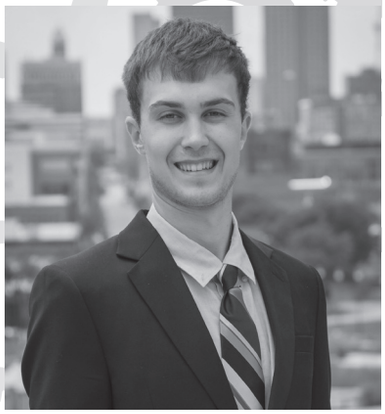

Joe Kranz

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School: Western Illinois University

CNH INDUSTRIAL AMERICA, LLC

BURLINGTON

COMPANY PROFILE

In 1999, Fiat Group acquired Case Corporation and merged the company with New Holland NV, creating CNH Industrial America. Since then, CNH has become a global leader in both construction and agricultural equipment with more than 64,000 employees, 66 manufacturing plants, and 57 research and development centers worldwide. One of the 11 plants in North America is in Burlington, Iowa. The Burlington plant employs more than 400 people and manufactures dozers, tractor loader backhoes, tractor loaders, rough terrain forklifts, and three types of combine headers – corn, draper, and auger.

PROJECT BACKGROUND

The intern focused on two systems throughout the summer. The primary project was to find a heat recovery solution for the powder coat cure oven. Within this project, other ovens throughout the facility were to be prioritized for implementation and expansion. The secondary project was to evaluate different improvements for the shutdown program with the goal of reducing energy consumption. Like the heat recovery project, prioritization of other high energy consuming equipment would be completed to optimize the impact of improvement efforts.

INCENTIVES TO CHANGE

CNH Industrial uses a program called World Class Manufacturing (WCM) which provides guidance for continuous improvements of operations. The goal of WCM is to eliminate all waste within the company, whether it be material, time, or, in this case, energy. Additionally, the Burlington plant is certified to International Organization for Standardization (ISO) 50001, which provides a framework for energy improvements.

This project demonstrates how environmental improvements can reduce utility costs and associated emissions.

RESULTS

Heat Recovery- Powder Coat Cure Oven: For the powder coat paint system, a large amount of exhausted heat and energy is released into the atmosphere. The main source of exhausted energy in this paint system is the cure oven. The cure oven uses a variable speed exhaust fan, which causes the air flow and temperature leaving the stack to vary. With temperatures ranging up to 360 degrees Fahrenheit, heat from this stack was prioritized for recovery and reuse elsewhere in the plant.

It was determined that a heat exchanger, installed on the cure oven exhaust system, could capture the heat before it entered the atmosphere and then transfer the energy to the nearby hot

water boiler return system. Using the forces of gravity or a small transfer pump, the return water could be pumped through a coil system in the heat exchanger. The high temperature exhaust gases would move in a crossflow pattern with the exchanger coils allowing the water to absorb the maximum amount of heat. This heat recovery system could be used year-round, reducing costs, natural gas usage, and CO_2 emissions associated with heating water.

Heat Recovery Expansion: Other oven systems throughout the facility provide opportunities for expansion of the heat recovery initiative. The electrocoat (ecoat) bake oven is the largest oven in the plant. A heat recovery system as described above could be replicated on the ecoat oven and integrated with the wastewater boiler. Adding a heat recovery system to the ecoat oven could reduce energy usage and associated emissions.

Shutdown Program- 2nd Shift Ecoat Ovens: The ovens on the ecoat paint line are large contributors to energy usage during first and second shift. Currently, the ovens are left on overnight although there is a period of five hours where production is halted. Being that the two largest consumers of energy in this paint line are the bake oven and the Haden oven, useless energy is being consumed. Turning the ovens off overnight after second shift could result in significant energy savings.

Shutdown Program- Drum Fans: Many fans are left on overnight throughout the plant including ceiling fans, personal fans, and drum fans. Within construction equipment (CE) assembly, 30 large drum fans are constantly left on. One reason for this is that the on/off switches are hard to reach. A short-term solution would be to centralize the on/off switches for a group of 10 drum fans throughout CE assembly. This would make it easier for employees to turn the fans on and off, saving energy. Ideally, occupancy sensors would be installed to provide the most reliable, long-term solution, reducing the need for manual operation.

Shutdown Program- Double Ender: Another piece of equipment left on overnight is a double ended lathe used for dozer fabrication. The total horsepower (hp) for this machine is 62hp. While the two 30hp motors get turned off, often a 2hp oil pump motor is left on, leading to unnecessary energy consumption. To ensure this motor gets turned off, a recommendation for a standard operating procedure is being made. This will ensure employees are familiar with how to turn the device off. Behavior practices can be modified using training and awareness to save electricity.

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
HEAT RECOVERY- POWDER COAT CURE OVEN	$1,998	6,891 therms 80,599 Lbs. of CO_2	RECOMMENDED
HEAT RECOVERY EXPANSION	$12,757	43,989 therms 514,730 lbs. of CO_2	RECOMMENDED
SHUTDOWN PROGRAM - 2ND SHIFT ECOAT OVENS	$27,739	95,653 therms	RECOMMENDED
SHUTDOWN PROGRAM - DRUM FANS	$4,562	48,020 kWh	RECOMMENDED
SHUTDOWN PROGRAM - DOUBLE ENDER	$722	7,600 kWh	RECOMMENDED