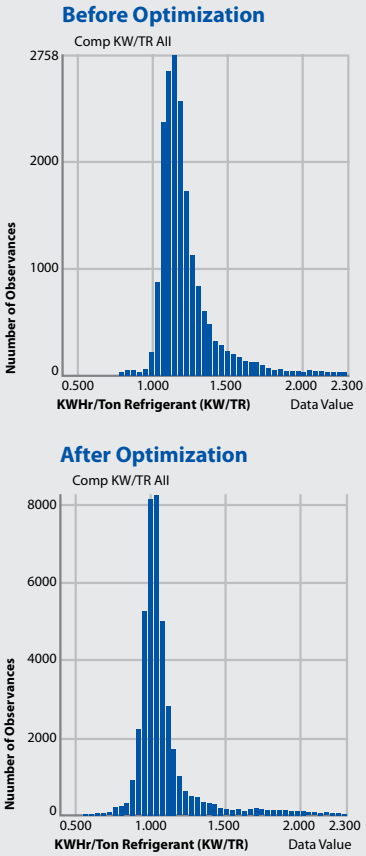
Frozen Foods Plant

Multi-Unit Optimization Solution Reduces Energy Costs 3 - 8 Percent

Key Benefits:

- Reliably delivered ammonia refrigerant to three primary pressure headers (HS, IS and LS)
- Reduced electrical energy costs through improved dispatch, load assignment and controllable parameters by 3-8%
- Reduced KW/TR by a at least 6.5%
- Payback in 11 months

6.5% Reduction in Energy Costs (KW/TR)



The Challenge

A major frozen foods plant in the Northeast United States has been producing quality frozen meals since the 1920's. In large frozen foods plants, refrigeration typically accounts for more than half of the total electric energy use. This plant had multiple compressors so the operators had options on how best to deploy and load the compressors. Like many manufacturers, they had been operating the utility system based on decades of experience. However, with skyrocketing energy bills the company sought to evaluate how they could increase the efficiency of their utility system. Company managers sought a control solution that would maintain system reliability and reduce energy costs by 3 to 7 percent.

The Production Process

This plant produces frozen prepared foods on a five-day week; factory cleaning and down-time cycles occur every night. On a typical day, production starts early in the morning with a gradual increase in refrigerant demand. As different lines stop for lunch, the plant experiences a short energy usage dip. Through the day demand is spread throughout various production sections. Operation runs through the evening and the day is completed late in the evening (i.e. two production shifts). Refrigerant and electrical energy loads swing during these cycles. The timing and full energy load often shifts based on the day's production schedule, the heat sink of the food processed, and any planned or unplanned factory upsets or maintenance outages. The challenge is to continually make the best energy generation decisions to minimize costs while meeting production demand.

The plant operates an ammonia refrigeration system employing 24 rotary screw compressors with over 10,000 hp and four pressure levels: low-pressure (LP, cold), intermediate-pressure (IP), high pressure (HP, warmer) and AC ammonia. Plant operators control the LP, IP and HP systems from a common control room in the middle of the factory near the compressor locations.

The plant operates under the philosophy that starts or service swings on compressors can occur at a maximum frequency to protect equipment. The earlier strategy ranked the compressor dispatch from largest to smallest compressor to provide a large control range on started machines and to minimize compressor starts and stops However, there are several common and frequent disturbances in the plant.

These include:

- Ambient temperature changes from shift to shift and season to season
- Process load changes depending on the line production plan
- Daily production cycles: ramp-up, ramp-down and lunch-break load shifts
- Equipment or performance changes based on availability and/or compressor or condenser situation

Rockwell Software Optimizes Compressors

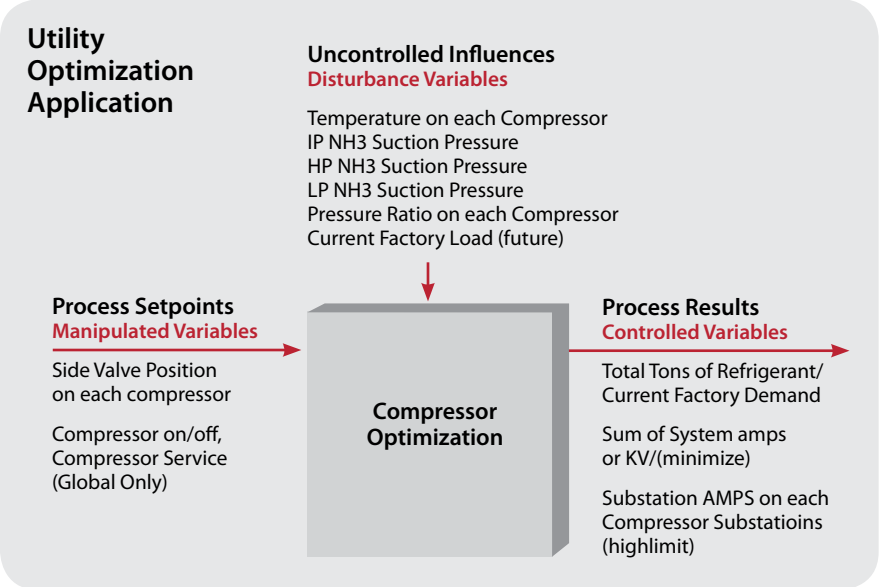
Following the ValueFirst™ customer engagement methodology, Rockwell Software performed an in-depth benefits analysis and identified a solution that would help the client achieve their key goals and objectives. Rockwell Software recommended a multi-unit optimization solution to identify the best operating decision for the primary utility system. The Rockwell Software solution integrates directly to the SCADA (Supervisory Control and Data Acquisition) system. The software continually assesses existing and optimized compressor sequences and makes recommended changes to the compressors based on each compressor's load curve. The solution also helped the company analyze and recommend process improvements like equipment start-up and shut-down, that will enhance the performance of the plant. Additionally, the solution helps the client handle unanticipated problems that arise from such occurrences as vibration and temperature limits.

Hot Results for Frozen Food Company

Pavilion's solution offered this frozen foods company a payback in less than 11 months by reducing compressor energy requirements by 3 to 8 percent. In fact, using the multiunit optimization solution and considering the system as a whole, this plant is exploiting multiple header options and compressor efficiency curves to achieve each of its objectives. The software solution provided the following benefits:

- Reliably delivered ammonia refrigerant to three primary pressure headers (HS, IS and LS)
- Reduced electrical energy costs through improved dispatch, load assignment and controllable parameters by 3-8%
- Reduced KW/TR by at least 6.5%
- Payback in 11 months

Although the client achieved all of their objectives with the 'open-loop' control solution, the company recognizes the opportunity to achieve additional benefits with a 'closed-loop' control solution that provides automatic adjustments to the process. However, with operations now running efficiently and energy bills under control, the plant has a reliable utility system.



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