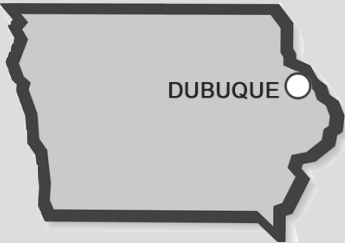


John Deere Dubuque Works

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Deere & Company, usually known by its brand name John Deere, is the world’s leading manufacturer of agricultural and forestry equipment and a major manufacturer of construction equipment. The John Deere Dubuque Works is a manufacturing facility of Deere & Company’s Construction and Forestry Division. Dubuque builds backhoe loaders, crawler tractors, wood bundlers, forwarders, harvesters

and skid steer loaders. The company employs approximately 47,000 people worldwide and 1,800 of these employees are located at the Dubuque facility.

Project Background

John Deere is interested in reducing electrical and steam demand throughout the John Deere Dubuque Works facility. The compressed air system offers an opportunity for continuous improvement based on assessment of operational characteristics, air leak loss, and other air uses throughout the plant.

Incentives to Change

The company will be able to save money by reducing energy use. In addition, lower facility demand for electricity will decrease demand charges at the plant. There are several issues that need to be addressed, which include:

- Operation procedures and unit dispatch
- Leak detection, repair and future plans to lower leak load
- Missing or inefficient air nozzles
- Wasteful end uses which could benefit from electric drive

Current operating characteristics of the compressed air system are wasting a large amount of energy. With some input, equipment needs and operating scenarios can be recommended to decrease air use.

Results

New Air Compressor and Condensate Air Valve Upgrade
After analyzing the supply side of the compressed air system, it was determined a new compressor is needed to properly meet the

demands of the system. Currently, all excess air is blown off, thereby wasting considerable energy. The new air compressor uses a variable frequency drive to match compressor output to system demand, eliminating excess production of compressed air and wasteful blow off. Two condensate drain valves can be upgraded for additional savings.

Leak Reduction

Using an ultrasonic leak detector and walking the entire facility, approximately 175 leaks were found with a total leak demand of about 435 CFM. Leaks continuously waste air, leading to increased electrical demand and inefficient system operation.

Nozzle Upgrades

Several blow-off applications in the plants were missing nozzles. Nozzles greatly reduce compressed air consumption by entraining surrounding air into the air stream. The cleaning power is better than an open pipe and performance is more reliable.

System Pressure Change

Currently the compressors are operated at a higher pressure than required to guarantee the end use pressure. The higher the system pressure, the more energy it takes to compress air. Air leaks also consume more energy at higher system pressure. Reducing system pressure by 5 PSIG will reduce annual electrical demand by 78,000 kWh.

Pump Evaluation

Many air pumps are used throughout the plant to move liquids. Several pumps run continuously, and each was investigated for a potential upgrade. A valve and regulator were replaced on a pump and an adjustment was made to the pressure setting. This action is saving 8,000 kWh per year. Another pump replacement has been recommended, which will reduce electrical demand by 34,830 kWh per year.

	Project	Annual Cost Savings	Environmental Results	Status
	NEW AIR COMPRESSOR	\$93,400	1,739,000 kWh	Implemented in process
	CONDENSATE AIR VALVE UPGRADE	\$4,100	82,000 kWh	Implemented
	LEAK REDUCTION	\$31,400	628,000 kWh	Implemented in process
Nozzle Upgrades	AIR KNIFE UPGRADE ON SHOT BLASTER	\$5,500	110,000 kWh	Recommended
	WATER BLOW OFF AIR KNIFE UPGRADE	\$1,700	34,000 kWh	Recommended
	AIR NOZZLE UPGRADE	\$550	11,000 kWh	Recommended
	SYSTEM PRESSURE CHANGE	\$3,900	78,000 kWh	Implemented in process
Pump Evaluations	POWERHOUSE PUMP UPGRADE	\$400	8,000 kWh	Implemented
	C-26 WASTE PUMP UPGRADE	\$2,590	34,830 kWh	Recommended

Air Pollutants Diverted in Tons

	Total for all sectors
SO2	8.54
CO	0.87
NOX	4.06
VOC	0.14
LEAD	0.0
PM	0.21

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	1,594.29
CH4	52.56
N2O	17.36
CFCS	19.26

