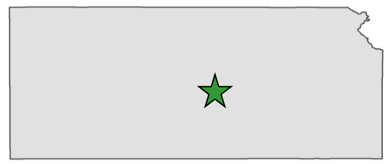
2016 Case Study

The Coleman Company, Inc.

Intern: Zade Safadi
Major: Petroleum Engineering
School: University of Kansas

Wichita, Kansas



Company background

Coleman is a producer of a wide variety of equipment primarily aimed at camping and recreational markets. It produces everything from gas lamps and stoves to tents and sleeping bags. The company was founded in 1900 and now employs more than 3,700 people. Coleman's facility is already advanced in energy efficiency with its maintenance department constantly looking at various ways to improve efficiency.

Project background

Zade Safadi's internship consisted mainly of energy-efficiency projects, including retrofitting air compressors with variable-frequency drives; addition of air-blast coolers to current chillers; replacement of current fluorescents to more efficient LEDs; and an internal leak audit of the air compressors, blowmolds, and rotovac units. The intern worked with the maintenance department, as well as the safety department, to find and implement energy-saving projects that could also improve productivity in the workplace.

Incentives to change

Continually looking for ways to improve efficiency at an already-improved facility, Coleman has participated in the P2 program for three years. In those three years, it has saved, or has the potential to save, more than $970,000, 29,700 MSCF of natural gas, 10,154,700 gal/yr of water, and more than 9,700,000 kWh of energy per year.

P2 projects

The first 2017 P2 intern project consisted of retrofitting Coleman's six active 200-HP air compressors with variable-frequency drives. These heavy-duty compressors are manual-start units, actively running at all times, because no individual is tasked with turning them off. Variable-frequency drives give Coleman the capability to determine when the units do not require full power and automatically lower the amount of power being distributed. Variable-frequency drives require use of an industrial Ethernet network and pressure sensors that allow communication between the devices. Implementing this project with all current active air compressors will save Coleman $50,000 and 632,000 kWh of energy per year.

The second project involved the addition of air-blast coolers to each of the heavy-duty chillers in order to utilize "free cooling" in the facility. Free Cooling is a little-known technology that uses the ambient temperature in the winter months to provide cooling. This technology has the potential to save a facility more than 70% of energy and cost it takes to run a single chiller. With the Wichita area experiencing more than 5,000 hours of winter-like temperatures, Coleman has the potential to save more than $450,000 and 5,800,000 kWh of energy per year for its 20 heavy-duty chillers that range from 25 to 40 tons in size. With the average cost of an air-blast cooler (with installation) ranging from $18,000 to $22,000, the payback is less than one year if all chillers were to be replaced.

The third project completed was a compressed-air audit using the UE 10000 Ultraprobe. The audit was done on the units most vulnerable to leaks, so the 28 blow molds, 12 assembly lines, 11 rotovacs, and two sheet lines were tested. The Ultraprobe uses ultrasound technology capable of detecting leaks in areas that would otherwise not be discernable with the naked ear. A complete report of the audit with pictures is viewable in Safadi's intern report. Twenty-eight leaks were found, and if sealed, would save Coleman $17,000 and 215,000 kWh of energy.

The fourth project was an LED light replacement. Coleman currently has roughly 1,000 fluorescent bulbs throughout the facility in predominate spaces such as assembly lines and blow mold areas. While fluorescents are better than some types of bulbs, they are not the most efficient. Safadi looked into replacing the fluorescents with LEDs in order to increase energy efficiency in the facility. He was able to find LED' that used half the wattage of the fluorescents, which saved around $11,500 and 146,800 kWh of energy. However, he later determined this project could not be implemented due to the amount of lumens in the LEDs compared to the fluorescents. The LEDs contained less lumens meaning they will not be as bright as the fluorescents. Any chance of negatively affecting assembly line workers can be a hazard, which is why this project is not recommended.

The fifth and final project dealt with heat distribution in the facility. Coleman faces high levels of heat in the facility that may affect productivity of the workers. To combat these high levels of heat, Coleman has approximately 178 high-speed fans in various areas. It has been determined that fans do not make areas cooler, but give the perception the temperature is cooler due to wind-chill effect. Accurately de-stratifying the air can avoid high-heat buildup in the ceiling, balancing ground and ceiling temperatures. This is achievable using high-volume, low-speed (HVLS) fans. Replacing the abundant number of high-speed fans with a few carefully situated HVLS fans will create savings of around $31,000 and 395,000 kWh of energy per year. Further research of this project, including a site visit from an HVLS fan specialist, has rendered this project improbable due the low ceiling heights in required areas.

Table 1: Summary of 2016 intern recommendations for The Coleman Company, Inc.

Project title:	Annual cost savings:	Environmental impact:	$MTCO_2e$ reduced:	Status:
I. Retrofitting air compressors	$50,000	632,260 kWh/yr	618	Recommended
II. "Free cooling"	$459,159	5,886,665 kWh/yr	5,757	Recommended
III. Compressed-air audit	$17,000	215,000 kWh/yr	210	Recommended
IV. LED retrofit	$11,448	146,764 kWh/yr	143	Not recommended
V. HVLS fan replacement	$30,820	395,128 kWh/yr	386	Improbable
Total savings*	$526,159	6,733,925	6,585	

* Does not include projects that are "not recommended" or "further research is needed."