



Source: LS Automation GmbH & Co. KG

Switching on the green light

Intelligent filter systems with Eaton technology achieve maximum energy efficiency

Location:

Bad Laer, Germany

Segment:

Wood processing

Challenge:

Cost-optimised, reliable and energy-efficient operation of complex filter systems

Solution:

HMI/PLC XV-100, PKZ and PKE manual motor starters, DIL contactors, NZM circuit breakers, PowerXL variable frequency drive, NZM-XMC-TC-MB transducer module

Results:

Thanks to compact control units, "IE3 ready" switching and protective devices, powerful variable frequency drives and universal energy measuring modules, LS Automation is able to generate added value for its customers such as energy savings, flexibility and data transparency.

"Thanks to Eaton technology, we are well equipped to 'switch on the green light' for our customers."

Ulrich Lemme, LS Automation

Air filter systems are a must for many companies in the wood, plastics and textile industries in order to safeguard the health of those working in production. But, since the energy requirement for a filter system comprises up to 40% of the total requirement of the actual production systems, energy efficiency is a key driver when ensuring high levels of safety. LS Automation specialises in intelligent control technology that provides for system optimisation and is achieving significant added value for its customers, in terms of energy efficiency, using Eaton technology.

Background

Air is vital for life and a human being needs 8,000 litres of air each day. Throughout the EU, several hundreds of thousands of people die every year from dust-contaminated air. This topic is very close to the hearts of Heiko and Andre Schulte-Südhoff, the managing directors of Schuko H. Schulte-Südhoff GmbH (Schuko) in Bad Laer, Germany. Their company is one of the world's leading specialists in extraction technology and filter systems. Schuko offers customised filtration solutions, from consultation, planning and project engineering to production, commissioning, maintenance and training. These solutions include mobile dust extractors for small-scale applications as well as filter systems for large industrial productions.

Today, LS Automation GmbH & Co. KG. (LS Automation), a spin-off company from Schuko is in charge of designing and constructing the control cabinets, including implementing automation solutions. It has established itself as a specialist in automation technology in process, environmental, energy and building systems.

Challenge

Take the example of a wood processing machine: shavings must be safely and completely extracted in order to ensure healthy, safe air for employees and to comply with legal requirements. The extraction performance and effectiveness of the filter system depends on a ventilator that is used to move the shavings pneumatically either in the clean air or in the untreated air. The efficiency of the ventilator drive has a great effect on the operating costs. For optimal power consumption, the air flow must be as low and slow as possible while the minimum air speed for extraction power is maintained. In the past, the ventilators were only switched on or off, but today the system requires intelligent control.

"Energy efficiency is currently a hot topic," said Schulte-Südhoff. "Take the energy requirement of a wood processing machine: the filter system needs 40% more power. This affects the bottom line. That's why we have been working for quite a while on energy and cost efficiency."



Powering Business Worldwide

Until now manufacturers like us have preferred to focus on optimising the design of their systems. In the meantime, we have been gaining customers based on control technology, which is directly attributed to the subject of energy efficiency."

For this reason, Ulrich Lemme, managing director of LS Automation, set the target of developing solutions using innovative control concepts and powerful automation technology, which generate competitive advantages for its customers such as Schuko and provide noticeable added value for end customer.

Solution

Eaton works with LS Automation as a technology partner, helping in the implementation of this task. As part of a large project for a furniture manufacturer, Schuko, with the support of LS Automation, was able to reduce the customer's energy requirement from about 3 MW to 400 kW. The solution involved a filter system for 168 machines, spread over an area of 5000 m² and requiring a 1.2 km long pipe system. More than 40 three-phase motors operate the 18 extraction ventilators and auxiliary transport ventilators, as well as the chain motors for shaving, transport and airlock motors.

