ZUKUNFTSME

Building automation in the "Zukunftsmeile Fürstenallee" research and development cluster

Future-proof technology for the "Future Mile"

In the building project "Zukunftsmeile Fürstenallee" (Fürstenallee "Future Mile") in Paderborn, Germany, a research and development cluster is being created for regional mid-sized companies. In the nation-wide competition "365 Landmarks in the Land of Ideas," the project has already won a prize when the first building was completed in 2012. The automation technology implemented in the building complex in Paderborn is just as innovative and future-proof as the project idea itself. On the one hand, Beckhoff and system integrator HGI were able to create a system that can be flexibly adapted to the office users' needs and to do it inexpensively at the same time. In addition, it was possible to implement a concept that is very open and flexible by accommodating future requirements and extensions.

The initiative "Germany – Land of Ideas" has awarded prizes since 2006 to ideas and projects that make a lasting contribution to the future economic viability of Germany. The Zukunftsmeile (future mile) Fürstenallee, which is supported by industry and science in the region of East-Westphalia (Ostwestfalen-Lippe, OWL), was honored for creating a cluster focused on product and manufacturing innovation in the fields of mechanical engineering, vehicle construction and information technologies as well as for the interfaces between them. It began with the "Intelligent Technical Systems" complex focussing on mechatronics, software quality, virtual prototyping/simulation and system integration. According to the development plan, there is still room for four further buildings in the first stage.

Flexible, functional and inexpensive

On a floor area of approximately 5000 m², building 1 of the Future Mile offers 3200 m² of rentable area. It is currently used by the University of Paderborn for the special fields of software technology, database and information systems and swarm intelligence, as well as by the Software Quality Lab (s-lab), the Paderborn Institute for Advanced Studies (Pace), the Fraunhofer Mechatronic Design Technology project group, the excellence networks InnoZent OWL e.V. and OWL Maschinenbau e.V., MLAP GmbH (University of Applied Sciences) and the it's owl GmbH Cluster Management. The large number of tenants in itself suggests one of the three most important requirements on the building automation, as Simone Probst, Managing Director of Zukunftsmeile Fürstenallee Infrastruktur GmbH, explains: "The largest challenge was that the building services had to be adaptable to various types of users with very different needs. Therefore, a great deal of flexibility was required."

The second aspect that Simone Probst attached a great deal of importance to involved building services "that we can develop further ourselves." After all, during the bidding and construction phase no-one could have known what the future tenant community would be like. And the third key requirement concerned the cost-benefit aspect: "The building itself and the initial technical building equipment were financed with a total of 11.5 million euros from public funds and, therefore, it was open to bids from the entire EU. Therefore,

Ethernet-based building automation

The systems realized by Beckhoff in Building 1 of Zukunftsmeile Fürstenallee comprises numerous automation components – e.g. 31 Ethernet TCP/IP Bus Couplers, eight Ethernet switches and approx. 450 Bus Terminals – installed in over 35 control cabinets to provide the control for blinds and a total of 314 lights, among other things:

– TwinCAT: Automation software with Building Automation and DALI libraries
– CP6607: 5.7-inch built-in Control Panel
– CX1010: Embedded PC with Windows CE and TwinCAT PLC runtime
– Bus Terminals with Ethernet TCP/IP Bus Coupler
– CU2008: 8-port Ethernet switch

One of the most important requirements for the building automation to be used was high flexibility. For example, the system had to provide user-friendly control of over 300 lights.

Access to the building can be controlled centrally and conveniently via the Beckhoff Control Panel for door control.

Zukunftsmeile Fürstenallee Managing Director Simone Probst (on the right) is pleased with the smooth and productive cooperation with Elektro Beckhoff project manager Ingo Wagner.

Beckhoff Building Automation components are used in over 35 control cabinets such as the CX1010 Embedded PC with numerous I/O terminals.

The integral building automation from Beckhoff also encompasses HVAC systems.

the solution not only had to be functional, but also markedly inexpensive. Both requirements have been fulfilled in an outstanding manner."

A universal and easy-to-handle solution

Beckhoff components serve as a universal basis for building control across all systems. Ingo Wagner, Project Manager at the contracting installation company Elektro Beckhoff, explains: "On our side, we handled the complete electrical installation in the Zukunftsmeile Fürstenallee. This includes the control of the interior and exterior lighting via DALI interfaces, the connection of I&C technology and multimedia, the acquisition of energy data in the main distribution system as well as the control of blinds and the central locking system." Heger Gebäudeautomation Ingenieurgesellschaft (HGI), on the other hand, was responsible for heating, ventilation and air-conditioning technology, which was no problem to integrate, as Ingo Wagner continues: "HGI also uses Beckhoff components such as the Bus Terminal I/O system and a standard Ethernet network in its solutions. In this way the data required in one system can be seamlessly exchanged with the other systems." HGI departmental manager Burkhard Brüning adds: "Our network checks the entire energy flow in the building from energy generation to distribution and storage to the loads. Of course, no building can be competitive today without a powerful and reliable IP network. This is where our Building Automation 2.0 system comes into play; it integrates building automation and IT."

HGI implemented the HVAC systems as well as individual room control and energy monitoring. In addition, HGI had to allow for integration of ground source heat pumps into the overall design. The Ethernet-based communication technology provides the backbone for an integrated system enabling, for example, Thermokon room control units, various field devices from different manufacturers as well as a CP6901 12-inch touchscreen panel and CX9010 Embedded PCs from Beckhoff to seamlessly exchange data Specifically, the CX9010s are used in connection with KL6401 LON Bus Terminals for controlling primary systems, i.e. heating, ventilation and cooling, as well as for superordinate functions for room-control.

Especially for use in buildings, Ingo Wagner sees a particular benefit in the DALI lights: "Thanks to this advanced lighting system the building is adaptable to the changing needs of the tenants, i.e. the extension or division of rooms can be ac-

counted for by a simple program change. In this way, a single-room situation can be created from an open-plan area without great effort. Zukunftsmeile Fürstenallee facilities are thus innovative and sustainably equipped." In any case, the underlying automation technology should be hidden to the users' eye in the interests of convenient and simple building use: "Therefore the installation has a standard look and feel; that is, it was realised with what at first sight appear to be normal operating switches. The series and changeover switches we used are, of course, communication-capable, while to the user they seem to be simply switching on and off of the light. The same applies to the control technology which in this case is implemented using TwinCAT automation software." Simone Probst adds: "The room size of the offices, for example, is fairly standard in order to achieve a compromise that is acceptable to the various users. A certain degree of individualization is, however, possible in a simple manner. In the larger offices, for example, the light is directed towards the center of the room. If the tenant desires, however, it can also be directed towards the desk or the meeting area." A password-protected CP6607 5.7-inch Control Panel in the caretaker's room is used for this, and also to support remote VPN access and changed door-opening times when evening events are scheduled.

Practice-proven and future-proof

After a very short construction period of just one year, Simone Probst also draws a positive balance for the building use: "The automation technology has proven to be outstanding in daily use so far and has fulfilled all expectations with regard to functionality as well." In addition, all doors remain open for future changes, because thanks to the universal hardware architecture, the building services can be adapted and optimized by means of simple software extensions without great cost. For instance, the weather station already installed on the roof of the building could be integrated more deeply into the automation technology if need be or, where remote access is concerned, an alarm could be sent to the caretaker by SMS in case of a malfunction.

Further Information:
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