

Ready to unlock the full potential of your semiconductor equipment?
Contact Kollmorgen motion control experts to discuss your semiconductor equipment needs and goals.

Kollmorgen Semiconductor Industry Solutions



Empowering Innovators, Creating Excellence

About Kollmorgen

Kollmorgen, a Regal Rexnord Brand, has more than 100 years of motion experience, proven in the industry's highest-performing, most reliable motors, drives, AGV control solutions and automation platforms. We deliver breakthrough solutions that are unmatched in performance, reliability and ease of use, giving machine builders an irrefutable marketplace advantage.

www.kollmorgen.cn

KOLLMORGEN
A REGAL REXNORD BRAND



Kollmorgen
WeChat Official
Account



Kollmorgen
WeChat Video
Channel

KOLLMORGEN
A REGAL REXNORD BRAND

Specifications are subject to change without notice. It is the responsibility of the product user to determine the suitability of this product for a specific application. All trademarks are the property of their respective owners.

KM_BR_000001_RevA_EN
©2026 Kollmorgen Corporation. All rights reserved

Why Kollmorgen

Who Are We?

Kollmorgen — Motion Control System Expert

Founded in 1916, with a century of deep cultivation in the motion control system field, Kollmorgen has become a trusted brand in the industry through profound technical accumulation and innovation strength. It provides global OEM machine manufacturers with a full range of products and solutions, including servo/direct drive/stepper motors, drives, motion control systems, and AGV vehicle control systems.

In China, with its Tianjin factory as the core, Kollmorgen strictly implements unified global processes and quality standards, integrating the local supply chain with global R&D resources to customize high-performance, cost-effective products and services for customers, driving the development of various industries: in the semiconductor industry, it drives key equipment to achieve precision and stable production; in the robotics field, it empowers joint drives and precise operations; in the lithium battery industry, it revolutionizes core processes such as coating and die-cutting; in the medical industry, it assists imaging equipment in achieving high-definition imaging and stable operation; in the machine tool field, it achieves micron-level high-precision machining; in the metal forming industry, it enhances dynamic cutting and stamping performance; in the photovoltaic industry, it improves the efficiency of screen printing and laser doping equipment; and in the printing and packaging industry, it leads high-precision direct-drive printing technology. Innovation leads the way, Kollmorgen creates countless legends!



01 Localized Manufacturing with High Efficiency and Cost-effectiveness

90% locally made, fast delivery, lower cost via local supply chain, great value.

03 Industry Deep Expertise, Rich Experience

Years of practice across diverse fields, precise demand matching, and capability to tackle complex challenges.

05 Professional Support, Precise Selection

One-on-one engineer service, customized solutions on demand.



02 Product Excellence, Efficient Service

International quality, reliable performance; local fast delivery and service, rapid response.

04 Global Presence, Empowering Overseas Expansion

Global network, supporting Chinese customers in overseas expansion.

06 Rich Tools, Solid Design

Diverse design tools and resources, empowering innovation throughout the design process.

