

Motion Control Without the Control Complexity

One controller. Two closed loops. Position and force, solved together.

Featured live at the 2026 Advanced Manufacturing Expo.

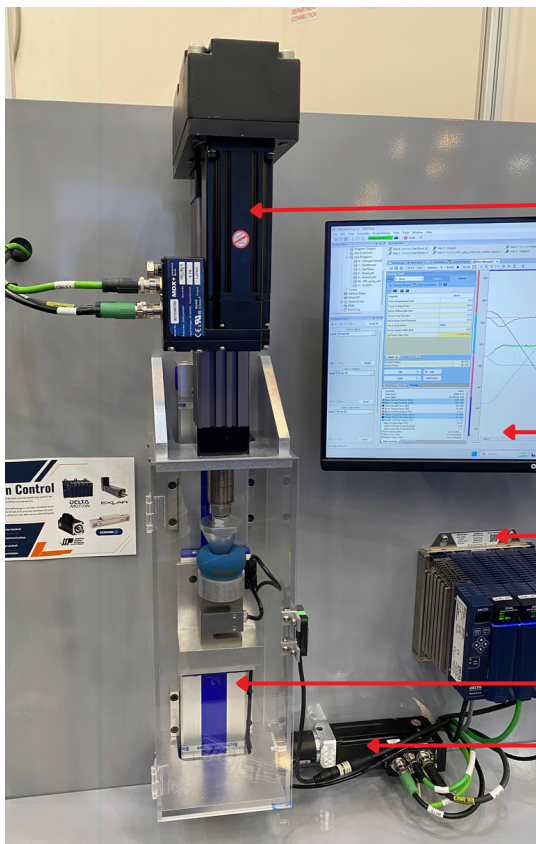
When an application needs to both position a load and control force, the instinct is to track position over force as its more predictable and easier to control. It's a reasonable instinct. It's also usually the wrong call, because it works better to track both position and force simultaneously.

Think about sanding a curved part by hand. You follow the contour and hold steady pressure at the same time, and because the contour keeps changing, the position has to change with it. You aren't holding one force. You're finding the right force at every new position, continuously. That's the behavior we built into a machine.

Donald Engineering's partnerships give our engineers access to leading motion control and fluid power technologies. Using **Delta Motion, Exlar, SCHUNK, and Applied Motion Products**, we built a system that closes two loops, one on position, one on force, inside a single controller, with the axes networked over EtherCAT.

Inside the Motion Control Demo

The setup: a compact tower combining a belt-driven positioning axis with a roller-screw force actuator, stacked so the actuator presses down through a load cell and into the load. A Delta Motion RMC200 is the controller; an Applied Motion MDX+ integrated servo drives each axis, and the axes communicate over EtherCAT. Position and force, specified and integrated as a single predictable motion function.



Exlar KX60 Roller Screw Actuator



Applies controlled linear force. Roller-screw technology gives very low backlash, high mechanical efficiency, and very high force capability in a compact package.

Delta Motion RMC200



Closes both loops — position and force — inside the same control scan & tracks all axis on the HMI.

SCHUNK Delta Belt Axis



Precisely positions the load. Position feedback comes from the 17-bit encoder inside the MDX+ servo.

