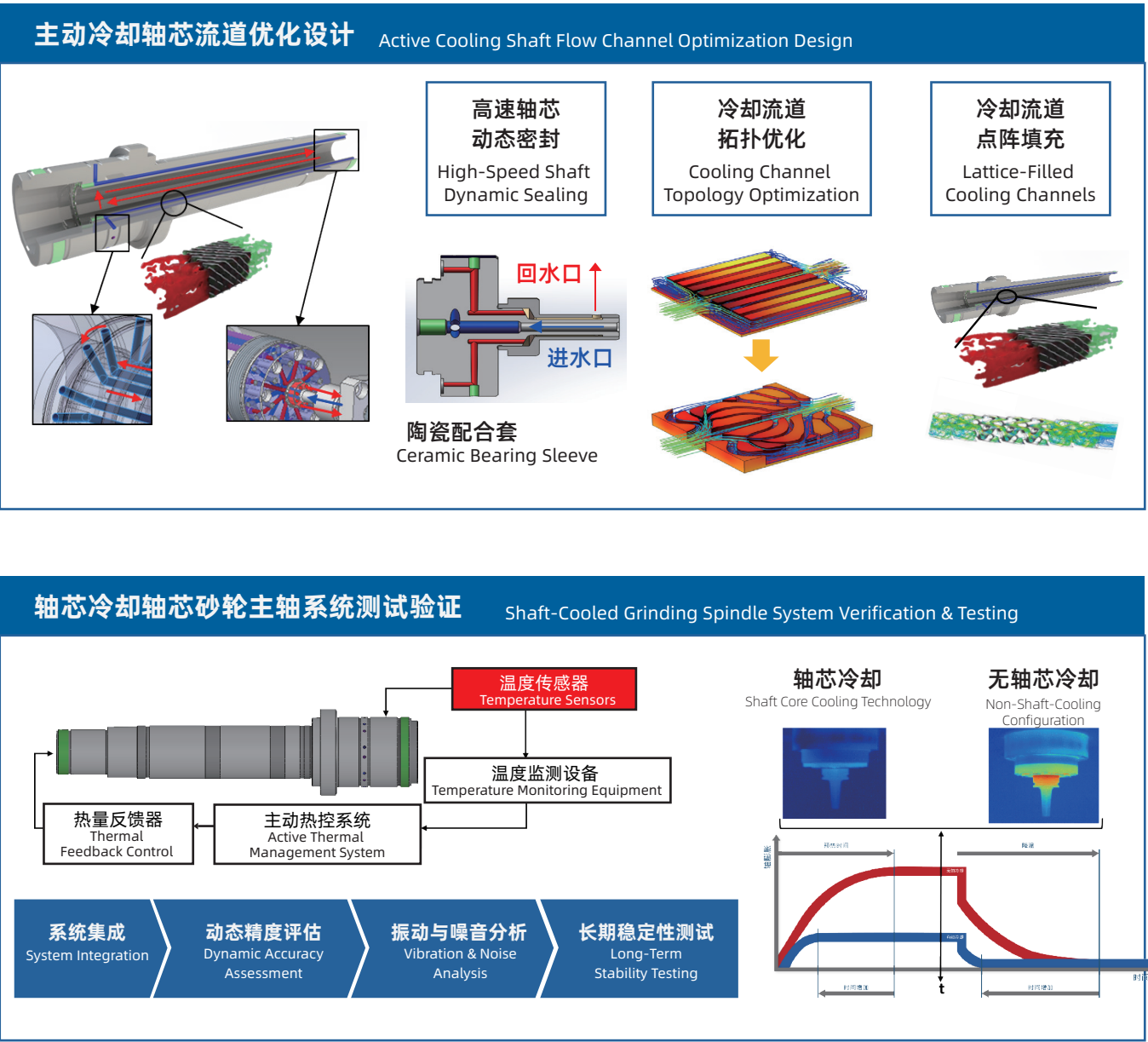
重要指标: HSK63主轴, 脂润滑最高转速达20000rpm HSK63 spindle with grease lubrication: 20,000 rpm max

磨床主轴径向和轴向刚性 $\geq 25\text{kg}/\mu\text{m}$ Grinding spindle rigidity: $\geq 25\text{ kg}/\mu\text{m}$ (radial/axial)

铣床主轴径向和轴向刚性 $\geq 35\text{kg}/\mu\text{m}$ Milling spindle rigidity: $\geq 35\text{ kg}/\mu\text{m}$ (radial/axial)

达到国际领先水平 Reaching internationally leading standards

轴芯冷却
Shaft Core Cooling



成果: 在手动打刀的主轴上, 已经实现轴芯冷却, 批量应用在高配版的成形磨齿机上。

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.

10000rpm工作20分钟, 轴向热伸长 $\leq 8\mu\text{m}$ 。

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

正向设计

Forward Design

区别于逆向设计，正向设计知其然，也知其所以然。需要深厚的数学，力学和机械设计功底。

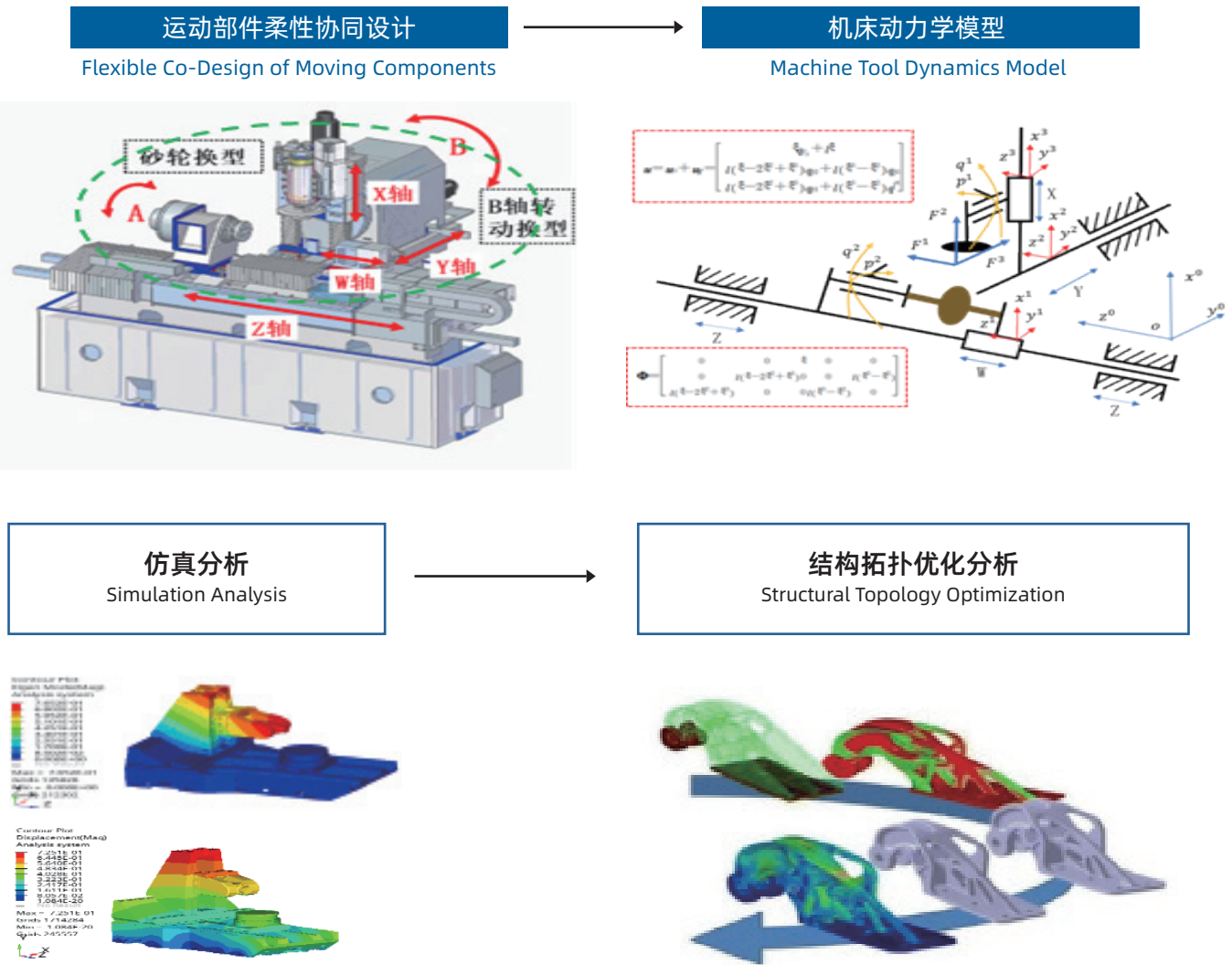
Forward design understands not just the 'how', but the 'why', requires profound expertise in mathematics, mechanics, and mechanical design.

国内掌握正向设计完整方法的机床企业，极其稀少。

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

星合坚持正向设计，虽然初期成本高，但是一旦掌握，一通百通，可以为不同的客户不同的应用场景，打造相适用的机床，可以对机床设计反复迭代从而获得卓越的机床作品。

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.



热补偿技术

Thermal Compensation Technology

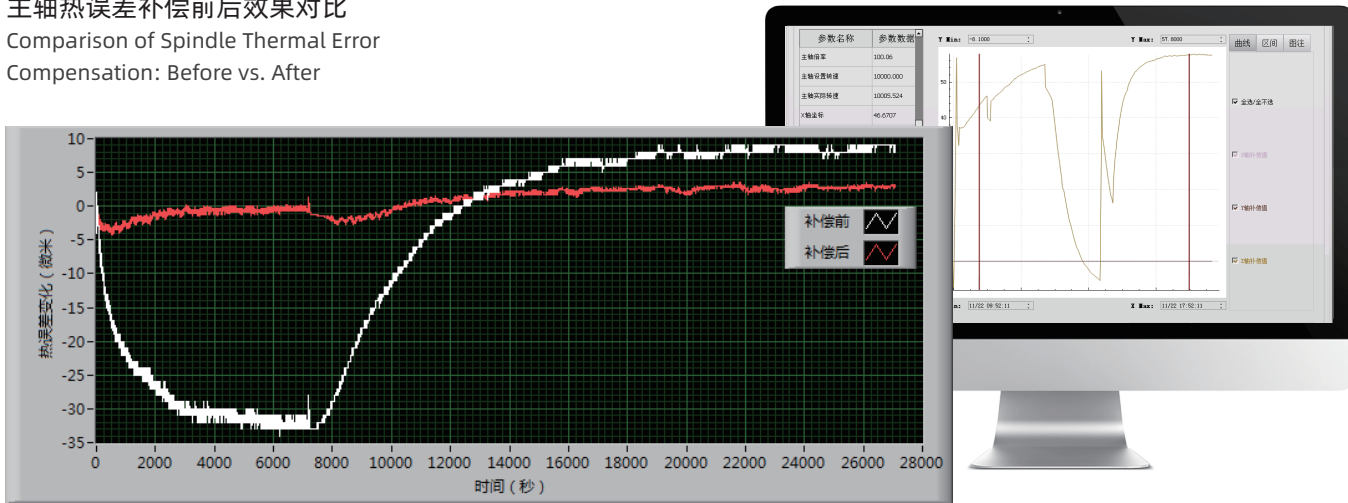
专用热补偿系统，功能包括主轴热伸长补偿、结构补偿。

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

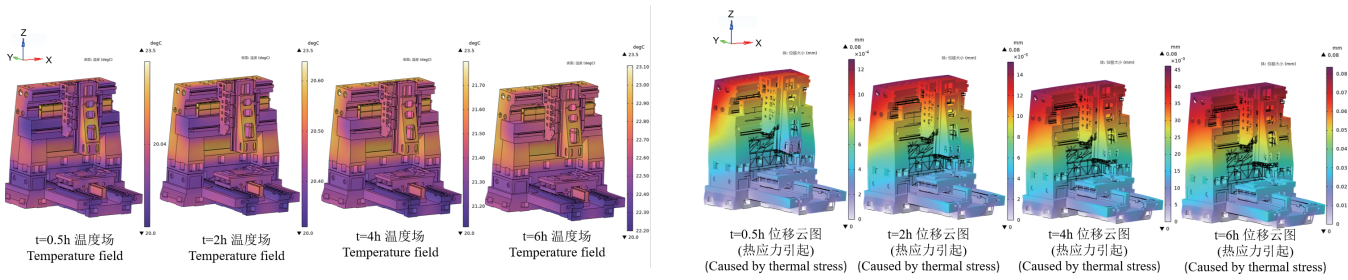
运用分布于机床本体、主轴内部的各个高精度、高灵敏度温度传感器，实时感测主轴、机床结构以及环境的温度变化，结合每台机器量身定制的热力学补偿算法，将因为温度引起的结构变形通过数控系统的实时补偿功能加以修正，实现温度变而位置不变的目标，进而实现机器在全时、全域的刀尖动态精度都处于设定的公差范围内，实现客户所需加工精度。

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.

