

→ The PC-based control system from Beckhoff is also increasingly used for intelligent building automation. In a variety of projects, the company Herrmann GmbH is using Industrial PCs, Bus Terminals and the TwinCAT automation software.

Flexible building automation with the Beckhoff automation kit

For a number of years, the company, based in Plüderhausen, Germany, has been carrying out building automation and building management refurbishment work at the Allianz head office in Stuttgart. The refurbishment concept proposed by Herrmann envisaged to integrate the existing building automation system, which was based on older AEG technology, into the new system without interrupting the operation. A demanding task, considering that around 20,000 connected data points had to be processed. Beckhoff products are used in the refurbished areas; in parallel, some of the AEG technology remains in the Allianz building. The Beckhoff Bus Terminals used in the refurbished areas were initially networked via Profibus. Meanwhile, Ethernet is used for the continuously progressing refurbishment.

Case study: refurbishment of the building management system at the Allianz building in Stuttgart using high-tech automation tools

The Allianz project combines different technology worlds: Apart from the AEG world, solutions from Siemens and Beckhoff are interlinked via the building management system. The greatest challenge was the large number of binary data points, which all had to be integrated into the new hercon building management system from Herrmann. More than 20,000 data points were distributed across three buildings. The client specified that the existing building management network should be used. The initial aim of this refurbishment phase was the replacement of the building management system computer, with continued utilization of the existing substations. Technically, the existing network was a telephone wire network. For the refurbishment of the substations and for the data collection from existing equipment, Herrmann suggested to use Beckhoff Bus Terminals with Profibus interface. Via Profibus, data could be transmitted through this network with the lowest transmission rate of 187.5 kbit/s.

Allianz
head office in
Stuttgart



The first application of the Bus Terminals was data collection at a lift installation. Once this application had been commissioned successfully, local intelligence was used for the subsequent application. The intelligent BC3100 Bus Terminal Controller was used, which contains a mini-PLC for small PLC applications. The aim was the realization of a fail-safe solution. Associated with this solution was the "discovery" of the Beckhoff automation kit by the company Herrmann. "In this way we examined the wide variety of the Bus Terminals, the Industrial PCs, the TwinCAT software PLC, and the openness of the system including OPC, and we investigated how we could integrate these options into our solution strategy", said Gerhard Haag, project engineer at Herrmann.

Depending on the signal form, i.e. single or two-channel, the appropriate solution could be implemented with the Beckhoff terminal blocks like in a construction kit. This was one of the most important arguments for the use of Beckhoff products. The modularity and the associated cost advantages enables customers to move from existing, out of date technology to a new, modern technology with little expense. The refurbishment of the building management system is completed, but the Allianz project is still continuing. The older building management system substations are gradually being replaced with Bus Terminals. This work is likely to continue for several years. The original strategy had been to keep the existing equipment and to supplement it with Beckhoff products. The arrival of the intelligent Bus Terminal Controllers provided the opportunity to realize decentralized intelligent individual solutions. "The solution concepts now on offer could not be realized previously. The number of ideas has literally exploded", comments Michael Falkenstein, instrumentation and control specialist at Herrmann. The BC9000 stations are now used with Ethernet interface, and an Ethernet network for building automation has been implemented. Distributed intelligence enables the creation of redundant control solutions, for example for the control of the refrigeration technology that is essential for a data center.

The individual projects realized at Allianz up to now deal with the refrigeration system, heating and ventilation equipment, data collection, intelligent camera control, lighting control and the logging of energy use. From the Beckhoff automation kit, the elements Bus Coupler, Bus Terminal Controller, Bus Terminals and the TwinCAT software PLC are being used.



TwinCAT deals with floor control at ECB

In the center of Frankfurt, the company Herrmann undertook the building automation and building management work for the Eurotheum skyscraper, with 30 floors and a total height of 110 meters one of the architectural highlights of the financial center on the river Main. A hotel is located in the upper part of the building, while the lower part is occupied by the European Central Bank (ECB). One requirement was the option of a new utilization concept for the premises. Flexibility was a high priority. In concrete terms this means that the room configurations and the room sizes can be rearranged within a predefined period.