01 Industry Value Targeted Empowerment

Core Values	Advantages Demonstrated
Outstanding Performance	• Nanometer-level Positioning: Position-control resolution up to 100 nm, with motion-control deviation below 0.5 μm. • High Repeat Accuracy: Repeat positioning accuracy reaches $\pm 1 \mu\text{m}$, and end-runout / radial-runout is controlled within 300 nm. • High Acceleration: Acceleration capability of 30000 RPM/s, enabling speed above 4000 RPM within 100 ms. • Low Speed Fluctuation: Precise control delivers extremely low speed fluctuation.
Compact Structure	• Frameless Design: Can be directly embedded into equipment bodies such as rotary machining bases. It utilizes the equipment's own bearings to achieve compact layout, with axial height compressed down to 115 mm. • Zero-backlash Direct Drive: Eliminates backlash, wear and latency caused by intermediate transmission components including gears and belts, delivering extremely high servo stiffness.
Custom Products & Integrated Solutions	• Rapid Prototype Delivery: Only several weeks are required from personalized customization requirement submission to prototype delivery, supporting customers' rapid iteration. • Integrated Packaging: Complex processes such as magnetic fluid sealing, water-cooled heat dissipation, hollow shaft and vacuum adsorption can be custom-integrated.
Complete Drive & Control Solutions	• Hardware-software Integration: Delivers PCMM2G / AKD PDMM controllers together with Kollmorgen Automation Suite (KAS). It supports PipeNetwork drag-and-drop programming, cutting software development time from 45 days to 10 days. • Powerful Drive Commissioning Tools: Equipped with auto-tuning, advanced filtering including resonance filter, multi-channel oscilloscope and other functions, enabling performance optimization completed within seconds. • Open Bus Compatibility: Drives support multiple industrial buses such as EtherCAT and Profinet for easy integration with host systems.
High Reliability & Long Service Life	• High Reliability: Direct-drive technology reduces wearing parts and lowers maintenance requirements. It ensures long-term reliable operation in fields with extremely high stability requirements. • Long Design Service Life: Manufactured in accordance with Kollmorgen's unified global process and quality standards, the products undergo strict verification. They adapt to harsh working conditions including continuous equipment operation and high start-stop frequency, and feature long design service life.
Local Supply & After-sales Service	• Localized Supply Chain: The R&D and manufacturing center located in Tianjin delivers highly competitive lead time and after-sales support.

Servo Motors

Product Series ▼	Specifications and Features ▼	Typical Semiconductor Applications ▼
AKM / AKM2G Servo Motor	Specifications: Frame size: 40-260 mm (AKM) / 58-192 mm (AKM2G) Wide power range: 0.08-19.5 kW Voltage range: 75 Vdc, 120-480 Vac Features: High performance and high reliability, high torque density and great flexibility. UL and CE certified, supported by global service network.	• Drive shafts for auxiliary equipment such as wafer handlers, sorters and material transfer systems. • Drives for peripheral mechanisms of equipment.
AKM Low Temperature Servo Motor	Specifications: Frame size: 40-260 mm, power range: 0.08-19.5 kW, operating temperature down to -40 °C. Features: Designed for extreme low-temperature environments to ensure reliable operation under harsh conditions such as freezing and cryogenic storage.	• Transmission and access mechanisms in semiconductor cold storage and low-temperature storage equipment. • Motion control components inside low-temperature chambers for special processes.
AKMH Stainless Steel Servo Motor	Specifications: Protection class IP69K, 316L stainless-steel housing, food-grade sealing. Features: Designed for moderate-to-heavy wash-down applications. It withstands rigorous cleaning procedures and meets high-hygiene standards for clean-room environments.	• Rotating spray arms and transport rollers exposed to chemical liquids in wet cleaning equipment. • Easy-to-clean auxiliary drive units for CMP equipment.

Direct-Drive Rotary Motors

Product Series ▼	Specifications and Features ▼	Typical Semiconductor Applications ▼
KBM / CBM Frameless Motor	Specifications: Stator outer diameter: 60-850 mm, continuous torque: 0.49-3445 Nm, peak torque up to 12,812 Nm, rotational speed up to tens of thousands RPM. Features: High torque density, zero backlash, smooth operation, flexible structure for seamless integration and high reliability.	• Drive rotary processing stages for coat-develop equipment. • Serve as high-precision, low-runout workpiece axes in wafer grinders. • Precision rotary tables for MEMS test equipment.
TBM2G Frameless Torque Motor	Specifications: Stator outer diameter: 60-115 mm, continuous torque: 0.16-6.03 Nm, low-voltage winding supported. Features: Extremely high power density delivers high torque within compact space, low cogging torque, and standardized housing for fast integration.	• Drive the rotation of ceramic wafer-holding stages in wafer edge grinders. • Core rotary power units for coaters.
CDDR Direct Drive Motor	Specifications: Frame size: 108-350 mm, continuous torque: 4.57-51 Nm. Plug-and-play housed design with special structural configuration, enabling installation and disassembly within 5 minutes. Features: Factory pre-calibrated for easy installation. High torque density (approximately 50% higher than conventional servo motors), greatly shortening customer integration cycle.	• High-performance, maintenance-free core for rotary table and indexing applications.

