

Intern identifies energy savings opportunities at Nordic Ware

Nordic Ware located in Minneapolis, Minnesota, manufactures kitchenware. In 2005, the company participated in the MnTAP intern program to identify ways to reduce energy use in the finishing department.

Process Overview

Nordic Ware manufactures cookware, bakeware, microwave, and barbeque products. The manufacturing process includes plastic compression and injection molding, power press and related secondary operations, and spray application of liquid and powder coatings. During production, Nordic Ware operates 17 paint booths, six large conveyor cure ovens and six batch cure ovens. In addition to cookware manufacturing, Nordic Ware operates an industrial coating division, which provides custom surface coating.

Incentives for Change

Increased manufacturing costs in many areas of the business necessitated evaluating as many cost saving options as possible. The company wanted to investigate opportunities to reduce energy consumption, to not only reduce production costs, but also Nordic Ware's impact on the environment.

Energy Reduction Project

A MnTAP intern analyzed the current energy use at Nordic Ware and determined possible energy saving opportunities. Three areas of focus were identified: current use of air make-up units, spray booth exhaust procedures, and boiler efficiency.

Air Make-Up Units

Painting operations continually exhaust air in order to comply with OSHA worker safety requirements and fire safety codes. The exhausted air must be replaced by fresh air from an air make-up unit in order to prevent extreme negative pressure in the



A MnTAP intern analyzed the current energy use at Nordic Ware. Here he is checking the air flow at a roof make-up air unit.

building and provide a comfortable workplace for employees.

Nordic Ware utilized nine air make-up units throughout five buildings to replace the air exhausted from spray painting booths in the coatings area. Prior to the project, some of the air make-up units were running during non-operating hours as a source of heat, which is an inefficient practice. The air make-up units were capable of heating 350,000 ft³ of outside air to room temperature every minute, which then was exhausted by the air booth exhaust ducts. Considering the substantial energy and economic costs of heating a large, unoccupied space, the intern recommended that Nordic Ware evaluate heating alternatives to replace the air make-up units as the primary sources of heat, resulting in cost savings.

The intern also recommended that Nordic Ware evaluate and perform maintenance on the air make-up units to determine if any units needed repair or replacement. One particular building, the Coatings building, requires three air make-up units to ventilate the area due to the volume of air being exhausted by the painting processes. Based on the intern's suggestions, Nordic Ware replaced one air make-up unit in the building due to its age and inability to be reliably switched on and

Benefits Overview

Waste Reduction Option	Waste Reduced/ Materials Savings	Annual Cost Savings
Modifying and replacing of air make-up units	43,000 therms	\$40,000
Adding gas unit heaters and turning off equipment	16,000 therms	\$15,000

off during the heating season. Another air make-up unit in the same building was repaired and the controls were moved to give employees easy access and visual signals regarding the status of the unit.

Additionally, based on the evaluation of the heating requirements and recommendations from the intern, four gas unit heaters with thermostatic controls were added, allowing the three air make-up units to be shut down during non-production times in the coating building. Gas unit heaters simply heat room air and force it into the room with a fan or blower, similar to a space heater. In order for the gas unit heaters to work properly Nordic Ware had to install natural gas piping, electrical wiring, and venting for the combustion exhaust. After the gas unit heaters were installed the air make up units were no longer used as a source of heat during non-production hours resulting in lower natural gas usage. Additionally, Nordic Ware has updated their shutdown procedures for night and weekend shutdown and may consider more integrated control systems when paint lines are upgraded or replaced.

The intern's suggestions for the packaging/shipping building included installing two gas unit heaters and retiring a 4 MMBTU/H air make-up unit. The air make-up unit was not removed, but was left as a back-up heat source for the extreme cold winter temperatures. After implementation of the project Nordic Ware upgraded their ceiling fans to help circulate the air and move warm air from the high ceiling down to the work level.

Spray Booth Exhaust Maintenance

The spray paint booths use gravity dampers on their exhaust system to prevent heat loss when the booths are turned off. While inspecting the gravity dampers at Nordic Ware, the intern found that many of them were not able to close properly due to age and lack of adequate maintenance. A regular maintenance schedule of the spray booths will ensure that the exhaust vents

operate correctly and prevent cold air from entering when the booth is off. Nine dampers were replaced and the others repaired and cleaned to ensure correct operations. Nordic Ware implemented an operation and maintenance plan including inspections of the exhaust systems including the dampers.

Boiler Replacement

Nordic Ware implemented another project involving the steam boiler used to heat some areas of the main coating building. The 3.7 MMBTU/H rated steam boiler was only utilized to 1 MMBTU/H. Nordic Ware retired the boiler and installed a 300,000 Btu/h hot water heating system supplemented with a few small electric baseboard heaters in the restrooms. Not only does this new heating system save energy costs and reduce air emissions, but requires less space in the facility as it is compact enough to fit in a closet. Plans are underway to convert the old boiler room into an air compressor room, reducing the noise in the production area and allowing more room in the coating department for staging in-process products.

Benefits

Modifying and replacing the air make-up units in the coating building as well as installing four gas unit heaters has saved the company approximately \$40,000 and reduced their energy use by 43,000 therms annually. It is estimated that adding two gas unit heaters and turning off the 4 MMBTU/H air make up unit in the packaging and shipping building has saved \$15,000/yr and reduced energy use by 16,000 therms. Nordic Ware also benefitted from improved heating efficiencies, reclaimed floor space, and reduced regulations involving the boiler.

**This project was conducted by MnTAP intern Ryan Schaefer, a mechanical engineering student at the University of Minnesota, Duluth.*



For More Information

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