VERMEER CORPORATION

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PELLA

COMPANY BACKGROUND

Founded in 1948, Vermeer Corporation has grown from a one-man operation into an international leader in the manufacture of agriculture, construction, mining and forage equipment. At the Pella campus, more than 2,000 employees work across seven manufacturing plants and 1.5 million square feet to research, design, assemble and fabricate the full line of Vermeer products.

PROJECT BACKGROUND

As an aid to its Environmental Health and Safety Department, the Pollution Prevention intern will help Vermeer reduce its environmental impact throughout the manufacturing process. After two successful internships with the program, Vermeer is hosting an intern that will complete a campus-wide energy audit and projects to conserve electricity and natural gas.

INCENTIVES FOR CHANGE

Vermeer strives to integrate Lean principles into every aspect of the business — quality, cost, delivery, safety and morale. The company is committed to improved production efficiency and enhanced product quality and reliability, and continually evaluates all processes to identify opportunities to improve efficiency.

Current projects at Vermeer include implementing an extensive recycling program, upgrading lighting and installing a geothermal cooling loop. Recently, Vermeer set a goal to reduce both electrical and natural gas consumption by 10 percent. Reducing waste and using energy more efficiently could significantly lower utility costs and keep the company competitive in foreign markets.

RESULTS

Destratification Fans: Stratification is the phenomenon of warm air rising in an indoor environment. Vermeer has documented a temperature differential of 10 – 20 °F from the floor to the ceiling. During the winter months, providing heat to the buildings accounts for a large portion of Vermeer's energy use. Most of this energy is heating the upper half of the building, when the heat is needed at the work level below. Destratification fans are high-efficiency units that force a column of warm air down to the actual workspace. The redistribution of warm air would provide a more thermally equalized work environment and reduce heating costs.

Lighting Occupancy Sensors: Lighting accounts for 10 to 15 percent of the electrical consumption in each building.

Occupancy sensors turn lights off when the work area is not occupied. Installing occupancy sensors in lower traffic areas of the buildings could produce substantial savings.

Vending Misers: Vending misers operate as occupancy sensors for vending machines; they turn off the lights and reduce the number of refrigeration cycles when not in use. Installing vending misers could reduce the energy use of each vending machine by approximately 46 percent.

Variable Frequency Drive (VFD) Motors on Engine Exhaust Fans: A VFD adjusts the operating frequency of the motor based on demand. Vermeer currently uses a large electric motor and drop-down piping to expel exhaust outside the building when a piece of equipment is in use. One large pipe comes down from the blower, with four to six drop-down pipes coming off of the main pipe. These drop-down pipes connect to the exhaust point of a gas-powered engine. The exhaust runs at full load capacity at all times.

Along with installing VFDs on the motor, dampers should be installed on the drop-down pipes to close a pipe when not in use. A pressure sensor determines the exhaust load from the open pipes and regulates the AC motor current based on the demand. In addition to producing significant electrical savings, this modification would keep more warm air inside the building, reducing the natural gas load on the heaters.

Waste Heat Recovery on Air Compressors: Warm air from the compressors is expelled at approximately 144°F. Rerouting this air into the adjacent work areas could reduce the heating load in three buildings. To avoid excessive heat in the summer, a split in the air exhaust piping would allow the heat to be rerouted into the adjacent work areas in the winter and expelled into the atmosphere in the summer.

VFDs on Multi-stage Washer Motors: Currently, a throttling valve controls the flow characteristic of the multi-stage washer line. Energy can be conserved by replacing the throttling valve with a VFD that would regulate the AC motor current. A VFD could reduce the energy use of these motors up to 50 percent.

Chiller Economizer Package for EcoCenter Distiller: Vermeer is in the process of installing a cold water chilling loop to cool the distillation process in the EcoCenter. An

economizer package added to this system would utilize cold air from the environment when the temperature is below the set point. The economizer could provide free cooling for approximately 27 percent of the year.

Energy Recovery Makeup Air Handling Units (MAUs): The heating, ventilation and air conditioning equipment on one building is not performing satisfactorily and will likely be replaced to ensure the specified five air exchanges per hour. Heat recovery MAUs transfer the heat from hot outgoing air to the cool incoming air. Installing heat recovery MAUs when replacing this equipment could reduce heating costs by up to 61 percent.

Paint Burn Off Oven Waste Heat Recovery: An oven in the EcoCenter burns paint from the hooks used to hang parts on the paint line. This oven expels air at 850–1400°F. The company could harvest this energy to create electricity.

Paper Towel Replacement: Reducing paper towel consumption by 80 percent at Vermeer could save $29,000 dollars annually and divert 7.82 tons of landfill waste. Efficient blow dryers that provide a 12.5-second dry time are an efficient alternative to the costly paper towels.