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CLARINDA

NSK CORPORATION

COMPANY PROFILE

NSK Corporation, founded in 1916 in Japan, is a leading manufacturer of bearings, linear technology, automotive components, and steering systems. NSK has a presence in 29 countries and employs more than 31,500 people. The NSK facility in Clarinda, Iowa, focuses on manufacturing ball bearings, with 244 employees. NSK is driven to contribute to the well-being and safety of society and strives to protect the environment through its innovative technology. Motion Industries® recently named NSK their 2020 Supplier of the Year.

PROJECT BACKGROUND

The objective of this project is to improve efficiency and reduce energy usage of the compressed air system at the NSK Clarinda campus. In this project, an in-depth analysis of the compressed air system and its corresponding applications was conducted with a focus on areas of the plant that utilize the most compressed air. This analysis revealed opportunities to reduce energy consumption with more efficient methodologies. Recommendations were presented to increase overall performance, curtail associated operational costs, and provide a starting point for future expansion.

INCENTIVES TO CHANGE

NSK Corporation is an ISO 14001 certified facility. As part of their environmental goals, NSK's Clarinda plant has developed a list of Environmental Objectives and Targets for the year of 2021. Reducing energy by increasing efficiency of the compressed air system is at the top of the list. Compressed air is a costly utility at the plant, making up almost 30 percent of the total electricity cost. This utility is used on the plant floor in various operations, with multiple areas dependent on a consistent supply of compressed air. The 2021 project will position NSK to meet its environmental targets within the plant's operation.

RESULTS

Electronic Flow Control: Compressed air is used to direct parts through a transport system via open-ended tubes. The intern proposed the installation of an electronic flow control (EFC), which regulates the compressed air so it would be used only when needed. An EFC utilizes a photoelectric sensor with a timing control that shuts off the air control valve when no part is present. One controller was purchased for a 30-day trial period. Its performance will be evaluated to confirm functionality and measure impacts. If the pilot is successful and renders the anticipated savings, this technology has the potential to significantly reduce energy usage in this application.

Engineered Air Nozzles: In various parts of the plant there are ¼ inch air tubes that flow constantly to push items onto transportation systems or through assembly processes. These

air tubes produce an average decibel (dB) level of 55 dB, which can be audible with hearing protection. Engineered air nozzles could minimize the airflow output and lower the decibel level of these tubes. The intern identified an air nozzle that is advertised to amplify airflow up to 25 times or more, while reducing the amount of cubic feet of air per minute (CFM). Five engineered air nozzles have been purchased to validate performance and efficiency prior to implementation throughout the remainder of the plant.

Repair Air Leaks: Air leaks have potential to put strain on air compressors and negatively affect equipment performance. Using an ultrasonic leak detector, the intern conducted a leak survey in the compressed air system and documented leak points for repair. Eliminating these air leaks has the potential to reduce energy usage and improve functionality on the plant floor. Repairing air leaks also provides fast returns on savings and reduces the overall plant decibel level. By fixing these air leaks, NSK could reduce associated costs of their compressed air usage at the plant by more than 15 percent.

On-going Leak Detection Program: Regularly scheduled leak detection is essential for optimal compressed air system performance. The intern developed a leak detection program to aid in repairing air leaks. This program includes a detailed procedure to guide NSK in leak detection, with a recommendation of purchasing appropriate equipment. Additionally, a guide for leak documentation and protocol was incorporated, along with a schedule, detailing when and where to conduct leak surveys.

Install Flow Meters: The intern recommended the installation of clamp-on flowmeters in order to measure CFM airflow output per compressor and the amount of CFM dispersed per department. This data could help maintenance staff identify leakage and inconsistencies within the system so that inefficiencies can be addressed quickly, keeping the compressed air system operating at optimum efficiency. Two flowmeters have been purchased and are ready to be installed to measure the output of the compressors.

Air Filters on Side Vents: The intake air vents of the compressor rooms often become obstructed, which can cause the compressor to work harder to intake air. This can also lead to having a large vacuum pressure across the compressor inlet and filters. Regularly scheduled cleaning of these air filters could allow for cleaner intake air and improve compressor efficiency.

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
ELECTRONIC FLOW CONTROL	$15,674	261,243 kWh	IN PROGRESS
ENGINEERED AIR NOZZLES	$15,919	265,311 kWh	IN PROGRESS
REPAIR AIR LEAKS	$77,042	1,284,030 kWh	IN PROGRESS
ON-GOING LEAK DETECTION PROGRAM	$12,405	206,757 kWh	RECOMMENDED
INSTALL FLOW METERS	$4,952	82,541 kWh	IN PROGRESS
AIR FILTERS ON SIDE VENTS	$545	9,090 kWh	RECOMMENDED