REFRIGERATION

Could control strategies optimize the energy efficiency of existing refrigeration systems?

Control systems vary in complexity from small programmable logic controllers to full-system controllers. Controls can optimize one part of the refrigeration cycle or control a variety of parameters to optimize energy use for the entire system.

- Use localized programmable logic controllers to continuously adjust individual components of the refrigeration system for maximum efficiency.
- Improve energy efficiency by using floating suction pressure control to continually optimize suction pressure set points based on cooling requirements.
- Optimize the freezer temperature set point to raise temperatures in refrigerated spaces while maintaining safe product temperatures.

Are there opportunities to reduce compressor energy use through operations and maintenance, O&M, or capital improvements?

Compressors typically consume more energy than any other component in a cold storage facility. Compressor improvements can significantly improve refrigeration energy efficiency.

- Decrease the head pressure set point and increase the suction pressure set point to the greatest extent that conditions allow. Increased suction pressure and decreased head pressure reduce compression ratio or lift, which reduces energy use.
- Stage compressor operation to fit the refrigeration load of the facility over the entire range of operating conditions. Operate with one or more compressors at full load, and use a compressor with efficient part-load performance as a trim unit.

Could improvements in evaporator energy efficiency reduce energy use of the entire refrigeration system?

Evaporators are typically an energy intensive component in industrial refrigeration equipment. Several proven energy-efficiency opportunities are available for evaporator fans and coils.

- Fine tune the floating suction pressure set point to optimize compressor efficiency.
- Clean the evaporator coil regularly to improve heat-transfer efficiency.
- Install controls to change constant- speed evaporator fans to an on/off cycle to reduce evaporator fan run time.
- Optimize the minimum-speed setting for evaporator fans using VFD control.

Have condensers and related systems been improved to optimize system energy efficiency?

Condenser systems account for a sizable portion of cold storage energy use. Energy-efficiency upgrades range from simple O&M measures to capital investments.

- Program control systems to optimize the floating head pressure set point.
- Optimize the minimum speed setting for condenser fans.
- Adjust fixed condensing pressure set point to the lowest possible safe setting.
- Clean condenser surfaces to improve the efficiency of heat transfer.
- Descale water-cooled condenser tubes to improve water flow and heat transfer.

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