主轴热误差补偿前后效果对比
Comparison of Spindle Thermal Error Compensation: Before vs. After

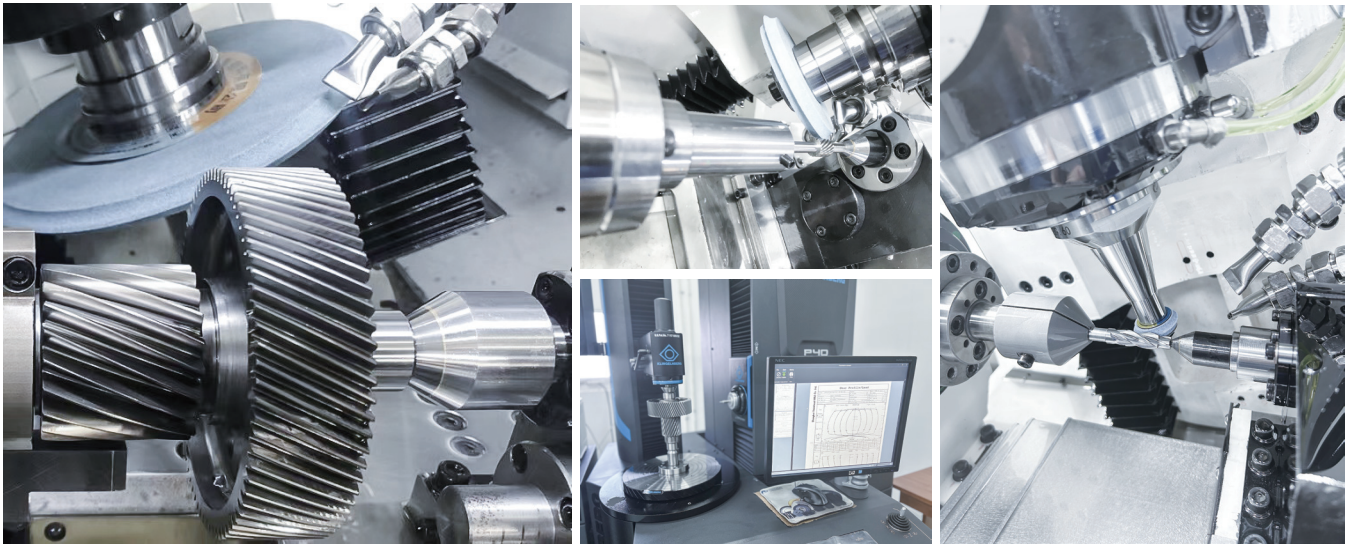
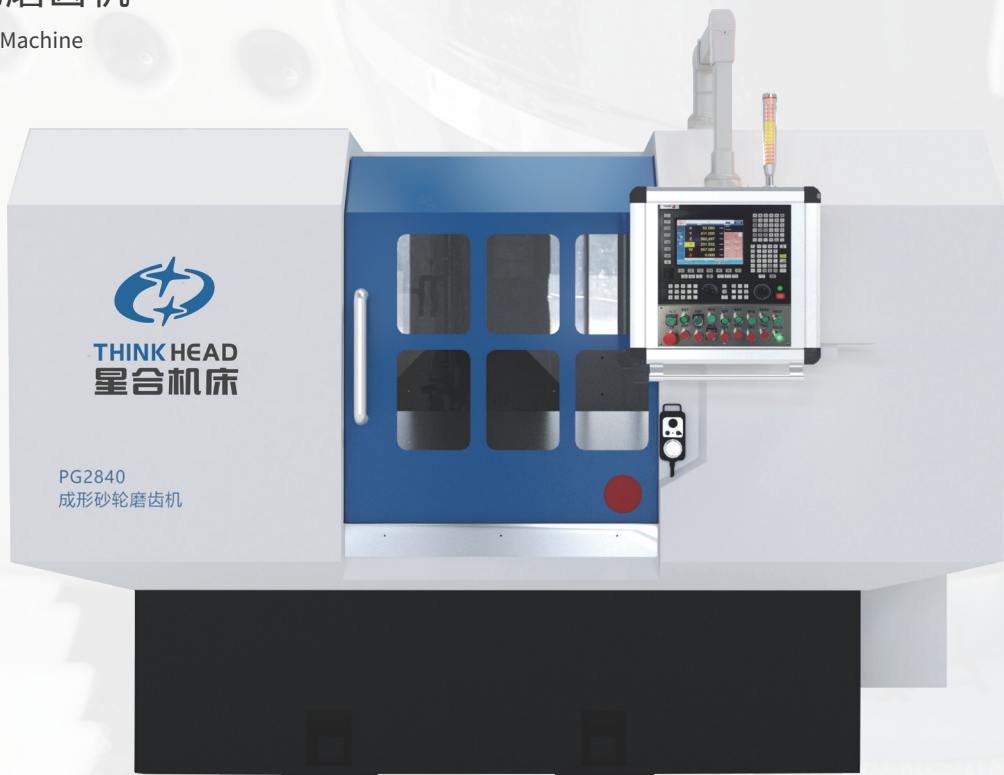


热成像图对比
Thermal imaging comparison



PG2840

成形砂轮磨齿机
Profile Grinding Machine

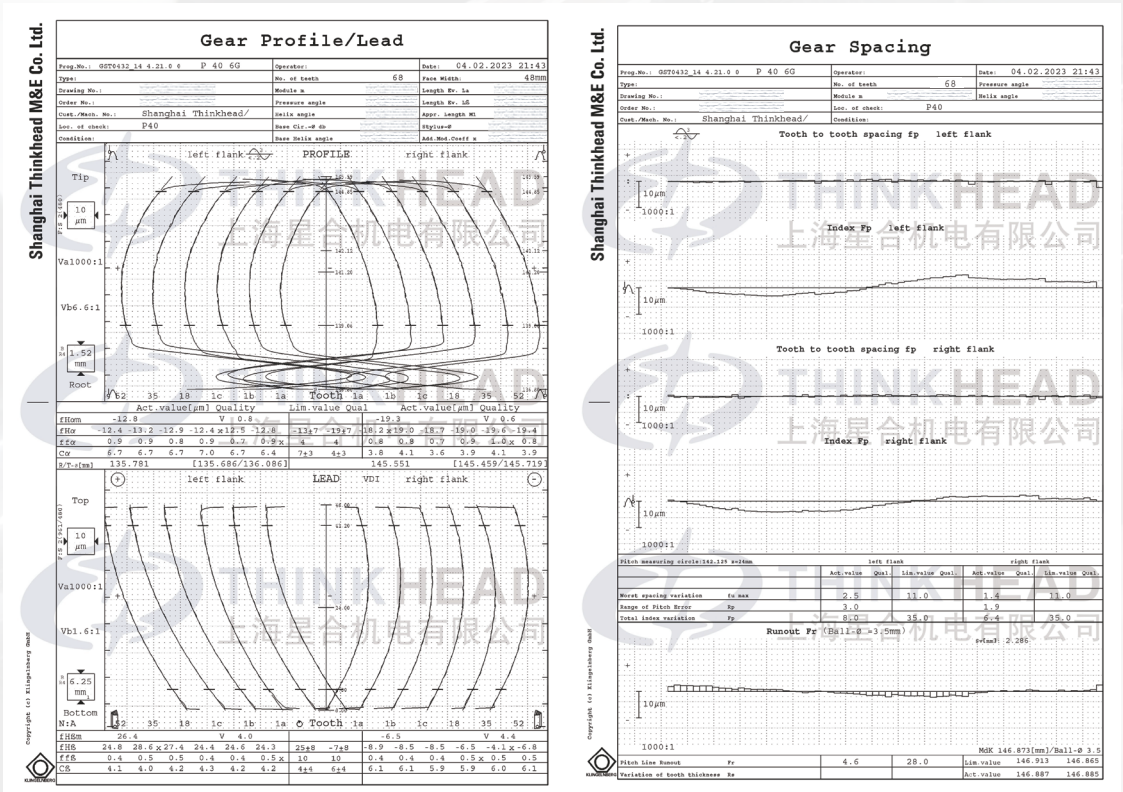


机床型号	Machine Model	PG2840
工件驱动方式	Workpiece Drive Method	直驱 Direct Drive
控制系统	Control System	发格8070 Fagor 8070
伺服电机和驱动	Servo Motor and Drive	发格 Fagor
光栅尺	Linear Encoder	发格 Fagor
控制软件	Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数	Number of CNC Axes	6
机床尾座	Machine Tailstock	伺服尾座 Servo Tailstock
机床主机尺寸	Main Machine Dimensions	3237x2252x2404mm
重量	Weight	6.5吨 6.5T
配电功率(不含过滤系统)	Power Rating (Excluding Filtration System)	30KVA

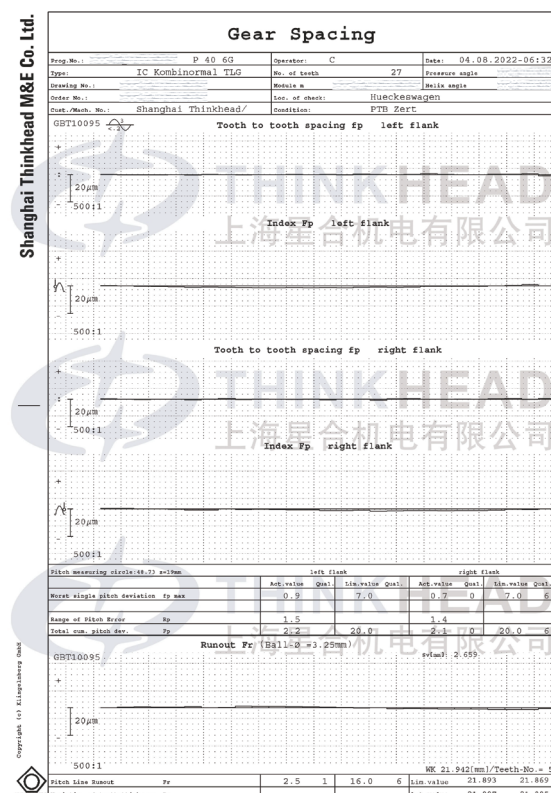
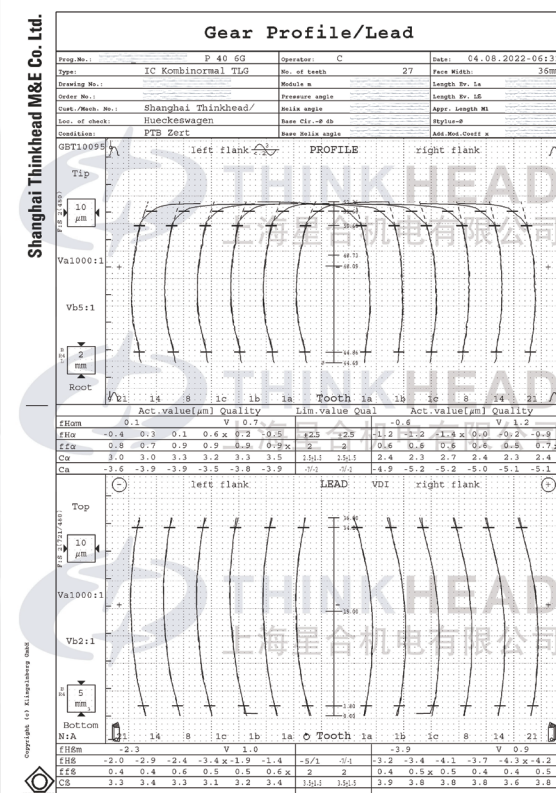
技术参数 Technical Parameters		
加工外径	Grinding Outer Diameter	φ2-φ280mm
磨削长度	Grinding Length	400mm
模数	Module	0.2-4mm
齿数	Number of teeth	任意齿数 Arbitrary
螺旋角	Helix Angle	±45°
最高精度	Highest Accuracy	DIN2
量产精度	Mass Production Accuracy	DIN4
砂轮直径	Grinding Wheel Diameter	φ30-250mm
砂轮最高线速度	Maximum Linear Speed of Grinding Wheel	50m/s
砂轮最高转速	Maximum Speed of Grinding Wheel	15000rpm
工件重量	Workpiece Weight	30kg

选配	Optional
三截面修形	Free twist modification
滚刀刃磨	Hob Resharpening
花键磨	Spline Grinding
顶尖修磨	Top center Resharpening
蜗杆螺纹磨	Worm Thread Grinding

扩展机型	Expanded Model
PG2840S	
PG2840E	



Profile Grinding Machine



PG2840H

工件驱动方式	Workpiece Drive Method	直驱	Direct Drive
控制系统	Control System	发格8070	Fagor 8070
伺服电机和驱动	Servo Motor and Drive	发格	Fagor
直线电机	Linear motor	Z轴+Y轴	Z +Y axis
光栅尺	Linear Encoder	发格	Fagor
控制软件	Control Software	星合嵌入式成形磨软件	Embedded Thinkhead profile grinding software
数控轴数	Number of CNC Axes	6	
机床尾座	Machine Tailstock	伺服尾座	Servo Tailstock
机床主机尺寸	Main Machine Dimensions	3150x2293x2390mm	
重量	Weight	7吨	7T
配电功率(不含过滤系统)	Power Rating (Excluding Filtration System)	40KVA	

技术参数 Technical Parameters

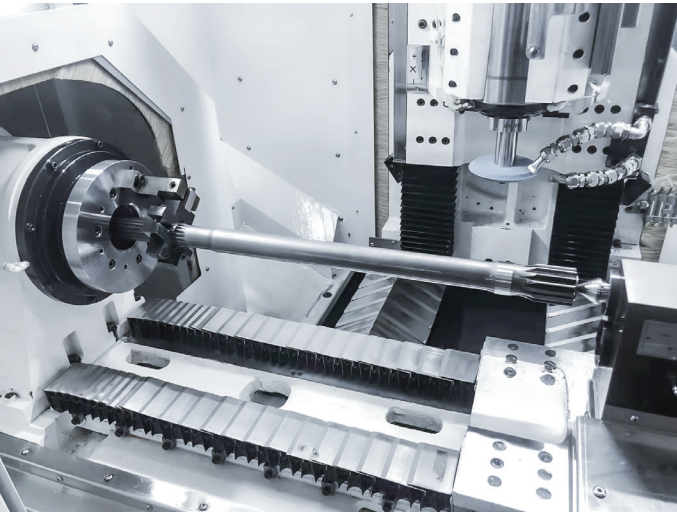
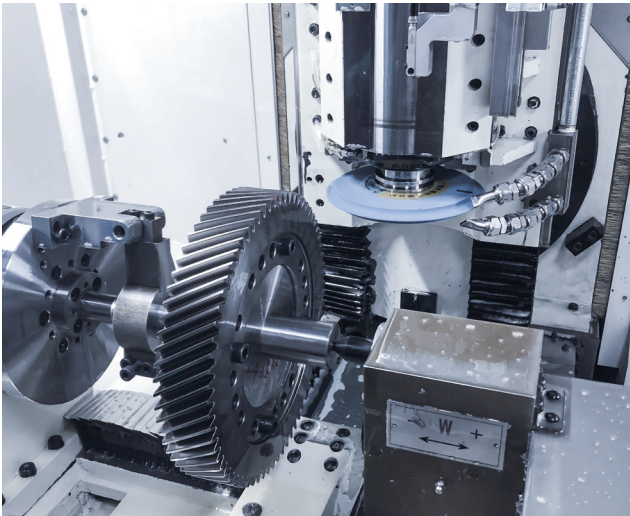
加工外径	Grinding Outer Diameter	φ3-φ280mm
磨削长度	Grinding Length	400mm
模数	Module	0.2-4mm
齿数	Number of teeth	任意齿数 Arbitrary
螺旋角	Helix Angle	±45°
最高精度	Highest Accuracy	DIN2
量产精度	Mass Production Accuracy	DIN3
砂轮直径	Grinding Wheel Diameter	φ30-250mm
砂轮最高线速度	Maximum Linear Speed of Grinding Wheel	50m/s
砂轮最高转速	Maximum Speed of Grinding Wheel	18000rpm
工件重量	Workpiece Weight	30kg

选配 Optional

三截面修形	Free twist modification
滚刀刃磨	Hob Resharpening
花键磨	Spline Grinding
顶尖修磨	Top center Resharpening
蜗杆螺纹磨	Worm Thread Grinding

