



TwinCAT
BA PLC
Libraries

TwinCAT
BA PLC
Templates

TwinCAT
BA Project
Builder

Beckhoff Building Automation

More efficiency, more comfort, more safety



Georg Schemmann is the Building Automation Business Manager at Beckhoff

Intelligent buildings naturally require intelligent building automation solutions. The integrated automation solution from Beckhoff uses system-spanning synergies to reduce hardware, software and operating costs. The integrated system is supplemented by a number of new components to be introduced at the 2014 Light + Building show in Frankfurt, Germany. Another highlight of the trade show will be efficient engineering with TwinCAT Building Automation. In the run-up to the trade show, the editor of Building & Automation spoke to Georg Schemmann, Business Manager at Beckhoff, about the future of building automation.

Buildings account for 41 % of the world's total energy use. Of that enormous figure, around 85 % is used for heating and cooling and 15 % for lighting. As energy resources become ever scarcer, the focus must be on optimizing energy efficiency in new buildings and on modernization projects for older buildings. In addition, demands for comfort and safety must continue to be satisfied. Examples of an intelligent building include: adaptable "color temperature" of the lighting, wind- and light-dependent control of shading systems, individually adaptable room automation, needs-based control of temperature and supply of fresh air. In medium-sized and large projects in particular, the focus is also on low investment and operating costs to provide a fast return on investment (ROI).

Synergies via integrated solution

These demands concern a variety of systems in the building and until now each system has brought along its own control and regulating system. The result: efficiency, safety and comfort were partly achieved; synergies, however, were not fully realized. "Despairing" technicians must also be considered: those who must deal with different programming environments and technologies. The expense for installation and maintenance is high and a patchwork of systems is inflexible when the building owner and tenants request changes.

Building automation can be implemented much better when a universal, coordinated control system is deployed for the automation of all technical building ser-

vices. The integrated building automation solution from Beckhoff thus achieves system-spanning synergy. The solution is by definition uncomplicated – no matter how complex the building is and no matter how many building systems need to be centrally controlled and synchronized. The software-based control system can be implemented inexpensively. The use of open standards enables many efficiencies, for example, commissioning via Internet. "The system integrator can assemble the control cabinet in their own workshop and no longer has to travel to the customer's premises for commissioning. Remote programming, parameterization and diagnostics via Internet drastically reduce the need for on-site commissioning," says Georg Schemmann.

The integrated system gathers all information from every device at all times and uses this information purposefully for optimizing efficiency. "Integrated building automation for us means that all systems in the building can be controlled and regulated by way of our overall system and the individual components," explains Georg Schemmann. "All building functions can be integrated 'from top to bottom,' regardless of whether sun protection, heating or lighting control is required, for example."

The possibilities for energy savings are particularly impressive: integrated building automation opens up energy-saving potential of up to 30 %, which creates impressive justification for the investment. Georg Schemmann is certain that



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“with system-spanning building automation, the idea of the ‘Green Building’ – of sustainable, energy-efficient building and living – is easily attainable. The acquisition of the operating data for heating, ventilation, air conditioning and lighting enables the appropriate regulation and control to ultimately save energy.” All energy efficiency classes can be fulfilled with the solutions. In addition, they are well-prepared for Smart Grid functions.

In the construction of new commercial properties, this perception has already led to the use of integrated building automation across the board. In the private sector, where large savings potential could similarly be found, there is still some catching-up to do as clients often don’t have the necessary budgets. Georg Schemmann is aware of the problem: “If you’re expecting an automated solution for the price of a low-tech, legacy installation, it is of course impossible. Automation creates added value toward the total cost of ownership, however, which is what we must help the customers better understand.”

Simple and efficient engineering lowers overall costs

Efficient engineering represents a key enabler for a fast ROI. In the case of complex projects, engineering makes up a significant portion of the total cost of the overall building system technology. This is where a particular strength of the complete solution from Beckhoff becomes apparent: the standards-based control that takes place via a central PC. The software and hardware are optimally matched to one another. All systems in the building are programmed or parameterized in accordance with IEC 61131-3 as established by PLCopen using TwinCAT as the automation software platform. “All code can be programmed in the same language and is available as function blocks in building libraries,” says the building automation specialist. Lifecycle costs are thus reduced, because the expense for maintenance is concentrated on one software platform. “TwinCAT Building Automation is optimized for modern, system-spanning building automation and enables efficient engineering,” he adds.

