EMERSON Industrial Automation

applied
To Natural Resources & Energy

DRIVES MAKE CALIFORNIAN DAIRY FARM EVEN GREENER

One of the leading dairy farmers in the USA is realizing energy savings of $18,000 a year at its 5,000 cow farm and dairy after installing a Control Techniques variable speed drive on a water pump, a crucial part of its methane digester system.

Joseph Gallo Farms accommodates 16,000 dairy cows across five dairies near Atwater, California. At the largest of the dairies, Cottonwood, with 5,000 cows, the company added a $2 million manure digester to convert manure into electricity, one of the first such installations in California.

Each cow produces about 120 lbs. of liquid and solid waste per day, potentially a serious environmental problem. In 2004, a 44,225,000 gallon lagoon digester with a seven acre surface area was added to process the 200 tons of manure produced daily by the herd. The digester produces 3,000 cu. ft./day of methane which is used to power two reciprocating engine generators, producing 940 hp (700 kW) – some 5.6 GWh annually. This provides half of the power required for the on-site dairy, which processes around 900,000 lbs. of milk per day in its cheese making operation.

Methane production in the lagoon is accelerated through the controlled addition of warm water from plant clean-up operations. Previously, this process was achieved by using an Emerson vertical hollow shaft AC motor driving a pump with a check valve and pressure regulator limiting the line to 70 psi regardless of pump outlet pressure.

Early in 2009, Joseph Gallo's Chief Plant Engineer called in their Emerson Distribution Partner to discuss the need to reduce the flow rate into the lagoon during the manure flushing process to avoid over-watering the fermentation lagoon. This could be achieved either by adding another regulator and valve, or by reducing motor speed to the level required. But would the cost of the additional motor control produce enough savings to justify the capital expenditure?

Our local distributor, Craig Ward, along with our Emerson sales representative, Tony Dileonardo, proposed a design

KEY BENEFITS

- $18,000 OF ENERGY SAVING PER YEAR
- 12 MONTH PAYBACK PERIOD
- POWER GENERATED USED TO POWER DAIRY
- IMPROVED CONTROL IN SYSTEM
- ADDED FUNCTIONALITY & INTELLIGENCE

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CONTROL TECHNIQUES

based on a Control Techniques Commander SK variable speed AC drive – with a potential for significant savings.

Based on a 12-hour-per-day duty cycle, the Emerson Control Techniques drive package is producing significant monthly savings, with a 12 month payback period. Their proposal was accepted and the solution package was installed in August 2009.

The application includes a 300 psi pressure transducer and an Emerson Control Techniques custom configured AC drive package comprising a 200 hp Commander SK AC drive (model 6402) mounted in a NEMA 3R freestanding enclosure. Pump software is pre-loaded on a Control Techniques LogicStick and all parameters are accessed via a door-mounted CT-Vue HMI. This customized solution was manufactured and programmed at the Emerson Control Techniques Drive Center in Canby, Oregon.

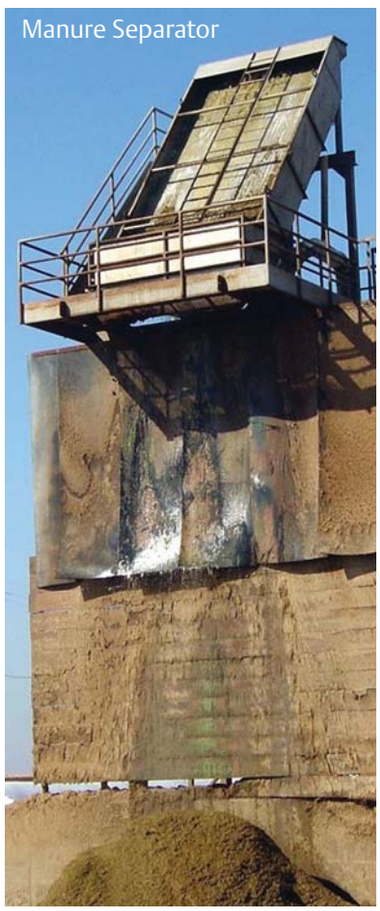
Previously, in order to reach a flow rate of 1,000 gallons per minute, the power consumption was 154Amps at 60Hz. After the variable speed drive installation, it was found that the same flow rate could be achieved with 25% less speed, halving the current to just 75Amps at 45Hz. Thus the optimal pressure of 70 psi could be maintained without using a regulator, but is retained for occasions when the bypass mode is employed.

"This variable speed drive pump control is in line with our environmental policy at Joseph Gallo," says Project Engineer, Mark Tovar at Joseph Gallo Farms. "We are constantly looking for ways to cut greenhouse gas emissions and to save energy. This one relatively small project has produced significant savings, while giving us improved control over this part of our digester system."

Thanks to its ultra-compact size, energy-saving performance and excellent motor control capabilities, the Commander SK AC drive is the ideal choice for this pumping application. The drive is ultra-compact as well as offering energy saving and excellent motor control. With on-board intelligence, I/O and fieldbus options like Ethernet, Commander SK offers much more than would be expected from a general-purpose drive.

The LogicStick used by Joseph Gallo adds functionality enabling pump application configuration, adding intelligence to the drive, eliminating the need for a computer or external pressure controller. This reduces both the size and cost of the control enclosure. The power range spans 0.33 hp (0.25kW) up to the 200 hp (132kW) unit used in this application.

Founded in 1979, Joseph Gallo Farms is one of the USA's largest dairy farm operations with more than 450 employees. Covering nearly 15,000 acres, Joseph Gallo Farms are located next to the largest concentration of wetlands left in California, the San Joaquin Valley Grasslands, home to a wide variety of wildlife. The company has worked hard to integrate its operation with the important surrounding environment and has achieved a number of environmental awards including the 2008 Innovative Farmer of the Year Award from the International Dairy Foods Association. The award is for applying creativity, excellence and forward thinking to achieve greater farm productivity and improved milk marketing.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