Michael Foods

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Organization Background

Michael Foods, a subsidiary of Post Holdings, is a large producer of value-added eggs and refrigerated potatoes. The company was founded in 1987 as a spin-off from North Star Universal Inc. and has grown into a leader in the processed food industry. Michael Foods has 17 plants, 9 farms, and over 4300 employees throughout 11 states. This project focused on Michael Foods' potato processing plant in Chaska, Minnesota. Annually, the plant with 369 employees produces 259,000,000 pounds of potato products, including hash browns, mashed and diced potatoes.

"I was able to get first hand experience in the industrial sector while making a positive impact on the environment and our state's public health. Over the summer I learned a lot about industrial food processing and the efforts that are made to optimize the use of our natural resources. I'm thankful for the support from MnTAP and Michael Foods and the opportunity to grow as an engineer." ~ PK

Project Background

As a company with a corporate responsibility for environmental sustainability, Michael Foods is constantly seeking to lessen its environmental impact. In 2010, Michael Foods closed its Minneapolis potato plant and opened a new one in Chaska. Three years later, a MnTAP intern investigated water conservation opportunities at that plant. Much progress was made, but room for improvement remained. The new plant could primarily rely on well water until 2023 when the plant's water use led to low aquifer levels. This caused production to shut down regularly, and Michael Foods decided to purchase water from the Met Council. While this change led to less production shut downs, Met Council's water costs more than pumping its well water.

Incentives To Change

Since the 2013 internship, production has increased by 22%, and water use has surged by 32%. Recently, the plant's water demand surpassed what can be drawn from its own well, and it now depends on the Met Council for its water supply. Given how expensive this water source is, Michael Foods is incentivized to reduce the amount of water its plant consumes for daily operations and lower its utility costs.

SOLUTIONS

Install Flow Restrictors on Peel Starch Separators

There are three peel starch separators on the peel floor in the Shred, Dice, and Retail Mash lines. These large rotating drums remove any excess peels after the potatoes go through the steam peeler. They require water to flush the removed peels from the machine, so it is possible to use more water than needed. According to the manufacturer, each rotating drum requires 5 gallons per minute (GPM). They currently run at over 10 GPM. Therefore, 5 GPM flow restrictors, which constrict the area where water can flow, should be installed on pipes for each of the three peel starch separators. This ensures that the correct amount of water is used and would save approximately 4,700,000 gallons of water and $49,000 annually.

> *"Padon came to work with a great attitude and work ethic to find ways to reduce our water usage. Padon discovered several areas where we could reduce usage if the correct equipment is installed, and I look forward to putting some of these ideas to use."*
>
> *~ Klel Harris, MIchael Foods*

Solutions

Install Flow Restrictor on Washer Sprayers

Immediately after entering the plant, potatoes are sent through a large washer to remove dirt and sand. The potatoes are then hit with five sprayers flowing at 16.5 GPM to remove any excess debris. As the sprayer water returns to the washer and causes its water level to rise, a stream of water flowing at 15.5 GPM from the washer's bottom helps prevent overflow. Dirty excess water then falls directly onto the floor drain, and more water is ultimately needed to clean the area. Using a flow restrictor on sprayers could resolve this issue, and testing revealed that a spray rate of 5 GPM would still adequately clean potatoes. Installing a 5 GPM flow would save approximately 3,600,000 gallons and $38,000 annually.

Automate Raw Receiving Conveyor and Sprayer Shut-Off

Around every 40 minutes, a truckload of potatoes falls onto conveyor belts at the Raw and Receiving area, and the potatoes typically spend around 26 minutes on the moving belt. The sprayers after the washer are also simultaneously running. Since the programmatic logic control runs the conveyor system, it would be possilbe to automatically shut down the conveyors when no potatoes are coming into the plant to lower energy costs. If the recommended 5 GPM flow restrictor is installed, this will save 520,000 gallons and $5000 annually.

Install Actuators in the Food Service Mash Line

The conveyor system in the Food Service (FS) Mash line is run automatically using a programmable logic control. Whenever the conveyor stops, the flow of water to each piece of machinery must be shut off manually. Installing actuators on this line could automate the water shut-off process and save approximately 180,000 gallons of water and $2000 per year. Additional study may be needed to quantify the exact savings..

Install Nozzle on USDA Hose

Before going into the washer, some potatoes are taken to a United States Department of Agriculture (USDA) station for quality assurance tests. One test requires a bucket full of water, and this bucket is kept clean by being continually emptied and refilled. Staff currently use an open hose to refill this bucket, which requires staff to walk around 20 feet before they can turn off its valve. Although the hose is left on a fraction of the time, the flow rate can be as high as 18 GPM. Attaching a manually controlled nozzle to the hose would help staff more promptly turn off the nozzle, and this action could save save up to 75,000 gallons and $800 annually.

Insulate Steam Pipes

Steam is used in many processes throughout the plant and requires a great deal of energy to create. Insulating steam pipes would reduce the amount of thermal energy released into the surroundings. Currently, the steam pipes' insulation is beginning to degrade or fall off entirely due to the steam's high heat. While replacing the insulation is not urgent, the energy costs are expected to rise every year. Replacing the insulation in the next couple of years could save 54,000 kilowatt-hours (kWh) and $6,500 annually.

Recommendation	Annual Reduction	Annual Savings	Status
Install Flow Restrictors on Peel Starch Separators	4,700,000 gal water	$49,000	Recommended
Install Flow Restrictor on Washer Sprayers	3,600,000 gal water	$38,000	Recommended
Automate Raw Receiving Conveyor and Sprayer Shut Off	520,000 gal water	$5,000	Recommended
Install Actuators in the Food Service Mash Line	180,000 gal water	$2,000	Recommended
Install Nozzle on USDA Hose	75,000 gal water	$800	Recommended
Insulate Steam Pipes	54,000 kWh	$6,500	Recommended

MnTAP Advisor: Kevin Philpy, Senior Engineer