With the TwinCAT BA PLC libraries the system integrator has at their disposal the established and tested basic functions from the fields of control and signal processing as well as special mathematical functions, error message processing and general system functions. The TwinCAT BA PLC templates consist of ready-to-use TwinCAT program blocks for sensors and actuators, complete assemblies for system parts and complete systems for heating, air conditioning and ventilation. As opposed to a “regular” PLC library, TwinCAT BA PLC templates are imported as program blocks into the PLC programs. The integrator can carry out any necessary adaptations independently. All of this makes highly efficient and fast implementation of projects possible.

The universal structure of the TwinCAT project files forms the basis for simple maintenance. “The system identification feature assigns a name to each data point and each program block according to fixed rules,” explains Georg Schemmann. “The TwinCAT BA Project Builder defines the system components and

assigns them to the individual templates. The project files for TwinCAT PLC Control and the System Manager are generated for each controller from this information.”

Scalable performance and a large range of functions for BACnet

Apart from the open control philosophy that is typical of Beckhoff, particular importance was attached during the design of TwinCAT Building Automation to the transparent integration of BACnet in accordance with EN ISO 16484-5 ^[1]. Georg Schemmann: “We have integrated extensive functions for BACnet in TwinCAT.” He continues: “Since a great many data points must usually be acquired in the simplest possible manner in the BACnet system, we have tailored our libraries to suit that.” The latest version of BACnet (version 12) is supported.

Together with the corresponding hardware, a complete product line is available for BACnet which is characterized by its high scalability: from the compact ARM-based CX90xx controller, which supports up to a thousand data points, to the CX5020, on which several thousand data points can be centrally collected and processed. These devices are usable without restriction as BACnet Building Controllers (BBC). The DIN rail-mountable Embedded PCs from the CX series integrate an interface for the direct serial connection of the Bus Terminal I/O system. “The integration of BACnet into TwinCAT also enables the use of integrated automation from Beckhoff without having to use multiple automation platforms,” Georg Schemmann adds. This is particularly compelling for modernization projects: sustainability is one of the strengths of the Beckhoff portfolio.

Beyond the core functions for classic HVAC applications, TwinCAT Building Automation also includes room automation in accordance with VDI 3813 ^[2] for lighting, air conditioning and shading systems. The foundation has thus been created for the installation of systems that comply with the EN 15232 ^[3] standard for energy efficiency in buildings.

New components for integrated building automation

No two buildings are identical: it is therefore advantageous if a broadly diversified range of products is available for integrated building automation solutions so that all requirements can be met. The building blocks for intelligent building automation from Beckhoff include the Bus Terminal I/O system, scalable control technology with Industrial PCs and Embedded PCs, open communication systems as well as software-based control technology based on TwinCAT. Using the I/O modules from the Bus Terminal system, it is easy to integrate all essential sub-bus systems and protocols such as DALI for lighting, SMI for blind drives, MP-bus for regulating flap drives in ventilation systems, M-bus for energy data acquisition as well as LON, EIB/KNX and EnOcean. Expensive gateway solutions are not necessary. Connection to hotel management systems such as Fidelio as well as to Crestron media controllers is equally possible with Beckhoff automation solutions.

“Every user will find the device they are looking for in the Embedded PC range: tailored to budget, performance class and the complexity of the control task,” Georg Schemmann continues. Panel PCs are available in many different equipment variations for the combination of the controller and display into one device. The panels enable the user to operate the building automation interface more intuitively. The operating philosophy can be adapted easily to the habits of the building users – even if they are not technical specialists.

Controllers are mostly located inside terminal boxes and control cabinets. The control panel, conversely, is located in an easily accessible area for users. In order to overcome frequently long distances inside buildings, Beckhoff has come up with an innovative solution: “Using the ‘CP-Link 4’ system, distances of up to 100 m between the controller and control panel can be bridged with a single Category 6a cable,” says Georg Schemmann. “This enables access to the centrally located controller from remote points throughout even very large buildings.”

All components can be integrated seamlessly into the Beckhoff automation solution. “In highlighting a new technology at Light + Building 2014, we will present our Standard Motor Interface (SMI) Bus Terminals for blind control as an extension to our building automation system – in a 24 V indoor version and in a 230 V version for outdoor use,” Georg Schemmann continues. The KL6831 and KL6841 SMI master terminals, which connect the Bus Terminal system with the SMI bus, integrate light and shading solutions into the building automation platform. Each terminal can control up to 16 SMI-compliant drives for roller shutters and sun protection. The energy consumption for heating/cooling and lighting is reduced by intelligently controlling the blinds or roller shutters according to the position of the sun.

Published in Building & Automation 02/2014, VDE-Verlag, www.vde-verlag.de

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Further Information:

www.beckhoff.com/building