PG3270

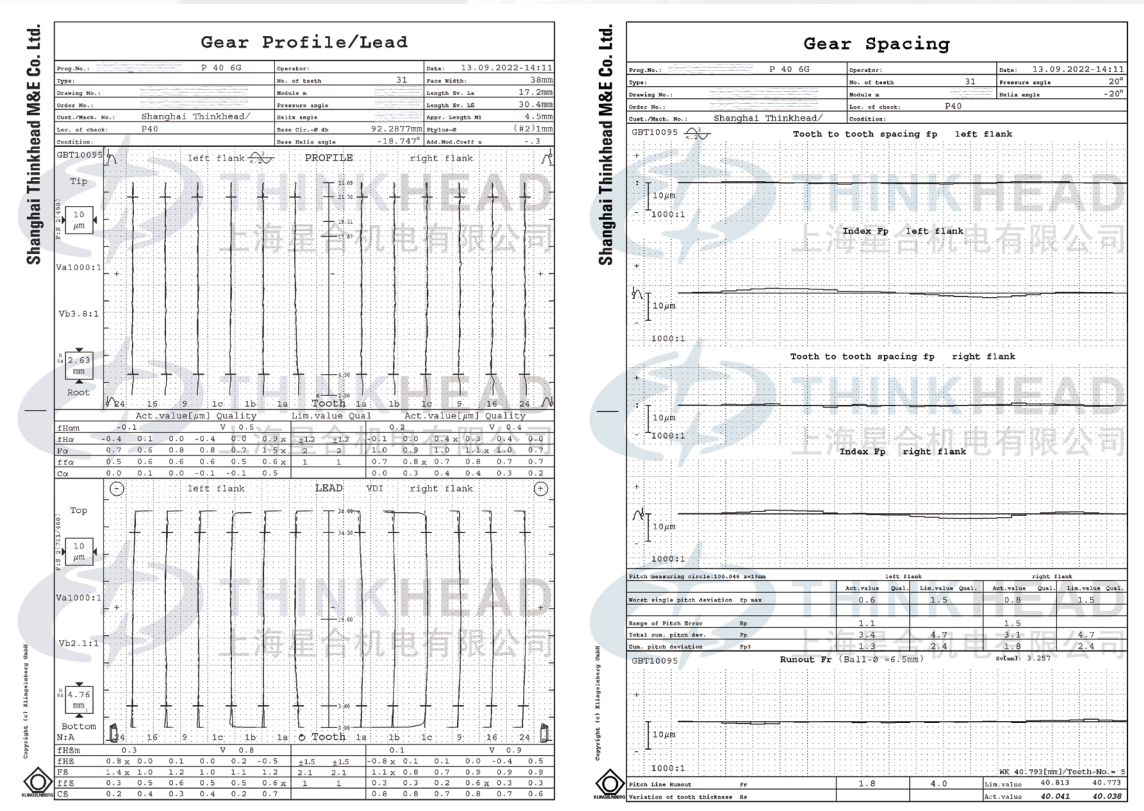
成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG3270
工件驱动方式 Workpiece Drive Method	直驱 Direct Drive	
控制系统 Control System	发格8070 Fagor 8070	
伺服电机和驱动 Servo Motor and Drive	发格 Fagor	
光栅尺 Linear Encoder	发格 Fagor	
控制软件 Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software	
数控轴数 Number of CNC Axes	6	
机床尾座 Machine Tailstock	伺服尾座 Servo Tailstock	
机床主机尺寸 Main Machine Dimensions	3718x2323x2437mm	
重量 Weight	7吨 7T	
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)	30KVA	

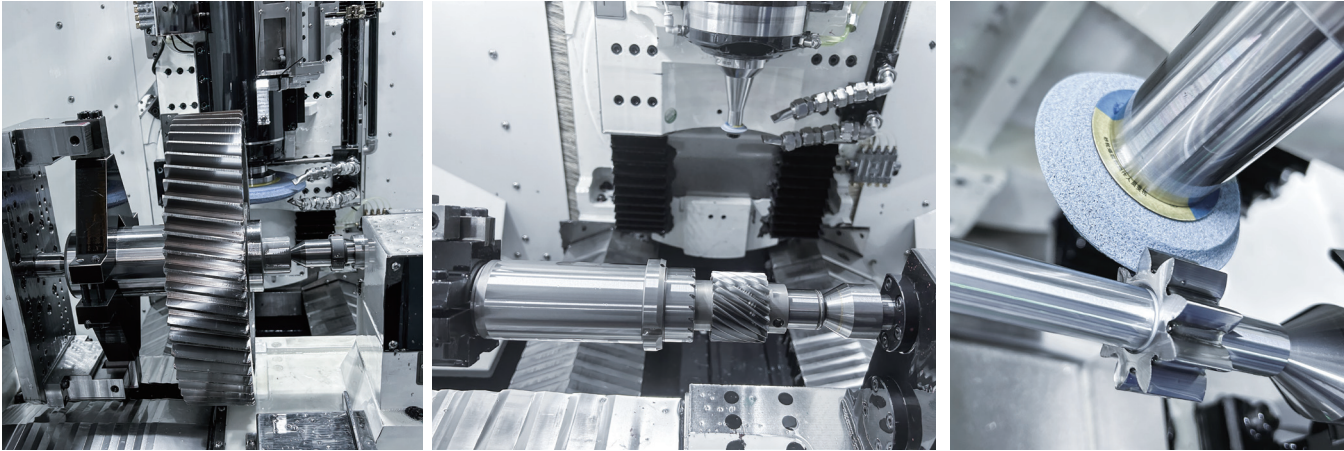
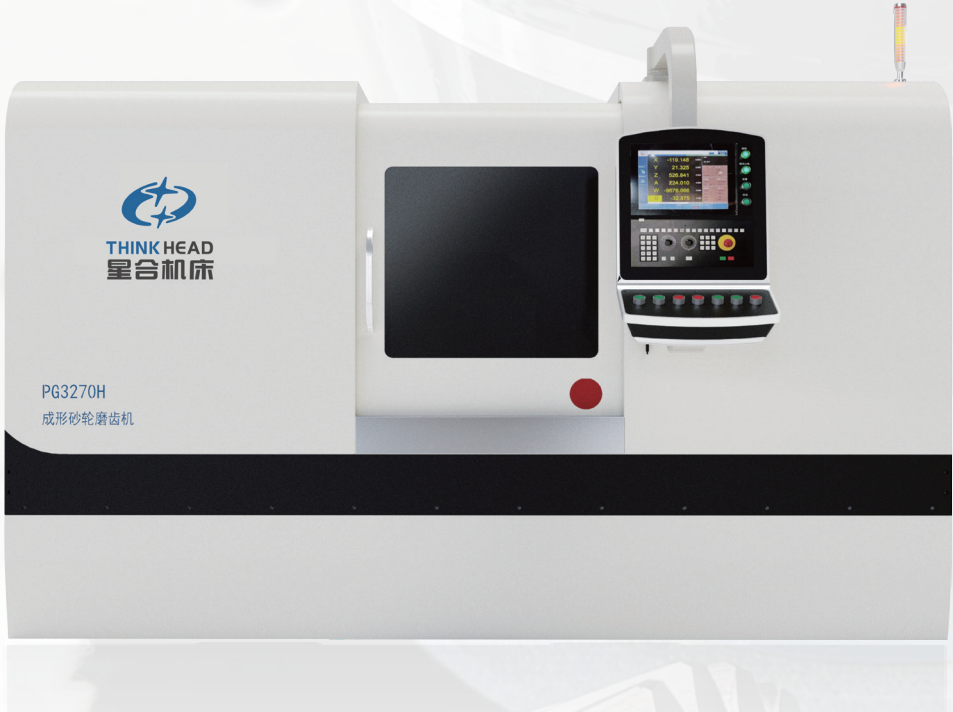
技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ10-φ320mm
磨削长度 Grinding Length	700mm
模数 Module	0.5-8mm
齿数 Number of teeth	任意齿数 Arbitrary
螺旋角 Helix Angle	±45°
最高精度 Highest Accuracy	DIN3
量产精度 Mass Production Accuracy	DIN4
砂轮直径 Grinding Wheel Diameter	φ40-250mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	50m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	15000rpm
工件重量 Workpiece Weight	50kg

选配 Optional	
三截面修形 Free twist modification	
滚刀刃磨 Hob Resharpening	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharpening	
蜗杆螺纹磨 Worm Thread Grinding	



PG3270H

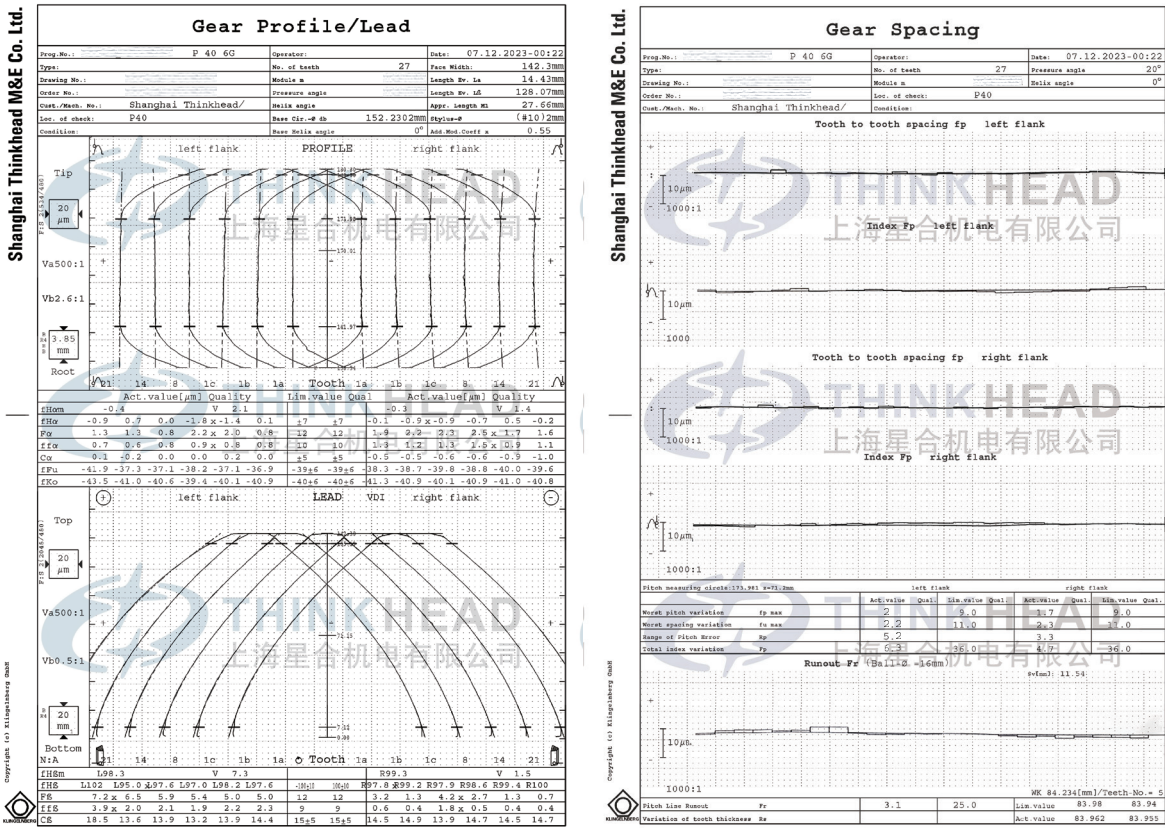
成形砂轮磨齿机
Profile Grinding Machine



机床型号	Machine Model	PG3270H
工件驱动方式	Workpiece Drive Method	直驱 Direct Drive
控制系统	Control System	发格8070 Fagor 8070
伺服电机和驱动	Servo Motor and Drive	发格 Fagor
直线电机	Linear motor	Z轴+Y轴 Z+Y axis
光栅尺	Linear Encoder	发格 Fagor
控制软件	Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数	Number of CNC Axes	6
机床尾座	Machine Tailstock	伺服尾座 Servo Tailstock
机床主机尺寸	Main Machine Dimensions	3581x2363x2450mm
重量	Weight	7.5吨 7.5T
配电功率(不含过滤系统)	Power Rating (Excluding Filtration System)	40KVA

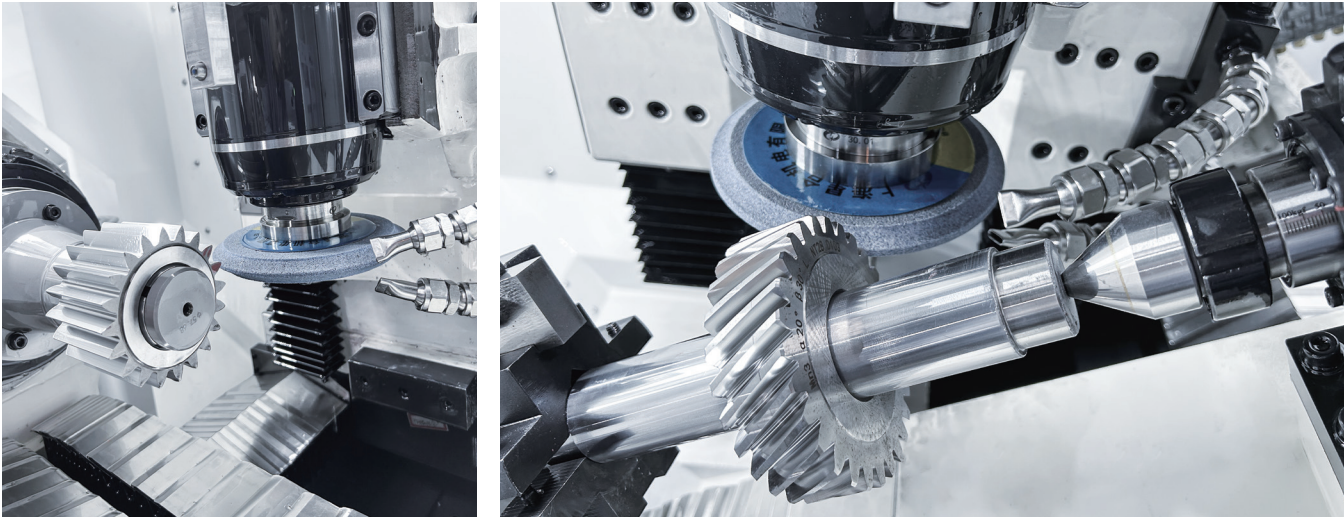
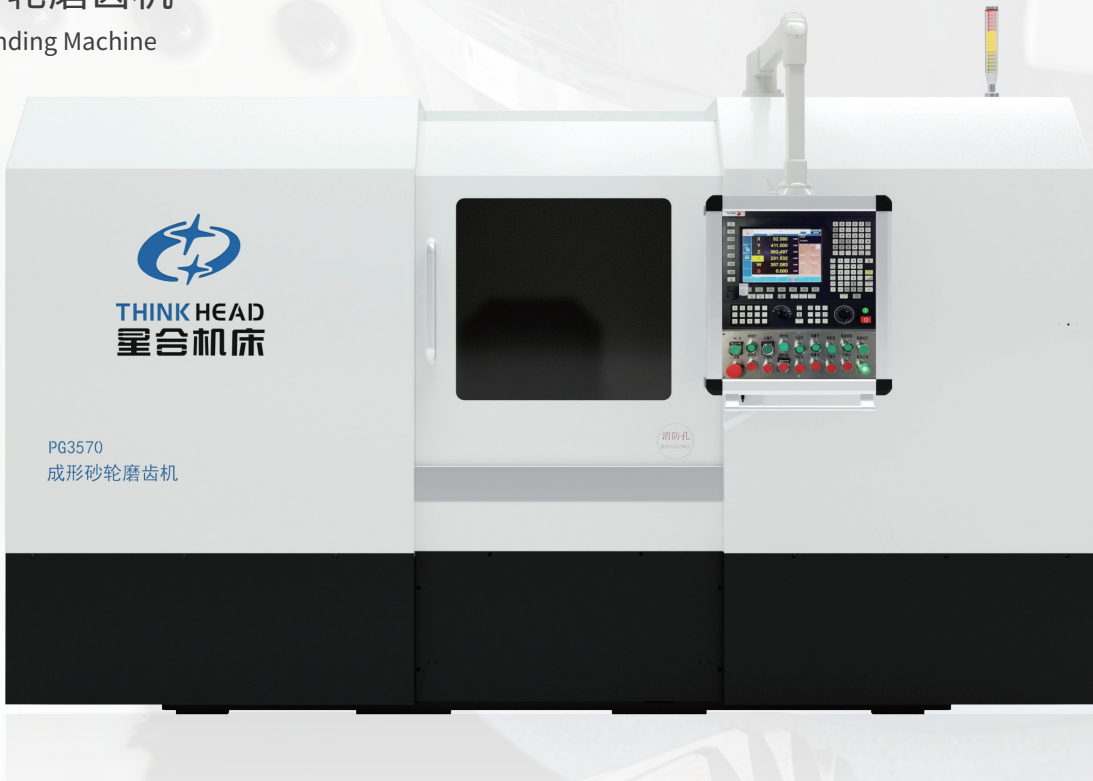
技术参数 Technical Parameters		
加工外径	Grinding Outer Diameter	φ10-φ320mm
磨削长度	Grinding Length	700mm
模数	Module	0.5-10mm
齿数	Number of teeth	任意齿数 Arbitrary
螺旋角	Helix Angle	±45°
最高精度	Highest Accuracy	DIN2
量产精度	Mass Production Accuracy	DIN3
砂轮直径	Grinding Wheel Diameter	φ30-300mm
砂轮最高线速度	Maximum Linear Speed of Grinding Wheel	50m/s
砂轮最高转速	Maximum Speed of Grinding Wheel	18000rpm
工件重量	Workpiece Weight	50kg

