



Microsoft: Building Automation meets Event-IT

PC-based building control for The New World of Work

In its new subsidiary for North Rhine-Westphalia in Cologne, Germany's waterfront quarter, Microsoft is combining cutting-edge IT and media technology with state-of-the-art building functions to realize its vision of the office of the future. Microsoft's aim is to make communication and collaboration with its customers, partners and colleagues more efficient and more intuitive. The integration of Microsoft IT technologies into building automation was achieved using PC-based and Ethernet-based control technology from Beckhoff.

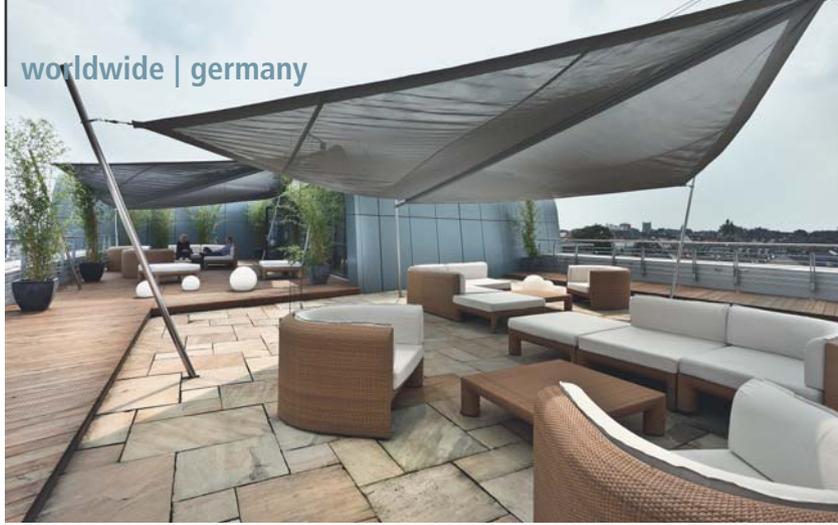
Supported by advanced IT technology, the world of work is undergoing radical change: new ways of working are evolving, which give employees greater freedom in terms of time and space and at the same time increase a company's productivity and innovative power. Today Microsoft is already making this vision of a "New World of Work" a reality in its Cologne, Germany subsidiary: The building is one of the most advanced office buildings in Europe. The IT infrastructure is based on Microsoft products such as "Unified Communications" technology, which make employees in every area of the building accessible, regardless of their individual terminals. The events level of the office building contains state-of-the-art conference rooms and offices in which Microsoft customers and visitors can experience the latest trends in software and hardware. The events

level also incorporates a state-of-the-art conference center, two lecture rooms, an equally spacious lounge with a bar, kitchen, catering area and rooftop terrace with an exclusive, panoramic view over the Rhine, Cologne Cathedral and the Old Town.

Superimposed operating functions

In order to integrate the IT and media technologies, the "Microsoft Technology Center" in Cologne was equipped with the most advanced building automation solutions from Beckhoff Automation. Accordingly, Elektro Beckhoff GmbH based in Verl was commissioned to plan and implement this integration. "The conference center is the first of its kind. Microsoft intends that it should serve as an example of just what can be





The awning on the roof terrace is raised and lowered at both ends by a servomotor.

View over Cologne's waterfront and water meadows

achieved in office buildings in terms of media and presentation technology now or in the very near future," says Beckhoff Building Automation Manager, Georg Schemmann.

All the functions of a modern building were integrated into a holistic building automation solution. These functions include control of the HVAC systems, the lighting, control of Venetian blinds and awnings, flexible lighting scenarios adapted to suit a particular occupancy, etc. Control of the rooms and areas is multifunctional. All the functions can be accessed interactively and on the Web via the central point of information (POI), using a touch screen or "Mobile Devices" connected by WiFi to the Microsoft Cologne subsidiary corporate network. Not only can preset functions be activated, but set values or lighting scenarios can

also be altered if necessary. This functionality is based on superimposing a building's IT systems on its automation technology. Alternatively, the individual rooms and areas can of course be operated conventionally via actuators and other operating devices as well.

