TYSON FRESH MEATS, INC.

STORM LAKE

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COMPANY PROFILE
Tyson Fresh Meats Inc. is a multi-national corporation founded in 1935 that produces value-added foods, prepared foods, and commodity meats at its 123 processing plants. Farmers from 18 states are contracted to supply livestock to the processing plants throughout the country. The company has grown to be the world's second largest processor of chicken, beef, and pork with more than 122,000 employees. The Tyson Fresh Meats facility located in Storm Lake, Iowa, is one of Tyson's six pork processing plants, has more than 2,200 employees, and processes more than 17,000 hogs daily.

PROJECT BACKGROUND

Pork processing is a very water intensive process. Water is used in most every stage of pork production including: harvesting, process applications, heating and cooling, steam generation, and sanitation. In 2017, Tyson Storm Lake partnered with the Pollution Prevention (P2) Intern Program to reduce water use in the process areas of the plant. Building on the successes of that project, Tyson Storm Lake again requested an intern with the P2 program to reduce water usage in the mechanical systems and targeted process areas of the plant. This year's project identified opportunities in the boiler and steam system and on the harvest floor.

INCENTIVES TO CHANGE

Since 2006, Tyson has created an annual sustainability report with a focus on animal welfare, food, community, the workplace, and the environment. One of Tyson's environmental goals is to achieve a 12 percent reduction in water used per pound of product by 2020 from a 2015 baseline. As of 2018, water usage per pound of product has been reduced approximately 3 percent from the 2015 baseline. This year's P2 Intern project will help further reduce water and natural gas usage at the Storm Lake plant contributing to the company-wide sustainability goals.

RESULTS

Boiler Flash Tank Economizer: Boiler blowdown occurs when the level of solids in the boiler water reaches a certain threshold. Removing this water keeps the boilers operating efficiently. Due to the high temperature of the blowdown water it cannot be sent directly to the drain. Instead, it is sent to a flash tank that converts the blowdown water into steam using a sudden pressure drop. Because of the solids present in the blowdown water, the resulting steam could not be used in the plant processes and is being vented to the atmosphere. Reusing this steam could lower the demand on the boilers and reduce the overall water and natural gas costs. Replacing the current flash tank with a flash tank economizer would allow this steam to be used by the deaerator to remove oxygen from the feedwater. A flash tank economizer uses centrifugal motion in an entrainment baffle to separate blowdown water from steam. Steam from the boilers that had been supplying the deaerator could instead be sent to processes throughout the plant. To implement this project, funding would need to be approved, equipment purchased, and piping from the flash tank economizer to the deaerator would need to be installed.

Steam Trap Repair: When steam utilizes its energy to heat product, it eventually condenses back into a hot liquid called condensate. Steam traps ensure that steam systems are operating as efficiently as possible by removing condensate from equipment and returning it to the boilers to be turned back into steam. Over time, traps become inefficient (failed), which can lead to energy loss, water loss, and damage to piping and equipment in the steam system from water hammer. Using an ultrasonic leak detector and a non-contact thermometer, the intern conducted an analysis of the steam system. Nearly 40 percent of the steam traps were found to have failed and 44 percent of the traps were leaking. Repairing the steam traps could increase the amount of condensate return from the traps by 20 percent and lower the high demand of steam production on the boilers. It would also improve the speed and efficiency of equipment throughout the plant, and reduce both water and natural gas usage and associated costs. Next steps for achieving efficiency of the steam system are to repair leaks, and repair or replace steam traps as needed.

Steam Trap Preventative Maintenance: A preventative maintenance program (PM) implemented by maintenance staff would help to maintain the efficiency of the steam system and reduce equipment damage. According to a U.S. Department of Energy publication series on energy efficiency, approximately 20 percent of steam can be lost to leaking traps in a typical distribution system that does not have a preventative maintenance program. Having a regularly scheduled PM program would ensure that future failures are identified and repaired in a timely manner, leading to ongoing water and energy savings. An ultrasonic leak detector is an effective tool for both steam and compressed air system preventative maintenance. Standard operating procedures and a cost calculator for failed or leaking steam traps have been prepared by the intern and made available to the maintenance staff. Acquisition and training provided to maintenance staff on use of the leak detector would be the next steps to implement a PM program.

Harvest Floor Water Reduction: The ambient temperature of the harvest floor is very hot due to several pieces of nearby equipment emitting heat into the room. The heat from the equipment also heats the pipes that supply water to the drinking fountains on the harvest floor. In order to keep the temperature of the drinking water cool, the valves on the drinking fountains are left open throughout production so cool water is readily available. The drinking water is not used consistently during a production shift. It was observed that at all other times, the water is going directly to the drain and, eventually, the wastewater treatment plant. When testing the water fountain's current state, the time delay to get cool water from a non-continuous running fountain was found to be less than five seconds. It is recommended that water fountain heads with automatically closing valves be installed on the harvest floor water fountains. Installing these new water fountain heads would reduce water usage by more than 1.3 million gallons annually. To implement this project, funding for the fountain heads will need to be approved and maintenance staff will need to install the new fountain heads.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Boiler Flash Tank Economizer	$20,818	823,062 gallons 84,994 therms	Recommended
Steam Trap Repair	$55,845	4,984,080 gallons 123,851 therms	Recommended
Steam Trap Preventative Maintenance	$27,922	2,492,040 gallons 61,926 therms	Recommended
Harvest Floor Water Reduction	$6,222	1,390,829 gallons	Recommended