interview PC Control 04 | 2011

Interview with Hans Beckhoff on the official release of TwinCAT 3, energy efficiency and sustainability

A plea for more production efficiency

Automation companies bear a great deal of social responsibility, because the prosperity of a growing world population can only be increased by making production more efficient while at the same time reducing the use of resources. Beckhoff Automation provides the "tools" for achieving this, as Ronald Heinze, Editor-in-Chief of Open Automation, found out in a conversation with Hans Beckhoff, Managing Partner of the company.

This year Beckhoff Automation is once again experiencing above-average growth: "Our current growth rate is 30 %," said Hans Beckhoff. For 2011 he expects an annual turnover between 440 and 460 million euros. Beckhoff currently has 2130 staff. "We are very satisfied with our result for the year," said the Managing Director. "A further growth of 30 % in 2011 after 45 % growth the previous year shows that our PC Control Technology is successful and can grow faster than the market." Growth in the first half of the year was disproportionately high for Beckhoff and exaggerated due to several special influences. In the second half the development was initially more normal and currently we are seeing signs of a slowdown, not least due to developments in the market for renewable energy. Since the whole economic development is characterized by various uncertainties, Beckhoff is reluctant to offer forecasts for next year.

In the last 12 months the production facilities at the Beckhoff Verl location were increased significantly by an additional 18,000 sqm to a total of more than 40,000 sqm. "We now have technical capacities for a turnover of 600 million euros," said Hans Beckhoff. A total of 12 million euros alone were invested in technical equipment, including comprehensive inventory management. "We can now ensure high supply security for our customers irrespective of fluctuations in the worldwide supply chain, since we are able to store materials and components for around six months," he said.

Social responsibility of automation companies

According to Hans Beckhoff, the company is "extremely well positioned for advancing amongst others the fields of renewables and energy efficiency." After all, renewables already generated a 15 % share of the company turnover, mainly in the wind sector, but also in solar engineering. Beckhoff has a wealth of industry expertise in the area of wind energy: Just recently the company developed a fuzzy controller for pitch control.

According to Hans Beckhoff, automation technologies for efficiency improvements in production processes are even more important: "Engineers have a social duty to improve efficiency." He justifies this as follows: "In order to ensure the prosperity of an increasing world population that continues to grow, in view of increasingly scarce resources, we have to significantly increase the efficiency of the complete production process." This doesn't just concern the energy efficiency of the actual production process. Even more important areas are raw material efficiency and production efficiency. "The challenge is to control machines intelligently such that improved control technology increases machine output, so that more products can be produced with less raw material." According to Hans Beckhoff, this is the larger and main contribution automation technology can make in many production machines to improve sustainability. "Realistically, saving 100 watts of power dissipation in the control technology isn't that important. The key is





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to maximize the control intelligence in the machine, in turn to optimize the production process."

Production methods must be optimized with urgency in view of a growing world population with relatively limited resources that has increasing prosperity expectations in newly industrialized countries. If we don't succeed, humankind would increasingly struggle with resource distribution challenges, no doubt associated with a number of political problems that also result in significant and explosive reactions from the populace. "This is the reason for the high social responsibility that engineers truly carry today," he said. "With this in mind it is clear that our common future directly and essentially depends on engineers and their ingenuity to help preserve societal order."

Beckhoff regards it as the company's mission to create the technological prerequisites for advanced automation technology. For example, the leading-edge Beckhoff XFC technology (eXtreme Fast Control) is able to control processes with very short reaction times down to 100 µs. For packaging equipment, as an example, in practice this means that less packaging material is used without affecting the functionality of the packaging. As an application example, Hans Beckhoff mentions the minimization of the wall thickness of PET bottles and the thickness of packaging films. "In many cases, reduced raw material consumption is the key factor for reducing the ecological footprint of a production process. It is interesting to note that ecological and economic interests are not in conflict here and both result in increased profitability." It is therefore advisable to analyze production processes holistically: Where does energy and resource reduction make most sense?

"With XFC and Scientific Automation we are very well positioned for the required production optimizations," said Hans Beckhoff. In addition to faster reaction times made possible by XFC, the integration of top-quality measurement technology opens up optimization options in automation. Important and critical process data are available to the controller in parallel with the sequential control. "A compelling application example is our EL3632 Condition Monitoring terminal with the corresponding analysis library, which can be used for anticipatory diagnostics and also enables processes to be run closer to their limits through improved monitoring processes, resulting in significant optimizations."