POI – the information and control center

The first object the visitor encounters at the entrance to the events floor is a kiosk, the central "Point-Of-Information" (POI). "You can find kiosks like this in many modern office complexes nowadays," comments Georg Schemmann. Various items of information, e.g. TV news bulletins, current flight schedules at the Cologne/Bonn airport or traffic reports can be accessed easily via the touch screen. These services are transmitted to the

The display wall at the lounge entrance consists of 16 46" displays arranged as a continuous series.



The "Point-of-Information" kiosk as an information and control center



Touch panel with control options for accessing the room functions



Georg Schemmann and Frank Humann at the rear-projection wall of the Microsoft Technology Center

Executive Briefing Center (EBC) conference

POI via news channels. "You can operate and control the whole events level using these interfaces," according to Frank Humann, the project manager from Elektro Beckhoff.

Moreover, all the room functions, including the heating, air-conditioning and ventilation systems can also be accessed at the POI via sub-menus. Beckhoff Automation equipment was "mounted on top of" the existing basic installations. A Beckhoff PC controller was also superimposed over the existing building technology on the fourth floor of the building in order to implement additional functions. "Moreover, we incorporated even more functions," Frank Humann reports: "Energy efficiency is another important aspect in Microsoft's view. So that the current energy consumption can be displayed at all times, we have installed energy measuring terminals into the system."

Embedded PC controls the events floor

Shading by means of Venetian blinds is one of the standard fixtures in the building. Weather sensors located around the building record

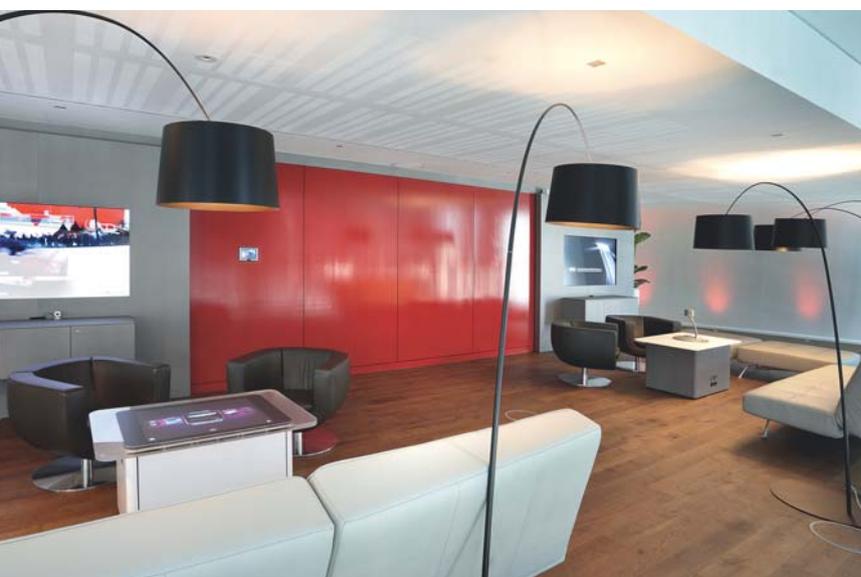
the temperature, precipitation, wind speed and brightness. The data are displayed via an RS485 interface and transmitted to the CX1010 Embedded PC from Beckhoff, which controls the entire building automation of the events floor. Data from the weather station sensors are integrated into the control of the Venetian blinds and HVAC systems which serve the whole building. Independently of this, Beckhoff building automation regulates and controls the indoor climate of the floors separately in terms of the individual areas or rooms. This is done via the volume flow regulator, which is in turn controlled by the CX1010 Embedded PC via MP Bus (Multi-Point Bus). Individual room control also makes it possible to regulate the volume flow according to the number of people occupying the conference rooms, for example. All of the room functions can also be controlled manually.

Moreover, it is possible to save certain preset scenarios which can then be retrieved or altered if necessary. Georg Schemmann observes: "Customers can go through the building and configure certain lighting scenarios themselves. They can do so either at an operating panel, via a light switch or the computer program because we have assigned certain values to a switch in our TwinCAT automation software via the 'Building Automation Framework'."

Connecting the IT worlds

Microsoft's Silverlight Technology is then integrated into the POI and used to operate the entire floor. This enables the user to navigate the floor plan and zoom in on individual areas.