Linear Motors

Product Series ▼	Specifications and Features ▼	Typical Semiconductor Applications ▼
High-Performance Linear Motor (Ironcore / Ironless)	Specifications: Wide thrust range (peak force up to 12500 N), maximum speed over 10 m/s, acceleration up to 10 G, high positioning accuracy. Features: Direct-drive design with non-contact operation and zero backlash. Eliminates mechanical transmission wear, delivers high dynamic response and compact structure.	• High-speed scanning axes (X / Y axes) for inspection equipment. • Precision cutting stages. • Wafer transfer and positioning platforms.

Servo Drives

Product Series ▼	Specifications and Features ▼	Typical Semiconductor Applications ▼
AKD Servo Drive	Specifications: Continuous current: 3-48 A, ultra-fast loop refresh rate (current loop at 0.67 μs), supports up to 32-bit feedback, compatible with multiple industrial buses including EtherCAT, CANopen, Profinet, etc. Features: Superior control performance, high compatibility with full motor portfolio, built-in advanced auto-tuning and filtering algorithms.	• Delivers core drive for AKM, DDL, KBM, TBM and CDDR motors. Widely deployed across various semiconductor equipment models to achieve high-precision and high-dynamic performance.
AKD2G Servo Drive	Specifications: Single-axis / dual-axis models available, continuous current: 3-24 A. Single-cable motor support as standard, with integrated functional safety options up to SIL3 / PLe. Features: High power density with compact dual-axis design, integrated safety functions, outstanding performance and easy commissioning, supporting equipment export.	• Drives for semiconductor automation equipment with stringent safety-level requirements. • The integrated functional safety options comply with international standards and are certified to TUV NORD SIL2 / 3, simplifying compliance procedures for equipment exports to Europe and North America while reducing certification costs and lead time.

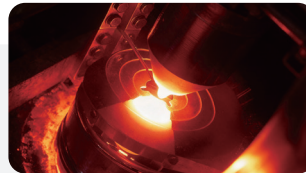
Motion Controllers

Product Series ▼	Specifications and Features ▼	Typical Semiconductor Applications ▼
PCMM2G Programmable Motion Controller	Specifications: Next-generation controller supporting synchronized path motion control for up to 64 axes. Features: Robust performance with excellent scalability. Suited for complex multi-axis motion control, featuring open and flexible hardware & software platforms.	• Multi-axis precision assembly and test lines. • High-end semiconductor packaging equipment (e.g., multi-station die bonders, wire bonders).
AKD PDMM Programmable Motion Controller with Integrated Drive	Specifications: Integrates servo drive, multi-axis motion controller and PLC functions in one unit, supporting control of 8 or more axes. Features: The 3-in-1 design greatly reduces system complexity, cabinet space and wiring cost. A unified programming environment shortens development cycles.	• Multi-axis inspection equipment for simplified system architecture.

03 Successful Case Experienced

Zone Melting Furnace

Semiconductor wafer growth furnaces represent one of the core equipment at the upstream end of the semiconductor industrial chain. They are used to produce high-purity, high-quality monocrystalline silicon ingots, which serve as the physical foundation for manufacturing all silicon-based chips. Among such equipment, zone refiners are critical devices for ultra-high-purity crystal growth.



