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Changing Role for Servo Drives

Better drive performance reduces hardware and leverages high-speed networking

BY AL PRESHER, CONTRIBUTING EDITOR

New servo drive development continues to ride in the wake of Moore's Law and the computer industry. Continuing increases in processor performance, memory capacity and speed are spawning new, higher performance drives that are priced at basically the same level of the products they are replacing. The role of drives in many systems is being transformed by widespread adoption of Ethernet, which is minimizing the role of dedicated controllers, and a move to more decentralized, soft real-time control.

"Like computers, drive performance and capability have improved significantly while the prices have drifted lower," says Scott Evans, product director for Kollmorgen. "The drives themselves are becoming much smarter, yet simpler, and they are better able to control a wider array of machines than in the past. The precision of the motion is much greater due to the ability to keep error small and respond very quickly to ever higher resolution feedback devices."

Because drives create higher motor performance and are better equipped to handle high-speed communications over Ethernet, designers are increasingly comfortable relying exclusively on the drives for critical motion tasks.

"If a drive responds to commands more quickly and with less error in the first place, then time required to correct error is reduced, thereby dramatically increasing machine performance," Evans says. He says Kollmorgen's new AKD™ Servo Drives series, for example, offers a torque loop (640 nanoseconds) that is an order of magnitude faster than other products on the market.



Ethernet-based AKD™ Servo Drive provides flexibility, scalability and power range to meet high performance requirements.

Evans says better overall performance, combined with Ethernet communication, is contributing to two interesting trends in motion control. Centralized control is becoming less and less dependent on dedicated hardware, and decentralized control is gaining traction in the marketplace.

Centralized control gives the controls engineer a single point of contact with the machine and enables them to do all the programming in one place, in one language.

What Evans sees as a trend with drives getting smarter and more capable is that end customers who still prefer centralized control are moving to "soft" real-time control.

"We are seeing a trend away from dedicated hardware and centralized controllers toward soft machine controls on a PC," says Evans. "It could be a single board computer, workstation, a thin client or a dedicated industrial computer. Because the drives are getting smarter, engineers trust the drives to close not only the torque loop, but also the velocity loop and perhaps the position loop."

This creates a de-centralized feel to centralized control where historically the front-end controls would close both the velocity loop and the position loop of every single axis in the machine. But being able to send target positions every few microseconds to drives over Ethernet, and having the drives communicate status plus additional data, requires reliable and very high-speed network communications. Legacy buses such as CAN, Profibus, DeviceNet and Modbus are simply not fast enough, running at a maximum rate of 1 or 2 Mbit/sec. Quality motion applications might require tens of thousands of target positions per second for even the simplest motion.

Ethernet capabilities within the newest drives increase communication bandwidth exponentially utilizing robust protocols and topologies that the computer is already using. Evans says the Kollmorgen Automation Suite™ embraces Ethernet and uses the EtherCat protocol to communicate seamlessly to the AKD™ Servo Drives.

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