The BK9000 Bus Couplers from Beckhoff which are integrated into the sub-distributions are connected via Ethernet TCP/IP to the CX1010 Embedded PC which acts as the master. The Bus Terminals are then connected to the Bus Couplers: for example, the lighting is operated by 230 V AC by means of DALI (Digital Addressable Lighting Interface) Bus Terminals with dimmer functionality. All the sensors, actuators or other signalling devices, are connected via the 24 V DC Bus Terminals. In addition, room operating devices are used which are coupled in series to the Bus Terminals via RS485.



The "Surface" touch screen computer is designed like a desktop. Everything is entered by one or more hands via multitouch on the 30-inch screen.

Superlative media technology



The absolute highlight of the events floor in the Microsoft subsidiary in Cologne is the wide range of media technologies available. Next to the "Point-Of-Information" kiosk at the entrance, which acts as an information and control center, is an impressive display wall comprising a continuous series of 16 46-inch LCD displays. All the current media content can be played back in 16:9 format on this large display wall.

Behind the display wall is the actual lounge landscape. The core of the fixtures and fittings are the Microsoft "Roundtable" video conferencing systems and Surface touch screen computers. The Round Table device with 360 degree camera has an all-round view, can focus on the speaker and films meetings. The contents of the "Surface" screen are filmed from above via a document camera integrated into the ceiling and projected onto one or both of the 65-inch plasma screens fixed to the wall.

Designed like a desktop, "Surface" comes without a mouse, keyboard or other conventional input devices. Everything is entered by one or more hands via multitouch on the 30-inch screen. This technology enables the computer to interact with either humans or other devices. Synchronizing "Surface" with other devices, e.g. mobile phones or digital cameras, is very straightforward. If these have WLAN, they must merely be placed on the screen. The touch screen computer will then recognize them and data can be exchanged, using drag and drop. The data are "dragged" into the devices by simple finger touch.

There are connections for Xbox, Media Center PC and various other multimedia devices in two media sideboards in the lounge. Signals from Xbox, a game console developed by Microsoft, can only be reproduced on the relevant plasma screen above the sideboard. Mounted above the two screens is an audio installation which

is controlled by a touch panel integrated into the wall. Since it is connected to the CX1010 Embedded PC from Beckhoff, this touch panel can also control the functions of the lounge area.

At the front of the Microsoft Technology Center (MTC) is a large rear-projection wall made of safety glass and with a screen measuring 201" (5.11 m) diagonal. The MTC projects images via three HD projectors, each with a brightness of 10,000 ANSI lumens. The envisioning process is carried out by a PC installed with the equipment in the rear-projection wall, which displays the contextualized background images created by the user in full-screen format. This PC is operated wirelessly from the MTC by means of a keyboard and mouse. A VGA laptop source can be inserted from either moderator desk as a picture in picture display. The positions are specified by the user.

The rear-projection wall is touch sensitive, i.e. the touch function is available optionally on either one of the two laptops. Alternatively, the touch function can be used for both the background and the two laptops at the same time. However, this assumes that the laptops can be connected to the installed PC via Remote Desktop.

All the websites for controlling the building are stored on a central C5102 19-inch Industrial PC from Beckhoff. Equipped with two network cards, the Industrial PC can connect to the Microsoft Corporate Network from which it gets its IP address. The second network card connects it to the Beckhoff network via Ethernet TCP/IP.

The WiFi interfaces are also connected to the Microsoft Corporate Network and transmit the room functions retrieved from the mobile operating devices (PDA or handheld). In turn the Microsoft Corporate Network transmits the function calls to the CX1010 via Beckhoff's Bus system. "Using a PDA or handheld device to operate room functions is becoming increasingly important," according to Georg Schemmann. "In the end it also makes sense to use devices that can do more than just make a phone call." The rooms can also be operated via "Windows Mobile Devices." The user interfaces are based on a Web application which can be operated with very different "Windows Mobile" devices.

approach via PLC program functions, the functions are selected and configured," explains Georg Schemmann. The Building Automation Framework simplifies building engineering and commissioning considerably. System integrators, building operators and users who have no programming skills themselves can implement new functions, change scenarios or assign different sensors and actuators easily by means of just a few clicks, following the motto of "Configuring instead of programming."

Microsoft Deutschland GmbH www.microsoft.com/germany
Beckhoff Building Automation www.beckhoff.com/building

Straightforward configuration of the room functions

The room functions were programmed with the aid of the "TwinCAT Building Automation Framework." "Instead of following the conventional