

Interview with Frank Würthner:

Beckhoff solutions for packaging machine industry challenges

With PC- and EtherCAT-based control technology, Beckhoff offers a universal automation system for machine design that is particularly well suited for packaging machines. Kai Binder, editor-in-chief of SPS-Magazin (Germany's PLC Magazine), spoke to Frank Würthner, Beckhoff industry manager for packaging technology, about the range of solutions that the company has to offer this industry.



SPS-Magazin: Beckhoff wants to engage itself more strongly in the field of packaging machine manufacturers. With which components do you want to do that?

Frank Würthner: Beckhoff specializes in many vertical markets, including the packaging sector. We are constantly expanding our automation portfolio. Certain industries, for example the packaging machine market, have a special meaning for us. Beckhoff has an open hardware platform, which is so scalable and has such a high performance that it is suitable

for essentially every industry. We are therefore specialized above all in the area of our TwinCAT software.

Does that mean that you offer appropriate software libraries for the different industries?

Frank Würthner: Yes, exactly. The TwinCAT automation suite is the definition of universal and is designed to be industry-independent. Our software solution bundles the know-how from all areas of automation



Frank Würthner: "We regard it as our duty to discover optimization potential in a packaging machine together with the customer and to solve problems with our automation toolset."

Kai Binder, editor-in-chief of SPS-Magazin



technology. All industries can then benefit from this, regardless of whether the application is a packaging machine or a press line at the end of the day. For the packaging industry we offer standard and special software libraries, in which many pre-engineered solutions are available, such as print mark control, dancer control of the print mark control, flying saw or torque controls. These function blocks are adapted to the corresponding application by simple parameterization. With this software we are able to image the controller on each packaging machine and the user saves time and development costs. On top of that, Beckhoff is a member of the OMAC organization and accordingly supports the guidelines of the PackAL library.

And what about the hardware?

Frank Würthner: In this area, there are various 'bottleneck scenarios,' especially in packaging. Each packaging system has a bottleneck somewhere, which one has had to accept so far, frequently by force of circumstances, because the traditional automation components quite simply reach their performance limits, in particular the fieldbus systems. With EtherCAT we have a technology at our disposal that is very fast and is thus particularly well suited for packaging machines. For example, we can implement print mark control with inexpensive standard components, where expensive special hardware was required before. Our eXtreme Fast Control (XFC) technology gives us the possibility to create a touch probe input for a packaging machine in the μ s range. Users can take a normal digital input terminal from our EtherCAT I/O system in order to monitor light barriers. Extremely fast cycle times can be achieved with an oversampling terminal and it is precisely with this system that we also frequently solve the problem of the bottleneck in such a machine.

A scalable control platform is an important prerequisite for all machine manufacturers today if they are to develop different types of machines.

Frank Würthner: Indeed. The scalability of the Beckhoff controller is unusually high and very finely granulated. It begins with an Embedded PC from the CX series as a true low-cost controller and extends up to the high power PCs with Intel® Core™2 Duo technology in design formats that include PCI slots, RAID controller, etc. The customer can select the most appropriate hardware, as if from a complete kit, and solve the application centrally or locally. Of course, the customer is not expected to work with different software platforms: there is one software, with which one can be confident of compatibility from the smallest to the largest controller. One of the things that distinguish us from all other suppliers, for example, is that we have Embedded PCs that can control a small conveyor belt with a DC motor, on which a single package is accelerated in order to feed it to a collecting packager. If customers want to realize such applications locally, perhaps in order to achieve modular solutions, they can always develop them with the same TwinCAT software and with the same libraries.

You have also integrated motion functions into TwinCAT software.

Frank Würthner: Motion control functions are a sticking point for packaging applications. We actually cover these by means of software with special function blocks and libraries in TwinCAT. As hardware, the Servo Drives from the AX5000 series are used, with a performance range today that extends from 1.5 to 170 A. Ultimately, we go with EtherCAT right into the drive controllers. All motion intelligence is located in the PC controller and not in



Indispensable for food and packaging machines: the new stainless steel Control Panels and stainless steel Panel PCs from Beckhoff are available as 12" and 15" touch panels and are manufactured universally as flush fitting designs in order to meet the hygiene and clean-room regulations in medical technology as well as in the food and packaging industries.

the drive controller. This is an enormous advantage in the entire life cycle of a machine, from the engineering and commissioning to servicing and maintenance. With this system we can cover the entire range of requirements in drive technology, up to a spindle that rotates at 70,000 rpm.

Robot kinematics is also in ever increasing demand in packaging applications.

Frank Würthner: So far it has been the case that many manufacturers need one system for the PLC, perhaps another separate one for the motion functions and a third for the robot. We have integrated the robotic functions such as delta kinematics or SCARA into the TwinCAT system. This means that the PLC, motion controller and robot kinematics are located in one powerful system. The entire robot data are thus also available to the PLC in real-time.

You have mentioned EtherCAT several times now. In your opinion, what are the specific advantages to users of fast communication with EtherCAT?

Frank Würthner: An ultra fast communication technology gives customers very clear advantages, because it allows them, for example, to build a machine with a smaller footprint. If you have to detect a product with a camera or even pick it up with a gripper at the very high speeds modern packaging machines run at, then the footprint of a machine can become smaller with EtherCAT and TwinCAT than with other technologies, because we can react to events faster with the EtherCAT Distributed Clocks. That is to say: if an event is triggered, e.g. by a light barrier, you are able to process this signal earlier with EtherCAT. That's why it is possible to build a smaller gripper. And if you can reduce the footprint of a machine that is 30 m long to 28 m, for example, then you have won.

That is what we understand by technology service. Another example: in a print mark detection system we have entirely omitted the dancer control, because this is mechanically very complex. Thanks to fast communication with EtherCAT we have managed to adjust the servo drive such that the foil does not tear off. You can achieve such things with EtherCAT. Such solutions were unthinkable with the reaction times that we used to have due to long fieldbus cycle times.

Time-to-market is an important criterion in the development of a new machine generation today.

How do you help users to bring their solutions onto the market quickly?

Frank Würthner: That is exactly the point: ultimately, we offer not only the hardware and software, but also the application software. In addition, we help customers with their initial steps, in the implementation of their application and in the case of problems in the project. And we have numerous system partners who are well versed in the field of packaging. TwinCAT 3 offers new possibilities to speed up the time-to-market. Thanks to the complete integration into Microsoft Visual Studio®, Beckhoff is ushering in a new engineering era with this newest software generation: the openness of the system makes it possible for machine builder companies to integrate 3rd party software in a simple manner, for example Matlab®/Simulink® or special cam plate modules. In addition, all high-level languages within the Visual Studio® software are available, and complex measurement tasks can be solved more simply with these than with the IEC 61131-3 languages.

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