



South-Town Refrigeration



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Company Background

South-Town Refrigeration and Mechanical engineers install and service commercial and industrial refrigeration throughout Minnesota. Operating since 1954, they are the largest company of their industry in the area. In addition to refrigeration, South-Town designs heating, cooling, building automation, custom ductwork and energy saving solutions for their clients.



“MnTAP is an incredible program that brings together people with a deep passion for the planet and inspires innovation and environmental stewardship. I’m very thankful for the opportunity to learn hands-on, while knowing that my work will make a difference.” ~ JKS

Project Background

Grocery stores consume far more energy than other businesses of comparable square-footage and a big reason for that is their walls are lined with refrigerated cases operating constantly. In addition, the refrigerants used in these systems are usually potent greenhouse gases. Grocery store owner/operators often lack the refrigeration expertise necessary to maximize their energy efficiency and recognize or prevent leaks.

The goal of this project is to provide grocery store owners with a comprehensive guide to operating their refrigeration system as efficiently as possible, focusing on practices with little or no capital cost.

Incentives To Change

Fifty-eight percent of the electricity consumed by grocery stores is accounted for by refrigeration, which is a significant impact on their bottom line. EPA estimates a typical grocery store may lose as much as 25% of the refrigerant in their system each year due to leaks. As harmful refrigerants are phased out to reduce global warming, it becomes more expensive or even impossible to refill what is lost. Store owner/operators care about their energy bills and environmental impact, and are interested in implementing efficient solutions that will save them money. In addition, the reliability and security of a refrigeration system is important as refrigeration failure can result in loss of product and major disruption to the business.

SOLUTIONS

Best Practices Guide

A comprehensive guide to general refrigeration system operation and maintenance was drafted. Written in approachable language, the guide details how to identify a myriad of equipment issues. It offers instructions that grocery store staff can follow for basic maintenance and inspections, and allows owner/operators to recognize and request service sooner for issues that require technician servicing. Implementing these practices will help grocery store owner/operators to improve their systems energy efficiency at the cost of a small amount of time per month. The guide can be found at www.mntap.umn.edu/resources/tools-calculators

Condenser Cleaning

Air cooled condensers are typically mounted on the roof of a grocery store and reject heat from hot refrigerant

“The MnTAP internship program provided South-Town Refrigeration & Mechanical with information to support all small and local retailers across Minnesota in maintaining and operating their refrigeration systems. This program is a great step towards improving refrigeration efficiency across the state”

*~ Ryan Welty, President
South-Town Refrigeration & Mechanical*

Solutions

by blowing air across a network of tubing. The intake of the unit must be cleared regularly, or dust and debris will quickly accumulate, reducing airflow and efficiency. Many medium to small grocery stores do not go up to the roof to check this on a regular basis. Therefore, it is recommended to clean the coils monthly and document this on the best practices checklist.

Insulation Repair

When refrigerant in transfer piping absorbs heat from the surroundings, it adds load to the system and increases energy usage. Two refrigeration assessments identified areas where missing or degraded pipe insulation was decreasing system efficiency. In one case, an initial quote of \$18,000 to repair 1,200 ft of insulation was out of the budget, but the necessary repairs could be made in-house for \$4,800 in materials and about 100 hours labor; a total cost of \$6,300. IR temperature readings and 3E Plus® software were utilized to estimate the energy savings at 38,500 kWh and \$3,400/yr, for a payback time of 1.8 years. A second assessment identified 30 feet of degraded outdoor insulation, which requires PVC jacketing to protect it from rapid UV degradation at an extra \$2/ft. The cost for materials and labor was estimated at \$300, with an expected savings of \$100 and 1,200 kWh/yr.

Awning & Spray Mister

Two condensing units were found mounted too close to the outside wall to maintain proper airflow, but moving

them was cost prohibitive. Instead, the cooling capacity of the air around them was increased to improve performance. An awning was constructed to shade the units, lowering the air temperature, and a hose with small misting nozzles was installed above the unit to increase the moisture and heat capacity of the air.



Case Loading

Open air refrigerated product cases use an air curtain to keep cold air inside the case. When product blocks the intake, the airflow pattern is disrupted and the insulation and efficiency of the case are compromised. The estimated annual cost of incorrectly loading a case is 520 kWh and \$46 per foot of case. During one walkthrough, a case with 2 feet improperly loaded was observed. Over a year, this would lead to an added 1,040 kWh and \$92 in costs. Correct case loading takes very little time and no money; however, it must be continually monitored as product is constantly being refilled and rearranged by employees and customers.

Recommendation	Annual Reduction	Annual Savings	Status
Best Practices Guide	5,700 kWh-18,200 kWh*	\$500-\$1,600*	Implemented at 8 stores
Condenser Cleaning	3,100 kWh-15,600 kWh*	\$300-\$1,400*	Implemented at 8 stores
Insulation Repair	39,700 kWh	\$3,500	Recommended
Awning and Spray Mister	12,100 kWh	\$1,080	Implemented
Case Loading	1,000 kWh	\$90	Recommended

*Varies by store size and previous observance of best practice.

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