选配	Optional
三截面修形	Free twist modification
滚刀刃磨	Hob Resharpener
花键磨	Spline Grinding
顶尖修磨	Top center Resharpener
蜗杆螺纹磨	Worm Thread Grinding



PG3570

成形砂轮磨齿机
Profile Grinding Machine

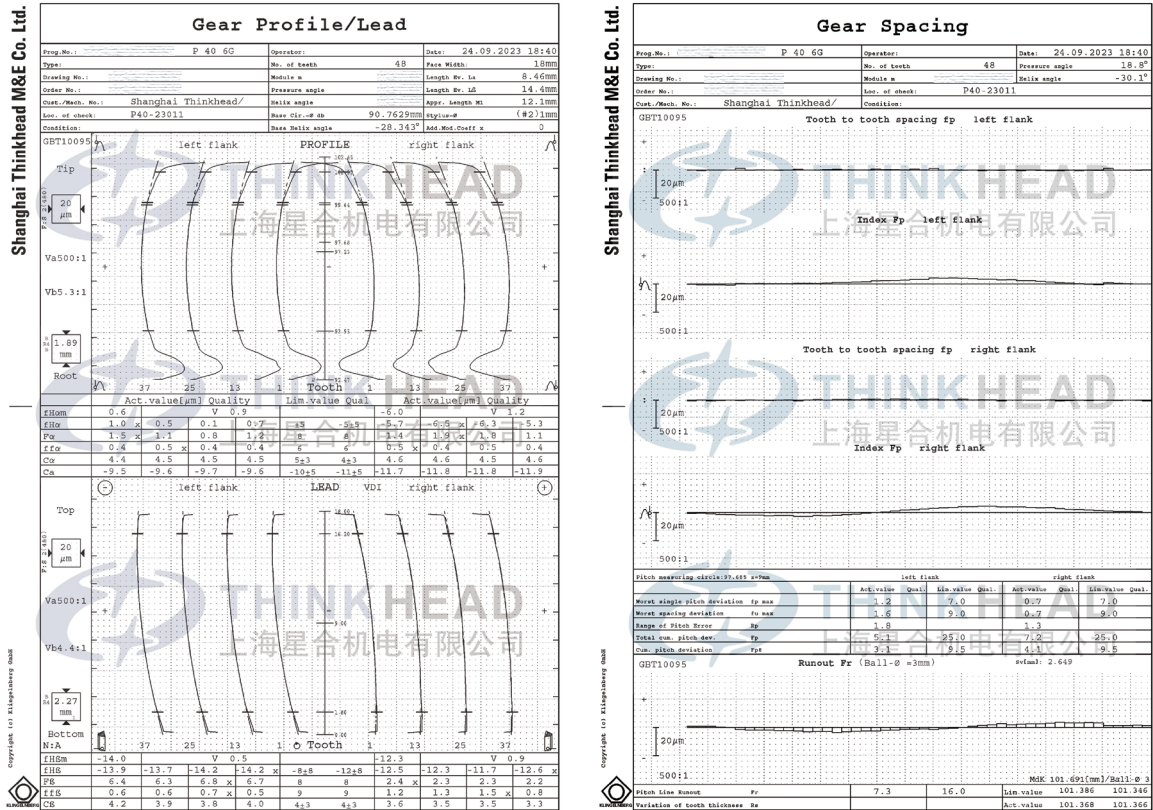


机床型号 Machine Model		PG3570
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8060 Fagor 8060
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		5
机床尾座 Machine Tailstock		电动尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions		3718x2323x2437mm
重量 Weight		7吨 7T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		30KVA

技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ10-φ400mm
磨削长度 Grinding Length	700mm
模数 Module	0.5-10mm
齿数 Number of teeth	任意齿数 Arbitrary
螺旋角 Helix Angle	±45°
最高精度 Highest Accuracy	DIN4
量产精度 Mass Production Accuracy	DIN5
砂轮直径 Grinding Wheel Diameter	φ50-250mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	40m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	10000rpm
工件重量 Workpiece Weight	80kg

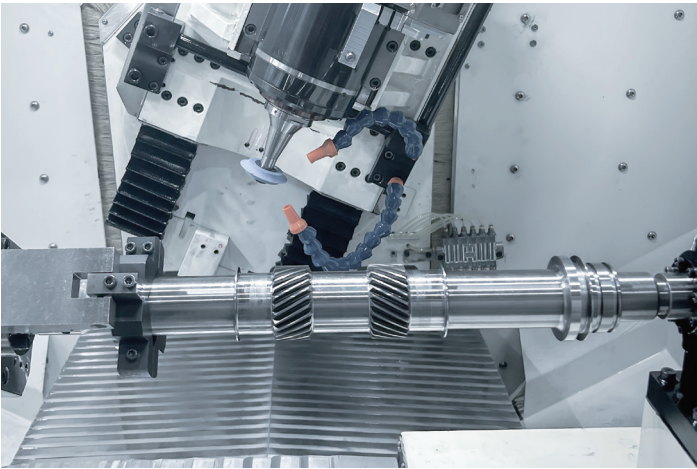
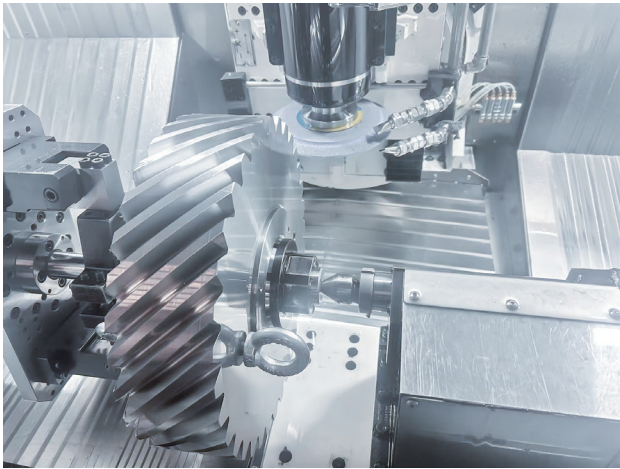
选配 Optional	
滚刀刃磨 Hob Resharpener	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharpener	
蜗杆螺纹磨 Worm Thread Grinding	

扩展机型 Expanded Model	
PG3570S	
PG4570	



PG40100

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG40100
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8060 Fagor 8060
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		5
机床尾座 Machine Tailstock		电动尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions		3896x2109x2644mm
重量 Weight		8吨 8T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		40KVA

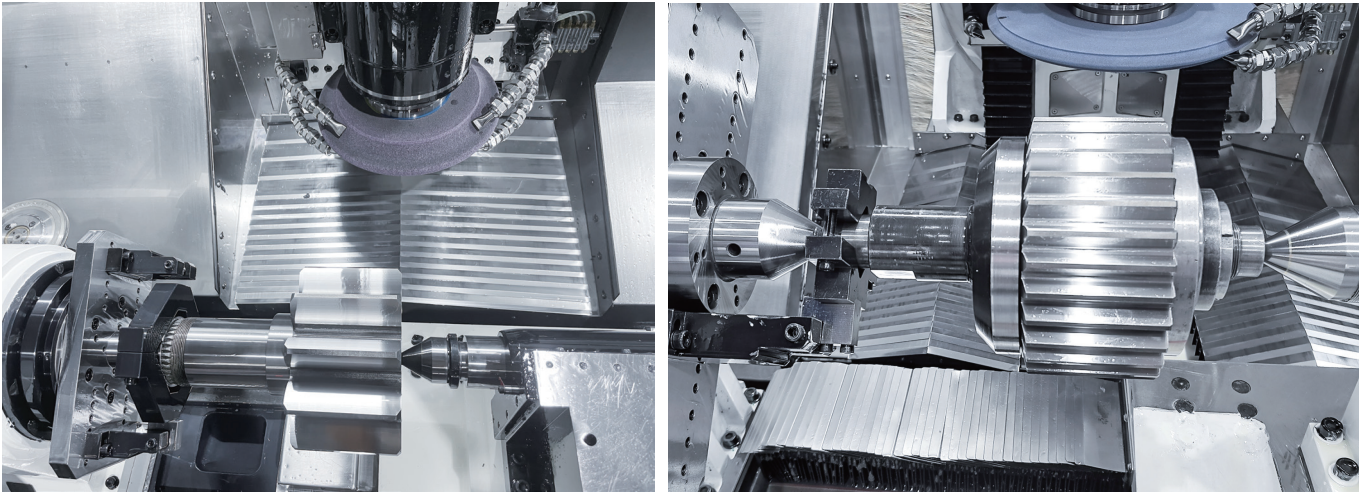
技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ40-φ450mm
磨削长度 Grinding Length	700mm
模数 Module	1-12mm
齿数 Number of teeth	任意齿数 Arbitrary
螺旋角 Helix Angle	左旋45°/右旋45° Left rotation / Right rotation
最高精度 Highest Accuracy	DIN5
砂轮直径 Grinding Wheel Diameter	φ30-250mm
砂轮最大厚度 Maximum thickness of grinding wheel	40mm
工件最长(最大顶尖距) Maximum workpiece length (max. distance between centers)	1100mm
工件最短(最小顶尖距) Minimum workpiece length (min. distance between centers)	200mm
砂轮最高转速 Maximum Speed of Grinding Wheel	10000rpm
工件重量 Workpiece Weight	150kg

选配 Optional	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharpener	
蜗杆螺纹磨 Worm Thread Grinding	

扩展机型 Expanded Model	
PG40100S	

PG40150

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG40150
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8060 Fagor 8060
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		5
机床尾座 Machine Tailstock		电动尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions		4502x2069x2634mm
重量 Weight		10吨 10T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		40KVA

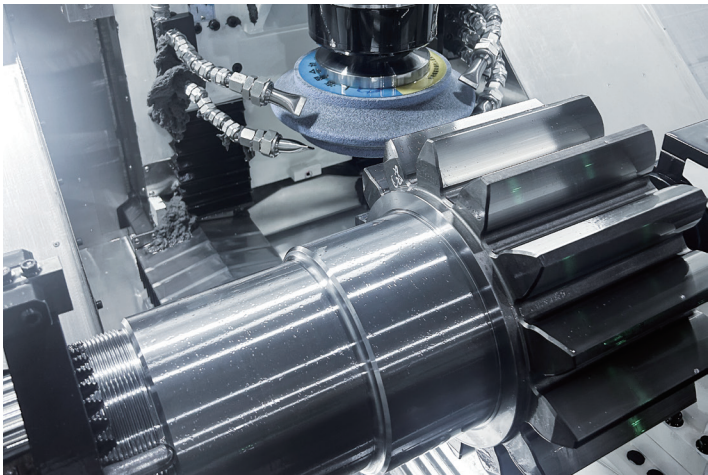
技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ40-φ450mm
磨削长度 Grinding Length	1500mm
模数 Module	1-12mm(可扩展 Scalable 1-16mm)
齿数 Number of teeth	任意齿数 Arbitrary
螺旋角 Helix Angle	±45°
最高精度 Highest Accuracy	DIN4
量产精度 Mass Production Accuracy	DIN5
砂轮直径 Grinding Wheel Diameter	φ60-250mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	50m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	10000rpm
工件重量 Workpiece Weight	200kg

选配 Optional	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharping	
蜗杆螺纹磨 Worm Thread Grinding	

扩展机型 Expanded Model	
PG40150S	
PG40200	

PG5070

成形砂轮磨齿机
Profile Grinding Machine

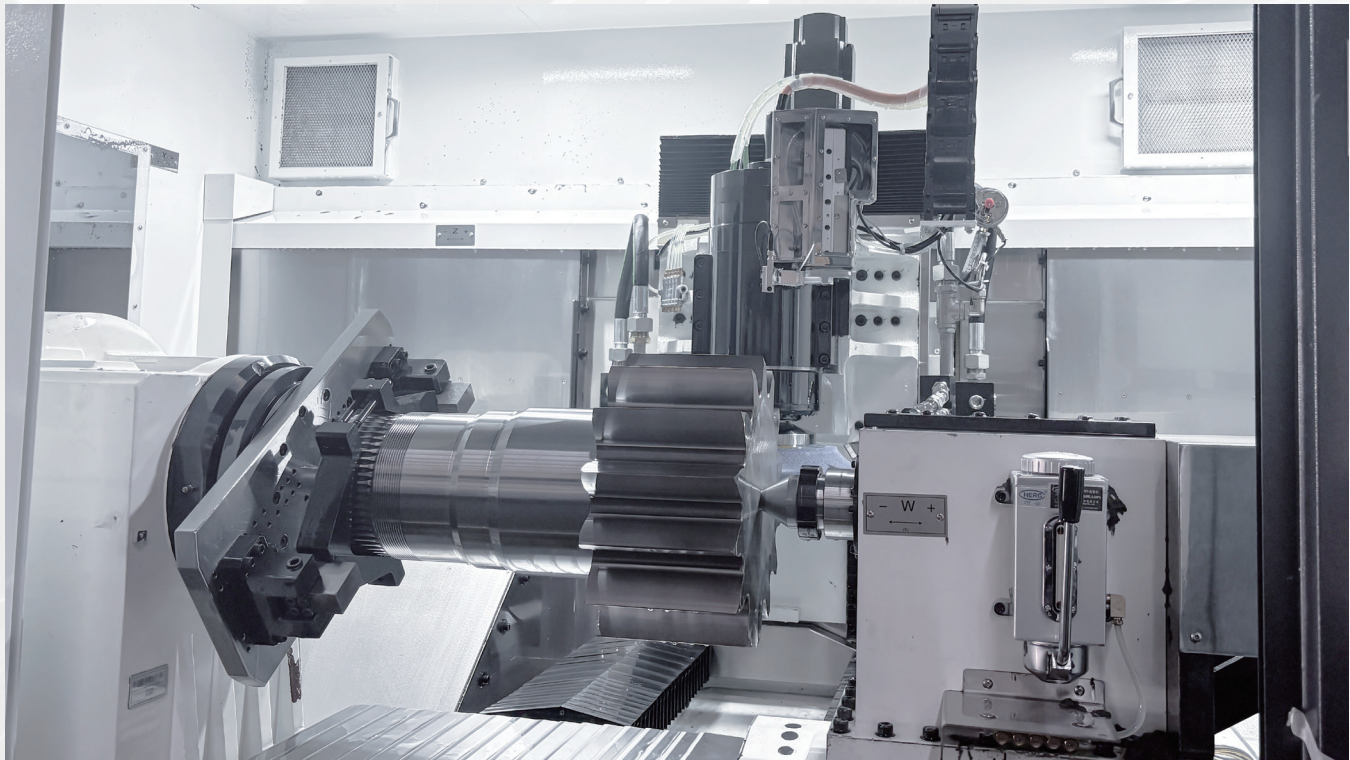


机床型号 Machine Model		PG5070
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8060 Fagor 8060
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		5
机床尾座 Machine Tailstock		伺服尾座 Servo Tailstock
机床主机尺寸 Main Machine Dimensions		3787x2375x2576mm
重量 Weight		9吨 9T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		40KVA