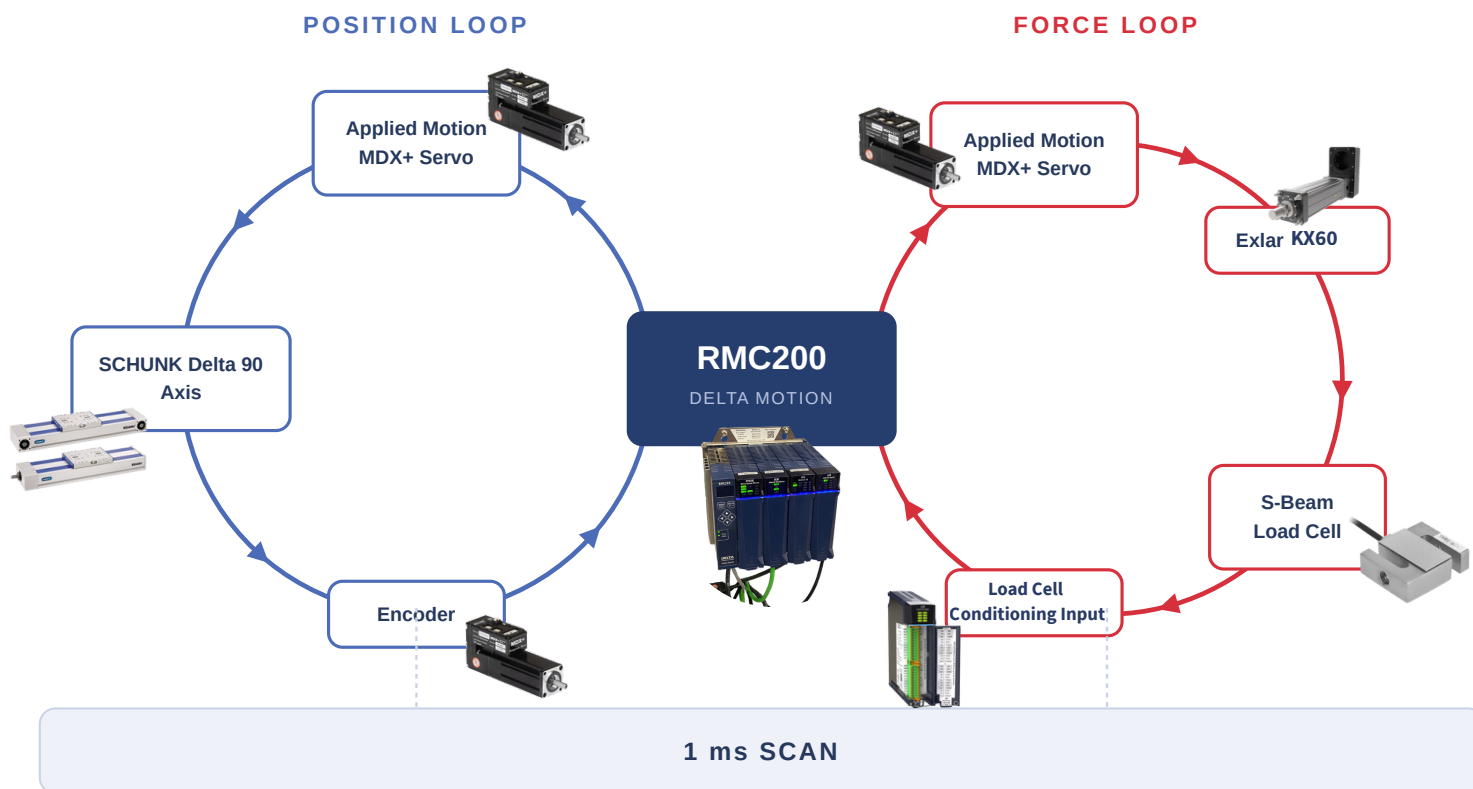
Applied Motion MDX+ Integrated Servo



Combines servo motor and drive into one package. Communicates with the RMC200 over EtherCAT.

Two Loops. One Scan.

Here's what's happening behind the scenes while the demo runs, loop by loop:



Both loops. Every scan.



Both loops run continuously and simultaneously, not one after the other. If the load shifts, the controller doesn't just find its position again; it finds the correct force at that new position in real time.

One Controller. One Clock.

Two controllers can absolutely run a position loop and a force loop. But, every handshake between them is time the load keeps moving, and that time shows up as force error exactly when the part is in motion, which is exactly when it matters.

One controller removes the argument. The RMC200 reads the encoder and the load cell, solves both loops, and updates both drives inside the same scan, 1 ms as standard. The force loop isn't reacting to where the part was. It's solving for the right force at the position the part is in right now.

"It's not moving to a position and then applying a force. It's solving for force the entire way there."

Why a Roller Screw?

Maintaining force takes more than good controls. The mechanical technology matters too. The Exlar FTX095 uses roller screw technology, giving very low backlash and high mechanical efficiency in a compact package.

