Metallux SA, Mendrisio TI

By optimising its the ventilation system, Metallux SA in Mendrisio TI has reduced the electricity consumption of its new ventilation system by three quarters and saves around CHF 17 000 per year. The additional investment has paid for itself in less than a year.

Metallux SA is a leading global manufacturer of ceramic pressure sensors and electronic components. The company's products are used in various industries, for example in medicine, automobiles or industrial applications. Founded in 1955, the company, which has some 150 employees, still produces in Mendrisio TI.

In 2018, a second production facility was added to the historic headquarters. Since some of the processing takes place under increased air quality requirements, and vapours and waste heat must be dissipated in some processes, ventilation with 100 % fresh air was also necessary around the clock at the new location. The ventilation system consists of a roof-mounted central air-conditioning unit and an extensive pipe network that provides a supply of fresh air and direct extraction of the exhaust air.

The original ventilation plans called for a standard air-conditioning system with supply and exhaust air, heat recovery, heating and cooling coils as well as humidification and dehumidification with two volume flow stages. However, when preparing the offer, the electrical planner additionally suggested the installation of frequency converters for both fans and a sensor-based, automatic control of the volume flow.

This control is based on the position of the air distribution dampers in the ventilation system. The building is divided into ten different temperature zones. In each zone, temperature sensors detect heating or cooling demand and control the air distribution dampers in their zone (opening degree between 30 % and 100 %). The speed of the fans is then controlled depending on the degree of opening of the air distribution dampers. Outside working hours, the system is operated in a reduced night mode, with a minimum volume flow and fully open dampers.

The new Metallux SA production facility in Mendrisio. Photo: Metallux SA.

Roof-mounted ventilation system. Photo: Márton Varga, Topmotors

To check the effect, the power consumption of the fans was measured over several days with the control switched off then on. It was found that with the sensor-based control, the average power consumption of the fans was only slightly above the power consumption in night mode, even during the day, and maximum power was not called up at all. Extrapolated over a year, this results in a saving of around 75 % compared to the original version. The additional investment of around CHF 8 000 was amortised after only half a year through the saved electricity costs alone. In addition, there are further savings on the thermal side, because the air volume that is not unnecessarily conducted does not have to be heated, cooled, humidified or dehumidified.

The project was implemented by Paolo Bergamin of Think Exergy SA (ventilation system) in collaboration with Diego Avesani of Spinelli SA (electrical systems and automation). It provides impressive proof of the potential for optimisation, even in new systems, if the individual components are coordinated with each other and with actual demand.

Topmotors
About one-third of the electricity consumption in Switzerland comes from industry. More than 70 % is due to electric motor systems. Topmotors' priority is to give an impulse by encouraging the use of highly efficient motors and intelligent controls. All Topmotors events, together with practical information, can be found here: www.topmotors.ch

«Nowadays, measures must be taken wherever possible to reduce consumption and pollution. Our company always takes a green approach as far as possible.»
Marco Andreis, Facilities Supervisor, Metallux SA, on the photo with Diego Avesani, Spinelli SA

Some extraction nozzles with sensor-controlled distributor flaps (left) and the two frequency converters (right).
Photo: Márton Varga, Topmotors

Facts and figures		
	Original plant	**Optimised plant**
Fans	Supply air fan AERMEC, max. volumetric flow 20 000 m³/h, pressure difference 1299 Pa Extract air fan AERMEC, max. volumetric flow 20 000 m³/h, pressure difference 810 Pa	
Motors	2x COMEFRI 11 kW, efficiency class IE2, direct transmission	
Frequency converter	–	2x Siemens G120 P 11/35B, 11 kW
Regulation	Two-stage	Automatically according to demand
Operating hours	8760 h/a	8760 h/a
Energy consumption	123 693 kWh/a	28 849 kWh/a

- Electricity saving per year: 94 844 kWh
- Cost saving per year: CHF 17 072
- Additional investment costs for the optimisation: ca. CHF 8 000
- Payback: 0.47 years