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from Beckhoff Automation AG.
(left to right)



Users of drive technology are primarily looking for manufacturers to provide greater safety in their products and well-protected investment, according to participants in a discussion of drive technology with "Aktuelle Technik". This is no surprise, because the export proportion in this sector is extremely high. Economical service and continuity play a large role here.

Safety and protected investment

Radde: Where is the trend in drive technology leading? There are a few new system announcements, such as from Siemens with Simotion; Rockwell, Mitsubishi and others also have made announcements. Beckhoff are following the PC road. What do users actually want nowadays?

Knuchel: From the user's point of view, there are two trends in automation. The most important points for the future are:

1. Global functionality must be provided. In other words, we would really like an open system, so we can use this drive here, that bus there, and so on. This is incredibly important, because we have different markets (USA, Asia, Europe), and each has somewhat different needs. We don't want to keep developing things from scratch, but want to use the modules again and again.
2. Safety meeting Category 3 must without question become standard throughout the industry. We must offer drives that meet this requirement, both in terms of the controller as well as the drive itself. It's my personal opinion that the frequency converter is dead. Nowadays, a servo system costs about the same as a frequency controlled system but has much greater capability and better properties. A servo system also has the great advantages of the permanently excited motor: easier cooling, and greater torque. In highly dynamic situations, PC technology is of enormous advantage. We have programmed the movement as a 5th order polynomial. That cannot be done with a fixed system, or at least only with huge difficulty.

Radde: Does "open systems" mean that you want to be able to connect together modules from different suppliers even within a single application?

Knuchel: Without question we would like to be able to use a PC based system, such as is offered by Beckhoff. Under that I might want to have an Intermax

drive, but in the USA I might want to use an Allen Bradley drive. 90 % of our output goes to export. It is necessary to establish conventions. They are on the horizon, but they are not here yet.

Eggimann: It is also very important for the drive interface to be standardized, such as is done with SERCOS. The great advantage of the Beckhoff controller is that all the features of a drive, whether it's cam plates or geared couplings, are provided in software form on the PC, rather than in the drive. That's the only way to be compatible. Special drive features, such as those of Indramat and Allen Bradley, are not the same – that is firmware. We can define it by software – the drive does whatever the PC controller tells it to do.

Knuchel: This is just where we have a great advantage, such as for remote diagnosis. I can log into a normal PC-based system, where I can use simple remote diagnosis involving little overhead and fast response time, and I can check the full range of features. I can't do that if I have different systems, or if the intelligence is located in various sub-systems.

Radde: Do you mean diagnosis via internet or Intranet? Is it really necessary to change every single bit in the drive, or isn't that rather just something that it is nice to have?

Eggimann: Nowadays we can inspect and set every single bit in the drive over a standard modem. For example: The two master front axle transducers that are fixed to the press are checked every 2 ms to see that they have the same value. It is possible that as a result of a certain amount of play in the press, the comparison of the two press transducers reveals some difference. I might, therefore, have to increase the tolerance a bit. Nowadays we do that via modem. Or if the end user exchanges a drive, we load the drive data by modem. We have already done that.



“It is also very important for the drive interface to be standardized, such as is done with SERCOS.”

[Jürg Eggimann, TAS Engineering AG]



“We will continue to work consistently with Microsoft technology. .NET will now provide a big step forward.”

[Gerhard Meier, Beckhoff]

Knuchel: We do that practically every week all over the world, mostly in the USA and Mexico. Sometimes we have a second telephone line open, so that we can say when things are switched on or off. That, of course, is something that has a big effect on cost.

Radde: So you don't just use remote diagnosis for display, you control and program as well?

Eggimann: Even program changes that are made here are loaded onto the system by remote service and immediately tested with the customer. It is important for PC-based systems that the HMI (Human Machine Interface) has been integrated at the same time. This is not just a matter of fixing bugs, but of helping the customer, because the same remote diagnosis allows us to see his interface screen, and to support him over a second line. It is possible, for example, to correct mistaken operations, just as if we were standing in front of the machine.

