

Even higher speed for EtherCAT and measurement technology is in the mix

→ In an interview with Ronald Heinze, chief editor of "openautomation," managing director Hans Beckhoff reports current trends and highlights at the SPS/IPC/DRIVES in Nuremberg, Germany and comments on the state of the EtherCAT development.



Hans Beckhoff is convinced that: "2005 will be an exciting year for Ethernet. Users will test Ethernet in a wide range of applications, and field experience will grow exponentially. The benefits, which will then be clearly apparent for everyone, will provide additional impetus for Ethernet in automation technology!"

"One of our priorities for 2004 is PC-based CNC technology. This year, we managed to gain quite a few customers from the CNC sector," Hans Beckhoff explained. Traditionally, the market for CNC controls is dominated and controlled by just a few suppliers. With this in mind, we are very pleased that we are now beginning to win over some large end users with our PC Control-based CNC solution, and that this market segment is slowly opening up for our 'New Automation Technology'."

"The success in the CNC sector is a reflection of the Beckhoff overall outlook," Hans Beckhoff said. "At the moment, we've even managed to surpass our ambi-

tious goal of 26 percent growth in annual sales. Our current growth rate is just over 28 percent."

Is it likely to become more difficult to achieve such high growth rates in future? The managing director is optimistic: "Our aim of 26 % growth is indeed very ambitious and was initially intended to serve as a guideline for our company. However, the market appears to permit such growth for us. Assuming that the worldwide automation market that Beckhoff serves has a volume of about 50 billion euros, our current market share is just 0.25 percent. Assuming we manage to maintain annual growth of 26 percent and the overall market is going to grow

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slightly, by 2010 we will have reached a market share of 0.8 percent. Therefore, the market is not the limiting factor."

"This year we managed to achieve growth in all areas, across all industries and in all regions," Hans Beckhoff said. "Particularly noteworthy is North America, with a growth rate of 50 percent, where a turnover of 14 million euros has been generated by 29 employees. After years of heavy investment, we are now making money in North America." Beckhoff U.S. also recently opened a new technical office in Carlsbad, California near San Diego.

"We will continue to strengthen the export business," the managing director continued. "This year we established new subsidiaries in France, Russia and Lithuania. We opened our third office in China. We have now been active in the Chinese market with our own staff for three years. Due to the dynamics of this market, we will redouble our efforts in China in the future." Notwithstanding the booming export business, Hans Beckhoff emphasizes, "The company also achieved strong growth in Germany."

Innovations for further growth

Continuation of the Beckhoff global growth strategy requires constant innovations. At SPS/IPC/DRIVES 2004 in Germany, Beckhoff will once again present a range of new developments: The company's linear motor offering has been extended and now covers peak forces up to 9000 N. In the Industrial PC range, innovations on display at the fair include Panel PCs with the Pentium M processor and the new C81xx range of the box PCs. "Our Industrial PCs are increasingly used for applications that are no longer directly related to core automation tasks. One example of this is measurement technology," said Hans Beckhoff.

Beckhoff will also present a CX1000 series Embedded PC with Pentium M processor. "High-end PC performance will now be available on the din rail," Hans Beckhoff continued. He regards the Intel Pentium M processor family as a "stroke of luck for automation." They solve the power loss problem with industrial P4 computers, since the maximum power loss for the new processor type is just 25 W. Furthermore, the processor architecture offers very high performance. "Our TwinCAT PLC benchmark indicated that the 1.6 GHz Pentium M Mobile offers the same performance as a standard 2.4 GHz Intel processor," Hans Beckhoff said.

Meanwhile, Intel announced their intention to continue developing the Pentium M family as their main product line. Also, the Windows CE-based CX9000 Bus Couplers with two integrated Ethernet ports will be presented in their final version.

"Demand for IP 65 I/O modules is growing," the managing director said. Customers are increasingly asking for tailor-made function modules that can be used as a compact and extremely robust "front end" for production machines. The automation manufacturer intends to utilize the experience gained in building Industrial PCs with metal housing and the know-how from the I/O products for offering customer-specific IP 65 modules with all-metal housing.

The Beckhoff Bus Terminals have developed into a market standard. Meanwhile, the company offers tailor-made terminals for almost 170 signal types and keeps expanding this range systematically. At the fair, the new KMxxxx terminal modules will be presented, which feature extremely compact design, plug-in connections and an attractive price per channel. Another development: new intelligent power Bus Terminals for direct connection of stepper motors. These Bus Terminals enable cost-effective connection of drive systems up to 200 W directly from the terminal network. "With our automation concepts, we have increased our presence on the Asian markets," the managing director said. Beckhoff is therefore developing a CC-Link Bus Coupler and negative-connection 8-channel digital terminals to reduce the price per channel.

Measurement technology as a new target market

Beckhoff has identified measurement technology as a new target market. Beckhoff, the embodiment of advanced automation systems, and measurement technology – how do the two fit together? The managing director of Beckhoff is convinced that: "Automation and measurement technology are converging on the basis of PC-based control technology, with measurement technology becoming established as an integrated component of automation technology. After the successful integration of PLC, motion and HMI functionalities on a single hardware and software platform, the extension of automation technology with measurement technology will open up new applications and markets." Beckhoff can sense a development towards "scientific automation," offering further increases in machine performance and reliability. Furthermore, according to Hans Beckhoff,



Reinforcement for drive technology:
new linear motors for peak forces up to 9000 N.

automation technology should also be able to penetrate the previously separate market of measurement technology. "The signs for automation companies are good, since many metrological tasks can be solved quite easily using automation technology." At the same time, he is convinced that instrument technicians can deal with automation tasks without significant effort.

