Fast forward for building automation

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Large switchboards and extensive cabling, high costs for planning and engineering, and time-consuming commissioning, are characteristic of the conventional switchboard approach to HVAC plant automation. Until now, long cables have been needed to interconnect all the different items of plant equipment. ABB Building Automation now offers an alternative – decentralized Energy Bus technology. The benefits of this new technology, especially the speed with which it can be installed and commissioned, were evident during the recent renovation of the Postbank building in Hamburg, Germany.

The Postbank complex in Hamburg is situated in the historic center of the city and consists of five buildings. A renovation program that has recently been completed has turned four of the buildings into a hotel. The fifth building, which previously was used for offices and storage, houses the Postbank's new, modern cashier hall. This is situated on the ground floor of the building, which has seven floors plus a car park in the basement.

The Energy Bus saves time and money

As part of the renovation scheme, a new ventilation plant has been installed to improve conditions for the staff and customers in the cashier hall. The related DDC (Direct Digital Control) system is also responsible for monitoring the power consumption.

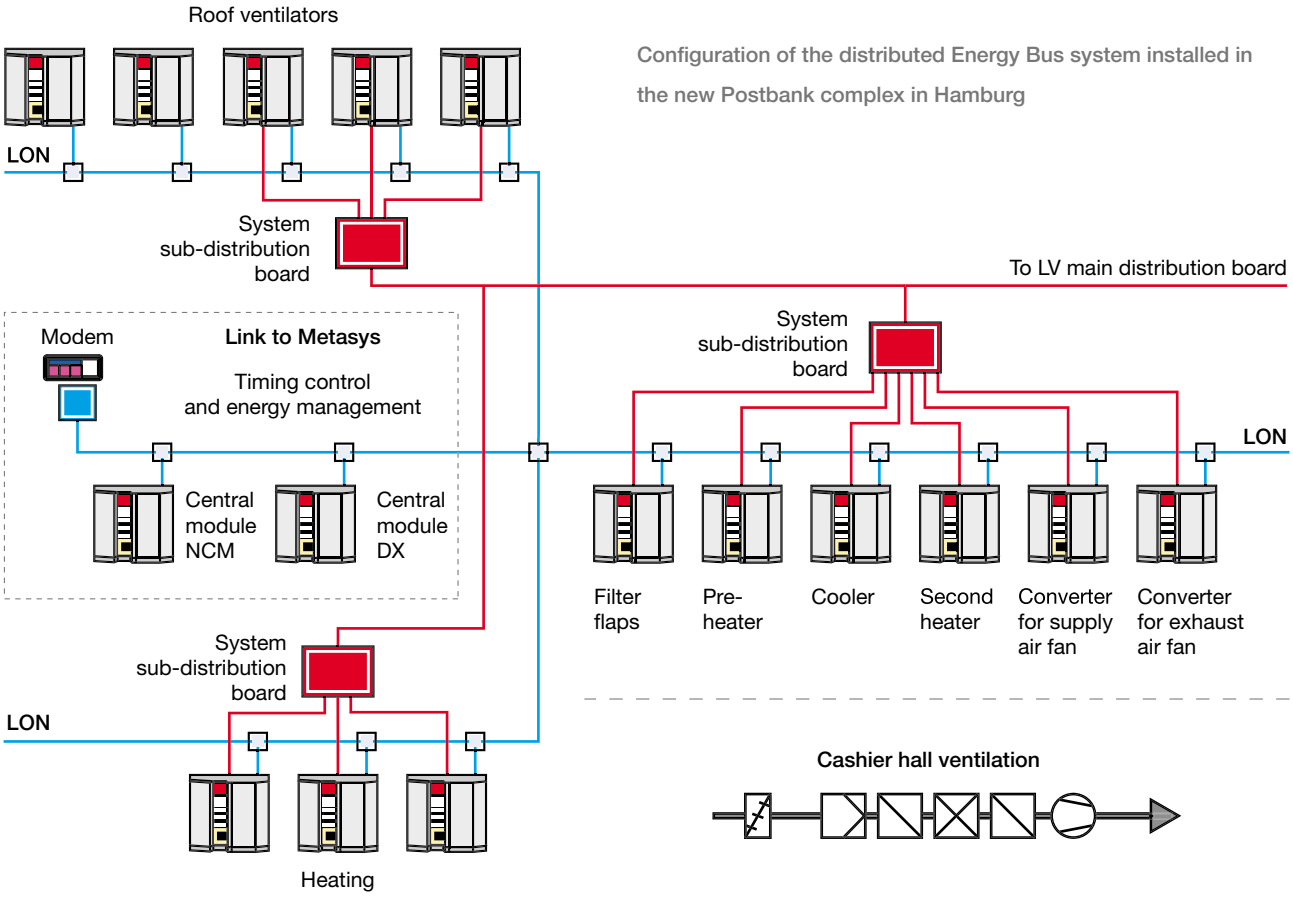
What made this project so exceptional was the time factor: counting from the time the contract was awarded, just six weeks were available to complete it.

