AMAN CHAUDHARY

SCHOOL: Augustana College
MAJOR: Mechanical Engineering

JBS USA, LLC

MARSHALLTOWN

COMPANY PROFILE:

JBS Foods is the largest meat processing company in the world, starting operations in 1953. JBS has its corporate office in São Paulo, Brazil, and offers a wide variety of quality, safe, and sustainable meat products across the world. The Marshalltown, Iowa, plant produces Swift Premium and La Herencia pork brands. The pork processing facility in Marshalltown runs 24/7 with three shifts, two production shifts and one sanitation shift, processing about 23,700 hogs daily and employing 2,394 team members.

PROJECT BACKGROUND

One of JBS's largest utilities is natural gas. The intern was tasked with assessing the steam system to improve efficiency and reduce the costs associated with steam generation in the facility. The intern completed a comprehensive assessment and evaluation of the plant's steam generation, supply, and usage, as well as operating costs. After completing the baseline assessment, the largest natural gas users were identified and prioritized based on cost and the amount of steam lost. The intern then explored recommendations to reduce the amount of steam used in various applications to reduce the consumption of natural gas used at the plant while cutting costs.

INCENTIVES TO CHANGE

While working on the intern project at one of the JBS's units in Marshalltown, it is essential to consider the strategic initiative that targets the improvement of energy efficiency and environmental aspects. By identifying and eliminating the unwanted steam system losses, fewer leaks in the steam system and less heat loss will occur, thus increasing the efficiency of the whole system. Increased efficiency reduces production costs and conserves natural resources, contributing to a more sustainable food product.

RESULTS

Steam Vacuums Improvement

Steam Vacuums (Steam Vacs) at the facility are used to cleanse the pigs with steam jets to ensure proper sanitation before further processing of the hog. Currently, the steam vacuums used in the Cutting Department are inefficient and costly in terms of energy use and consume around 90,000 pounds of steam per year. It is recommended to replace the existing Steam Vacs in the Cutting Department with more efficient models. Replacing the steam vacuums with newer, energy efficient models will decrease energy usage, save steam usage, decrease operating expenses, increase efficiency, and support JBS's sustainability initiatives. Newer models are going to have improved insulation and controls, and could potentially use renewable energy, depending on the model that is purchased. This upgrade has been approved by management and will be completed by the end of 2024.

Cooker Unit Improvement

The heating cookers act as the major appliances in the processing steps of many products originating from hogs. The heating cookers can heat up to a maximum temperature of 366°F, which allows the meat product to be well cooked, sterilized, and to undergo other thermal changes that are needed in the process of converting hog derived raw materials into the final products. It is recommended that the company upgrades the cooker unit in the rendering department due to the problems with steam leaks and performance. Flow meters will be installed to control steam usage, which will enhance efficiency,

save costs from steam leaks, and cut out waste. Also, the grease flow controller housing will be redesigned and a preventative maintenance plan should be followed by maintenance staff after the upgrade. All of these changes will help reduce resource use, increase efficiency, and contribute to JBS's sustainability goals. The project has been recommended and the management team has all information to move this recommendation forward.

Steam Leak Repair

The Hair Hydrolyzer is a continuous steam unit, aimed at softening and effectively cooking the hair with steam. It is recommended to repair the steam leak in the rendering department. The Hair Hydrolyzer, which remains crucial for the processing of hog hair, periodically leaks steam from the unit. A preventative maintenance plan should be put in place that provides inspection, early repair, and modern methods of leak detection. Employing expansion joints, readjusting the supports of pipes, and replacing dual valve systems with fixed valves and separators will help in avoiding leakage and erosion. Using these additional components will reduce maintenance and steam leak costs and improve the working of the systems. The plant engineer has started to perform periodic check-ups to monitor the implementation's progress and will continue to be accountable for the implementation of this recommendation.

Fisher Valve Improvement

The Dehair Unit is a piece of equipment with rotating rubber beaters that uses steam to heat the equipment to a standard temperature of 139°F. This equipment guarantees adequate hair elimination from the skin of the hog using hot water immersion and mechanical agitation. If needed, hogs go through several cycles on the Dehair Unit to obtain a satisfactory level of cleanliness. The fisher valves in the dehair unit have steam overflow and leaks. It is recommended to change the fisher valves in the dehair unit to reduce the amount of steam that needs to be generated and to improve operation efficiency. Once the valves are replaced, they should follow a preventative maintenance schedule by the maintenance staff. This project is recommended and is pending management approval.

ENVIRONMENTAL AND ECONOMIC SAVINGS TABLE

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
STEAM VACUUMS IMPROVEMENT	$680,724	1,053,653 therms 19,800,000 gallons	IN PROGRESS
COOKER UNIT IMPROVEMENT	$616,586	1,149,428 therms 20,500,000 gallons	RECOMMENDED
STEAM LEAK REPAIR	$11,414	2,298,857 therms 160,000 gallons	RECOMMENDED
FISHER VALVE IMPROVEMENT	$11,782	604,755 therms 17,500 gallons	RECOMMENDED