



Solutions for  
**Robotics**  
**Manufacturing**

Custom Motion  
Components for Robotic  
Systems & Automation  
OEMs

# Precision That Powers Progress

Robotics has become the foundation of modern automation, accelerating production, improving precision, and enabling entirely new forms of intelligent manufacturing.

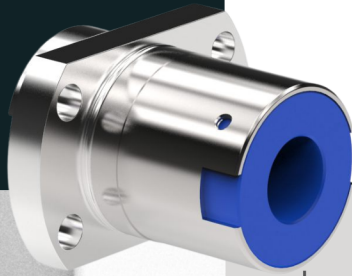


From collaborative robots on assembly lines to autonomous mobile robots navigating dynamic environments, today's robotic systems demand reliable, high-efficiency motion components that can perform with accuracy across millions of duty cycles.

As engineers advance toward higher payload capacities, faster cycle speeds, and more compact mechanical assemblies, precision linear motion becomes a critical enabler of innovation.

# The Role of Precision Motion in Robotics

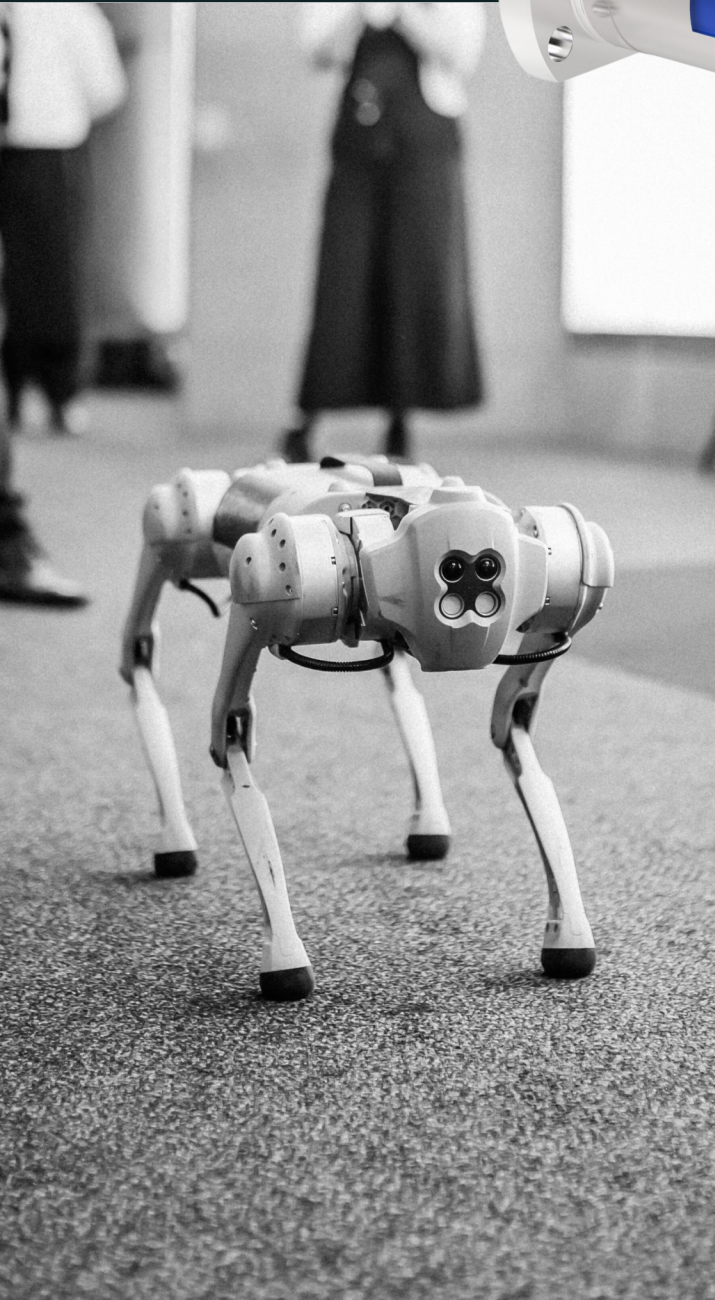
Every robotic system whether it moves, grips, lifts, inspects, or positions, relies on predictable, repeatable linear motion. Lead screws, ball screws, and linear actuators form the mechanical backbone of these systems, converting rotary energy into controlled linear movement.