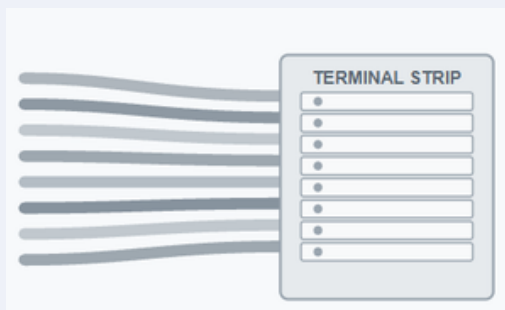
The bigger advantage is contact area. A planetary roller screw carries its load across many more contact points than a comparably sized ball screw, because a ball screw's contact is limited by the size of the balls themselves. More contact area means higher load capacity and greater stiffness, significantly more force out of the same envelope.

EtherCAT: Less Wiring. More Information.

Both axes use Applied Motion Products MDX+ integrated servos, servo motor, drive, and encoder in one package, communicating with the Delta controller over EtherCAT. One cable carries what used to take a bundle: position, velocity, torque, temperature, faults, status, and motion targets. The exception in our demo is the load cell, which feeds an analog signal directly to the RMC200's LC8 load-cell input module.

BEFORE

Discrete wiring



Individual signals terminate at the strip

WITH EtherCAT

Networked motion control

Motion command Position feedback Drive Status



EtherCAT 

One network cable links the controller and drives

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Fewer wires. Less installation time. Fewer potential failure points. And far more information available to the controller. That last part pays off at commissioning.

If an axis isn't behaving as expected, an engineer can see position, velocity, torque, faults, and status directly through the control system, rather than immediately crawling around the machine looking for a damaged cable, a missing signal, or an incorrectly wired connection.

Where Does This Matter?



Bearing Press-Fit

Position tells you the bearing is seated. Force tells you whether it went in straight. An off-profile force curve means a crooked part, a wrong bore, or damage; caught at the press, not at final assembly.



Forming or Staking

Hit the dimension without overloading the part getting there. The controller holds the tonnage profile while driving to the final position, so you form the feature instead of cracking it.

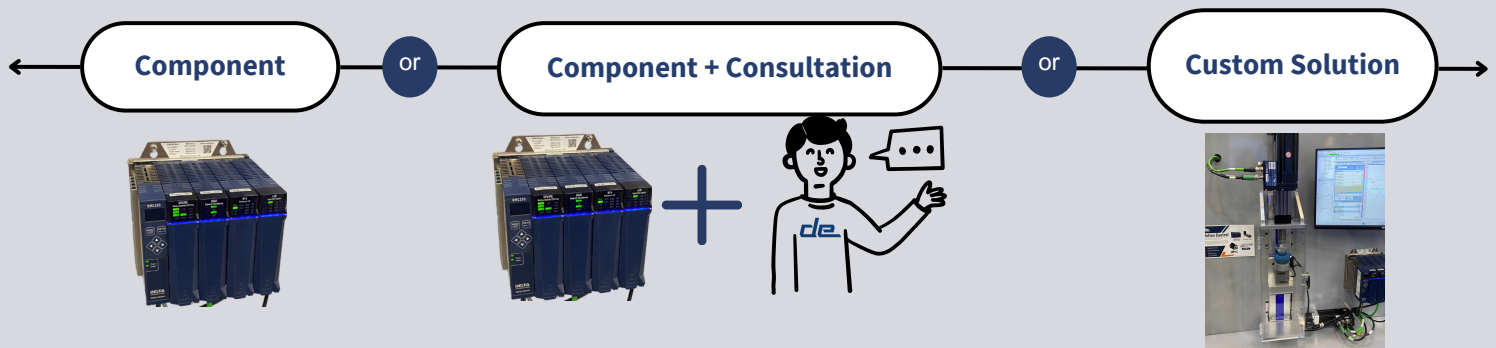
Sophisticated Control Doesn't Have to Mean a Complicated System

Each component has a job. The real value is knowing how to make them work together.

That's where Donald Engineering comes in. Our vendor partnerships give us access to the technology, while our engineering experience helps us apply it to the application. Bring us the application. We'll help engineer the motion.

HOW WE HELP

The Donald Engineering Difference



We don't just recommend components. We help manufacturers bring motion, feedback, controls, and communication together around what the application actually needs to accomplish.

Have a motion control challenge? Bring us the application.

Whether you need the right actuator or controller, help integrating technologies, or a more complete engineered solution, our team can help determine the right path forward.

Contact our team today!



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