

Intelligent in-house service

Hotel guests can now enjoy increased comfort with fewer energy requirements thanks to ABB's i-bus® KNX building control system

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Whether through experience or stories related by friends and family, how many of us have spent time trying to adjust air-conditioning systems in hotels to avoid fridge-like temperatures, or were defeated by lighting, shutters or blinds that seemed to have a mind of their own! While guests were fighting their own battles, many hotels had to deal with high energy costs.

Thanks to ABB's i-bus KNX intelligent installation system, hotel guests can now enjoy even greater comfort with minimum effort. While comfort is enhanced, these "intelligent" hotels are benefitting significantly from reduced energy requirements and improved efficiency, which directly translate into increased savings.



Sustainable results

For many travelers, hotels have almost become a home away from home. As in their homes, guests want to feel safe and comfortable, and hotels have always strived to provide such an environment. However, in many cases this has proved costly and inefficient in terms of energy usage.

In recent years, innovative solutions and products allowing various home electrical systems to be flexibly connected and easily – but intelligently – controlled via the existing electrical network have started to appear on the market. Functions provided by such a system allow atmospheric lighting, heating and ventilation, the monitoring of windows and doors, and shutters and blinds to be controlled. One such system, the i-bus® KNX intelligent building control system from Busch-Jaeger, an ABB company, allows multiple electrical devices to interact wherever and whenever the user requires [1]. As well as its application in residential buildings, ABB's i-bus KNX control system is now widely used in public buildings, such as museums, airports, office buildings and hotels.

The i-bus KNX intelligent installation system is based on the proven KNX technology, which is now accepted as the world's first open standard, ISO/IEC14543, for device control in industrial, commercial or residential buildings. In July 2007, the KNX standard was accepted as the Chinese National Standard, GB/Z 20965-2007, which is titled "The control network home and building electronic system (HBES) technical standard."

The use of the i-bus intelligent control systems in top grade hotels has not only improved the quality of the service in terms of comfort and convenience, but the all-important energy-saving goal has been realized through the automatic and intelligent control of lighting, curtains and blinds, the air-conditioning system and TV.

Welcome to another world

Intelligent service using ABB's i-bus system begins the moment a guest enters the hotel. In the lobby and public area, the air conditioning and lighting are automatically controlled to pro-

vide the required illumination and temperature. Using natural light as a reference, a brightness sensor determines if, and to what level, lights should be turned on to maintain a constant illumination. Illumination and temperature settings vary throughout the day. The curtains in the lobby are also controlled using a light sensor.

The i-bus control system adjusts itself to match the varying flow of people in public areas during the day. Motion detectors control the amount of lighting provided depending on the amount of activity they register. During busy periods, most or all of the lights are switched on and the air conditioning is optimally set. As the flow of people decreases, part of the lighting and air conditioning is switched off. And at night when activity is most probably at its lowest rate, the lighting and air conditioning are controlled only by the motion detector to keep energy consumption low.

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Intelligent rooms

Once the hotel guest inserts a special card into the slot provided in the room, the ABB i-bus system sets the lighting to welcome mode and the air conditioning system to comfort mode (ie, 23°C in summer and 28°C in winter). Dimming the reading lamp, adjusting the electric curtain and other operations can be carried out by the guest from the comfort of their bed [1].

The air conditioning system is automatically controlled via an i-bus thermostat. To maintain the required temperature setting, the wind speed automatically switches from high to low before finally stopping. Air conditioning control is interlocked with the

opening and closing of doors and windows, and so when a window or balcony door is open, the air conditioner turns off automatically.

Before going to sleep, the guest can turn off all lights via a switch located over the night table, and the air conditioning system will then automatically switch to night mode [2]. A night-activity mode button turns on a night light and a light in the bathroom if required. After the card has been removed from its slot as the guest leaves the room, all lights are turned off and the air conditioner is automatically switched to vacant mode (ie, 30°C in summer and 18°C in winter).

Improved housekeeping

The ABB i-bus system has also helped to increase housekeeping efficiency. All information concerning room vacancies and service or emergency calls is displayed on a computer in the housekeeping department. This information is gathered using switch sensors in a guest room, which transmit various instructions over the i-bus system to the housekeeping computer. Device control in each room is interlocked with the housekeeping computers at the reception desk. This allows the lighting and air conditioning in the room to be automatically turned on once a guest has checked in and turned off immediately following check out. In this way energy is saved without inconveniencing the guest.

