

Improving power efficiency and cutting costs



A combination of the latest technologies and excellent collaboration between specialists from UFA, Bühler and ABB in Switzerland has led to an impressive solution that reduces the power consumption of electric drive systems in an animal feed plant by more than 50%.

Since May 2011, UFA's poultry feed mill built in 1965 has been one of only a few unmanned feed mills in the world. The mill runs from 9 p.m. until 5 a.m. without any operating personnel.

UFA

UFA, which stands for Union des Fédérations Agricoles, is a Swiss agricultural company specializing in animal feed and the market leader in this segment. The UFA produces feed at its Herzogenbuchsee, Sursee, St. Margrethen and Puidoux sites and markets them for farm animals and hobby farmers in Switzerland.

More information: www.ufa.ch

Mechanical engineer Peter Hofer is a member of management and responsible for the entire production of UFA. Using power as efficiently as possible for UFA's large production volume is important for him and the company – for reasons of cost and for the sake of principle: "You can do a lot to efficiently use energy if you analyze the processes accurately," stresses Hofer.

Analyzing and optimizing processes – Using power efficiently

Working with the Bühler Technology Group, UFA has been particularly successful in optimizing processes at its Sursee feed mill (see box). The energy savings mean the investment pays for itself in just a few years. Until the beginning of 2015, an aspiration ventilator was installed here with a conventional



Synchronous reluctance motor

Synchronous reluctance motors are equipped with a rotor consisting of packets of geometrically optimized oriented electrical sheets. As a result there are almost no losses in the rotor. An example: Compared to a 75 kW induction motor, total losses measured in a synchronous reluctance motor of same capacity are 3 kW instead of 4.8 kW. This reduction in losses by more than a third brings the overall efficiency of 94.0 percent up to 96.2 percent, which corresponds to the highest efficiency class, IE4. In addition, the motor heats up less, which prolongs the life of the insulation and extends the lubrication intervals.

75 kW induction motor. This ventilator dehumidifies and cools the steamed, pelleted feed before it is packed. For this, it draws the air through the material to be dried from the tenth floor of the production tower. The ventilation was controlled simply via a flap; the motor directly coupled to the power grid always operates at fixed speed.

This ventilation system, which was state of the art when it was installed in the 1980s, needed to be replaced. "I read a technical article about a ventilation system at University Hospital in Zürich where, during a renovation, a new, highly efficient synchronous

reluctance motor from ABB with a frequency converter was used. I was impressed by the figures that showed how much less energy it used," remembers Hofer.

Precise motor design saves space and costs

Peter Hofer sat down with experts from Bühler to explore the potential efficiency improvements that renovating the ventilation system with an ABB drive package could bring. Together, they first thoroughly inspected the process of measuring the power of the motor.

The new plant was finally precisely designed along with specialists from ABB and Bühler.

Team performance enables exploitation of potential

A 37-kilowatt (kW) ABB synchronous reluctance motor was installed for the drive of the new aspiration ventilator, controlled by an ABB ACS880 frequency converter.

The solution was made possible by excellent collaboration between UFA, Bühler and ABB in Switzerland. "The collaboration was very constructive and has worked smoothly from the outset," said Patrik Herburger-Rauter, the Team Leader of Account Management for Motors and Drives at ABB. "When three proven specialists contribute equally to the solution and bring their expertise to the table, impressive savings are possible."



Sensors are used in the ventilation system for measuring the temperature and humidity of the exhaust air. The operator can respond, if necessary, to the changing air values with the frequency converter and optimize the air flow rate.

50% power saving

The commissioning was carried out together with an ABB engineer and a Bühler process expert in April 2015. The ventilation system has proven itself completely. It runs five to six days a week around the clock, all year round. The results are convincing: On average, the motor draws an electrical output of 14 kW from the converter. "That pays off!" emphasizes Peter Hofer. "We save around 50% power compared to the previous system. It's around 300 megawatt-hours in this system. At approximately 120 Swiss francs (\$118) per megawatt hour for industrial electricity, that makes 36,000 Swiss francs (\$35,400) a year. The drive package pays for itself quickly. And the reduced CO₂ emissions are also considerable." Additional positive side effects, such as a reduced need for cooling in the control cabinet, reduced space

requirements, and savings due to the smaller size of the motor, have not yet been considered in this analysis.

Trendsetter for power efficiency

Synchronous reluctance motors had already been retrofitted in the UFA plant in St. Margrethen, and two more are installed in the Herzogenbuchsee plant. "UFA can be seen as a trendsetter for power efficiency at their installations and energetically optimizing their processes," explains Viktor Borner. "I think these efficient systems are in increasing demand in the market, if the investment costs are offset with the entire life cycle costs. The savings speak for themselves – even the reduced CO₂ emissions from an operation."

Bühler

The Bühler Group is an internationally active specialist in machinery, equipment and services for processing staple foods and for the production of high-quality materials. Bühler's solutions are characterized by high power efficiency and quality. The technology group is active in over 140 countries and employs approximately 10,600 people worldwide. Bühler is a family business and particularly committed to sustainability. More information: www.buhlergroup.com

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