

DESIGNED FOR DEMANDING ROBOTIC APPLICATIONS

The delta robot demo highlights not just the capabilities of ECM's 2Nm servo evaluation motors, but the broader advantages of PCB Stator architecture in high-performance motion control. From mechanical simplicity to electrical precision, every design choice supports accuracy, reliability, and system integration.

CHALLENGE

In modern robotics, especially in dynamic and multi-axis systems, engineers are constrained by several persistent challenges:

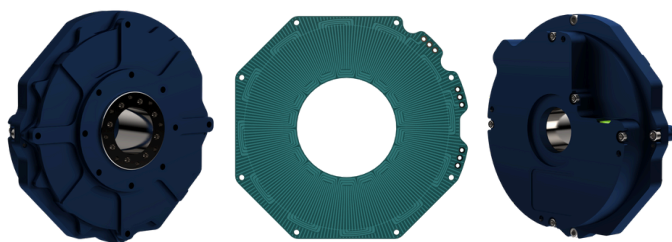
- **Precision & Responsiveness:** Coordinating multiple axes in real time demands high-resolution feedback and seamless motion.
- **Noise & Vibration:** Many traditional motors introduce cogging, acoustic noise, and unwanted mechanical vibrations, which can be problematic in haptic or precision environments.
- **System Footprint:** In space-constrained robotic architectures, motor size and complexity can limit integration options.

High-Precision Delta Robot Demo Showcases the Real-World Advantages of ECM's Servo Evaluation Motors

- **Electromagnetic Interference (EMI):** EMI can disrupt control systems and create noise in sensitive environments, particularly when controllers are located far from the motor.

ECM'S SOLUTION

At Automate 2025, ECM showcased a delta robot, whose mechanical arms were actuated by three (3) PCB Stator servo motors from the [newly unveiled shelf-stock line](#). This demo highlighted how ECM's technology overcomes the challenges above through several key innovations:



- **Direct Drive, Zero Cogging Torque:** Thanks to ECM's patented PCB Stator axial flux design, the motors offer smooth, cog-free operation, eliminating vibration and improving motion quality. Also, this direct drive approach simplifies system architecture, reduces the bill of materials (BOM), and mechanical backlash.

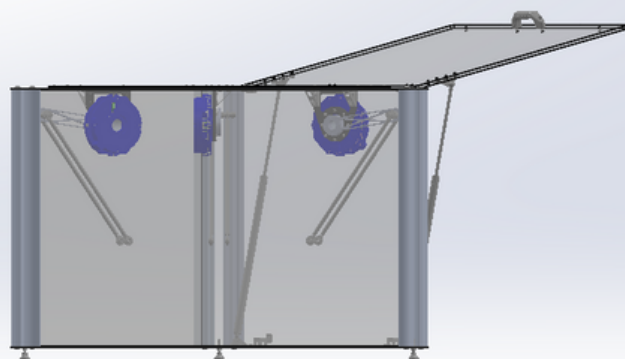
- **Integrated Absolute Encoders for Real-Time Coordination:** Integrated within each motor is an optical absolute encoder, enabling precise, closed-loop control of position and speed. The delta robot leverages this to maintain tight synchronization across all axes—crucial for rapid pick-and-place tasks and high-precision movements
- **Compact Form Factor for Better Integration:** The axial flux architecture results in a slim, low-profile motor design, ideal for compact robotic arms like delta systems. ECM's 2Nm servo motors integrate cleanly into the delta robot's joints, preserving torque output and motion precision without adding bulk. This compactness simplifies system layout and allows tighter packaging in space-constrained environments.
- **Exceptionally Quiet Operation:** The motor is mechanically quieter thanks to direct drive, eliminating belts, gears, and backlash. ECM's PCB Stator design further reduces acoustic noise through structural innovation. Unlike traditional motors with iron cores and exposed windings, ECM's stators feature fully encapsulated copper coils within a composite structure. This construction dampens mechanical vibrations and isolates external forces, leading to significantly lower noise during operation. The result is a motor that's exceptionally quiet, ideal for haptic robotics, cleanroom environments, and other sensitive or public-facing applications.
- **Lower EMI for Cleaner System Design:** Because ECM's servo motors include onboard integrated controllers, the signal path between the drive electronics and the motor windings is

short—dramatically reducing EMI risks and simplifying cable routing and shielding requirements.

"Integrating ECM's 2Nm servo motors into the delta robot allowed us to achieve exceptionally smooth, quiet, and precise motion, all within a compact and elegant form factor. The combination of PCB Stator technology and integrated controls streamlined both the mechanical and electrical design, enabling real-time multi-axis coordination with minimal EMI and impressive repeatability. It's a motor platform that simplifies complexity."

Dr. Eric Ponce, PhD

ECM Director of Research and Development



OUTCOME

The delta robot demo demonstrates how ECM's servo motors can unlock higher performance in compact robotics platforms, offering OEMs a plug-and-play solution for fast prototyping and deployment.

[See a video of it in action at Automate here](#)

To learn more about ECM's shelf-ready evaluation motors for robotics and automation, visit:

<https://pcbstator.com/pcb-stator-evaluation-motors>