

Case note

School cuts energy costs using ABB standard drives for HVAC



ABB standard drives for HVAC reduced electricity consumption at Konala Comprehensive School by 14% during the first 10 months of operation while the heating used fell by 16%. Left to right: ABB's Simo Niskanen, Petri Peltonen from Airwecare, and City of Helsinki Public Works Department's Timo Posa, energy saving specialist and Pasi Moisio, automation engineer.

Finland's City of Helsinki Public Works Department (PWD) Construction Management was concerned about wasting energy in its schools. One of these was Konala Comprehensive School, where the gymnasium was considered a high energy consumer.

The heating, ventilation and air conditioning (HVAC) system was designed to cope with the maximum capacity of 400 people. Lack of control meant that the HVAC system was running at over 4,500 hours a year at full speed, even though most days saw only 30 people using the gym at one time.

Furthermore, the ventilation within the changing rooms was operating continuously, whether or not there was excess moisture.

Energy audit - basis for the improvement plan

Helsinki PWD launched a pilot project and asked specialist HVAC company and distributor of ABB drives, Airwecare Oy, to investigate energy use at the school and to come up with a solution to improve both efficiency and the school environment.

Airwecare carried out an energy audit and found that the annual electricity consumption for the gym ventilation fans alone was 34,200 kWh, 20% of the total electricity consumption for the school. Also, 117 MWh of heating energy was released to the outside air through the ventilation system every year, equivalent to 26% of the entire school's heating energy consumption. These high energy consumption figures were due to using the fans at full or constant speed.

Other problems identified included a poor fan efficiency of 20% and the fact that the return fan was blowing into the noise reduction chamber, disturbing the free flow of air.

Substantial savings, improved ventilation

The Airwecare solution uses ABB standard drives for HVAC, controlling new high efficiency Eff1 ABB motors, which in turn drive the supply and return fans.

The supply fan responds to the CO₂ reading in the gym hall and to the moisture levels from the shower. The return fan follows the speed of the supply fan, causing a small negative pressure in the building and giving a free flow of air through it. Running hours are set using the real time clock feature of the ABB standard drive for HVAC.

The air duct of the return fan was also fixed to cure the troublesome air turbulence, which was reducing the air flow. This also improved the performance of the other return fans. In addition, the fans are driven directly by the motor, with the result that the noise levels are significantly reduced compared to traditional belt-driven fans.

Following the installation, electricity consumption for the first 10 months of 2007 for the entire school fell by 14%, while the heating used fell by 16%.

Mr. Timo Posa, energy saving specialist at Helsinki PWD, points out that there are some 150 schools within Helsinki that face a similar situation. "We are very pleased with this project. It was executed within the agreed time without causing any disturbance to the school's normal activities.

"In addition, we could save 220,000 Euros by targeting only the 50 highest energy consuming schools."



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Solved problem

- Uncontrolled HVAC system in the gym was operating continually at full power whatever the level of occupancy
- The ventilation within the changing rooms was operating continuously, with no regard for moisture levels
- Even when visitors use the facilities outside normal school hours, the gym and changing rooms remain moisture free

Solution

- ABB standard drives for HVAC, controlling new high efficiency Eff1 ABB motors, which in turn drive the supply and return fans
- CO₂ and moisture controls feed data to the drives to control their speed

Benefits

- Electricity consumption for the first 10 months of 2007 for the entire school fell by 14%, while the heating used fell by 16%
- Direct drive of the fans by the motor has cut noise levels significantly
- Moisture free environment

For more information please contact:

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