Such an undertaking would have been almost unthinkable with conventional switchboard technology. However, with the decentralized Energy Bus technology, the normally time-consuming engineering of switchboards is reduced to a minimum. A single power cable, arranged in a ring circuit, feeds the electrical energy directly to the ventilation plant components. The ACM (Areadat Control Module) modules at each of these locations accommodate the power components for the drives and motors in the same compact housing as the controller building blocks. Also incorporated is the motor protection, which includes the devices for measuring the phase current and power factor. Thus, the decentralized Energy Bus technology cuts cabling costs drastically. The advantages can be summed up as follows:

- Less space is required.
- 70% less power cabling is needed.
- The risk of fire is reduced.
- A simple, clearly structured layout is defined for the final automation system.

The factory-tested modules are available in four variants – for flaps, heaters/coolers, humidifiers or ventilators – allowing a wide range of applications. Every ACM contains three microprocessors, each of

70% less cabling and a lower risk of fire are among the main advantages of the installed system.



Configuration of the distributed Energy Bus system installed in the new Postbank complex in Hamburg

which controls the other two. With the help of a 'live list' of all connected information nodes, the presence and functionality of all the other devices on the bus is continuously monitored. Should a fault occur on the line, eg a CPU or a module has stopped reporting in, the plant concerned switches itself to a predefined, safe operating state.

Short commissioning time

The potential risk of error during installation or in the software is radically reduced with decentralized Energy Bus technology. As there is no need for programming, the faults associated with this task are avoided. The modules can be set up for different equipment configurations by making just a small number of parameter changes. At the present time, the databus cable runs parallel to the Energy Bus cable, but it is planned to integrate both buses in one cable in the future, which will further reduce the installation costs.

Behind the Energy Bus technology lies a universal building management concept which subdivides all the relevant hydraulics of the plant into logical sections. Instead of a bulky one-off monolith with switchboards and extensive cabling, discrete ACM modules can be individually mounted and combined as the application requires.

Service is made easier

The ACM modules can be placed close to the sensors and actuators, enabling plant faults to be easily located and then cleared quickly. Because of the decentralized arrangement, an ACM module can be exchanged in its entirety while its neighbors continue to control the plant. In the event of equipment breakdown the plant can be returned to operation after only a short downtime.

Other advantages are the high level of hardware standardization and the parameter-controlled specialization of each unit, plus the choice of five basic types, all of which go to make stock-keeping of spare parts more efficient.

"The biggest cost factor in building automation today is still the conventional switchboard technology, since it entails costly installation and cabling work."

A central module takes on the generic tasks of timing control and energy management for one or more plants, and also provides the link to the building management control station. Data communication is carried out via LON interfaces in accordance with the LONMARK standard. This open interface also allows the Energy Bus system to be combined with various building management systems. Short delivery times are ensured by the standardized fabrication of Energy Bus modules, which can be ordered project-by-project.

Safe communication via LON interfaces

Whereas the previous DDC system controlled all five buildings of the complex, the building in which the new cashier hall is located will now be controlled autonomously. Also, the new ventilation and air-conditioning plants (HVAC) and the existing HVAC equipment (this includes the battery and static and dynamic heating systems) will be controlled by the existing management system, Metasys from JCI, located in the main control room of the Postbank. The new equipment consists of the mentioned HVAC plant and the dynamic heating in the cashier hall, the outgoing air ventilator in the transformer room, and the chiller. Although all data from the new plant will be displayed at the building management level, only fault messages from the existing plants will be transferred to here (via modem).

The automation hardware for the cashier hall consists of seven ACM modules, with another three modules provided for the boiler room. Additional data from the older, existing HVAC plant are transmitted via ACM modules to the system. The bus and the ACM modules are mounted directly on this plant. With the new Energy Bus technology every control function can be performed directly on the plant itself or, invisibly, from inside it. Further bus sections or modules can be connected at any time, eg if the plant has to be extended. Plans are in the making to also equip the four buildings that form the new hotel with Energy Bus technology.

This new, decentralized technology will soon outpace the conventional switchboard approach, particularly for projects where time is of the essence. The advantages of the Energy Bus are the simple and fast way in which it can be handled, the smaller demand it makes on valuable space, its safety and its economy.

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"Energy Bus technology pushes building automation to the forefront during the planning of complexes such as the Postbank in Hamburg."

Energy Bus technology can also be retrofitted on existing HVAC plant.