- Motion Control Requirements
- Ultra low speed, ultra smooth motion and ultra long cycle life
 - Stable operation under high temperature and strong interference

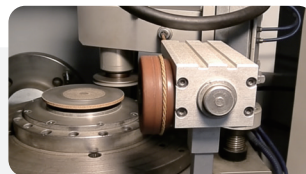
 Kollmorgen Product Solutions: AKD Servo Drive / AKM Servo Motor / KBM Frameless Torque Motor

Solution Values

- » Multiple electronic filters of the AKD drive together with its high servo-loop refresh rate, combined with the skewed-slot direct-drive design of KBM motors, deliver well-suppressed fluctuations during low-speed operation.
- » 155°C high-temperature insulation enables stable operation. The flexibly configurable encoder delivers excellent anti-interference performance.

Wafer Chamfering Machine

The wafer chamfering machine precisely grinds, rounds and polishes wafer edges to eliminate microcracks, reduce chipping and ensure flatness for subsequent thin film deposition and lithography, posing extremely stringent requirements on servo motors.



- Motion Control Requirements
- Extremely high-precision requirements for motion profiles
 - Motor adaptability to harsh chemical environments
 - High rigidity and high-response requirements

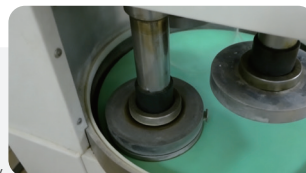
 Kollmorgen Product Solutions: AKD Servo Drive / TBM2G Frameless Torque Motor

Solution Values

- » The unique ring-magnet design of the TBM2G motor minimizes cogging torque to ensure accurate and error-free motion profiles.
- » The TBM2G features customizable packaging solutions. The motor can be encapsulated with suitable materials to address challenges posed by harsh chemical environments.
- » The high refresh rate of three control loops of the AKD low-voltage drive, combined with the direct-drive design of TBM2G, enhances overall system rigidity while delivering powerful motor performance and superior motion control.

Wafer Thinning Equipment

Wafer processing in the semiconductor industry defines the reliability and stability of electronic products. Wafer thinning equipment precisely grinds wafers down to tens of microns for 3D packaging and memory manufacturing, imposing stringent requirements on servo motors.



- Motion Control Requirements
- Extremely high dynamic stiffness and disturbance-resistance capability
 - Constant linear speed and constant grinding-rate control

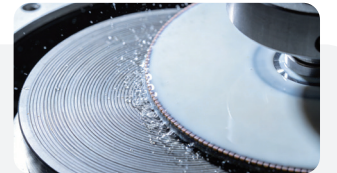
 Kollmorgen Product Solutions: AKD Servo Drive / KBM Frameless Torque Motor

Solution Values

- » The KBM-series motors deliver extremely high peak-to-continuous torque ratios, easily coping with overload loads occurring during processing.
- » The frameless direct-drive design of KBM motors eliminates numerous additional mechanical components. Direct-drive technology improves overall system rigidity, and when paired with the high-refresh-rate three-loop servo control of AKD drives, motion-control errors can be corrected more rapidly.
- » The high refresh rate of AKD servo drives, combined with the skewed-slot winding design of KBM motors, minimizes speed fluctuations of the load during motion.

CMP Chemical-Mechanical Polishing Equipment

Semiconductor CMP (Chemical-Mechanical Planarization) equipment is critical for achieving global planarization in wafer fabrication. Its servo motor system faces unique and severe technical challenges.



- Motion Control Requirements
- Precise coordination for complex multi-axis trajectories
 - Ultimate requirements for motion accuracy and stability
 - Nearly unlimited MTBF (Mean Time Between Failures) requirements

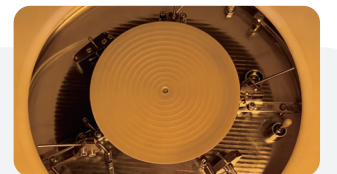
 Kollmorgen Product Solutions: AKD Servo Drive / AKM Servo Motor / KBM Frameless Torque Motor

Solution Values

- » The controller provides customized PVT control and tailored control algorithms.
- » Featuring the high-refresh-rate three-loop servo control of AKD and the unique skewed-slot design of direct-drive motors, the system can precisely suppress speed fluctuations even under variable down-pressure from the polishing head.
- » Superior product consistency together with a highly modular design extends MTBF. It also enables easy hot-swap of relevant components, greatly reducing downtime.