技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ40-φ500mm
磨削长度 Grinding Length	700mm
模数 Module	1-20mm
螺旋角 Helix Angle	±45°
砂轮直径 Grinding Wheel Diameter	φ100-350mm
最高精度 Highest precision	DIN3
磨削精度 Grinding precision	DIN5
工件最长(最大顶尖距) Maximum workpiece length (max. distance between centers)	750mm
工件最短(最小顶尖距) Minimum workpiece length (min. distance between centers)	200mm
砂轮最高转速 Maximum Speed of Grinding Wheel	6000rpm
工件重量 Highest Accuracy	300kg

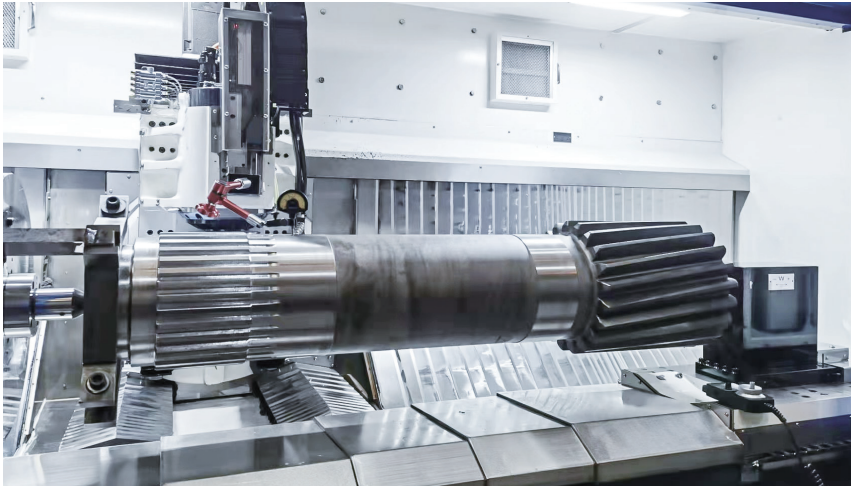
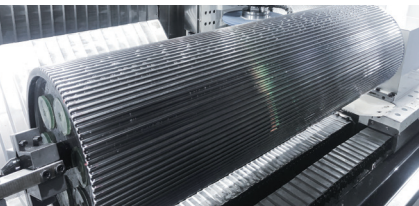
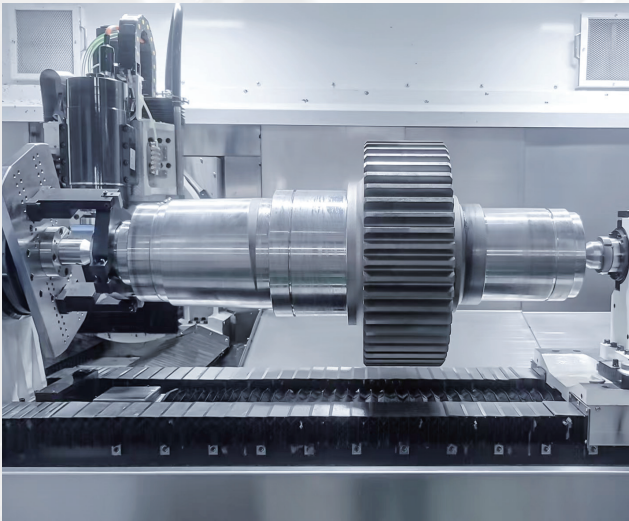
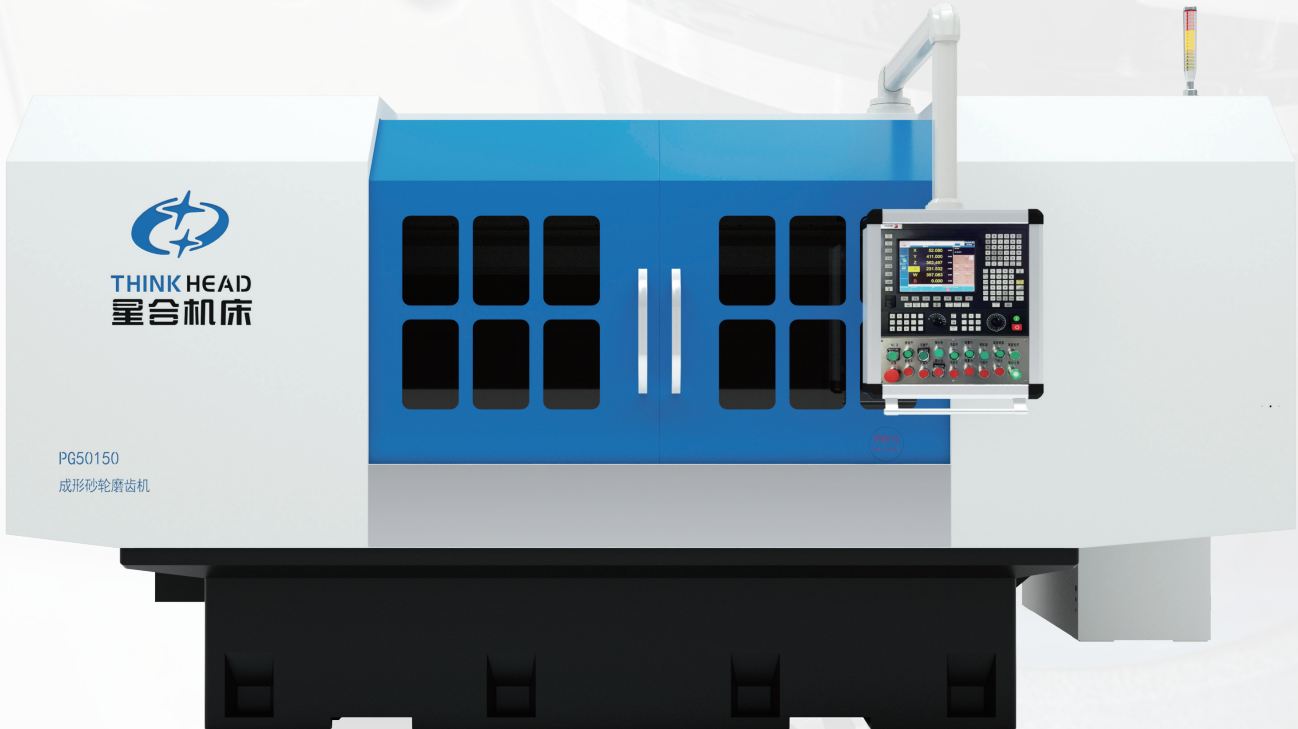
选配 Optional	
三截面修形 Free twist modification	
滚刀刃磨 Hob Resharpener	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharpener	
蜗杆螺纹磨 Worm Thread Grinding	
在线测量 Online measurement	

扩展机型 Expanded Model	
PG5070S	
PG5070MS	



PG50150

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG50150
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8070 Fagor 8070
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		6
机床尾座 Machine Tailstock		伺服尾座 Servo Tailstock
机床主机尺寸 Main Machine Dimensions		4622x2360x2641mm
重量 Weight		14吨 14T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		45KVA

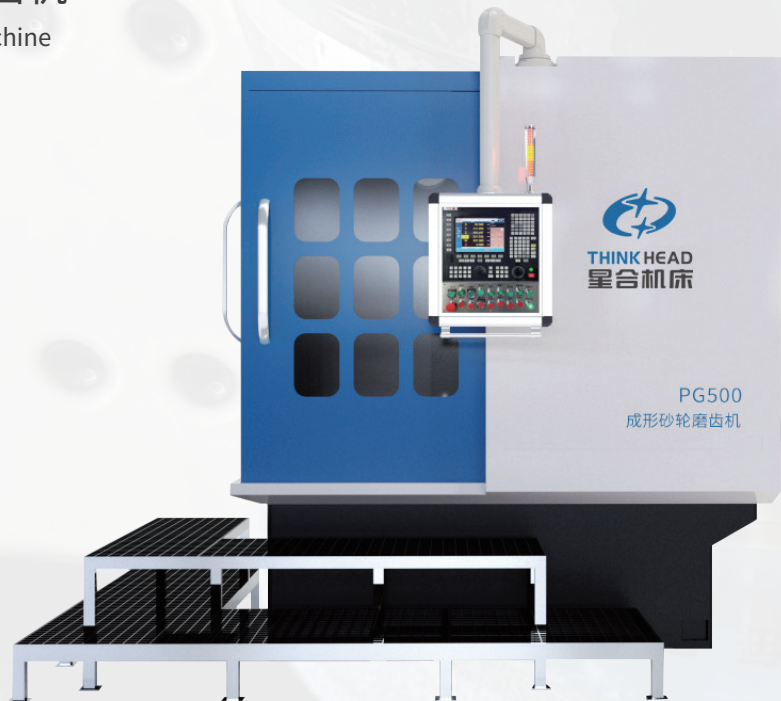
技术参数 Technical Parameters	
加工外径 Grinding Outer Diameter	φ40-φ500mm
磨削长度 Grinding Length	1500mm
模数 Module	1-20mm
齿数 Number of teeth	任意齿数 Arbitrary
螺旋角 Helix Angle	±45°
最高精度 Highest Accuracy	DIN3
量产精度 Mass Production Accuracy	DIN5
砂轮直径 Grinding Wheel Diameter	φ60-350mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	45m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	6000rpm
工件重量 Workpiece Weight	300kg

选配 Optional	
三截面修形 Free twist modification	
滚刀刃磨 Hob Resharpening	
花键磨 Spline Grinding	
顶尖修磨 Top center Resharpening	
蜗杆螺纹磨 Worm Thread Grinding	
在线测量 Online measurement	

扩展机型 Expanded Model	
PG50150E	PG50250
PG50150S	PG50350

PG500

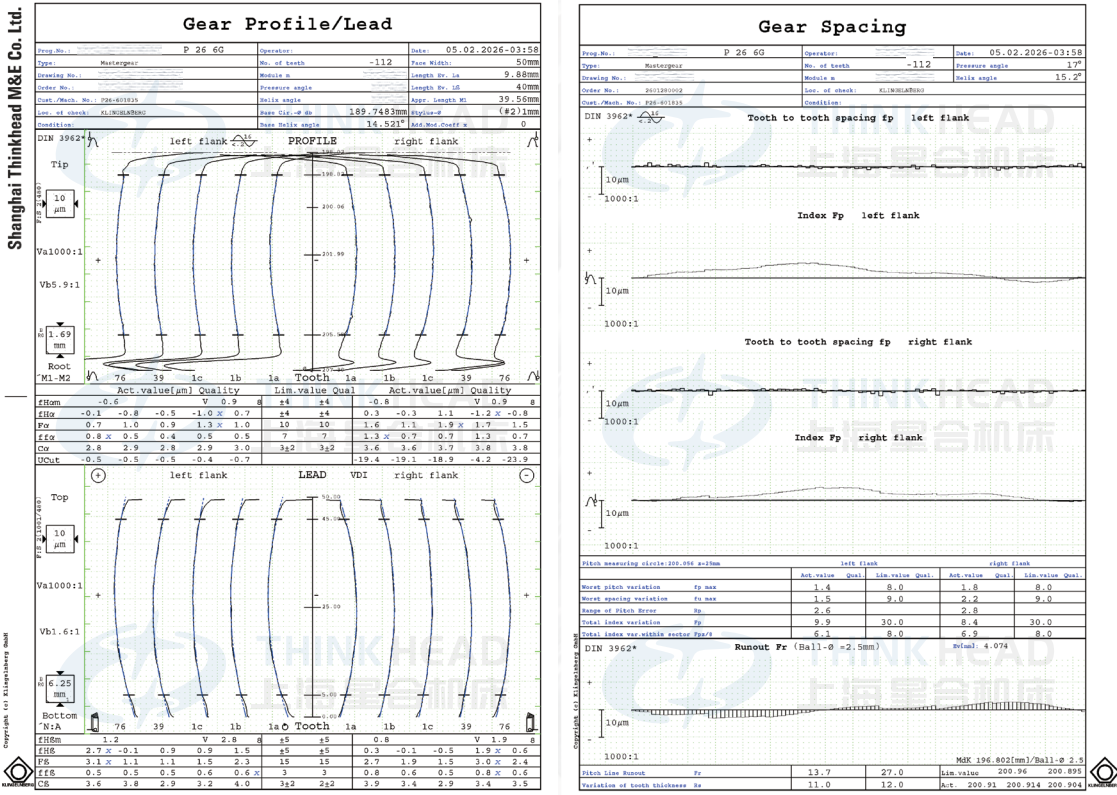
成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG500
工件驱动方式 Workpiece Drive Method	直驱 Direct Drive	
控制系统 Control System	发格8070 Fagor 8070	
伺服电机和驱动 Servo Motor and Drive	发格 Fagor	
光栅尺 Linear Encoder	发格 Fagor	
控制软件 Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software	
数控轴数 Number of CNC Axes	6	
机床尾座 Machine Tailstock	电动尾座 Electric Tailstock	
机床主机尺寸 Main Machine Dimensions	3258x2205x3241mm	
重量 Weight	12吨 12T	
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)	45KVA	

