2011 24-WEEK INTERNSHIP

VERMEER CORPORATION

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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, Iowa, campus, more than 2,000 employees work across seven manufacturing plants and 1.5 million square feet to research, design, fabricate, and assemble the full line of Vermeer products.

PROJECT BACKGROUND

As an aid to its Environmental Health and Safety department, the Pollution Prevention Intern Program will help Vermeer reduce its environmental impact throughout the manufacturing process. After two successful internships with the program, Vermeer hosted a 24-week intern in 2011 to complete a campus-wide energy audit and identify projects to conserve electricity and natural gas. Vermeer will also benefit from replicating feasible recommendations at a South Dakota facility.

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: 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 would reduce heating costs.

Occupancy Sensors: Lighting accounts for 10 percent 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 Drives (VFD) on Multistage Washer Motors: A VFD adjusts the operating frequency of the motor based on demand. 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.

Compressed Air:

Repair Compressed Air Leaks: Compressed air is one of the most costly utilities at manufacturing facilities. The intern used an ultrasonic leak detector to identify and tag compressed air leaks. Fixing these air leaks would save 1,013,094 kWh of electricity annually.

Leak Detection Maintenance Plan: Allowing air leaks to develop decreases the amount of air available to critical applications, reducing production efficiency and increasing risk of injury to equipment operators. It is much more cost effective to adopt a scheduled leak detection plan to keep the compressed air system operating at optimum efficiency.

Heat Recovery from 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.

Closed-Loop Cooling Process: Vermeer is in the process of installing a cold water chilling loop to cool the distillation process in the Eco Center. A closed-loop system would allow the coolant to recirculate through the chiller and distillation process, alleviating the need for continuous feed from municipal water sources.

Heat 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 desired 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.

Refrigerator Replacement: The intern observed several older-model refrigerators in use throughout the plant. Replacing the aging appliances with newer energy efficient models would reduce energy consumption in the break rooms.

Lighting Retrofit: A variety of lighting fixtures are in use throughout the facility. Replacing metal halide lamps with more efficient high-bay T8 lamps and fixtures with electronic ballasts could save electricity costs and also reduce inventory of spare lamps needed.

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. Blow dryers that provide a 12.5-second dry time are an efficient alternative to the costly paper towels.

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO_2	SO_2	CH_4	N_2O	CFC	PM_{10}
1374.73	19.34	318.58	18.77	44.53	0.46

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
DESTRATIFICATION	$152,128	210,754 KWH	RECOMMENDED
OCCUPANCY SENSORS	$27,424	340,940 KWH	RECOMMENDED
VENDING MISERS	$8,730	123,195 KWH	IMPLEMENTED
VFDS ON MULTISTAGE WASHER MOTORS	$2,708	38,839 KWH	RECOMMENDED
REPAIR COMPRESSED AIR LEAKS	$70,643	1,013,094 KWH	IN PROGRESS
LEAK DETECTION MAINTENANCE PLAN	$54,713	885,615 KWH	IN PROGRESS
HEAT RECOVERY (AIR COMPRESSORS)	$13,137	17,005 THERMS	RECOMMENDED
CLOSED-LOOP COOLING PROCESS	$6,776	3,153,000 GALLONS	IMPLEMENTED
HEAT RECOVERY (MAUS)	$63,201	90,639 THERMS	RECOMMENDED
REFRIGERATOR REPLACEMENT	$2,196	30,470 KWH	IN PROGRESS
LIGHTING RETROFIT	$1,791	25,691 KWH	RECOMMENDED
PAPER TOWEL REPLACEMENT	$28,655	9.77 TONS	RECOMMENDED