Coater and Developer

As the core equipment of front-end lithography, the coater and developer relies on high-performance servo systems to guarantee photoresist uniformity, low defect rate and high throughput, posing top-tier technical challenges in industrial automation.



- Motion Control Requirements
- Motor speed needs to reach up to 8000+ RPM
 - Ultimate dynamic acceleration-deceleration performance
 - Excellent heat dissipation and thermal stability are required

 Kollmorgen Product Solutions: AKD Servo Drive / KBM Frameless Torque Motor

Solution Values

- » Kollmorgen motors generally deliver a maximum speed of 8000 RPM, and the speed limit can be further exceeded with suitable bearings and drives.
- » The maximum current of motors and drives perfectly meets the demands of frequent high-acceleration-deceleration operations.
- » The KBM series supports water-cooling sleeves and customizable motor housings, which thoroughly address heat dissipation issues.

Etching Machine

Etching machines are core micro-processing equipment. They are used to precisely remove materials from wafers and define circuit patterns as well as other fine structures, serving as key devices for manufacturing electronic components and integrated circuits.

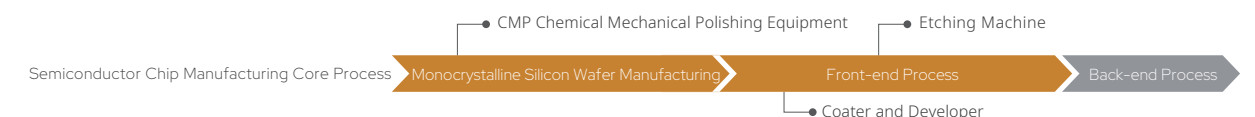


- Motion Control Requirements
- Material outgassing and contamination control for motors
 - High Repeat Positioning Accuracy
 - Micron-level leveling and motion control

 Kollmorgen Product Solutions: AKD Servo Drive / KBM Frameless Torque Motor / TBM2G Frameless Torque Motor / High-resolution Encoder

Solution Values

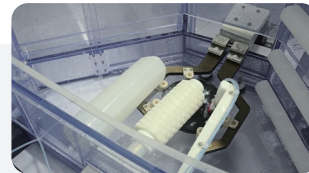
- » The high-refresh-rate current loop of AKD ensures high dynamic response of the motor.
- » The frameless direct-drive motors feature high customizability. Customers can flexibly select suitable bearings, greases and other components to meet motor environmental cleanliness requirements.
- » Combined with high-resolution BiSS-C encoders, micron-level motion control is achieved.



03 Successful Case Experienced

Wet Cleaner

Semiconductor wet cleaner is critical equipment that removes particles, organic residues and metallic contaminants from wafer surfaces in semiconductor manufacturing. Different from coaters and lithography machines, its servo motors demand reliability under harsh chemical conditions, stable low-speed control and sophisticated multi-axis coordinated motion.



- Motion Control Requirements
- Reliability and Isolation under Extreme Chemical Environments
 - Smooth Operation at Ultra-low Speeds
 - High Requirement for Mean Time Between Failures



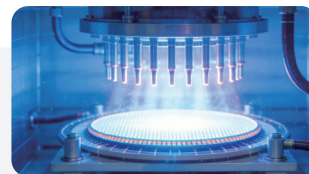
Kollmorgen Product Solutions: AKD Servo Drive / TBM2G Frameless Torque Motor

Solution Values

- » TBM2G features customizable packaging. Users can select customized housing and shaft seals according to on-site chemical conditions to ensure stable motor operation.
- » Its integrated magnetic ring rotor design minimizes cogging torque, keeping low-speed speed fluctuation within 0.1%.
- » Fully automated manufacturing delivers outstanding consistency and high modularity, enabling low failure rate, easy maintenance and 24 / 7 continuous operation.

