Integrated building automation at Hotel Grischa in Davos, Switzerland

Luxury in harmony with sustainability and energy efficiency

At the start of the 2011/2012 winter season the four-star Superior Hotel Grischa opened in the Swiss mountain resort of Davos. The hotel is highlighted with outstanding features in terms of its luxury interior, facilities and its environmentally-friendly design. On the one hand, Hotel Manager Maurice Parrée insisted on sustainability and energy efficiency during construction and operation of the hotel, on the other hand, the high comfort expectations of the international guests from a hotel of this category had to be met at the same time. The integrated building automation from Beckhoff, implemented by system partner simconex from Liechtenstein, played a crucial role in the realization of this demanding construction project.
Davos is renowned as an exclusive meeting place for international events and conferences and as a destination for high-alpine winter sports. Since new plots of land in the Alps region are quite hard to come by, the shells of two existing hotel buildings were used as a basis to build Hotel Grischa, which now offers 93 rooms and suites, five restaurants and several conference areas.

**Integrated control technology: from HVAC to room automation:**

The two parts of Hotel Grischa, which were linked as part of the project, each have their own heat generation, ventilation and climate control systems. The whole building automation system was implemented by simconex AG, based in Triesen, Liechtenstein. Markus Gimplinger, Manager of simconex, described the design: “We implemented a totally new building automation concept, in line with the requirements and expectations of the hotel management. The solution is based on Beckhoff building automation technology with its unsurpassed openness and flexibility, without which it would have been impossible to achieve the goals of the project.” simconex automated all building services, including HVAC, room automation and building management. A total of 19 Embedded PCs are used: 10 x CX9001, 5 x CX1010 and 4 x CX5010 units. Five CP6902 Beckhoff Control Panels deal with visualization of the processes in the control cabinets and control centers. An additional CP6607 Ethernet Panel control unit is located on the ground floor.

The building automation solution realized at Hotel Grischa includes around 3,000 physical and 4,600 virtual data points. The network linking all parts of the building is based on Ethernet TCP/IP. Different fieldbus systems are used in the subsidiary building services systems.

The integrated application of Beckhoff automation technology at Hotel Grischa to control all building services and for room automation naturally required adaptation of the system to the respective standards of each building service. The heat-generating systems are directly connected to the CX9001 and CX5010 Embedded PCs via Bus Terminals. For ventilation purposes actuators and flap drives from Belimo, which are controlled via the MP-Bus protocol, were installed in virtually all building zones. When used as an MP-Bus master terminal, the KL6771 Bus Terminal from Beckhoff can accommodate up to 16 field devices: eight drives and eight sensors.

All fans are controlled via frequency converters, which are directly connected to the Beckhoff Embedded PCs via analog outputs (0 – 10 VDC). All control processes (set value and actual speed values) are computed on the controllers. “This control technology enables us to integrate all aspects of building services even at a later date should special requirements emerge in the future,” said Markus Gimplinger.

Other important components of the HVAC systems at Hotel Grischa are the measuring points for electricity, water and electrical energy consumption. Although an energy management system has not yet been implemented, Markus Gimplinger points out that this is quite likely to happen in the future. After all, Hotel Grischa has a 266 m² solar system, a heat pump and a heat recovery system, which together cover 50 to 60% of the total heat demand. The measuring points for consumption data metering are also connected to the Bus Terminal I/O via M-Bus. The data of the main electricity meter are read by the building management system via the Modbus TCP/IP bus system.

**Central temperature and lighting control**

At first glance the room automation in the hotel rooms seems rather modest. In addition to IT systems, guests have the usual options for switching lights on and off, although there is no operating panel for individual room control.

In the reception area of Hotel Grischa a large “light sculpture,” consisting of 1,400 Murano glass pendants, provides a unique ambience. The two-by-seven meter light sculpture is controlled via an EL6851 the DMX terminal from Beckhoff, which enables dynamic play of light and colors.
The philosophy at Hotel Grischa is that individual room temperatures should be controlled centrally via the reception. All rooms have room temperature sensors, underfloor heating and ventilation facilities, which can all be controlled individually via the central control system. The shading devices are also controlled locally, based on the data from the weather sensors installed on the main building.

A different automation concept was implemented for the suite. Here, EIB/KNX control units for individual room control are used, with the option of calling up different lighting scenarios. The suite has its own control cabinet, located in a side panel in the foyer.

**Customizable room control for flexible room configurations**

In the conference rooms and restaurants, which can be combined to form larger units as required, the lighting is controlled via EIB/KNX room control units and DALI technology. Markus Gimplinger explained that the customizable room configuration enables Hotel Grischa to act as a venue for a wide range of meetings and conferences of different sizes. “Here too, the special features are in the details: For example, the locations of the removable walls are visualized on the touch panel. By tapping with a finger, partitions can be marked as open or closed so that the individual room control can be adapted to the respective spatial situation,” said Markus Gimplinger.

DMX technology is not only used for an impressive “light sculpture” in the reception area of the hotel, but also for controlling the lighting in all elevators. The EL6851 DMX terminal enables dynamic play of light and colors.

**Expandable control system is ready for the future**

The central control system runs on a conventional PC and covers all system configurations for the whole building automation concept. Only a few people have access to the password-protected system. “All staff can view the system visualization, but changes can only be implemented with permission,” said Markus Gimplinger.

All control tasks can be visualized and initialized via the control system. Via lists, all doors, rooms and lighting installations can be called up for the purpose of individual room control. It goes without saying that the heating and ventilation systems are also fully visualized. “At the system screens the operator can visualize the respective control task,” said Markus Gimplinger. “For example, status messages with different colors indicate the state of the different components when the lighting zones are viewed.”

The developer — Goodfast BV Davos — and the hotel management are very satisfied with the results. Manager and President of the board of directors, Maurice Parrée and Markus Gimplinger, Manager of simconex, are aware that the building automation “wish list” remains open, so that additional measures can be realized in the future.
The four-star Hotel Grischa was built using the shells of two existing hotel buildings as a basis. The two buildings “Caprice” and “Terminus” are linked by a new wing.