SOLUTION DYNAMICS

CASE STUDY: AMMONIA REFRIGERATION FLOATING HEAD PRESSURE CONTROLS

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 Floating Head Pressure Controls

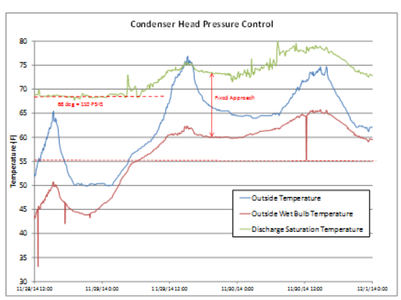
CHALLENGE— Achieving Maximum Seasonal System Efficiency Considering Compressors and Condensers

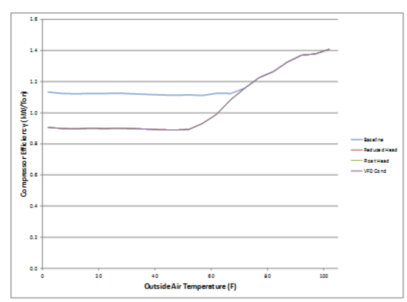
A dairy processing plant, focused on fluid milk pasteurization and bottling, was installing a comprehensive ammonia refrigeration control system and wanted to achieve maximum seasonal efficiency of the entire central system, including compressors and condensers. The system included three single-stage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

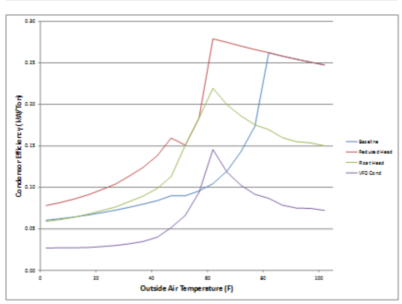
After measuring system performance, including power logging, pressure logging, and equipment reviews of the compressors and condensers, a comprehensive plan was proposed to reduce energy use of the system. Part of the plan included improving the system efficiency using a floating head pressure control optimized to maximize the system efficiency, taking into account the interrelated nature of the compressors and condensers.

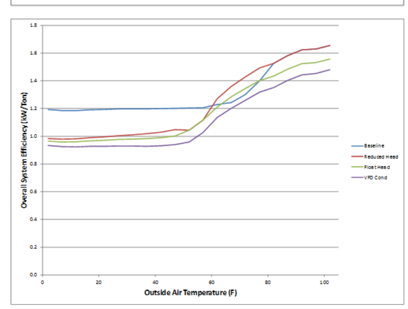
SOLUTION— System Optimization Through Integrated Controls, Floating Head Pressure on Wet Bulb Temperature, and Condenser Fan VFDs

The control system was installed, including a floating head pressure control based on approach to wet bulb temperature and condenser fan VFDs, to achieve maximum system efficiency.









SOLUTION—Continued

The approach to wet bulb was optimized to achieve maximum system efficiency. While reducing head pressure will result in reduced compressor power, the means for controlling the head pressure at this lower level has a significant impact on the condenser power. Simply reducing head pressure as a static setpoint results in an increase in system energy much of the year (shown as outside temperatures between 60 degrees and 80 degrees here). Using the optimized float controls reduces the time when the system energy is increased to only a 10-degree window, and reduces peak power by not overdriving the condensers when wet bulb increases. VFDs installed on the condenser fans further reduce condenser power, resulting in a net reduction at all conditions.

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.
Head Pressure Controls account for ~39% of project savings

Key Benefits

Cost Savings	Total annual savings of $ 37,800.
Energy Savings	Annual Energy Savings of 620 MWh,
Carbon Reductions	Annual Reduction of 290 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,

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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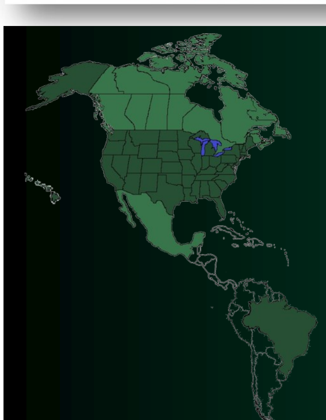
Achieve energy/sustainability goals & increase profit - *Guaranteed*



Solution Dynamics is a team of certified energy experts committed to improving the environment by implementing sustainable solutions that reduce use of precious natural resources.

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.

For additional information, or to schedule a consultation, please call us at **(888) 435-9226 or email: info@sol-dyn.com.**

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