



Retrofit Improves Energy Efficiency and School Learning Environment



Allgemeine Gewerbeschule (www.agsbs.ch) is a vocational school and training center in the Swiss city of Basel. AGS has 250 teachers providing basic vocational training and advanced education for almost 4,000 apprentices across 50 different professions. During a comprehensive renovation of the exterior building facades throughout the seven-block campus, designed in the 1950s by the Basel architect Hermann Baur and listed as a historic complex, the interior underwent renovation for energy efficiency.

The goal for updating the campus technically was to provide a modern learning and working environment for the apprentices and teachers, respectively, while satisfying the high expectations of the city of Basel regarding energy efficiency, sustainability and comfort.

The Challenge

The city of Basel, owner of the buildings, stipulated that renovations not interfere with the day-to-

day operations of the school, generate noise pollution or other disturbances for the surrounding community.

The city also established the following objectives for the project:

- realization of energy efficiency to meet both economic and environmental requirements
- minimization of the investment required
- reduction of physical alterations compared to conventional installations
- creation of a modern and comfortable learning environment
- increase in the level of security provided for each building
- high availability for dependable operation
- flexibility to accommodate potential future requirements

To satisfy the demanding objectives, meet the aggressive schedule and honor the historical integrity of the buildings, the city of Basel contracted with Swiss integrator Selmoni Ingenieur AG (www.selmoni.ch). Selmoni's department of building management systems is technically well-equipped and has extensive experience within the field of building automation. Selmoni's staff is certified by LonMark International and the company is a TAC Silver Partner. All members of the project team are educated in electrical engineering and have detailed knowledge of HVAC systems.

The Solution

The implementation process was divided into two phases in order to minimize interference with ongoing teaching activities. The tight schedule needed to fully satisfy requirements for minimizing investment costs and physical alterations, while achieving the highest quality standards. Over 300 classrooms were to be equipped with extensive individual room controls for heating, lighting and blinds to create a comfortable learning environment.

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Exterior doors and windows were also to receive access controls and alarms to create a safe learning environment. From the very beginning, the system was planned to support future changes over time, making adjustments easy, fast and cost-effective.

Each room was assigned a schedule to be stored in the TAC Xenta Controllers from Schneider Electric. The timetables establish the room's status for three scenarios: normal operating state, stand-by mode and energy-saving mode. In each scenario, all conditions within the rooms are regulated automatically according to external conditions. A user-friendly interface enables the operator to create and modify the individual timetables, as well as the environmental and security controls for single rooms or groups of rooms. There is also an "override" option for each room to manually control any function from a central location. The effect of this approach is to create an ideal learning environment, while simultaneously reducing energy consumption.

In order to minimize the installation effort and costs, all buttons, window contacts, modules for monitoring the operating hours and room temperature sensors are connected to the LON network via wireless EnOcean receivers. In addition to EnOcean and Schneider Electric, other elements of the solution came from Funkstuhl, Infranet Partners, Loytec, Newron Systems, Svea BCS and Themokon.

The security package utilizes the stored timetables to protect the building from unauthorized access. During regular class hours, the entrance doors are released for general access. Outside of these times, the buildings can only be entered by the teaching staff. In addition, the system monitors whether certain doors are open for an unusually long period of time, or if windows remain open at the end of the day or when no class is currently scheduled.

The high degree of availability by the solution is critical for the security applications. The decentralized structure and constant segmentation of the LON network assure the highest degree of protection. Commands and scheduled programs are stored in their respective TAC Xenta Controllers; the actuators themselves contain the logic required to perform their intended functions. Special programs and interfaces were designed for the on-site operator to ensure a straightforward, self-explanatory usability.

The wide range of monitoring functions (2,300 values total) are available for viewing in real-time or as archived records for each room. Critical conditions, such

as an open window or door, are visible at-a-glance in the online console. Alarm messages are issued automatically, as determined by the operator. With the touch of a button, a detailed report of historical trends can be produced for any room or all rooms. The system even registers the operating hours of every fluorescent light and generates maintenance instructions to prevent unplanned outages.

The Results

As intended, the system has enabled AGS to reduce energy consumption by 15 percent, while maintaining a comfortable and secure learning environment.

The faculty and students alike at Allgemeine Gewerbeschule Basel now benefit greatly from a modern learning environment, which meets all of the desired objectives pertaining to energy efficiency, high availability, historical integrity and flexibility for the future. By minimizing investment costs and ongoing operational expenditures, AGS now complies with both the economic requirements and high environmental standards established by the city of Basel.

The project also fully compliant with established guidelines and is awaiting certification from MINERGIE® (www.minergie.com), a Swiss non-profit organization promoting sustainability in new and refurbished buildings. MINERGIE buildings provide comfort, good health and inexpensive operation—be it in the office, in school or at home.

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