

EtherCAT expands the horizon: ultra high-speed terminals for world-class automation systems



Beckhoff has been implementing the concept of PC-based control technology successfully for over 20 years. Today, a single PC with an advanced, high-performance processor can handle the control task equivalent of several traditional PLCs, motion controllers, safety control systems and other special control components. In the past, however, it was not easy to utilize the high CPU performance of an Industrial PC for control tasks. The link between the machine and PC control was originally realized using traditional fieldbuses that were developed 10 – 15 years ago. These types of communication systems are no longer suitable for advanced, high-performance CPUs, particularly in terms of data throughput and synchronicity.

EtherCAT (Ethernet for Control and Automation Technology) closes the gap between fast CPUs and the I/O world of the machine and enables increases in update and response times by a factor of at least 10 when compared with traditional fieldbuses. This makes EtherCAT the ideal communication system for high-performance controllers.

However, performance data such as update times of 1,000 digital I/Os in 30 μ s are not the only reason machine designers are switching to EtherCAT. There are also economic reasons: hardware costs are reduced significantly because no special master card is required on the control side, and inexpensive I/O couplers, cables and connectors are available.

EtherCAT opens up new application possibilities that in the past required complex and expensive systems that were proprietary and closed. With EtherCAT, cable redundancy can easily be implemented, thereby increasing machine availability.

The performance of EtherCAT Terminals, the core offering of the Beckhoff I/O product line, has increased significantly: oversampling terminals enable sampling rates of up to 200 ksamples/s. This opens up a route into instrumentation and condition monitoring applications.

EtherCAT offers absolute openness, both on the slave side and on the master side. In the past, users had to develop their own hardware and software for special requirements. Now they are able to map their know-how in the software, perhaps even in their own EtherCAT master, and use fast EtherCAT I/O Terminals as their interface to the outside world. Users no longer have to maintain their own hardware on an ongoing basis and development resources can be used to expand unique selling points.

The attractiveness of this technology is further demonstrated by the fact that more than 250 EtherCAT Technology Group (ETG) member companies are already actively developing EtherCAT master and slave devices. With more than 380 member companies, the EtherCAT Technology Group is the largest Industrial Ethernet organization in the world.

Continuous expansion of the existing range of EtherCAT products is one of the primary aims of the Beckhoff product development group. More than 100 new EtherCAT Terminals are scheduled to become available during 2007. In addition to the current product range, which already covers all standard digital and analog signals, incremental encoders, SSI, RS232, RS485, and fieldbus masters and slaves, a wide range of innovations will become available in future that will enable EtherCAT Terminals to be used in almost any application. Availability of further signal types, e.g. through counter, PT100 and thermocouple terminals, and price reductions through 4- and 8-channel digital and analog modules are important goals for the new terminal range to achieve.

More than three years of global practical experience with EtherCAT illustrates the user benefits, particularly considering benefits such as much faster machines, better controls, and more cost-effective control concepts.

Beckhoff representatives worldwide are happy to discuss the new opportunities and benefits EtherCAT can offer users.

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