Fieldbus systems versus Industrial Ethernet

Industrial Ethernet is without a doubt very well established in automation technology, although traditional fieldbus technology still has a long way to go before reaching retirement. Since modern machines and systems must perform increasingly complex tasks, data networks are growing ever larger. This is where real-time capable Ethernet networks come into play, because they provide a consistent flow of data from the control level down to the field level. While all established systems offer this basic set of benefits, users who want to switch nevertheless face a variety of Ethernet-based models and options which can be difficult to understand or is even confusing. Also, other aspects such as functional safety are becoming increasingly important. To shine more light on the “Ethernet jungle,” electrical engineering editor, Ines Näther spoke with Martin Rostan, who heads the technology marketing department at Beckhoff.

How do you assess Beckhoff market share in the area of fieldbus I/O, and what future developments do you foresee with regard to the replacement of the traditional fieldbus systems by Industrial Ethernet?

Martin Rostan: As a pioneer in the field of modular I/O components for fieldbus systems, Beckhoff is undoubtedly one of the world’s largest manufacturers of fieldbus I/O systems. The millions of I/O Bus Terminals we have sold since 1995 have contributed significantly to our exceptional growth as a company. Since Beckhoff stands for open control and communication technologies, we support over 20 fieldbus systems with our product lineup. Although EtherCAT accounts by far for the largest share of our sales these days, we continue to support all relevant fieldbus technologies. For new projects, however, our customers decide almost exclusively in favor of EtherCAT. One of the reasons: Even if EtherCAT is your system bus, you can still integrate other buses via one of our gateways without losing performance. Since numerous machines and systems are built for many years without any modifications, traditional fieldbus technology will, of course, be around for many more years. For that reason, the associated modules will keep accounting for a good part of our sales as well. In addition, many of our components are used with third-party controllers. While most controllers may “speak” EtherCAT by now, there are still others around that don’t.

What are the user’s general benefits from switching to Ethernet-based communication, and which points are particularly important when making such a change?

Martin Rostan: The benefits clearly depend on the selected version of Industrial Ethernet. EtherCAT users benefit from significantly higher performance and more efficient machines, all while reducing equipment costs. They also enjoy faster commissioning which takes less time than it does with legacy fieldbus technology. For example, users don’t have to set device addresses, and the diagnostic capabilities of EtherCAT make the process of finding the sources of
malfunctions and troubleshooting substantially easier. Switching to Ethernet per se does not necessarily mean that everything will automatically work better, though. Depending on the specific technology selected, you might have to deal with more complexity and higher costs that may not be balanced out by application benefits. For example, if complex IT expertise is required on the field level to configure managed switches, or if the network topology adversely affects its performance, switching to that “brand” of Ethernet might not be advisable.

Where do you still see problems with regard to Ethernet for safety technology? According to a recent study, 33 percent of machine manufacturers use Ethernet for safety, but only on six percent of their machines. What is the current status, and how do you assess its future development?

The sales of Beckhoff TwinSAFE products with the Safety over EtherCAT protocol indicate that our customers are more advanced than this. The benefits of our integrated safety solution seem to make the difference for users: safe access to secure I/Os even with a standard controller, easy configuration instead of complex programming, and all of this with the flexibility of a modular approach and lower costs. Keep in mind, though, that just like how fieldbus technology with its local I/O modules took many years to replace parallel wiring, integrated safety Ethernet technology will also take a while to become ubiquitous. I don’t see any “pressing problems” at this time, however.

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