



**TYLER CASEY**

**SCHOOL:** St. Ambrose University  
**MAJOR:** Mechanical Engineering and Mathematics

## JBS SWIFT PORK

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OTTUMWA

### COMPANY PROFILE:

JBS is a Brazilian multinational company created in 1953, with more than 400 facilities spanning twenty different countries. JBS is the world's largest protein producer, with its subsidiary, JBS USA, being a leading producer of beef, pork, and poultry. The company operates five pork processing plants in the Midwest, including the one in Ottumwa, IA. The plant produces both pork and bacon, processing more than 21,000 hogs per day and employing more than 2,500 people.

### PROJECT BACKGROUND

The primary project focus was to identify opportunities for solid waste reduction within the plant, with a priority placed on source reduction solutions for cardboard and plastic waste. Electricity use in the wastewater treatment plant was also analyzed, in order to develop cost effective energy efficiency solutions. Detailed baseline assessments were established for both projects and strategies for ongoing data collection were developed as part of the project deliverables.

### INCENTIVES TO CHANGE

As the largest protein producer in the world, JBS is committed to sustainability within their own operations as well as the greater food production system. Due to the Ottumwa plant's sizable production operations, a reduction in the amount of solid waste generated and electricity used will generate a meaningful impact on their environmental footprint and carbon emissions, while reducing their overall consumption of natural resources.

### RESULTS

#### Improved Waste Metrics

While overall landfill and recycling weight totals are tracked separately, having a more detailed breakdown of waste materials generated will allow for more targeted source reduction strategies. Three different tracking sheets were developed to track defective or damaged cardboard, plastics, and waste by department. The sheets will be piloted in designated departments and then their use expanded to other departments.

#### Optimize Placement of Pallet Rollers

Pallets of flat product box bundles are transported via sloped pallet rollers. The slope of one roller section is steep and pallets forcefully hit the stops at the bottom. This can cause the box stacks to either spill to the floor and be discarded, or

misalign, which increases the potential for equipment jams. Reducing the rollers' slope will slow down the pallets and avoid cardboard losses. Maintenance will schedule a time to perform the approved modifications.

#### Case Erector Equipment Modifications

Case erectors are machines that assemble product boxes. They can jam easily if a box doesn't align properly when being discharged, resulting in damaged, unusable boxes. Adding a metal funnel to better guide boxes when discharged will prevent jams and reduce cardboard loss. Maintenance will install the funnel and adjust based on performance.

#### Reducing Combo Damage

JBS uses large, octagon-shaped cardboard containers called combos to transport bulk product. Combos are delivered in flat, banded bundles which are transported by forklifts. Any contamination or forklift damage causes combos to be rendered unusable. A multi-pronged solution to minimize losses includes the use of cardboard sheets and spacers between bundles to create better protection from forklift forks. Combo stacks will also only be stored two bundles high



to improve the accuracy of forklift access. After operational changes are implemented, outcomes will be monitored by JBS staff.

#### Utilize In-House Product Bags

JBS purchases two types of plastic product bags for individual finished products. Each has design drawbacks that can lead to packaging rework and wasted bags. By

switching to an in-house bagging machine and making their own bags, JBS will have more control over the plastic feedstock and bag sizes, allowing for better product fit, less waste, and less rework. Further research will identify the optimal machine and bag thickness before installation.

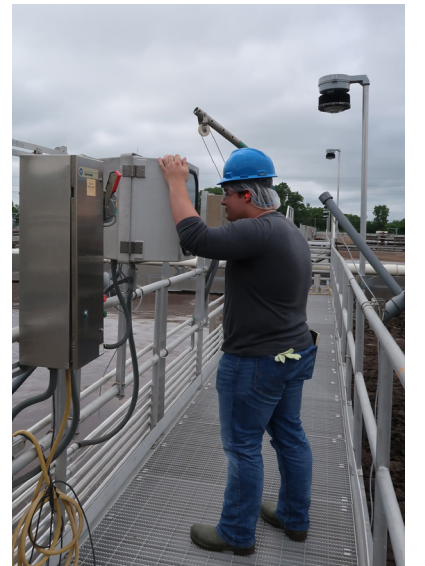
#### Optimize Product Bag Size

In certain departments JBS creates custom product bags. Since bags can be sized to the product, less waste is generated. However, there is often not enough time to adjust bag sizes between product runs so a longer bag size is frequently used for all products. If employees pre-produce smaller bags during down time, bags and product sizes can be better matched, reducing excess plastic use. Employees will be trained on the new procedure before implementation.

#### Improved Collection Containers

An inventory of the production floor indicates there are not enough collection containers to capture recyclable cardboard and plastic. Additionally, employees sometimes use combos for waste collection out of convenience, which then must be landfilled with their contents. Expanding the number of permanent collection solutions for both solid waste and recyclables will create uniform practices and reduce unnecessary waste. After employee training, new containers will be acquired and implemented facility-wide.

**Combos Redesign**  
Cardboard combos are designed to withstand heavy bulk product transport. Redesigning the current combo to use less cardboard, while retaining its current durability and performance, could lead to reduced cardboard generation. The redesigned combo will be tested in various internal production applications before next steps are determined.



#### Replace Wastewater Blowers

In the wastewater treatment plant, five air blowers are used to provide aeration to the aeration basin. They are manually controlled based on the measured levels of dissolved oxygen (DO) present. Replacing these with variable speed drive (VSD) blowers that are automated to respond to DO sensor readings will optimize blower run speeds, making the process more energy and labor efficient. After all system quotes are collected, JBS can submit for budget approval.

### ENVIRONMENTAL AND ECONOMIC SAVINGS TABLE

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
IMPROVED WASTE METRICS	\$8,240	120.4 tons mixed recyclables	IN PROGRESS
OPTIMIZE PLACEMENT OF PALLET ROLLERS	\$14,085	5.3 tons cardboard	IN PROGRESS
CASE ERECTOR EQUIPMENT MODIFICATIONS	\$15,301	11.4 tons cardboard	RECOMMENDED
REDUCING COMBO DAMAGE	\$101,636	76 tons cardboard	IN PROGRESS
UTILIZE IN-HOUSE PRODUCT BAGS	\$184,491	3.3 tons plastic	MORE RESEARCH NEEDED
OPTIMIZE PRODUCT BAG SIZE	\$4,091	2.2 tons plastic	IN PROGRESS
IMPROVED COLLECTION CONTAINERS	\$97,778	51 tons cardboard	IN PROGRESS
COMBOS REDESIGN	\$316,800	225.7 tons cardboard	IN PROGRESS
REPLACE WASTEWATER BLOWERS	\$114,913	1,531,237 kWh	RECOMMENDED