



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 ten 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 co-op is to analyze the water chiller system at the Heartland plant and find points of inefficiency, research potential solutions and recommend further action. Namely the intern focused on the buildup of scale within the chillers that is caused by the hard water that is used in the system which contributes to system inefficiencies. This extends to also increasing the capacity



of the chiller system. 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 aforementioned solutions.

INCENTIVES TO CHANGE

Ajinomoto has been committed to sustainability and the reduction of greenhouse gasses. Ajinomoto has stated the goal of reducing their environmental impact 50% 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 reducing GHG emissions and reducing overall site water consumption.

RESULTS

Cold Lime Softening (CLS) System

The primary source of inefficiency in the water chiller system is from the minerals that have been able to build up on the inside of the copper pipes. These minerals act as an insulator that inhibits heat transfer. To address this problem the intern recommended the use of a CLS system that will remove the minerals before they reach the pipes. Once the tubes are clean, this will help maintain the highest amount of heat transfer and reduce the amount of power drawn by each of the chillers. It also saves a significant amount of money on water treatment chemicals as Ajinomoto must extensively treat the water before it reaches the rest of the plant.

Control and Monitoring System

Throughout the 28 weeks it became apparent that there is very little data tracked in the utility building. Because of this, it would be difficult to see the effect that the recommendations would have on the system and it would be more difficult to fine tune the changes. 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. There has been a vendor contacted and a quote has been acquired, with the next step being the implementation of the system onto each of the water chillers.

Tube Cleaning

In discussing this project, the intern found that there was an in-house tube cleaning brush that had previously been used to maintain the water chillers. However, this was discontinued at some point. For the CLS system to have the greatest impact the intern recommends that each of the water chillers be cleaned regularly. This would increase efficiency in each of the chillers and decrease the amount of power needed. This is also the project that would have the quickest results as once they 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

When establishing the baseline, the intern discovered that there was a disconnect between the tower water flow rate and where the manufacturer's representative says it should be. This was then cross referenced with design documentation provided by the chiller manufacturer and discovered to be true. 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 out of the year to make up the difference. The intern checked pipe and pump sizes and found that they were sized correctly. Thus, the only other reason could be a restriction caused by a valve that is partially closed. The specific valve proved difficult to find as they are largely out of view. The intern therefore recommends that the site investigate 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 GAL	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.