Chemical Vapor Deposition (CVD) Equipment

PECVD (Plasma-Enhanced Chemical Vapor Deposition) equipment is the mainstream device for depositing dielectric layers such as SiO_2 , Si_3N_4 and SiON in semiconductor manufacturing. The challenges for its servo system are closely associated with complex operating conditions including high temperature, plasma, chemical reactions and high vacuum, which go far beyond conventional automation scenarios.



- Motion Control Requirements
- Long-term Operation under High-temperature Conditions
 - Ultra-stable Low-speed Rotation and Lifting



Kollmorgen Product Solutions: AKD Servo Drive / KBM Frameless Torque Motor

Solution Values

- » The KBM motor features an insulation temperature rating up to 155°C, meeting high-temperature requirements for chemical vapor deposition processes.
- » Adopting skewed-slot winding design, the KBM motor minimizes cogging torque without compromising torque and speed. Combined with the high-refresh-rate servo three-loop control of AKD, it ensures extremely low speed fluctuation during low-speed operation.

Chip Probe Testing Equipment

Semiconductor chip probe testing equipment (commonly known as prober, or the handler unit within ATE-Automatic Test Equipment) serves as core testing equipment prior to chip packaging and testing. It performs precise electrical contact and signal testing between micro-scale pads on wafers or individual chips and probes.



- Motion Control Requirements
- Ultra-high Resolution and Absolute Accuracy
 - Extreme Motion Stability and Vibration Suppression
 - Central Through-hole



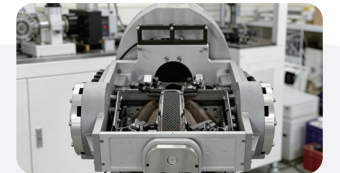
Kollmorgen Product Solutions: TBM2G Frameless Torque Motor

Solution Values

- » Paired with high-resolution encoders, the motor delivers repeat positioning accuracy $\leq \pm 2$ arcseconds and positioning accuracy ≤ 6 arcseconds.
- » Combined with precision packaging technology, the motor ensures shaft runout $\leq 2 \mu\text{m}$, mechanically minimizing resonance for enhanced stability.
- » The large through-hole design facilitates internal cable routing or integration of other structures, greatly expanding design flexibility for equipment.

(MEMS) Chip Testing Equipment

MEMS sensing chips are micro-mechanical angular-rate sensors implemented with micro-electro-mechanical-system technology. They mainly include gyroscopes and accelerometers for direction sensing and gravity-change detection. These devices can measure one- or multi-axis rotational angular velocity and accurately sense complex motion in free space.



- Motion Control Requirements
- Extremely High Positioning Accuracy and Resolution
 - Extremely Low Motion Noise and Speed Ripple
 - Extremely Low Jitter and Vibration Suppression



Kollmorgen Product Solutions: AKD Servo Drive / Dual KBM Frameless Torque Motor

Solution Values

- » Equipped with high-resolution absolute encoders, KBM motors deliver motion-control accuracy down to the arcsecond level.
- » AKD one drive controls two synchronized KBM motors to reduce mechanical vibration.
- » Featuring high-refresh-rate servo three-loop control and electronic filters of the AKD drive, combined with the direct-drive design of KBM motors, jitter and resonance during equipment operation are greatly suppressed.

Wafer Handling Robot

The wafer handling robot serves as the core equipment for automated transport in wafer fabs. Its servo motors act as the "power joints", directly determining the handling speed, accuracy, reliability and cleanliness.



