JBS USA, LLC

TREVER TOLLIVER
MECHANICAL ENGINEERING
IOWA STATE UNIVERSITY

COMPANY PROFILE
JBS is the world's leading animal protein processor with more than 200,000 employees worldwide, more than 300 production facilities, and export customers in more than 150 countries. JBS was founded in 1953 and is headquartered in San Paulo, Brazil. The JBS pork processing facility, distribution center, and warehouse in Marshalltown, Iowa, provide fresh quality pork products to domestic and international customers. JBS Marshalltown is one of the largest pork processors in the nation and is continually innovating to improve their process.

PROJECT BACKGROUND
The goal of this project is to identify and recommend strategies to optimize the operating efficiency of the 12 compressed air systems at the plant. This project can help the facility reduce operating costs and associated environmental impacts while continuing to produce high quality products.

INCENTIVES TO CHANGE
JBS is highly committed to identifying opportunities that can improve production efficiency while reducing environmental impact. Compressed air is one of the most costly utilities due to the inefficiencies associated with the process. Compressed air accounts for approximately 11 percent of JBS' total electrical usage. With the critical need to meet the demands of production, identifying opportunities to optimize the efficiency of the system is a priority for JBS.

RESULTS
Compressed Air Leak Detection and Repair: Compressed air leaks contribute to demand within a system by putting strain on the compressors and negatively affecting equipment performance. Eliminating air leaks could significantly reduce energy usage and improve system performance. The intern used an ultrasonic leak detector to identify leaks throughout the system. By fixing the leaks identified, JBS has the potential to save nearly $26,000 annually.

Compressed Air Leak Detection Program: Regular monitoring of leaks is critical to keeping a compressed air system operating effectively. The intern developed a procedure to aid in the leak detection process with recommendations for purchase of associated equipment. Additionally, the intern developed a user-friendly spreadsheet to aid with recording leaks and calculating the saving potential of each leak thus allowing maintenance to easily prioritize which leaks to fix first.

Energy Efficient Drain Traps: Removing condensate is important for maintaining the appropriate air quality in the compressed air system. Significant air loss can occur in the process of removing condensate. Installing energy efficient drain traps after each compressor can reduce air consumption while maintaining the air quality needed.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
COMPRESSED AIR LEAK DETECTION AND REPAIR	$25,596	420,299 KWH	IN PROGRESS
COMPRESSED AIR LEAK DETECTION PROGRAM	$8,532	140,100 KWH	IN PROGRESS
ENERGY EFFICIENT DRAIN TRAPS	$5,292	86,894 KWH	RECOMMENDED
COOLER AIR SWITCH REMOVAL	$35,516	177,342 KWH	IN PROGRESS
TROLLEY BLOW OFF OPTIMIZATION	$3,406	18,640 KWH	RECOMMENDED
EFFICIENT NOZZLES FOR SANITATION EQUIPMENT	$88,193	1,448,159 KWH	IN PROGRESS
ADDED DEMAND STORAGE	$36,832	604,797 KWH	RECOMMENDED

Cooler Air Switch Removal: Many of the air leaks detected were in the air switch system, used to load and unload coolers at JBS. The current switches also require a significant amount of maintenance. Installing manual style switches would remedy the leaks within the system, require less maintenance and save more than $35,000 annually.

Trolley Blow off Optimization: Electronic flow control systems use a switch triggered by a conveying object to turn compressed air on when needed and off when the object passes by. Significant air savings could be achieved by implementing on-demand flow control.

Efficient Nozzles for Sanitation Equipment: The air wands currently used during the sanitation process require large volumes of air, place strain on the compressor, and reduce the supply for production startup. High-efficiency air nozzles combine compressed air and ambient air to produce the high velocity flow necessary for the process. Installing high-efficiency air nozzles, could reduce compressed air usage by more than 90 percent during the cleaning process.

Added Demand Storage: Sufficient storage helps smooth the peaks in demand creating a more stable compressed air supply. With the recent addition of another production line, adding storage is critical to meet production air needs. Installing larger air receivers mated with a flow control valve could gain improved system performance along with significant cost savings.

ESTIMATED CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS
For Implemented and In Progress Recommendations

TOTAL FOR ALL SECTORS						
CO_2	NH_3	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
1,478.93	0.02	2.86	0.43	0.32	5.81	0.11

ESTIMATED GREENHOUSE GASES DIVERTED IN METRIC TONS

TOTAL FOR ALL SECTORS			
$MTCO_2e$	CH_4	N_20	CFC
1,661.55	54.61	9.08	8.89

ESTIMATED CONVENTIONAL AIR POLLUTANTS DIVERTED IN METRIC TONS
For Recommendations in Recommended Status

TOTAL FOR ALL SECTORS						
CO_2	NH_3	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
1,730.81	0.02	3.34	0.50	0.37	6.80	0.13

ESTIMATED GREENHOUSE GASES DIVERTED IN METRIC TONS

TOTAL FOR ALL SECTORS			
$MTCO_2e$	CH_4	N_20	CFC
1,944.53	63.91	10.62	10.40