WEST LIBERTY FOODS, LLC

LUCAS BLACK
MECHANICAL ENGINEERING
UNIVERSITY OF WISCONSIN-PLATTEVILLE

COMPANY BACKGROUND

West Liberty Foods, LLC strives to be a leading food manufacturer by converting needs, ideas, and expertise into value for their members, business partners, and consumers. With achievements such as the SUBWAY 2012 Vendor of Year Award and the 2012 Progressive Grocer's Store Brands Supplier Pacesetter Award, West Liberty Foods has proven its dedication to producing quality products. West Liberty Foods has also displayed its concern for the environment by becoming landfill free, and is now working to prevent pollution by reducing their energy consumption.

PROJECT BACKGROUND

To supply the plant in West Liberty, Iowa, with compressed air needed for their pneumatic equipment, West Liberty Foods operates two compressors simultaneously. High-quality compressed air is essential for production and for meeting company standards. An audit of the complete compressed air system was done to identify inefficiencies and quantify opportunities to save energy and associated costs.

INCENTIVES TO CHANGE

Due to the age of the facility and the fact that air is non-hazardous, the compressed air system at West Liberty Foods had been neglected. With more than 100 air leaks detected, an ineffective distribution system, and no way to control the pressure downstream of the receivers, there were many opportunities to improve the efficiency of the system and reduce energy consumption. As compressed air is one of the company's highest utility costs, it deserves to be monitored closely and updated regularly.

RESULTS

West Liberty Leak Survey: An audit of the compressed air system was completed using an ultrasonic leak detector. Close to 120 leaks were detected. The intern took pictures of each leak, quantified them, and then prioritized the leaks into three groups so that the most severe leaks could be repaired first. When all leaks are repaired there is a potential for almost $40,000 in annual savings.

Distribution System: The compressed air dryers in the West Liberty plant were manufactured in 1988. They are non-cycling and consume unnecessary energy. The dryers are hooked in parallel but are undersized for needed air flow and room heat. This resulted in excess moisture throughout the distribution system, which can do significant damage to pneumatic equipment. Installing a new, properly sized dryer could save more than $16,000 annually.

Demand-side air storage can be beneficial for machines that require a high volume of intermittent air. Instead of drawing high-volume flow from the primary receivers and increasing the load on the compressors, machines would have secondary receivers on site. These would create an initial volume of air for the machine to use before it demands air from the primary receivers, providing a good buffer if demand throughout the plant is high. The result is a lower pressure required from the compressor, decreasing its operating time and consuming less energy. It is expected to reduce pressure demand by about 5 pounds per square inch, saving more than $2,800 annually.

Control System: The control system for West Liberty Foods' rotary screw compressors is a simple load/unload system. This means the compressors are programmed to maintain a certain range of pressure at all times and to operate at 100 percent load when compressing. Load/unload controls are very common for rotary screw compressors and are the most efficient at 100 percent load. Variable frequency drive controls are often thought to be more efficient. However, this only applies to partial loads, and high temperatures in the engine room may prevent this as an option.

Installing a pressure/flow controller to regulate the pressure downstream of the primary receivers would reduce artificial demand from leaks and unregulated processes. This modification would decrease compressor operating time and energy consumption, and could save more than $9,000 per year.

Mount Pleasant Leak Survey: A leak survey of the compressed air system at the Mount Pleasant plant was done using the same process followed at the West Liberty plant. Repair of the forty leaks that were found will save an estimated $20,000 annually.

CONVENTIONAL AIR POLLUTANTS AND GREENHOUSE GASES DIVERTED IN METRIC TONS

TOTAL FOR ALL SECTORS							
CO_2	SO_2	CH_4	N_20	CFC	NO_X	VOC	PM_{10}
882.70	4.76	33.10	0.44	10.80	2.26	0.07	0.18

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
WEST LIBERTY LEAK SURVEY*	$39,410	637,702 KWH	IMPLEMENTED
DISTRIBUTION SYSTEM**	$19,199	141,036 KWH	RECOMMENDED
CONTROL SYSTEM	$9,397	152,098 KWH	RECOMMENDED
MOUNT PLEASANT LEAK SURVEY	$20,000	323,625 KWH	IN PROGRESS

* ASSUMING AIR IS SUPPLIED TO ALL LEAKS 24/7/365
** ASSUMING ELECTRONIC VALVE FAILURES ARE A CAUSE OF EXCESS MOISTURE IN COMPRESSED AIR