- Motion Control Requirements
- Stringent Space Constraints
 - Effective Heat Dissipation in High-Vacuum Environment
 - Extremely High Requirements for Motion Accuracy and Dynamic Performance



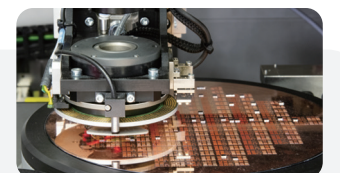
Kollmorgen Product Solutions: AKD Servo Drive / TBM Frameless Torque Motor / TBM2G Frameless Torque Motor

Solution Values

- » TBM motors adopt direct-drive design and premium magnets for high power density, fitting tight spaces while satisfying load demands.
- » Fabricated via vacuum-qualified processes, they work in vacuum environments. Optimized thermal management plus housing conduction avoids overheating.
- » AKD drive's built-in biquad filters and the motor's skewed windings enable high-speed, smooth, precise motion profiles.

Wafer Sorter

The semiconductor wafer sorter is critical automated equipment in the back-end semiconductor manufacturing process (packaging and testing). Its core function is to automatically, precisely and efficiently sort, classify and transfer wafers according to predefined rules.



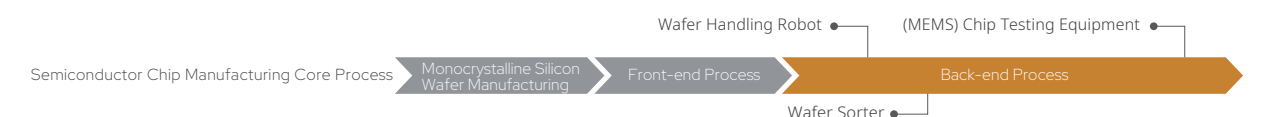
- Motion Control Requirements
- High-speed High-cycle Dynamic Challenges
 - Thermal Management During Long-Duration Operation



Kollmorgen Product Solutions: AKD Servo Drive / AKM Servo Motor / CDDR Direct Drive Motor

Solution Values

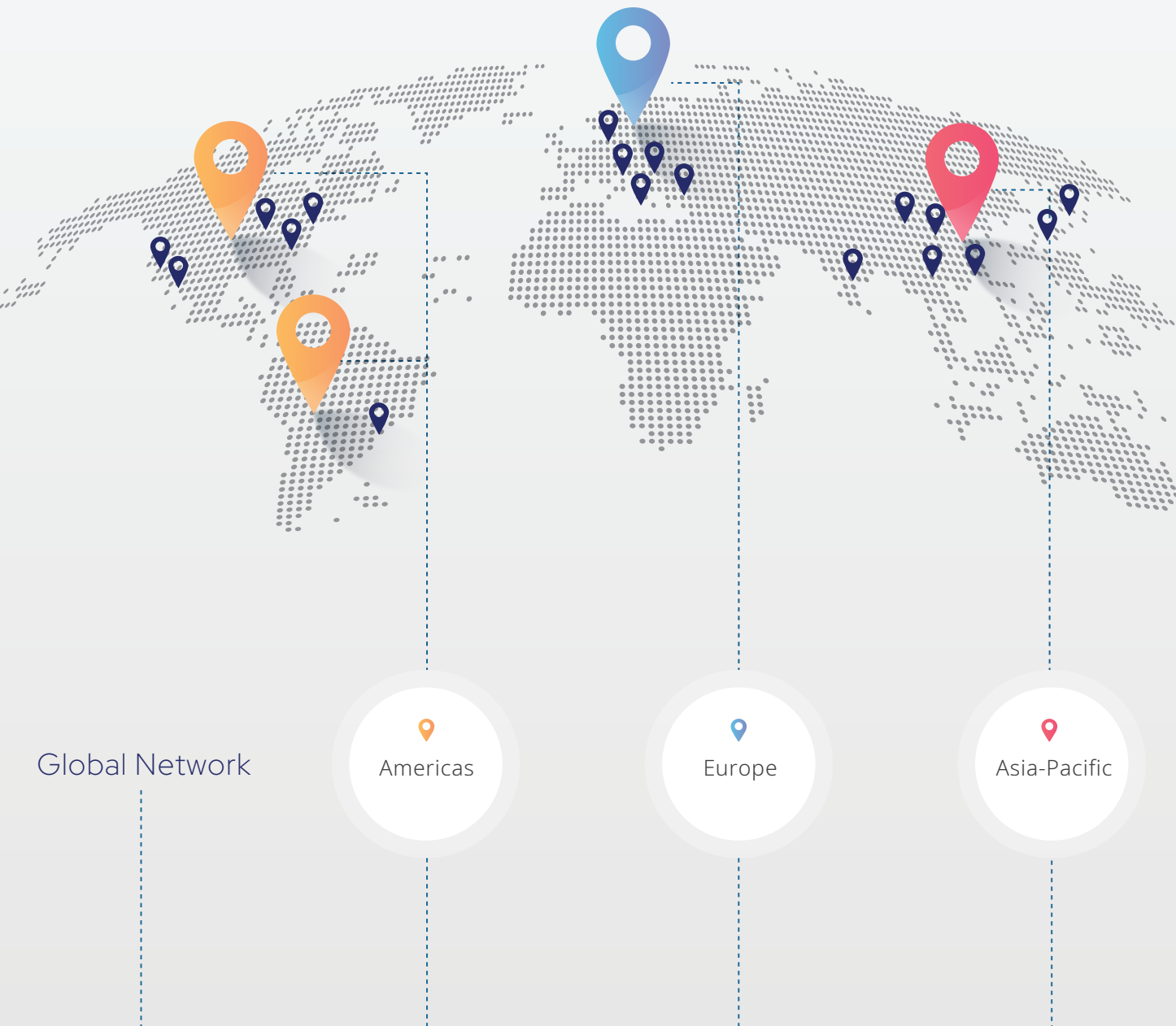
- » For high-speed axes such as rotary tables, the CDDR direct-drive motor achieves fast and precise positioning of $45^\circ \pm 0.02^\circ$ within 30 ms without overshoot, ensuring clear imaging for visual inspection and recognition.
- » Featuring high power density and superior thermal management, both AKM and CDDR motors deliver controllable heat generation under high-frequency motion. Their modular design enables quick replacement and effectively reduces equipment downtime.