Beckhoff is already offering a number of standard components for solving a wide range of measurement technology tasks. One example is the KL3356 Bus Terminal, which was specially developed for metrological tasks and offers a very small measurement error of ± 0.01 % of full scale value. Beckhoff will continue to develop measurement Bus Terminals for analog signal recording with this kind of precision," Hans Beckhoff said.

"Machines or systems can utilize PC-based control technology even more effectively, if the existing high-performance processors also deal with processing the measurement readings," he continued. "This is why one of our aims is to develop TwinCAT software into a platform for measurement tasks. When it comes to measurement technology, we are first dealing with the hardware side and will then move on to the software."

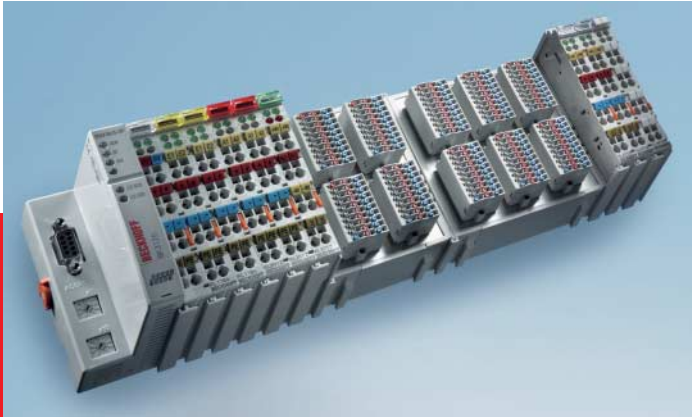
TwinCAT automation software remains the linchpin of the Beckhoff strategy. The new version 2.10 contains a range of improvements and will be presented at the SPS/IPC/DRIVES show. EtherCAT will be fully integrated in this version of TwinCAT. Hans Beckhoff said, "It will enable us to guarantee response times of 100 μ s."

Distributed clocks for EtherCAT: New high-speed class

EtherCAT, the real-time Ethernet technology for control applications developed by Beckhoff, is making headway at all levels. "The success of the EtherCAT Technology Group (ETG), which was only established in November 2003, has exceeded even our most optimistic expectations," Hans Beckhoff said. "The technological principle on which EtherCAT is based is obviously attractive enough for ETG to be successful even on industry 'word of mouth' alone. We are very pleased about this positive response." ETG already has 127 member companies from all over the world, including well-known automation and drive technology companies such as ABB, Advantech, Baldor, Baumüller, Bosch, Jetter, KEB, Moeller, SEW, SMC, Turck and Weidmüller. The company Hilscher intends to integrate EtherCAT in its netX all-in-one network controller.

27 ETG members will have a joint ETG stand at SPS/IPC/DRIVES and will present their EtherCAT products as well as a concrete application example from the sheet metal processing sector. The roll feed developed by Schuler AG is controlled with EtherCAT drives from Baumüller and EtherCAT terminals from Beckhoff. ETG is also making good progress with international standardization. "Meanwhile, ETG has become an official partner of the IEC SC65C working groups," said Hans Beckhoff. "We are now in the process of submitting EtherCAT for standardization." "EtherCAT slave controllers are already available," he continued. "In the second quarter of 2005, they will also become reality in the form of ASICs." Previously, the chips were based on FPGA technology. According to Hans Beckhoff, ASICs are characterized by their small size (approximately 7 mm x 7 mm), low power loss, attractive price and high performance.





The new Beckhoff terminal modules for the Bus Terminal system are characterized by their compact design and advantageous price per channel.

Several innovations based on EtherCAT technology are now available: "One of our highlights is the distributed clock concept," Hans Beckhoff said. What is behind it? In addition to minimized time jitter, real-time synchronization also requires absolute isochronism. "Under industrial conditions in the field, we are now able to achieve values of less than 100 ns for jitter and absolute time deviation, and in the laboratory even less than 30 ns." Hans Beckhoff hopes to be able to increase speed and precision even further using this concept.

But are such high speeds generally really needed in automation technology? "Definitely," the managing director said. "Jitter reduction is very important for control technology. Constancy of sampling times and absolute simultaneity of signal acquisition directly influence control accuracy. Our distributed clocks are, therefore, a high quality feature for the next generation of controllers. With this technology, EtherCAT will be able to gain further advantage over other real-time Ethernet concepts."

Even with the successful development of EtherCAT, Beckhoff will remain open for other real-time Ethernet protocols – true to the company philosophy of open control technology. "What is perhaps less known in the market is that we not only contribute to the development of PROFIBUS and PROFI-safe, we also actively support the development of PROFINET," said Hans Beckhoff. "Our products will also support Ethernet IP and other Ethernet-based systems, as demonstrated by the 13 different communication systems that have already been integrated in our automation solutions so far. This openness offers great benefits for our users."

Safety communication has to be system-independent – no "fieldbus straitjacket"

The automation market is currently characterized by an intense discussion about different concepts for safety-related communication. There is a risk that a similar diversity will develop in this sector as already experienced in standard communication. Beckhoff is trying to take a different route. With TwinSAFE, Beckhoff offers a communication-neutral, decentralized safety concept for functional security applications. TwinSAFE is characterized by safety-related communication as an additional layer over existing, freely selectable communication channels and independent of the chosen physical transfer medium. In practice this means that TwinSAFE can be used in any fieldbus environment and operates as "fieldbus-neutral." The same applies for EtherCAT. "Obviously, TwinSAFE-based, safety-related communication can also run via EtherCAT," explained managing director Hans Beckhoff. "Therefore, we see no need for a separate EtherCAT safety specification. We feel that this notion might also prevail with other Ethernet systems, since it is a technically cleaner and simpler solution."