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AJINOMOTO HEALTH & NUTRITION NORTH AMERICA, INC.

EDDYVILLE

2024 28-WEEK CO-OP PROJECT

COMPANY PROFILE:

Ajinomoto Health & Nutrition North America, Inc. (Ajinomoto), founded in 1909, is a Japanese-based food and amino acid producer with more than 34,000 employees worldwide and annual sales exceeding 10 billion dollars. Dedicated to its mission to improve the health of humankind, Ajinomoto produces high quality products to resolve food and health issues globally. Ajinomoto is the world's largest producer of monosodium glutamate (MSG), a flavor enhancer that is naturally present in many foods. The location in Eddyville, Iowa, focuses on the production of MSG as well as amino acids for farm animal consumption, including lysine, threonine, and tryptophan.

PROJECT BACKGROUND

The objective of the 28-week project is to analyze the water chiller system at the Heartland plant and find points of inefficiency, research potential solutions, and recommend further action.

The first half of the project was spent establishing a baseline while the second half was used for researching solutions along with creating an action plan for the following recommendations.



The intern focused on the buildup of scale within the chillers, caused by the hard water that is used in the system. Hard water use in a chiller system contributes to system inefficiencies and decreases its overall capacity.

INCENTIVES TO CHANGE

Ajinomoto is committed to sustainability and the reduction of greenhouse gasses (GHG). Ajinomoto established a goal of reducing their environmental impact 50 percent by 2030. Locally, the company strives to be a productive and responsible neighbor, contributing to a healthy community. From an environmental perspective, this project aims to substantially reduce the water usage by the cooling towers, which will decrease the stress placed on the deep well that Ajinomoto draws from. This would also result in a decrease in electric costs, as the chillers would be using less power and running more efficiently. These benefits will reduce the plant's overall GHG emissions and related utility use.

RESULTS

Cold Lime Softening (CLS) system

The primary source of inefficiency in the water chiller system is from the minerals that build up on the inside of the copper pipes. These minerals act as an insulator that inhibit heat transfer. To address this problem, the intern recommends the use of a CLS system that will remove the minerals before they reach the pipes. This will maintain the highest amount of power drawn by each of the chillers. It also saves a significant amount of money on water treatment chemicals, since Ajinomoto must extensively treat the water before it reaches the rest of the plant.

Control and Monitoring System

Currently, a limited amount of data is tracked in the onsite utility building. Setting up a more robust data collection

system would allow staff to see the effect any changes to the chillers would have in real time, and allow them to fine tune any needed adjustments. With this in mind, the intern recommends



the implementation of a control and monitoring system that would not only allow Ajinomoto to see in real time the status of the water chillers but also make small changes to how the entire system operates. Another benefit is that the water chillers could

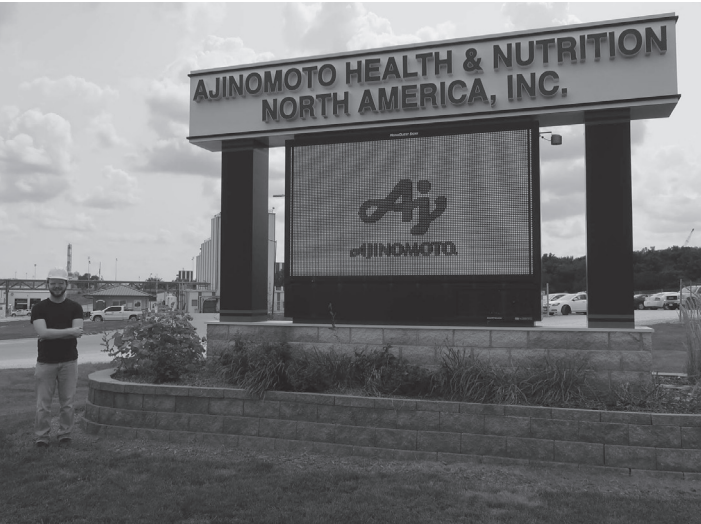
automatically adjust themselves and talk to each other. A vendor has been contacted and a quote has been acquired. The next step would be the implementation of the system onto each of the water chillers.

Tube Cleaning

For the CLS system to have the greatest impact the intern recommends that each of the water chillers be cleaned regularly. This project will have quick results as each time the tubes are cleaned there will be an instant increase in heat transfer. The next step is to rotate the chillers out of service and clean them one by one.

Increased Flow to Chillers

The current tower water flow rate was different from the flow rate recommended by the manufacturer. This was confirmed by cross-referencing the design documentation provided by the chiller manufacturer. The effect this has on the system is that it reduces the amount of heat that can be transferred out of the chilled water. Because of this, Ajinomoto has been renting water chillers for six months of the year to make up the difference. After eliminating other possible causes, it was concluded that there is likely a restriction being caused by a valve that is partially closed. The specific valve proved difficult to find as they are largely out of view. The intern recommends that the site investigate further to determine if there is a partially closed valve.



ENVIRONMENTAL AND ECONOMIC SAVINGS TABLE

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
COLD LIME SOFTENING (CLS) SYSTEM	\$357,157	72,270,000 gallons	IN PROGRESS
CONTROL AND MONITORING SYSTEM	\$185,244*	TBD	RECOMMENDED
TUBE CLEANING	\$185,244	\$2,646,352 kWh	IN PROGRESS
INCREASED FLOW TO CHILLERS	TBD	TBD	RECOMMENDED

**The cost savings are associated with proper operation based on the ability to monitor and control the process based on a new control and monitoring system. The cost savings for the control and monitoring system are already included in the tube cleaning.*