04 Global Footprint Timely Support

Value to Customers:

- ✓ Kollmorgen's multiple global production bases adhere to unified professional design, manufacturing, process management and ISO 9001:2015 quality management system standards.
- ✓ Local production supports fast and stable delivery as well as technical services.
- ✓ Global business cross-regional collaboration provides comprehensive support, including on-site technical services, troubleshooting and on-site product application technical training.



05 Professional Support Precise Selection

One-stop Technical Solutions

Customer-centric, providing full-process support from requirements to after-sales service, ensuring your equipment operates more stably and efficiently!



Requirements Analysis

- Recommend the suitable motor type based on the customer's application scenario.
- If standard products cannot meet the requirements, provide customized motor solutions through CoE (Customization of Engineering).



Precise Selection

- Quickly match motors using intelligent selection software based on load and motion profiles.
- Recommend highly compatible encoders according to accuracy requirements to ensure performance meets specifications.



On-Site Commissioning

- Provide detailed manuals and documentation before commissioning.
- Offer on-site training and technical support when needed to ensure customers fully understand and complete the commissioning smoothly.



Comprehensive Support Capability

- Real-time Online Technical Support.
- Efficient Product Repair and RMA Service.

Intelligent Self-Service Selection Tool

Offering a variety of tools including a servo selection tool, performance curve generator, and 2D/3D model downloads, comprehensively supporting self-service selection to easily meet your personalized needs!



Learn with me! Quick servo system design and selection!

We invite you to explore the secrets of precise, fast and efficient servo system design and selection!

Watch Now



- Motioneering sizing software, performance curve generator
- Comprehensive product catalogs with detailed parameters, informative installation manuals
- Training courses and videos

Each regional engineer provides 1:1 support for model selection and collaborative development.



400-668-2802



www.kollmorgen.cn