



VLT® drives pay back in 9 months on boiler fans

Following the installation of a VLT® drive on an 11 kW boiler forced draft fan, Dairy Crest has achieved energy savings of over 47,000 kWh per annum, worth over £1,800, reduced associated carbon emissions by 5.52 tonnes per year and achieved a payback on the investment in only nine months.

Dairy Crest Severnside in Stonehouse Gloucestershire is one of the most modern milk processing sites in the UK, producing fresh milk, butter, cream, buttermilk powder, skimmed milk concentrates and powder. The site is a very large steam energy user, the majority of the steam being used for the processing of dairy products and the steam boilers represent a major element of the site's £1.8 m annual utilities bill.

In 2000, Dairy Crest became a participant to the negotiated Climate Change Energy Agreement and since then, in the quest for energy savings, has invested in improved boiler control among other measures. One of the energy saving opportunities identified was associated with the low pressure (100 psi) boiler. Rated at 4,230 kg/hr of steam, this boiler was supplying an average of 2,200 kg/hr, only 52 % of its capability.

Inaccurate and wasteful damper control

Combustion control was effected by damper control of the forced draft fan which was inaccurate and wasteful.

Craig Pepworth, Dairy Crest's Electrical Engineering Manager, initially considered

reducing the size of the boiler burner to match the steam load, which would have allowed them to reduce the size of the forced draft fan motor. However, process steam demand would eventually increase at some future point when new products were introduced, which ruled out any reduction in boiler capacity.

Improved control of the fuel/air ratio

After consultation with the boiler burner manufacturer Saacke, it was established that more efficient control would be achieved through fitting a new electronic fuel control system and a variable speed controller to the forced draught fan motor. These simple retrofits would provide full optimisation through improved control of the fuel/air ratio. The drive speed would be regulated via a 4-20mA signal from the direct digital combustion controller (DDCC) and the drive in turn would provide a 4-20mA feedback signal back to the DDCC.

Reduced fuel consumption

In addition to good electrical savings from efficient speed control of the motor, a reduction in fuel use on the boiler was expected and the electronic control

system would replace the mechanical system of fuel control, thereby reducing maintenance. Fan motor life would also be extended and fan noise levels would be reduced.

Pay back measurements

Payback on the investment in variable speed control was initially calculated at less than one year. To substantiate this, initial measurements were taken on the fan under damper control over a full year of operation. During 264 days running, the measured power taken by the 11 kW motor was reasonably constant at about 9.75 kW. The motor consumed 61,776 kWh, a running cost of £2,471/year.

Energy measurements were taken follow-

ing the retrofit of the new fuel system and the Danfoss VLT® 6000.

Average power consumed had reduced to 2.30 kW at 32 Hz running frequency. Extrapolating this average figure over a typical year of operation gives an annual energy consumption down to 14,572 kWh, and costs of £582 per year, an annual saving of £1,889.

The total installed cost of the Danfoss drive was £1,400 giving a return on investment in just 9 months. Equally important, a reduction in CO² of 20,294 kg was achieved.

Installed the drive without help

“We are really happy with the new variable speed drive and boiler fuel control

system”, says Craig Pepworth, Dairy Crest.

“I installed the VLT® drive myself and found it simple to set up, and as a result, I have installed many similar drives on other plant in the factory. In addition to saving us money, the drive has made my life a little easier through reduced maintenance requirements on the boiler.

We are always looking for opportunities to reduce our energy consumption and costs, and this modification to the boiler has made a valuable contribution towards our commitment to savings under our climate change levy negotiated agreement. We are aware that we can claim valuable tax breaks from fitting energy saving equipment and, as a company, will take advantage of this benefit in the future”.