SMITHFIELD FOODS, INC. - SIOUX CITY

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COMPANY PROFILE
Smithfield Foods, Inc. is the world's largest pork processor and hog producer. The company is committed to providing good food in a responsible way and maintains robust animal care, community involvement, employee safety, environmental, and food safety and quality programs. In the United States, the company is also the leader in numerous packaged meats categories with popular brands including Smithfield®, Eckrich®, Nathan's Famous®, Farmland®, Armour®, Farmer John®, Kretschmar®, John Morrell®, Cook's®, Gwaltney®, Carando®, Margherita®, Curly's®, Healthy Ones®, Morliny®, Krakus®, and Berlinki®. The company's facility in Sioux City, Iowa, produces packaged meats, specializing in barbeque meats and pork ribs. With more than 600 employees, Sioux City's facility is capable of processing more than 100 million pounds of meat.

PROJECT BACKGROUND

Smithfield's Sioux City facility is continually pursuing projects that increase sustainability and improve environmental performance. Cooling water is required for several types of machines throughout the facility. Incorporation of a cooling system would provide opportunities for much of this water to be reused throughout the process before being discharged. Excess water use in cooking and sanitation processes could be reduced by automating systems and modifying procedures.

INCENTIVES TO CHANGE

Smithfield has many sustainability goals and targets aligned with reducing its environmental impact, earning ISO 14001 certifications in all applicable facilities in 2005. By 2020, it is expected that all farms and facilities will reduce water usage by 10 percent and energy by 5 percent from a 2014 baseline. The Sioux City facility strives to exceed these goals. As part of the company's commitment to responsible operations, two previous Pollution Prevention interns completed projects in compressed air system efficiency and solid waste reduction. This summer's project to reduce water usage throughout the facility will align the Sioux City facility with the company's sustainability targets while reducing operating costs.

RESULTS

Spray Injector Closed-Loop Cooling: Two spray injector machines are used on the preparation side of the facility to inject brine evenly into a variety of meats, such as pork shoulder, chicken breast, and chuck roast. Cooling water is used to remove heat from the machine's oil and keep it running in optimal condition. A single-pass cooling system is used with a valve controlling the cooling water based on oil temperature. The control valves in both injectors were not operating properly resulting in a continuous flow of cooling water. Replacing the single-pass system with a closed-loop cooling system could generate significant water savings. A closed-loop system would pump heated water through a cooler and then recycle it to the cooling water inlet. Holding tanks would be used prior to the heated discharge streams entering the coolers. Similar closed-loop systems are currently used for other processes at the facility and could be easily replicated for use with the spray injectors. The equipment for the closed-loop system is scheduled to be purchased and installed once the plant completes its changeover to closed-loop systems for other specified processes.

Conveyer Belt Sanitation Timer: Clean-in-place (CIP) systems are installed on the ends of two conveyer belts in the rib room, which allows for sanitation of the belts without constant employee supervision. Workers connect the hose to the CIP system, which sprays water through gaps in the continuously moving belt and sanitizes the belt surface. Once the hose is connected, workers may move on to another task while the system runs. Current requirements dictate the CIP run for two minutes, allowing for three full passes of the belt, which has proven effective for cleaning and sanitizing the belts. However, with this process being controlled manually, it often runs continuously and longer than necessary, until someone is free to shut it off.

Installing a solenoid valve and timer to automatically close the hot water pipe after two minutes would effectively manage the run times of the CIP systems and alleviate the need for manual operation of the process. In addition to significant reductions in water usage, automating this process could enable the sanitation employees to perform other tasks uninterrupted while the CIP is running. To implement this recommendation, a timer and solenoid valve will need to be ordered and installed on the hot water pipe.

Serpentine Oven Cold Water Automated Filling: Serpentine ovens have continuous moving trays that hold meat during cooking. The trays move horizontally along the bottom of the oven and then vertically move in a serpentine motion through the rest of the oven. Hot water is used to blanket the bottom of the oven to collect and drain grease and meat scraps that fall off the product during the cooking process. Since the water takes more than 15 minutes to fill, employees load the ovens with meat before terminating the fill which leads to overfilling, especially in less-trafficked areas of the cookhouse.

A switch and solenoid system could be installed on the water tanks to prevent overfilling. By switching pipe-header connections and installing probes with solenoid valves on the current water pipes, significant water and energy savings could be realized. It was also determined that hot water is not required for this particular process. Switching to cold water for filling the ovens could reduce natural gas used for heating this water. To implement this recommendation, each Serpentine oven would need to have a solenoid system installed on the source pipe, and water tanks would each need an electronic probe installed at the fill line. The piping connections could be switched during a scheduled shutdown of the cookhouse.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Spray Injector Closed-Loop Cooling	$10,855	1,955,893 gallons	Recommended
Conveyer Belt Sanitation Timer	$3,049	337,886 gallons 3,170 therms	Recommended
Serpentine Oven Cold Water Automated Filling	$15,534	1,359,971 gallons 21,580 therms	Recommended