Radde: In which parts of the open system are the suppliers still most failing you? What do you miss?

Knuchel: It's mainly the communication interfaces; either the display system itself, or from the controller to the display system, or from the controller to the drive. There are still big differences there, and these swallow a lot of the engineering time. Something still has to be done. The PC-based systems are, of course, best here, because they can use the standard communication tools that are available for the Microsoft environment in any part of the world. That has to be the way of the future. OPC communication, for instance, is a simplification for the display and visualization system. It is not really suitable for rapid processes, but at least it is possible to generate a standard so that data can be exchanged with a reasonable effort. In the case of drives, however, there is still a lot to do.

Meier: Some are even pulling out, sadly. There may be a world-wide SERCOS standard, but not everybody is sticking to it.

Knuchel: It works for those who are maintaining the SERCOS standard. It means we are able to exchange drives nowadays without having to make other modifications. It must be admitted, unfortunately, that it is the big manufacturers who are holding things up. We would like to use Allen Bradley drives, but that manufacturer uses the SERCOS protocol in accordance with their own standard. Layer 7 is still "crooked" there.

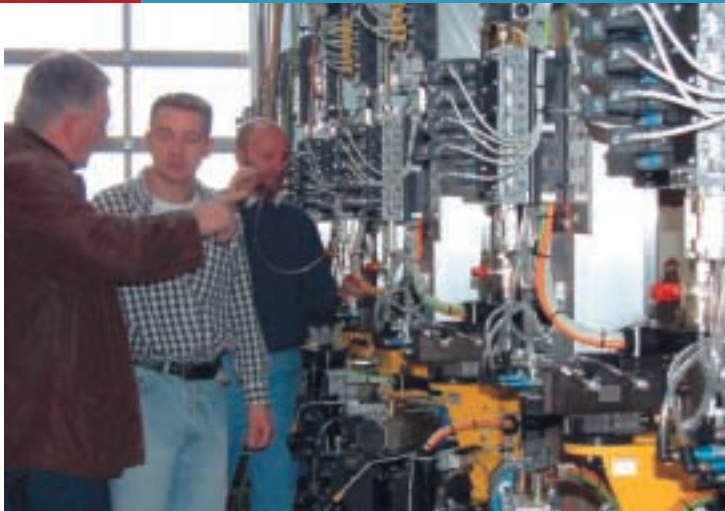
Eggimann: Nowadays we are also running the soft PLC on PCs from Allen Bradley, Beckhoff or Siemens, for instance, and it works with no problem. That is open control technology. It does not mean that you can only incorporate things from one manufacturer. I need to use what the customer wants, and what makes sense, and not the things that the manufacturer wants me to use.

Radde: What have Beckhoff got to offer for the future?

Meier: .NET will now provide a big step forward. The operating system makes full use of Internet technology. And the XML-based features will also find their way into control technology. An XML file can be used, for instance, to configure the system manager as early as the project planning stage, not just at the controller. The XML format also allows the documentation to be included immediately, without having to write the same thing again on a different system. The full connection to the visualization system is available. If I can say in the variable declaration that this variable is an OPC variable, then I don't have to declare the same variable again in a visualization section. The integration of .NET will give another powerful push forward. The second level on which we are active is that of small CE-based controllers, where we can extend the Bus Coupler/Controller through bus



“We would really like an open system, so we can use this drive here, that bus there.” [Martin Knuchel]



control. This means that we have local, distributed intelligence in the terminal sector too, for cases where that is valuable and the customer wants it.

Radde: We have touched on the topic of .NET – is that something that users are currently concerned with, or are you waiting for it to happen?

Knuchel: No, .NET is not yet a major concern – it has not even been standardized yet.

Meier: That will take until autumn. Three different worlds have to be brought together: The Vision Basic world and C++ are being brought together in the new C Sharp platform. There will be a single development tool, with which it will then be possible to program the entire Microsoft world, where three tools are needed at present.