TwinCAT 3 – bringing automation technology and IT together

From the perspective of Beckhoff, the convergence of AT (automation technology) and IT (information technology) is an urgent requirement that receives a massive boost with the series release of TwinCAT 3 control software. "TwinCAT 3 represents a new automation revolution, the significance of which will only gradually become apparent," said Hans Beckhoff. With the TwinCAT platform the world of automation can now benefit immediately



from developments in the IT world, resulting in significant savings potential for engineering. Object-oriented programming in IEC 61131 and the parallel utilization of programming in C, which all young engineers are familiar with from their university studies, will become increasingly important in automation technology. "We have transferred the benefits of the PLC into the C world," said Beckhoff. It is now possible to use standard Microsoft C compilers for real-time control. "TwinCAT 3 combines the best of both worlds: the wider range of options offered by C with the automation features of a PLC programming language," said Hans Beckhoff.

The performance capability of high-level language programming is also apparent in the visualization integrated into TwinCAT, which has become established as the standard in a wide range of smaller mechanical engineering applications. For larger applications, the PC-based Beckhoff world offers all open integration options for other platforms.

"The single-cable connection of the Beckhoff AM8000 servomotor series leads to a significant reduction in material costs and reduces the assembly and engineering effort enormously."

A further significant argument for the new software version of TwinCAT is multi-core support: "TwinCAT 3 makes multi-core technology easily controllable," said Hans Beckhoff. "Multi-core technology is also highly suitable for automation, since most machines naturally operate in parallel, and therefore the corresponding control programs can also be parallelized quite easily." According to Beckhoff, Moore's law will remain valid for some time. The roadmaps of the large processor manufacturers envisage tiny 8 nm configurations by 2018. Linear extrapolation could lead to 128-core processors, which would provide a further massive performance boost for automation technology. "This development is a challenge and a big opportunity at the same time for all automation companies: New ideas for capitalizing on these vast CPU resources will become major factors in the globally-competitive machine manufacturer market," said Hans Beckhoff, calling on all engineers to take up this challenge. The door to further efficiency improvements in PC-based control technology is wide open.

"TwinCAT is one of the most efficient and most integrated tools available for this competition of new ideas," Beckhoff concludes. It offers functions for standard PLC Control, Motion Control, CNC, robotics, safety, measurement technology, Scientific Automation, C and Matlab®/Simulink® programming, communication via OPC, HMI and much more. As already announced, the plan to open up TwinCAT 3 for modules from third-party suppliers is right on schedule. According to Hans Beckhoff this will lead to further improvements in efficiency, since many innovative solution ideas will become available to a wider audience.

Single-cable connection for servomotors

The joint venture and Beckhoff subsidiary Fertig Motors, based in Marktheidenfeld, Germany, is developing successfully. The first products will be presented at SPS/IPC/DRIVES, including the new AM8000 servomotor series, which is characterized by excellent dynamic performance and a new connection technology. The exciting highlight: The motors only need one connection cable, instead of the usual two. The feedback line is no longer required, since it's now integrated into the standard motor cable. "This may sound trivial to some, but it is a genuine innovation. The single-cable connection leads to a significant reduction in material costs and reduces the assembly and engineering effort enormously," said Hans Beckhoff. With the same number of wires and cable diameter, the motor cable now also integrates high-performance encoder communication, which in addition to actual position information still has reserve capacity for further motor data such as temperature and other physical values.

"We have reached our goal: the creation of our own innovative, high-performance and competitive motor series. Production will commence in early 2012," said Hans Beckhoff. "We have achieved even more than expected. At the trade show we will also present the AM8800 series with stainless steel casing, which is suitable for application in the food industry, for example. In addition, Fertig Motors has also realized the division's first custom developments. We expect to make good use of our production capacities in Marktheidenfeld, Germany.

Entrepreneur Hans Beckhoff is convinced that the New Automation Technology from Beckhoff will result in higher efficiency and enhanced sustainability. The key components of this are TwinCAT, XFC and Scientific Automation.

Published in Open Automation 06/2011, VDE-Verlag, www.vde-verlag.de