In robotic applications, motion components must deliver:

- High repeatability for consistent positioning
- Exceptional rigidity under dynamic loading
- Smooth, low-friction travel for predictable performance
- Durability across millions of continuous cycles
- Precision required for advanced automation and collaborative systems

Helix designs these components to integrate seamlessly into robotic architectures, ensuring optimal speed, accuracy, and reliability in every axis.



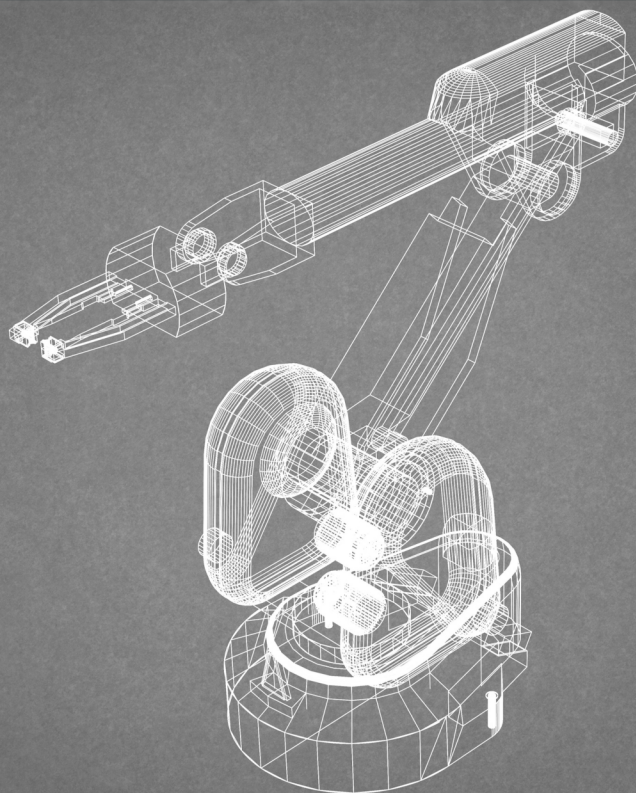


# Challenges in Robotic System Design

Robotics engineers face a unique set of mechanical and environmental challenges.

Helix supports OEMs by addressing issues such as:

- Compact space constraints: Achieving powerful actuation in small footprints
- High-duty cycle demands: Continuous operation with minimal maintenance
- Dynamic loads & vibration: Maintaining accuracy as robots accelerate, decelerate, and change direction
- Contamination control: Ensuring clean operation for food, medical, and electronics environments
- System rigidity: Minimizing deflection for high-precision tasks
- Reliability in 24/7 automation: Avoiding unplanned downtime or assembly wear





# How Helix Supports Robotic OEMs

Helix Linear Technologies brings decades of engineering and manufacturing expertise to the robotics industry, delivering motion solutions tailored to each system's performance requirements.

Key areas of support include:

- Custom lead screw and ball screw assemblies engineered for exact stroke, pitch, diameter, and materials
- Integrated linear actuators designed for compact robotic joints and end-effectors
- High-performance nuts and anti-backlash solutions for consistent accuracy
- Specialized coatings and materials for reduced friction, extended life, and environmental resistance
- Collaborative engineering assistance from concept development through full-scale production

This partnership-driven model ensures robotic OEMs receive motion components optimized for their mechanical, environmental, and performance needs.