Originally, the rooms were to be arranged in a "biaxial grid", the so-called biaxial solution. However, the ECB required a single axis solution. Single axis solution means that every window arrangement can be used flexibly. Because of its international staff structure, ECB specified that it should be possible to create three individual offices and a conference room for a particular team within 24 hours.

Apart from flexible wall layout, this also requires particular flexibility in terms of building automation. While the infrastructure of the end points for HVAC control as well as the blinds, sensors and actuators and the control elements for the lighting remains unchanged, the building user must be able to vary the in-

Eurotheum, Frankfurt

With the switch from analog control engineering to digital technology, the significance of data communication in building automation increased, and the requirements became stricter.

teraction of these data points that are linked to the building management system. This is achieved through parameterization of the building management system.

According to the original utilization concept, all data points are connected via Interbus modules. These distributed data points are connected using Interbus technology and coupled with an interface card installed in an Industrial PC. Beckhoff computers are used as IPC stations. They are capable of integrating up to four Interbus interface cards. All data points within one office floor can thus be connected to a single computer. Bus Terminals were also used for connecting additional data points that were subsequently required due to the change in utilization.

Oliver Schaube, project manager at Herrmann, describes the building automation concept of the Eurotheum building as follows: "The solution is a perfect example of the use of open systems. The building systems were connected with the Industrial PCs via open I/O connection and bus technology. We are using a total of 40 Beckhoff C6130 Industrial PCs with 128 MB of RAM each, all running Windows NT4.0. Based on OPC, different makes were integrated into the building management system." The Industrial PCs with TwinCAT software PLC are all networked via Ethernet and linked to the central building management system.



Interview with Dipl.-Ing. Horst Herrmann, managing director of Herrmann GmbH

“We prefer open solutions”

Mr. Herrmann, how do you process projects, how did you come across Beckhoff products?

Herrmann: From our point of view, the necessity to provide services means service from start to finish. In case of faults, we must be able to respond quickly. In my opinion, hindrances such as third-party software, for which no license is available and which requires service staff from the software manufacturer, should be eliminated from building automation. The same applies for the complete infrastructure. The complete supply chain is therefore very important to us. Since we have been dealing with projects without relying on specific brands for some time now, and based on the premiss that building management will be based on our software, we look for open solutions, with which we can realize our projects. This is how we came across Beckhoff.

What strategy did you use previously?

Herrmann: We realized projects based on various product concepts, for example with Landis&Staeefa, Simatic S7 or Phoenix Contact. We now have had very positive experience with Beckhoff. For automation applications, we program Beckhoff products based on TwinCAT with structured text according to IEC 61131-3, i.e. we create reusable, open program blocks, particularly for building automation. The Beckhoff products opened up a very interesting, open perspective. Starting with the question how we could realize economically and technically attractive and reliable solutions based on our service concept and given the required hardware coupling, Beckhoff offered a very flexible platform, almost like a system construction kit. This enables us to work out structured solutions, without our services being affected by dependencies.

What is your experience so far with Beckhoff products?

Herrmann: The answer is two-fold. For the Eurotheum project in Frankfurt we are using approximately 40 Industrial PCs from Beckhoff, each containing Interbus coupling modules. In this case, the data is logged via the Interbus and transferred to the Industrial PC stations. The IPCs are connected with our hercon building management system via TwinCAT and OPC. For the Allianz project, in addition to the IPCs we also used Beckhoff Bus Terminals in the refurbished areas for connecting the data points. We found the products to be very reliable, very open and modular, from connection method to software coupling.

What concrete measures do you support in case of faults, what is your approach?

Herrmann: We recently had a malfunction that demonstrated the significance that automation now has, and what the important issues are. A device failed over the weekend. During the troubleshooting we realized how helpful it can be to have the option of manual control directly at the device, in addition to central building management. The intelligent Bus Terminal Controllers from Beckhoff enable such solution details.

Why did you decide to go for Beckhoff Bus Terminals?

Herrmann: With an HVAC plant you never know exactly how many I/O points are required. The more flexibly one can plan, the more precisely the cost frame can be defined, particularly with analog I/O connections. Every card that is not required reduces the cost frame. The Beckhoff Bus Terminals enable very detailed planning and also very fine amendments. Further advantages arise from the open connection method. Our software specialists got used to the TwinCAT software PLC very quickly. The process created no problems whatsoever.