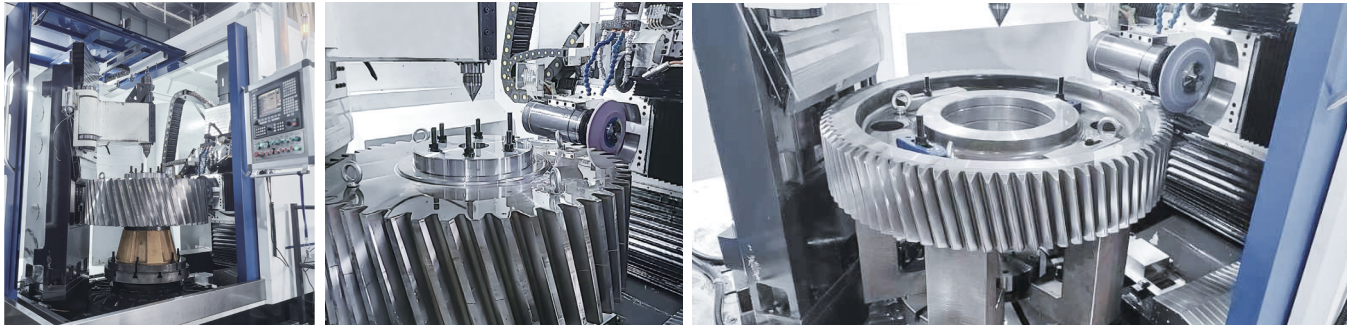
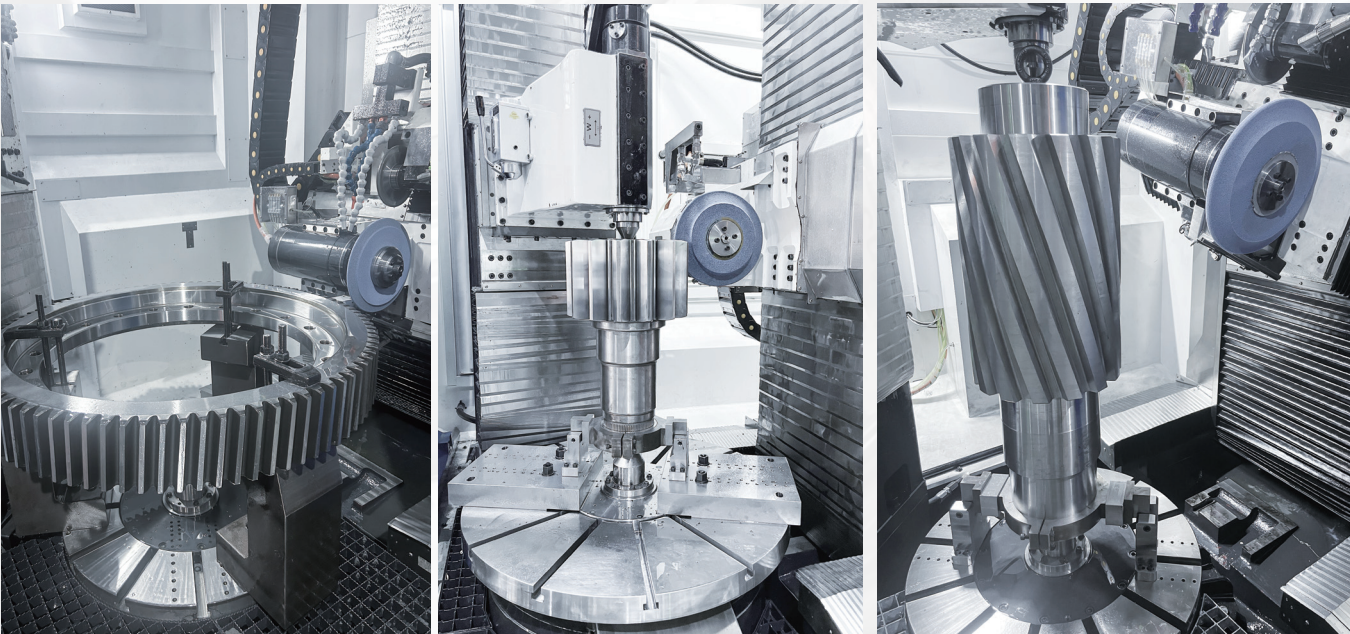
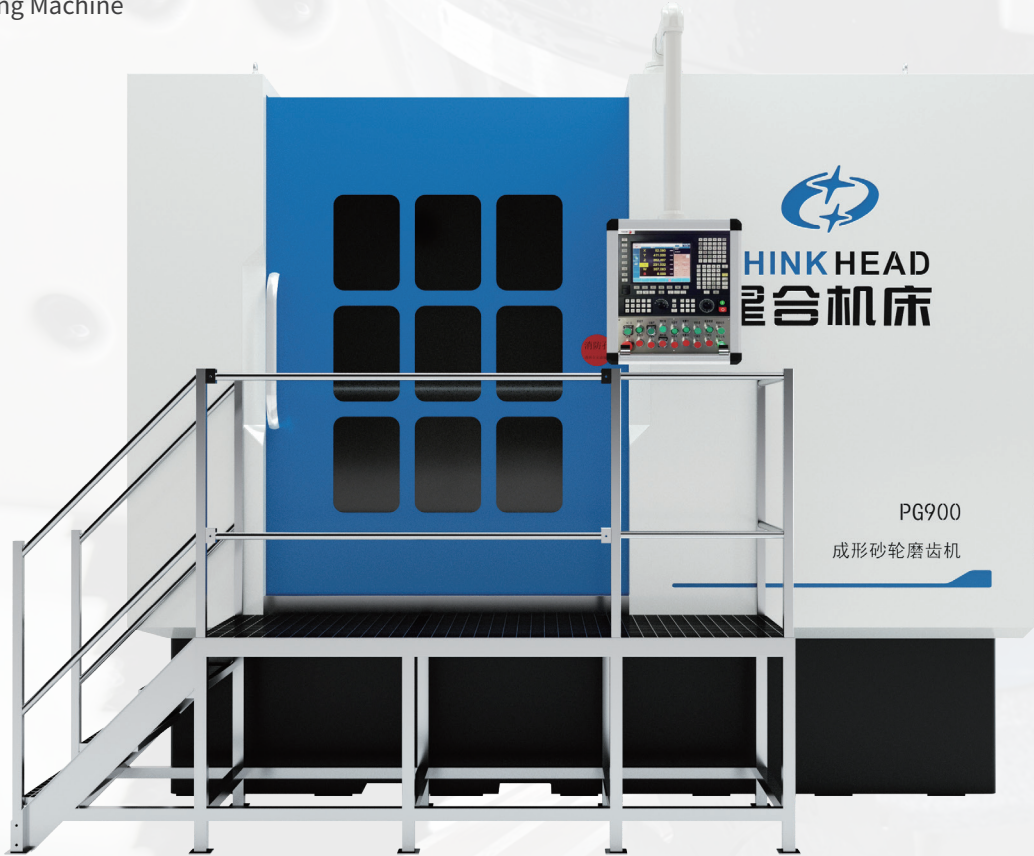
技术参数 Technical Parameters	
内齿最大小径 Maximum Minor Diameter of Internal Gear	φ500mm
内齿最小小径 Minimum Minor Diameter of Internal Gear	φ90mm
最大长度 Maximum Length	40mm (磨臂不干涉可做到100mm)
内齿模数 Internal Gear Module	0.8-4mm
内齿螺旋角 Internal Gear Helix Angle	±30°
最高精度 Maximum Precision	DIN3
量产精度 Mass Production Precision	DIN5
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	40m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	15000rpm
工件重量 Workpiece Weight	100kg
100 内磨臂砂轮直径 Grinding Wheel Diameter of 100 Internal Grinding Arm	100mm
最大砂轮厚度 Maximum Grinding Wheel Thickness	10mm
150 内磨臂砂轮直径 Grinding Wheel Diameter of 150 Internal Grinding Arm	150mm
最大砂轮厚度 Maximum Grinding Wheel Thickness	15mm

选配 Optional	
顶尖修磨 Top center Resharpener	



PG900/PG1000

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model	PG900	PG1000
工件驱动方式 Workpiece Drive Method	直驱 Direct Drive	直驱 Direct Drive
控制系统 Control System	发格8070 Fagor 8070	发格8070 Fagor 8070
伺服电机和驱动 Servo Motor and Drive	发格 Fagor	发格 Fagor
光栅尺 Linear Encoder	发格 Fagor	发格 Fagor
控制软件 Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes	7	7
机床尾座 Machine Tailstock	伺服尾座 Electric Tailstock	伺服尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions	4230x2586x3484mm	4405x2300x3850mm
重量 Weight	19吨 19T	23吨 23T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)	50KVA	60KVA

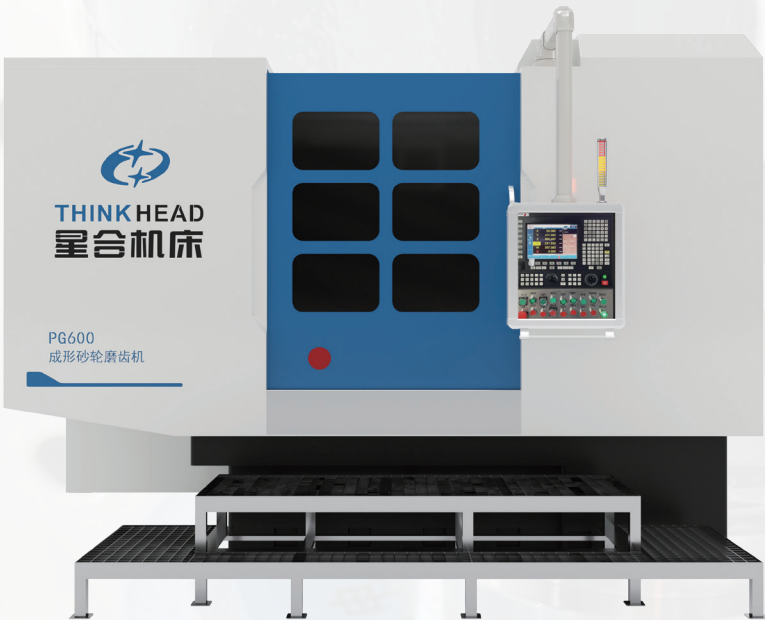
技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter	φ40-φ900mm	φ150-φ1000mm
磨削长度 Grinding Length	600mm	1000mm
模数 Module	2-20mm	2-25mm
齿数 Number of teeth	任意齿数 Arbitrary	任意齿数 Arbitrary
螺旋角 Helix Angle	±45°	±45°
最高精度 Highest Accuracy	DIN4	DIN3
量产精度 Mass Production Accuracy	DIN5	DIN5
砂轮直径 Grinding Wheel Diameter	φ60-350mm	φ250-400mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	40m/s	55m/s
砂轮最高转速 Maximum Speed of Grinding Wheel	6000rpm	4000rpm
工件重量 Workpiece Weight	2000kg	2000kg

选配 Optional		
	花键磨 Spline Grinding	三截面修形 Free twist modification
	顶尖修磨 Top center Resharpener	花键磨 Spline Grinding
	内齿磨 Internal gear grinding	顶尖修磨 Top center Resharpener
	在线测量 Online measurement	内齿磨 Internal gear grinding
		在线测量 Online measurement

扩展机型 Expanded Model	
	PG900S
	PG900M

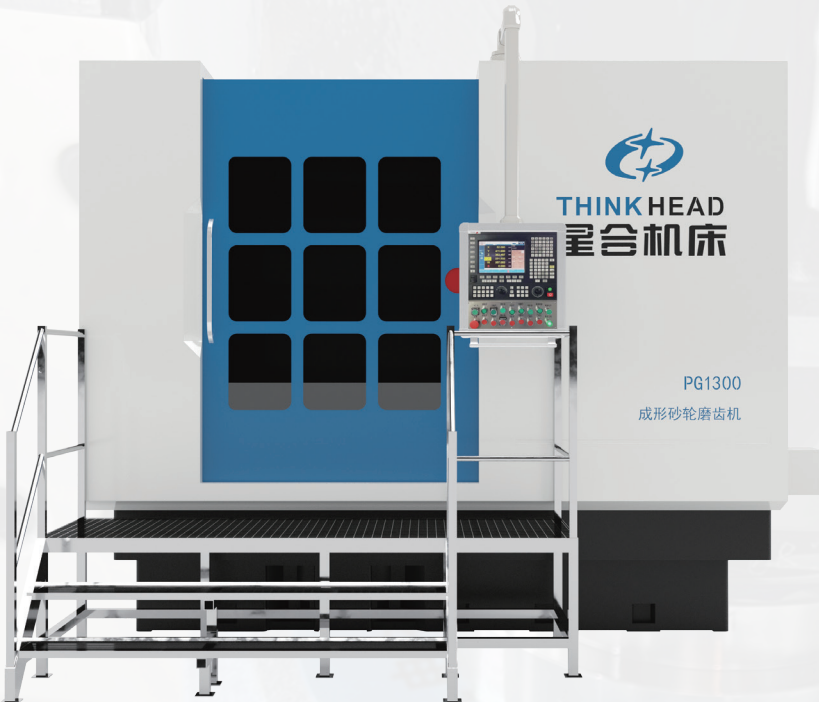
PG600

成形砂轮磨齿机
Profile Grinding Machine



PG1300

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG600
工件驱动方式 Workpiece Drive Method	直驱 Direct Drive	
控制系统 Control System	发格8070 Fagor 8070	
伺服电机和驱动 Servo Motor and Drive	发格 Fagor	
光栅尺 Linear Encoder	发格 Fagor	
控制软件 Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software	
数控轴数 Number of CNC Axes	4	
机床尾座 Machine Tailstock	电动尾座 Electric Tailstock	
机床主机尺寸 Main Machine Dimensions	4133x1974x2973mm	
重量 Weight	10吨 10T	
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)	40KVA	

技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter	φ10-φ600mm	
磨削长度 Grinding Length	600mm	
模数 Module	1-10mm	
齿数 Number of teeth	任意齿数 Arbitrary	
螺旋角 Helix Angle	左旋120°/右旋45° Left rotation / Right rotation	
最高精度 Highest Accuracy	DIN3	
量产精度 Mass Production Accuracy	DIN5	
砂轮直径 Grinding Wheel Diameter	φ50-300mm	
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	40m/s	
砂轮最高转速 Maximum Speed of Grinding Wheel	15000rpm	
工件重量 Workpiece Weight	500kg	

选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		

扩展机型		
PG600M		

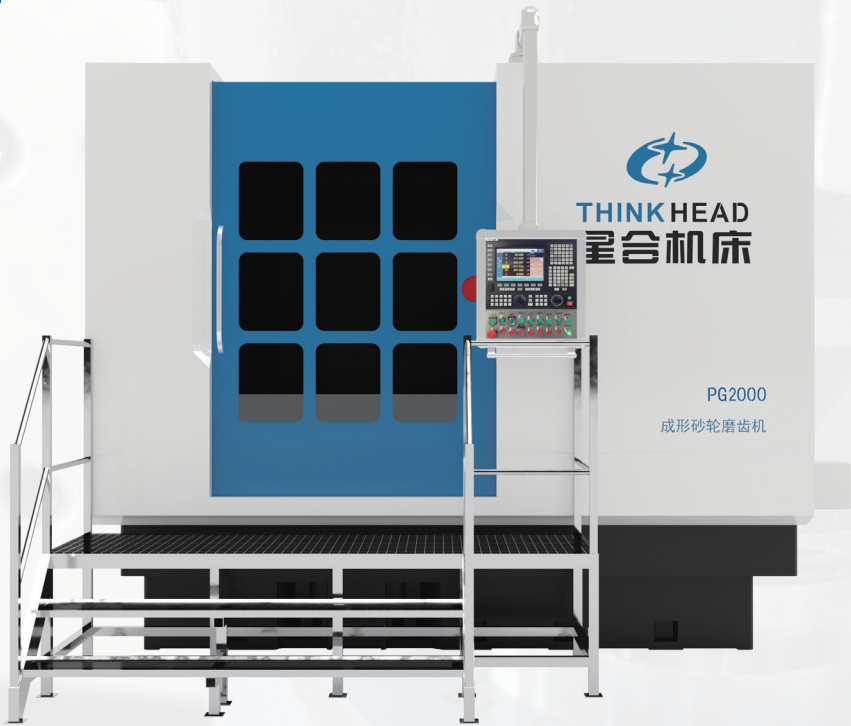
机床型号 Machine Model		PG1300
工件驱动方式 Workpiece Drive Method	直驱 Direct Drive	
控制系统 Control System	发格8070 Fagor 8070	
伺服电机和驱动 Servo Motor and Drive	发格 Fagor	
光栅尺 Linear Encoder	发格 Fagor	
控制软件 Control Software	星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software	
数控轴数 Number of CNC Axes	7	
机床尾座 Machine Tailstock	伺服尾座 Electric Tailstock	
机床主机尺寸 Main Machine Dimensions	4800x2268x3874mm	
重量 Weight	21吨 21T	
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)	50KVA	

