An Optimal Solution

15 June 2015: YASKAWA

For its five state-of-the-art hatcheries, the Dutch company Probroed & Sloot relies on exemplary standards of quality for the day-old chicks it produces – and for its sustainability. The responsible employees at the company are constantly looking for new solutions to reduce energy consumption. One current measure is converting the drives of some 200 circulation fans to YASKAWA motors of the highest efficiency class, IE4.

The SPRiPM permanent magnet motor meets the high efficiency requirements of...

Turning an egg into a healthy, high-performance broiler chicken requires a complex poultry production chain. Based in the Dutch city of Groenlo, Probroed & Sloot has specialised in the hatching process: the independent company has five of its own hatcheries in the Netherlands and Germany, where it produces top-quality day-old chicks. Achieving this goal takes years of experience and a great deal of innovation, also evidenced by the company’s in-house research and development department. For example, a special track-and-trace system allows monitoring of every single chick.

Probroed & Sloot’s objectives for sustainability are just as ambitious. Saving energy is a particular point of focus. Reusing heat from exhaust air is just one of the measures the company takes. Probroed & Sloot’s latest optimisation has been retrofitting the circulation fans in the hatching chambers. There are around 200 of these chambers just at the Groenlo location, and they operate around the clock, seven days a week. With a continuous load like this, measures to boost energy efficiency are particularly important.

Maximum efficiency

Even before the current modernisation of the fan drives, Probroed & Sloot used inverter drive-operated induction motors. Electronic control of the motor speed plays a key role in saving energy. This is the main reason why the European ErP
In combination with the V1000 drive, the motor forms a highly efficient drive package.

(energy-related products) directive, also called the Ecodesign Directive (2005/32/EC and 2009/125/EC), covers the use of inverter drives. The European Commission passed this directive in 2005 to govern environmentally friendly designs for energy-related products at the EU level. Two essential phases have since been completed. The third phase began in early 2015.

The first two phases primarily focused on defining efficiency requirements for individual products. For example, the resulting mandates have led to a ban on the distribution of motors below the IE2 efficiency class since 2011. The drives Probroed & Sloot previously used also met the requirements of this efficiency class.

Permanent magnet motors generally offer higher efficiency. Unlike induction motors, they always have to be controlled with an inverter drive. They now meet the requirements of IE3 (Premium Efficiency Class) as standard. However, high-efficiency permanent magnet motors that meet or even exceed the requirements of the highest efficiency class specified in the standards, IE4 according to IEC TS 60034-31, are now also available.

With that in mind, Probroed & Sloot decided to test models from various manufacturers in practice. For this purpose, half of the fans in individual hatching chambers were equipped with new fan drives.

Installation layout at Probroed & Sloot with three V1000 inverter drives.

Six fans work in one chamber: three on the left and three on the right. This test setup meant that the consumption values of the three existing induction motors could be compared with those of the three new motors under absolutely identical conditions.

The SPRiPM permanent magnet motor
In the tests, the YASKAWA SPRiPM (Super Premium IPM Motor, pronounced like “supreme”), which is sold in the Netherlands by MCA Motion Control Automation B.V., clearly defeated the competition. This high-efficiency motor is offered as a drive package in combination with the V1000 inverter drive and covers an unusually broad range of IE4-compliant applications. The energy savings measured at Probroed & Sloot (as compared to the IE2 induction motors) were about 14% at the nominal working point and about 50% in the partial load range, which is more important for the application.

In addition to its high energy efficiency, the SPRiPM features an extremely compact design. The design of permanent magnet motors alone makes them considerably smaller and lighter than comparable induction motors. With this new development, the dimensions are even smaller: each new motor is up to 40% more compact than a comparable induction motor. This is equivalent to a frame that is two standard sizes smaller. In addition, the SPRiPM weighs 50% less and has 60% less inertia than an induction motor. This means it can start and stop 60% faster.

The motor can be combined with YASKAWA’s proven V1000 drive to provide a high-performance IE4 drive package with standardised technology for a wide variety of applications. The motor-specific parameters are already integrated in the software, meaning that the plant manufacturer merely has to connect the motor-inverter package.

For applications with variable torques – including fans – the special “flying start” function is particularly advantageous: in the event of a power failure, for example, the fan wheel continues to turn. The SPRiPM and the V1000 cover the speed range down to 5% of the rated speed to allow optimal restarting. The motor’s low noise level is particularly beneficial in applications with fans, because the blades of the fans would magnify any noise.

**Conclusion**

The Dutch hatchery specialists from Probroed & Sloot set themselves extremely high standards not only for the quality of their day-old chicks, but also for sustainability. With round-the-clock operation of the hatching chambers, measures to boost energy efficiency are particularly important. That’s why the company is gradually replacing the IE2 induction motors on its around 200 circulation fans with high-efficiency YASKAWA SPRiPM motors, which meet the requirements of the current highest efficiency class, IE4. This reduces energy consumption by about 50% in the partial load range that is important for the application.