Outside lighting effects

Depending on what is on, lighting control in scenic areas and in the parking lot is achieved using a combination of integral, division and individual control. In general integral control is implemented in most scenic areas and in the parking lot. This means a timer controls when the lights are turned on and off, while light intensity is sensor controlled. In spring, a timer is also used for irrigation, and is set according to climatic and soil conditions. During festivals or large events, the lights in all scenic and garden areas are controlled via the computer in the central control room. In the parking lot, the lighting in different sections can be individually controlled via a panel in the control

- 1 Operations such as adjusting the electric curtain can be carried out from the comfort of the bed.



room. In addition, ventilation fans can be turned on and off at set times.

Top-quality service in Beijing

The Changbaishan International Hotel in Beijing is located close to the Olympic stadium (ie, Bird's Nest) and swimming pool (ie, Water Cube), and is situated in the center of the Olympic business zone. This five-star luxury hotel uses ABB's i-bus intelligent system to control lighting and air conditioning in its 220 luxury guest rooms, lobby, multifunction hall, business center, gymnasium, hallway and other public areas.

The conventional switches¹⁾ in each guest room are user-friendly, and extra low-voltage wire is used to connect them directly to the i-bus system. Intelligent control, which is easily realized, achieves comfortable and convenient reading, rest and TV modes. By pressing a particular switch over the night table, guests initiate the service-call function. The relevant signal is displayed on a display outside the room door, as well as on computers in the floor service room and housekeeping department, thus minimizing the service response time.

There are three different visualization interfaces: one each for the reception, and the maintenance and housekeeping departments. In addition to the basic functions, an automation function, which is connected to the hotel management system, enables the room to be managed and prepared efficiently. For instance, when a guest checks out, the room is automatically

- 2 All lights can be turned off via a switch located over the night table. The air-conditioning system will then automatically switch to night mode.



set to stand-by mode. At all times the status of each individual room in terms of temperature, occupancy, service calls, curtains, lighting, etc is graphically displayed at the operation desk.

Remarkable savings

ABB's i-bus intelligent control system doesn't just improve the already high level of service offered in many hotels, it also allows them to achieve significant energy savings.

Operational efficiency can be increased by both regular maintenance and system optimization. When it comes to saving energy in a central air-conditioning system, decreasing consumption in components such as the chiller, water pump and room electrical devices (eg, the fan coil unit) helps meet the energy-saving goal.

Through proper control of the electrical devices in a room²⁾, the energy consumed and the total load on the air conditioning system are greatly reduced. In turn, the energy consumed by the cooling water units, the three-speed fans or boilers is minimized. To be more specific, a one degree increase in summer or a one degree decrease in winter in a typical room temperature setting results in a 6 percent reduction in energy consumption by an integral air-conditioning system [2]. In other words, the automatic adjustment of room temperature settings via an intelligent thermostat achieves the all-important energy saving goal.

The annual energy consumption bill in Beijing's Changbaishan Internation-

al Hotel before ABB's i-bus intelligent control system was installed was around \$702,000. Now the hotel estimates it can reduce the cost of running the central air-conditioning system per year by an average of \$84,200! This figure is calculated on the basis that over a 24-hour period, the 220 rooms will operate for eight hours in energy-saving mode, another eight in night mode and the remainder in normal mode.

It cost \$322,000 to install the system in Beijing's Changbaishan International Hotel. With annual savings estimated at \$84,200, the calculated payback time of the system works out at less than four years. Most definitely money well spent.

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References

- [1] Doerstal, B. Value-added comfort: Intelligent electrical installation technology makes living safer, life easier and the use of energy more efficient. *ABB Review* 2/2008, 10-14.
- [2] Bin, Y., Baoyi, G., Xiaoping, M. (1999). Optimization of indoor design parameters of comfort air conditioning. *Heating and ventilation air conditioning*, 29 (1), 44-45.

Footnotes

- ¹⁾ The style and color of the switches are in harmony with their installation environment.
- ²⁾ This can be achieved by switching to the "off" or "energy saving" mode when the room is vacant, to the "energy saving" mode when the guest is out, and to "night" mode when the guest is sleeping.