技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter	φ250-φ1350mm	
磨削长度 Grinding Length	1000mm	
模数 Module	2-30mm	
齿数 Number of teeth	任意齿数 Arbitrary	
螺旋角 Helix Angle	±45°	
最高精度 Highest Accuracy	DIN3	
量产精度 Mass Production Accuracy	DIN5	
砂轮直径 Grinding Wheel Diameter	φ250-400mm	
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel	55m/s	
砂轮最高转速 Maximum Speed of Grinding Wheel	4000rpm	
工件重量 Workpiece Weight	6000kg	

选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		
内齿磨 Internal gear grinding		
在线测量 Online measurement		

PG2000

成形砂轮磨齿机
Profile Grinding Machine

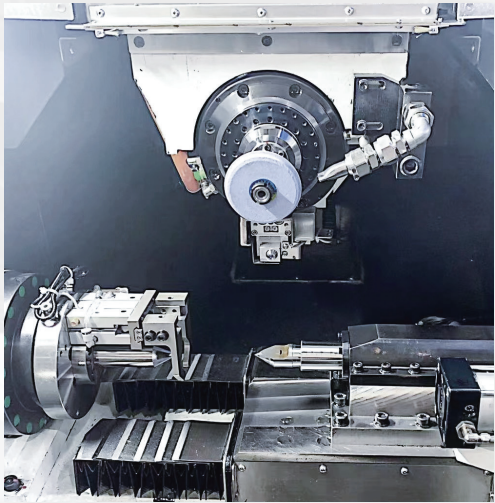


机床型号 Machine Model		PG2000
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8070 Fagor 8070
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		6
机床尾座 Machine Tailstock		/
机床主机尺寸 Main Machine Dimensions		5230x6326x3730mm
重量 Weight		30吨 30T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		80KVA
技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter		φ400-φ2000mm
磨削长度 Grinding Length		550mm
模数 Module		2-30mm
齿数 Number of teeth		任意齿数 Arbitrary
螺旋角 Helix Angle		±45°
最高精度 Highest Accuracy		DIN3
量产精度 Mass Production Accuracy		DIN5
砂轮直径 Grinding Wheel Diameter		φ250-500mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel		55m/s
砂轮最高转速 Maximum Speed of Grinding Wheel		4000rpm
工件重量 Workpiece Weight		15000kg
选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		
内齿磨 Internal gear grinding		
在线测量 Online measurement		



PG1230S

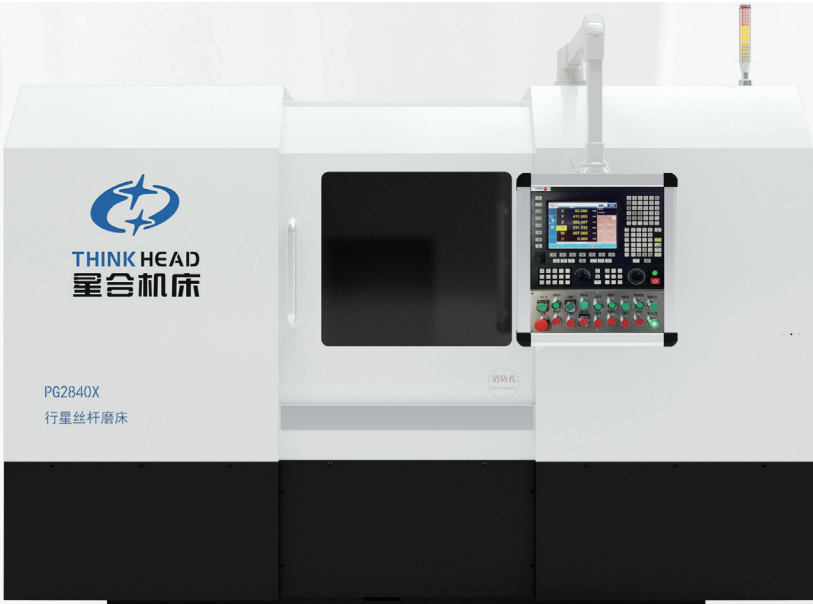
成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG1230S
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8070 Fagor 8070
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		4
机床尾座 Machine Tailstock		电动尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions		2000x1500x2701mm
重量 Weight		5吨 5T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		25KVA
技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter		φ3-φ150mm
磨削长度 Grinding Length		300mm
模数 Module		0.2-3mm
齿数 Number of teeth		任意齿数 Arbitrary
螺旋角 Helix Angle		0°
最高精度 Highest Accuracy		DIN3
量产精度 Mass Production Accuracy		DIN5
砂轮直径 Grinding Wheel Diameter		φ20-150mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel		45m/s
砂轮最高转速 Maximum Speed of Grinding Wheel		25000rpm
工件重量 Workpiece Weight		10kg
选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		

PG2840X

行星丝杆磨床
Planetary ball screw grinder



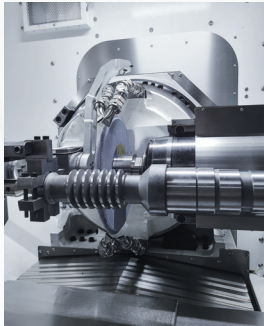
针对行星丝杆加工开发的双主轴磨床，一个主轴磨齿，一个主轴磨外螺纹，磨削时自动切换。可实现齿部和外螺纹一次装夹全部磨出。

A double-spindle grinding machine developed for planetary screw machining, with one spindle for gear grinding and the other for external thread grinding, which switches automatically during the grinding process. It enables the complete grinding of both gear parts and external threads in a single clamping.

机床型号 Machine Model		PG2840X
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8070 Fagor 8070
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形/螺纹磨软件 Thinkhead Embedded Form/Thread Grinding Software
数控轴数 Number of CNC Axes		6
机床尾座 Machine Tailstock		伺服尾座 Servo Tailstock
机床主机尺寸 Main Machine Dimensions		3210x2254x2388mm
重量 Weight		6.5吨 6.5T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		35KVA
技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter		φ10-φ280mm
磨削长度 Grinding Length		400mm
模数 Module		0.2-4mm
顶尖距 Center distance		30-400mm
磨削精度 Grinding accuracy		DIN4
工件重量 Center distance		30kg
磨齿螺旋角 Gear grinding helix angle		±15°
砂轮直径 Grinding Wheel Diameter		15-100mm
主轴最高转速 Maximum gear grinding spindle speed		40000rpm
磨螺纹螺旋升角 Helix Angle of Thread Grinding		±25°
砂轮直径 Grinding Wheel Diameter		φ250-350mm
主轴最高转速 Maximum thread grinding spindle speed		10000rpm
砂轮最高线速度 Maximum peripheral speed of grinding wheel		40m/s
选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		

PG3575

成形砂轮磨齿机
Profile Grinding Machine



机床型号 Machine Model		PG3575
工件驱动方式 Workpiece Drive Method		直驱 Direct Drive
控制系统 Control System		发格8060 Fagor 8060
伺服电机和驱动 Servo Motor and Drive		发格 Fagor
光栅尺 Linear Encoder		发格 Fagor
控制软件 Control Software		星合嵌入式成形磨软件 Embedded Thinkhead profile grinding software
数控轴数 Number of CNC Axes		4
机床尾座 Machine Tailstock		电动尾座 Electric Tailstock
机床主机尺寸 Main Machine Dimensions		3816x2182x2325mm
重量 Weight		6.5吨 6.5T
配电功率(不含过滤系统) Power Rating (Excluding Filtration System)		30KVA
技术参数 Technical Parameters		
加工外径 Grinding Outer Diameter		φ10-φ350mm
磨削长度 Grinding Length		700mm
模数 Module		0.5-8mm
齿数 Number of teeth		任意齿数 Arbitrary
螺旋角 Helix Angle		-45°~+120°
最高精度 Highest Accuracy		DIN4
量产精度 Mass Production Accuracy		DIN5
砂轮直径 Grinding Wheel Diameter		φ50-350mm
砂轮最高线速度 Maximum Linear Speed of Grinding Wheel		40m/s
砂轮最高转速 Maximum Speed of Grinding Wheel		10000rpm
工件重量 Workpiece Weight		80kg
选配 Optional		
花键磨 Spline Grinding		
顶尖修磨 Top center Resharpener		
蜗杆螺纹磨 Worm Thread Grinding		

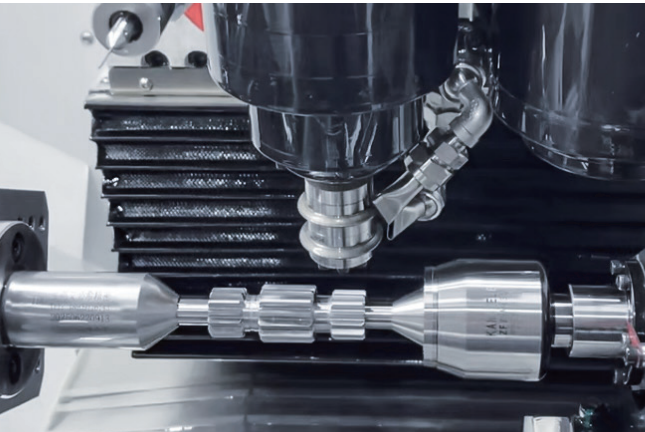
功能扩展

Optional

为适应不同客户的个性化需求，星合工程师们从设计源头着手，为客户实现多种配置的选配功能，无论是在精度的提升上，还是成本的优化方向，客户可随时联系星合工程师，他们会提供各种个性化方案，包括硬件的配置及软件系统的开发。

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.