Eggimann: We are occupied, peripherally, with the question of transferring Visual Basic applications to .NET. We are examining the consequences and the necessary new techniques. We have seen that with Visual Basic a great deal of what is already used in the office environment can be employed for user interfaces too. This may be databases, or the graphical interfaces, where we are also presently implementing solutions.

Radde: You are relying entirely on Microsoft. That almost sounds like a conspiracy!

Meier: We have been on the market now for over 10 years with PC-based controllers. The first soft PLCs were even based on DOS. We then converted to Windows NT, then to Windows NT Embedded, Windows 2000 and now XP. This has not given us any problems. Microsoft can offer this upwards compatibility. And that means that our investment is secure for a long time.

Eggimann: ... and then it is still possible to optimize, so the best can be leveraged out of the new computer platform. But basically we must port, and everything runs as it did on the old system. Here, of course, Microsoft carries a great deal of responsibility towards users, to guarantee this portability. Other operating systems, OS/2 for instance, have disappeared from the market, and the software must, to all intents and purposes, be thrown away.

Knuchel: I believe that basing ourselves on worldwide standards is the right way forward. It takes us further forward, provides simplification and increases the benefits. We Europeans are masters of new standards, but this time we must leave it to one side.

Radde: What is your opinion of Ethernet's continuity?

Eggimann: As far as PCs are concerned, this question has now been defused. Accessing the data from a sensor from somewhere else has long been a reality for Beckhoff. From any location I have access via Ethernet through the controller down to the sensor. This continuity is already available. This is unlike the situation, for instance, with Profinet, where gateways must be created. The PC does not need this, because it is itself the gateway.

Knuchel: Yes, and communication with nearby or supervisory installations is also straightforward if we can communicate using standards like Ethernet and TCP/IP.

Eggimann: So even if it isn't actually yet real-time capable, I still think this system has the best chance for the future. This will be made possible in the future.



Certification documents were presented to Beckhoff's system partners at go.automation (left to right): Jürg Eggimann and Egon Wassmer, both of TAS Engineering AG; Roland Jacquéroiz of ALRO Engineering SA; Gerhard Meier, General Manager of Beckhoff's Swiss subsidiary; Jörg Maurer and Guido Maurer, both of Kirchofer AG

"Nowadays we can inspect and set every single bit in the drive over a standard modem." [Jürg Eggimann]



Beckhoff at the go.automation.days 2002

At the beginning of September, Beckhoff Automation AG presented themselves at the go.automation.days, the International automation trade exhibition in Basel. The full range of automation components was presented to visitors on the large exhibition stand. Center stage, however, was taken by the CX1000 Embedded PC, Beckhoff's most recent development, a modular hardware platform for PLC and Motion Control applications. Gerhard Meier, general manager of Beckhoff's Swiss subsidiary, sees the trend moving towards consistent, scalable system solutions, capable of the necessary communication, and based on open architectures.

The exhibition also provided an opportunity for presentation of the certification document to the engineering companies TAS AG, ALRO SA and Kirchofer AG. This gave official recognition to the successful co-operation between Beckhoff Automation AG and their system partners.

through rising performance. Just four years ago we could not have imagined that we could operate 30 axes and cam plates by software in a 2 ms cycle.

Radde: What is at present your biggest technical problem with drives?

Knuchel: The most important points in the drives field are safe stopping and safe slow travel when setting up. This has to be secure – the problem must be solved. Every vertical axis is included in the position control, and somewhere it has a weight of 200 kg, and this can cause irreparable damage to humans. That is why we must achieve Safety Category 3.

Eggimann: It is true that this is nowadays specified in the standard, but there is hardly any drive manufacturer who has properly implemented it. Bosch have led the way, and Bosch-Rexroth are now following. Siemens are doing it by having the PLC and CNC parts monitor the safety part. That is also one way in which this safety category can be achieved. But it means that it is again necessary to get everything from the same manufacturer. That's why we favor safe technology in the drive – open systems.

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