

CASE STUDY: AMMONIA CONDENSER FANS VFDs

Electric Savings

Success Story

The PLC controls were installed and controlled on the condenser pumps and fans to maintain head pressure successfully. Once this was achieved, additional commissioning efforts were undertaken in parallel with other project tasks, recording condenser fan operation patterns at typical plant loads.

These measurements were used to target 80% load on the condenser fans during floating control, optimizing the system. This extended commissioning allowed the Solution Dynamics Project Manager to run simulations in conjunction with variable parameters to test projected seasonal performance at different approaches to wet bulb.

The measurements and commissioning effort saved an additional \$4,000 per year for only a small time investment, and verified that both energy and demand savings were optimized – no guessing required once the control system and data collection are in place.

Dairy Plant Improves Refrigeration System Efficiency Using VFDs Installed on Condenser Fans

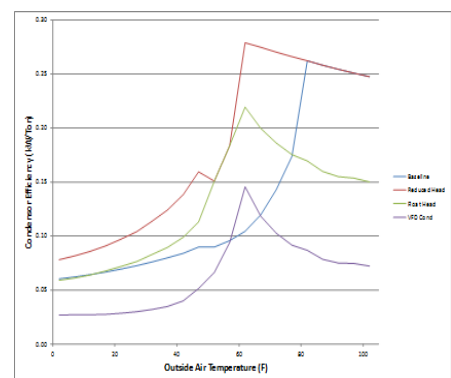
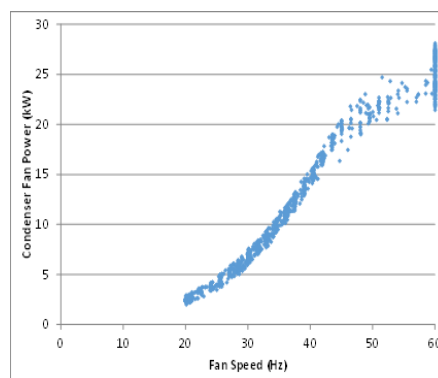
CHALLENGE— Achieving Maximum Condenser Efficiency Using VFDs

A dairy processing plant, focused on fluid milk pasteurization and bottling, was installing a comprehensive ammonia refrigeration control system and wanted to achieve maximum efficiency of the condensers. The system included two condensers, each with a single pump and three fans. Baseline operation included fixed fan speed operation.

After measuring system performance, including power logging and equipment reviews of the condensers, a comprehensive plan was proposed to reduce energy use of the system. Part of the plan included improving the system efficiency using VFDs on the condenser fans, and automated control of the condenser pumps.

SOLUTION— System Optimization Through Integrated Controls and Condenser Fan VFDs

The control system was installed, including condenser fan VFDs and condenser pump start/stop controls to achieve maximum system efficiency.



Using commissioned floating head pressure controls allowed the system to operate most hours at 80% or less capacity requirements on the condensers. Because of the affinity laws governing fan power relative to speed in an open system, the fan power decreases sharply with speed, and the system can be optimized at use the least energy on a seasonal basis running at this nominal speed. This also allows the system to respond to moderate spikes in the load without significant changes to the head pressure. Integrating the pump controls into the control system is important at low loads and temperatures...

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SOLUTION—Continued

because at speeds below 30 Hz, the 25 HP fans each use less power than the 7.5 HP pump. At low temperatures, changing to dry operation can then provide a greater energy benefit than cycling the fans at minimum speed. Integrated with floating head pressure controls, condenser fan VFDs provide the most efficient system control over full seasonal operation.

RESULTS— Significant System Energy and Cost Savings, Large Utility Incentive Payment to Help Support the Effort

Key Results

Annual Energy Use Reduced by 39% .
System Peak Demand Reduced by 32% .
Annual CO ₂ Emissions Reduced by 743 Tonnes.
Annual Cost Savings of \$ 96,900.
Awarded an electric utility incentive of over \$290,000.
1.0 Year Simple Payback.
Condenser Fan VFDs account for ~15% of project savings

Key Benefits

Cost Savings	Total annual savings of \$ 14,500.
Energy Savings	Annual Energy Savings of 239 MWh,
Carbon Reductions	Annual Reduction of 111 Tonnes of CO ₂
Fuel Type	Electricity
Payback	1.0 Year Simple Payback, after Incentive

Financial Data

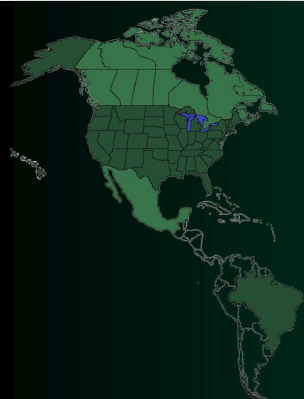
Investment	Development: \$ 17,800 Component of Larger Capital Project
System	PLC Control System, Allen-Bradley VFDs, Touch-Screen Interface, System Commissioning & Personnel Training, Long-Term Monitoring & Central Control System Tie-Ins.

Customer Profile

Headquarters	Springfield, Missouri
Locations	14 Production Locations in 7 States throughout the Midwest.
Number of Employees	Approximately 1,000
Estimated Sales	\$1 Billion
Industry Type	Dairy – Fluid Milk, Juice, & Beverages



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We serve clients in commercial and industrial sectors who are seriously committed to reducing their energy consumption, cost, and environmental impact. Guaranteed results are delivered on a risk-free basis.

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