For some time Schuko has been using efficient IE3 motors in accordance with the ErP (Energy-related Products) Directive. Due to their increased start up currents for safe and reliable operation, these motors set special requirements for switching and protective devices. As one of the first providers of this equipment, Eaton had already extensively tested the response behaviour of its products and optimised the contactors and manual motor starters of its DIL, PKZ and PKE series accordingly. For the most part, the furniture manufacturer used PKZ manual motor starters; in some cases manual motor

starter combinations from DIL contactors were used for a direct star/delta start-up.

One special feature of Schuko systems is the cascade system. This allows for optimal power regulation and adjustment of the extraction system to suit the actual air requirement - thus helping to optimise power consumption. The system consists of multiple individual ventilators that can be switched on and off as required. The system therefore always generates the required pressure, even with small quantities of air. One of these ventilators is initiated by a variable frequency drive to balance pressure fluctuations, whilst the others operate on the mains at a fixed speed at the optimal operating point.

The combined XV-102 control unit (HMI/PLC) controls both the cascade systems and drives for the filter system and the 168 drives that regulate the air flow at the individual workstations based on the local activity. The system, which is separated into two constructed sections, is designed so that every two HMI/PLC devices control one section, but the four units are networked for data exchange.

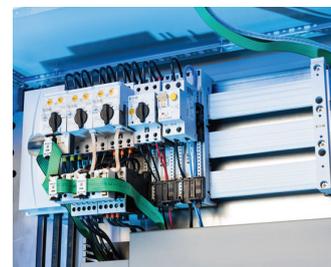
Many system operators want a comprehensive record of operating data and energy consumption. Growing cost pressure and increasing energy prices have generated higher interest in assigning energy costs to production processes and gaining an overview of utilised machine capacity. This approach is the only way to optimise use, maintenance and investment. "Thanks to the Codesys programming and Galileo visualisation software, HMI/PLCs from Eaton give us the option and the freedom to realise our ideas quickly, easily and cost-effectively," said Lemme. "We were recently able to programme an operational data recording module for a project without a hitch. The customer submitted an additional request for energy data recording. In this context, Eaton's NZM-XMC-TC-MB

measuring module in conjunction with the NZM circuit breakers provide the ideal solution." The NZM-XMC-TC-MB transducer module was designed for the use of external, possibly already existing transformers, and is especially suitable as a retrofitting solution. It includes the measuring technology for the entire current range up to 6300 A in one device.

Results

As a result of their previous collaborative work with Eaton, a cooperative partnership has since developed between the company and Schuko and LS Automation. LS Automation is now an "Authorized Lean Solution Partner" in Eaton's partner programme. Thanks to this partnership with application specialists, Eaton is able to provide its customers with easy access to efficient and integrated solutions.

"In the future we plan to be able to transmit operating and energy consumption data directly to enterprise resource planning systems such as SAP," explains Lemme enthusiastically. "We are also focusing more on diagnostic and maintenance concepts, as well as the communication of machines and system parts with each other. In an upcoming project, for example, we want to use the intelligent SmartWire-DT system to further develop our data and diagnostic transparency and bring it to the actuator/sensor level. Eaton's new XV-300 HMI/PLCs, that have two independent Ethernet interfaces, also provide us with the option of controlling the automation of filter systems via a network and facilitating parallel communication with all other subscribers in the company via the customer's network. Overall, thanks to Eaton technology, we are well equipped to 'switch on the green light' for our customers in terms of energy efficiency and prepare ourselves for the implementation of industry 4.0."



Eaton's PKE and PKZ manual motor starters and DIL contactors have been tried and tested for both IE2 and IE3 motors.



LS Automation uses a cabinet prototype to demonstrate the technical possibilities for constructing and monitoring energy-efficient systems and preparing for ISO 50001, with control technology such as the XV-300, innovative drive technology from the PowerXL range, energy measurement and monitoring based on NZM, BreakerVisu and XMC measuring modules.

Eaton
EMEA Headquarters
Route de la Longeraie 7
1110 Morges, Switzerland
Eaton.eu

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