# Key Applications of Helix Components in Robotics

Helix motion components support a wide range of robotic systems, enabling smooth, accurate, and reliable operation in critical applications:

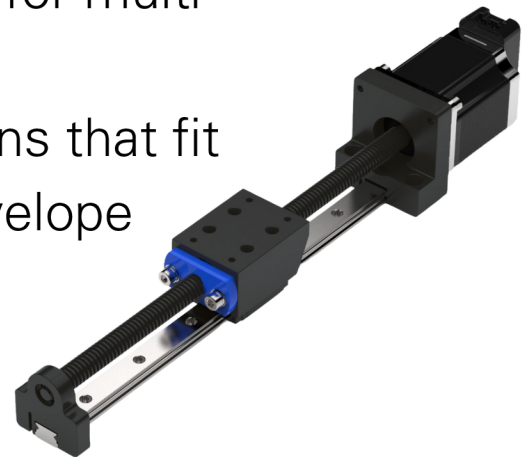
- Pick-and-place automation for fast, precise movement
- Collaborative robot (cobot) joints & end-effectors requiring smooth, safe motion
- Autonomous mobile robots (AMRs/AGVs) for lift, steering, and navigation mechanisms
- Robotic welding and fabrication cells where durable, high-load actuation is essential
- Machine tending and assembly robots requiring dependable linear positioning
- Inspection, testing, and metrology systems where accuracy is non-negotiable
- Precision dispensing, cutting, and finishing robots benefiting from low-friction actuation

Each application benefits from Helix's ability to engineer purpose-built motion components.

# Recommended Helix Solutions for Robotics

Robotic architectures vary widely, but certain Helix products consistently meet the performance requirements of modern automation:

- **Lead Screws:** Lightweight, efficient solutions for controlled linear motion
- **Ball Screws:** High-speed, high-load systems delivering superior efficiency and rigidity
- **Linear Actuators:** Compact, integrated motion stages ideal for constrained robotic assemblies
- **Guide Rails:** Smooth, stable motion for multi-axis platforms
- **Custom Assemblies:** Tailored designs that fit unique robotic requirements and envelope limitations



Helix's flexibility in materials, coatings, and geometric customization ensures OEMs receive exactly what their systems need.



# Engineering Advantages

Robotic system designers choose Helix for components engineered with performance and longevity in mind:

- Exceptionally low backlash for precise, repeatable positioning
- Quiet, smooth motion ideal for collaborative and high-speed automation
- High efficiency and low friction to reduce energy consumption
- Corrosion-resistant materials & advanced coatings for clean or demanding environments
- Long service life due to optimized thread forms and material pairings
- Customizable geometries supporting envelope, stroke, and integration constraints

These advantages help robotic OEMs build smarter, more reliable machines.

# Why OEMs Choose Helix Linear

Helix Linear Technologies is trusted across robotics, automation, medical device, aerospace, and semiconductor markets because of its commitment to engineering precision and customer partnership. Robotics manufacturers choose Helix because we provide:

- AS9100-certified quality for dependable performance
- Rapid engineering collaboration with shorter development cycles
- High-precision machining and thread rolling for optimal mechanical performance
- Durable, repeatable motion essential for demanding robotic operations
- Scalable U.S.-based manufacturing supporting prototype through full production

This combination of quality, customization, and technical expertise positions Helix as a strategic motion partner for next-generation robotics.

## Contact & Engineering Support

Helix's engineering team is ready to support your robotics project with custom motion solutions tailored to your exact requirements. Whether you're developing a new robotic platform or refining an existing design, we provide the expertise, responsiveness, and precision manufacturing needed to bring your system to life.



Visit [HelixLinear.com](https://HelixLinear.com) to connect with our engineers and request a custom motion solution.



# A Legacy of Precision. A Future of Innovation.

Since 2011, Helix Linear Technologies has been designing and manufacturing precision motion solutions for critical industries. Our commitment to innovation, quality, and engineering excellence makes us a trusted partner in the fast-evolving world of semiconductor manufacturing.



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