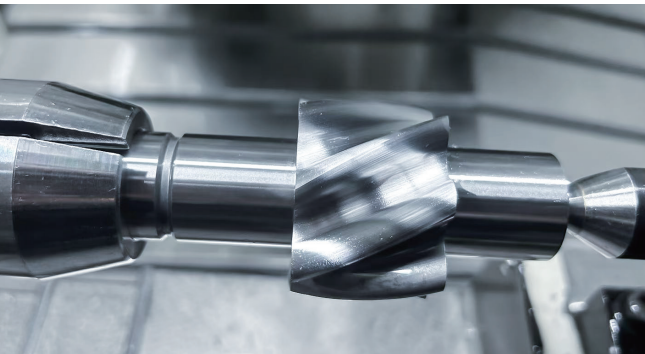
CBN砂轮磨削 CBN Wheel Grinding



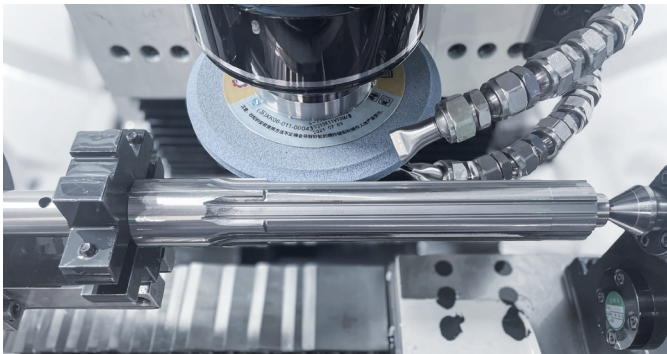
测量模板磨削 Gauge Template Grinding



全齿廓磨削 Full Profile Gear Grinding



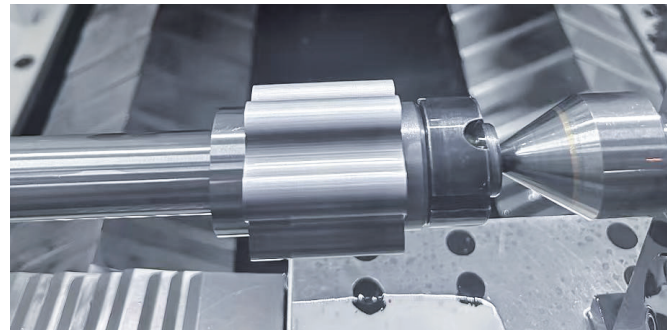
矩形花键磨削 Rectangular Spline Grinding



三角花键磨削 Triangular Spline Grinding



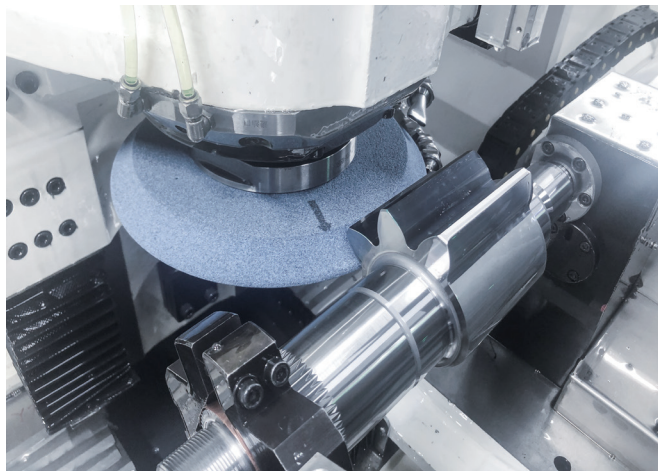
圆弧花键磨削 Circular Spline Grinding



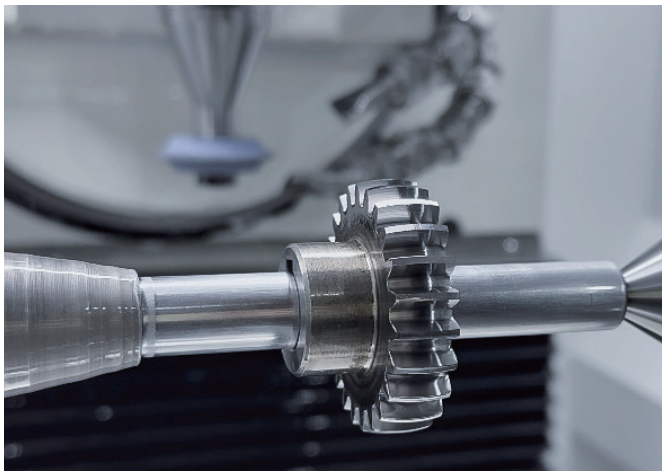
功能扩展

Optional

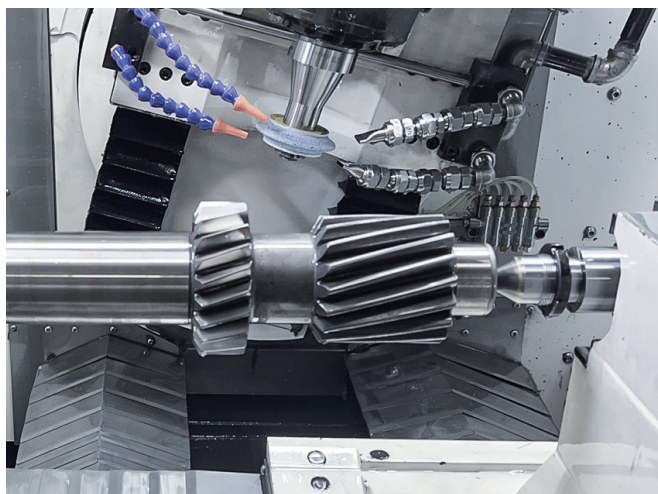
扇形齿磨削 Segment Gear Grinding



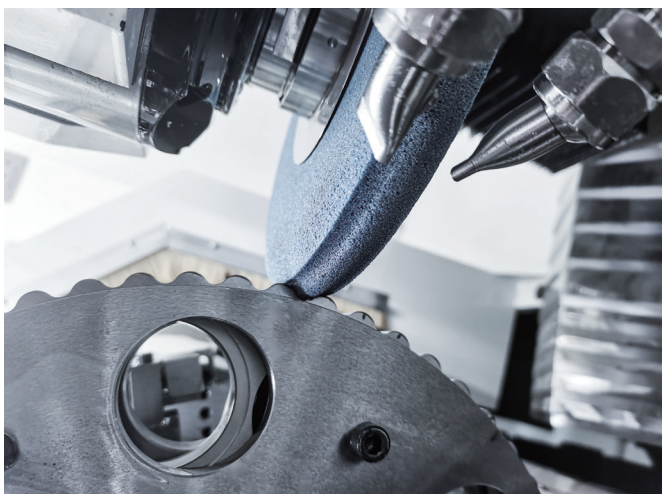
鼓形齿磨削 Crowned Tooth Grinding



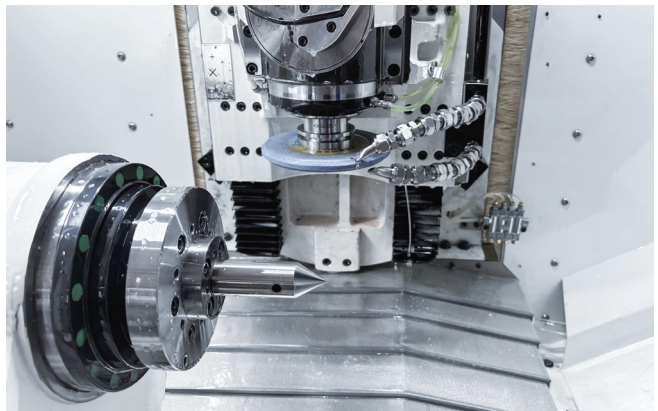
同轴对齿磨削 Coaxial Gear Grinding



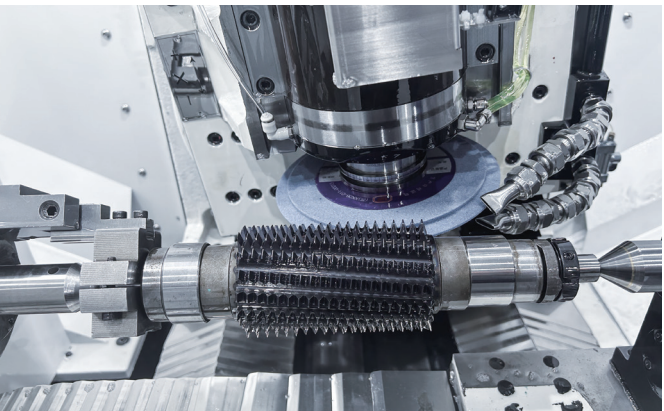
摆线磨削 Cycloidal Grinding



修磨顶尖 Top center Resharpener



修磨滚刀 Hob Resharpener

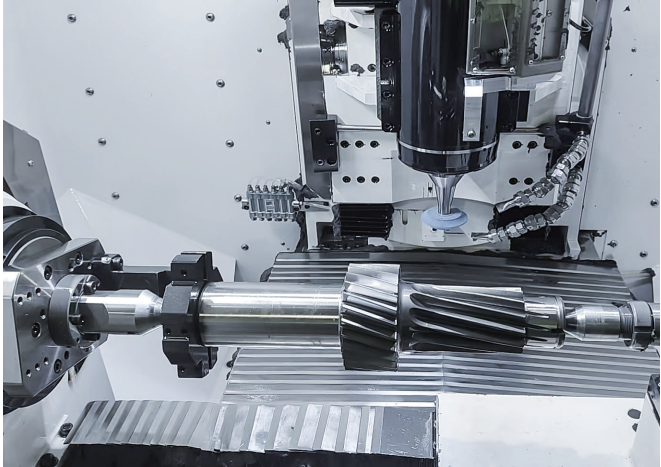


功能扩展
Optional

✔ 探针对齿 Monitor-assisted Tooth Alignment



✔ 扫描对齿 Scan-matching Tooth Alignment



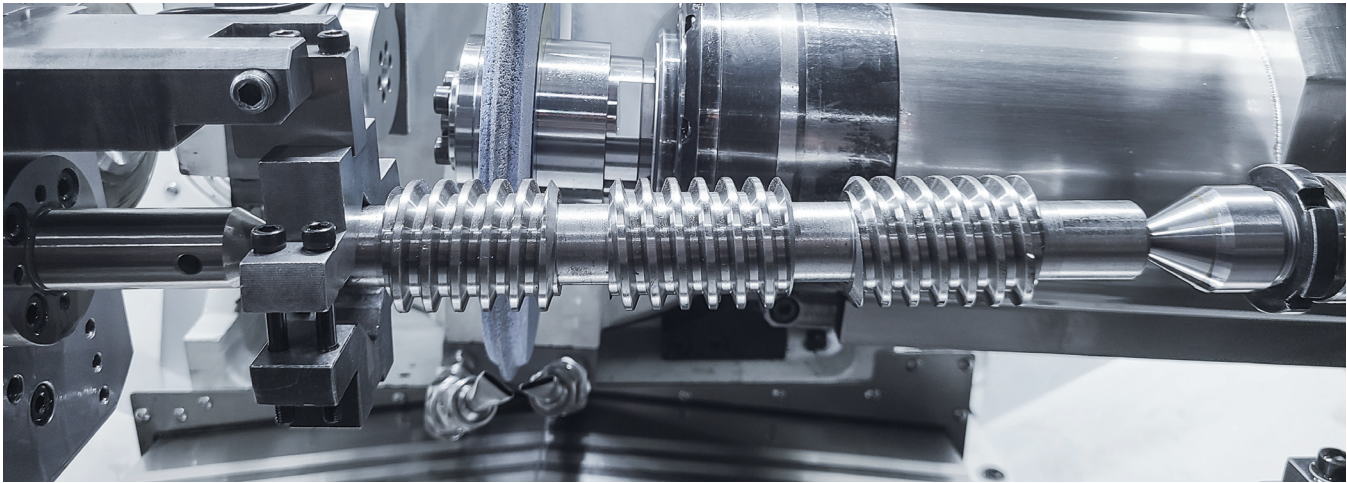
✔ 在线测量 Online measurement



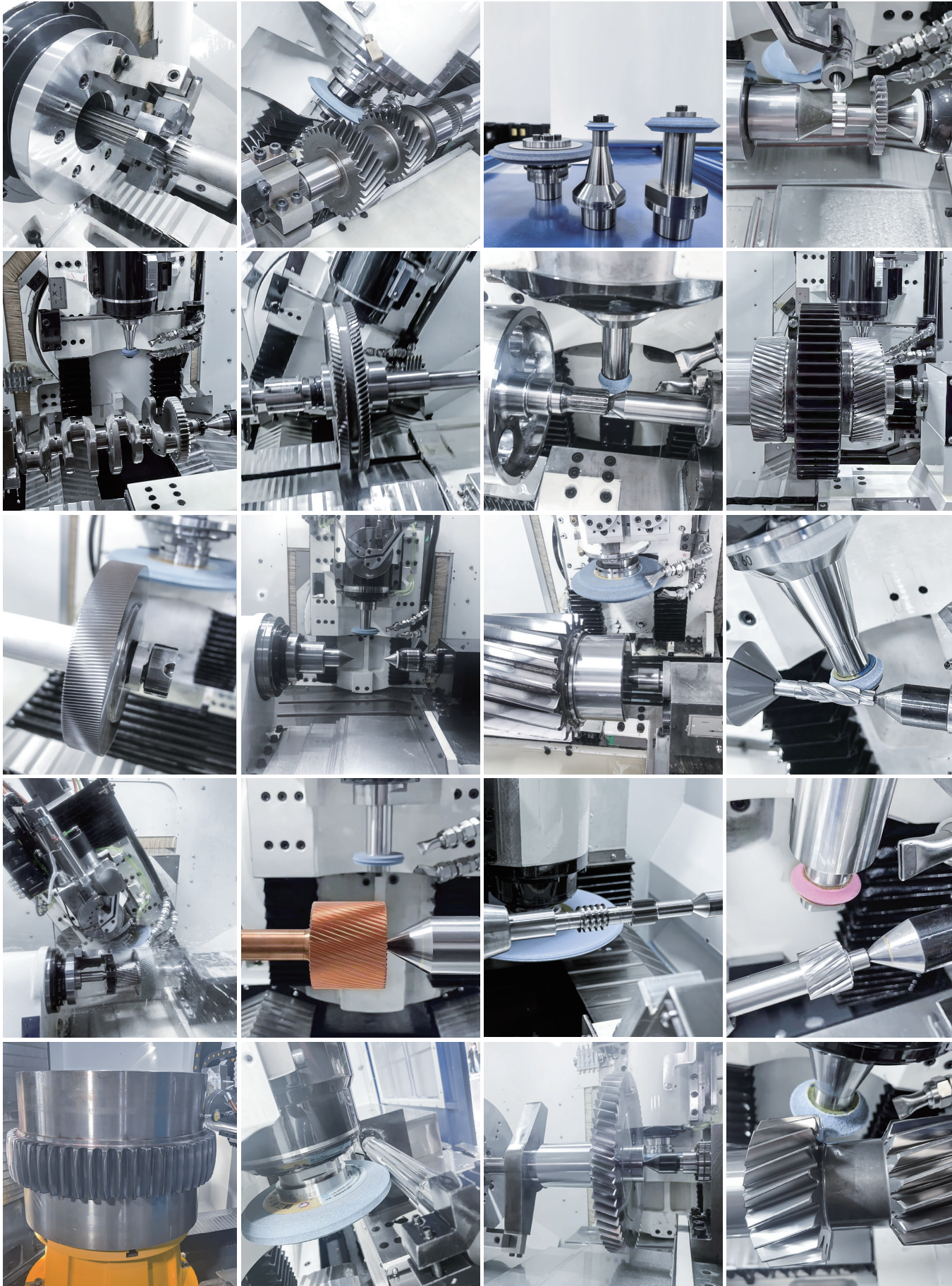
✔ 自动上下料 Automation

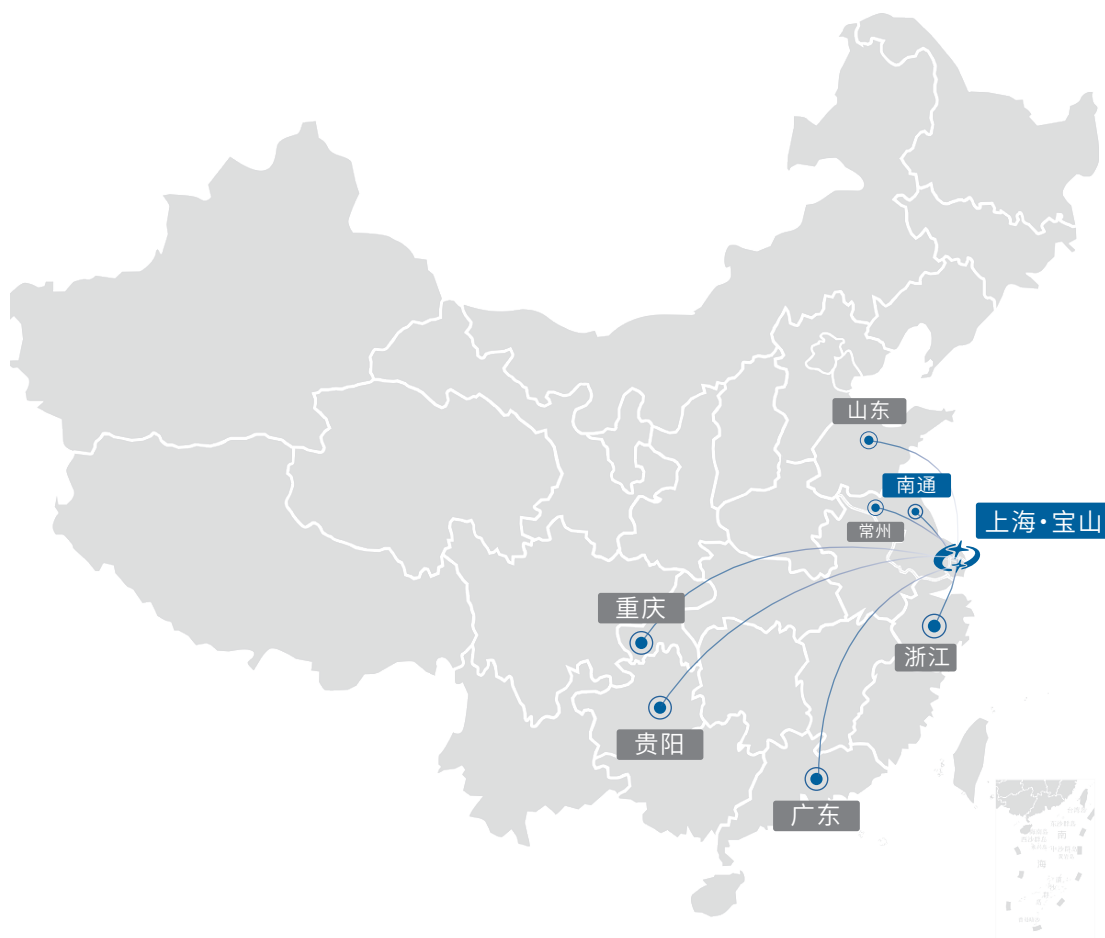


✔ 螺纹蜗杆磨功能 Worm Thread Grinding Function



加工案例
Processing Cases





上海-宝山研发中心、上海-临港研发生产基地、南通-通州湾生产基地、南通-海门研发生产基地
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上海星合机电有限公司

Shanghai Thinkhead M&E Co., Ltd.

咨询电话 / Tel.: +86 400-999-0081 +86 021-6686 1737

传真 / Fax: +86 021-5686 3167

官方网址 / Official Website: www.think-head.com

公司地址 / Company Address: 上海市宝山区威航路18弄Y10号

Y10, Lane 18, Weihang Road, Baoshan District, Shanghai, China



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