WELLS ENTERPRISES, INC.

COMPANY PROFILE

Wells Enterprises, Inc. is the largest family-owned ice cream manufacturer in the United States. The company was founded in 1913 and is headquartered in Le Mars, Iowa. There are two manufacturing plants in Le Mars, as well as plants in Nevada, New Jersey, and New York. Wells has more than 4,000 employees nationwide and produces more than 200 million gallons of ice cream per year. Their mission is to be the most admired ice cream company in America. The company intends to do so by being a leader in quality, innovation, food safety, and operational effectiveness.

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PROJECT BACKGROUND

The focus of this project was to reduce the amount of water used at the Le Mars plants. Large amounts of water consumption are attributed to single pass water systems being used for heat transfer. At both plants, water is used to heat up product to bring it to melting temperature. At one of the plants, cold water is used to reduce the temperature of their air compressors. The intern analyzed these systems and researched more efficient alternatives. The impact of alternative systems was calculated, and feasible solutions were recommended to the company.

INCENTIVES TO CHANGE

Wells Enterprises is committed to sustainable manufacturing practices and strives to improve efficiencies and reduce environmental impacts in all facets of its daily operations. Pre- and post-treatment processes used for water can be costly. Decreasing water usage at the plant translates to reductions of water softener, natural gas, and chemicals. Eliminating single pass heating and cooling processes are projected to significantly reduce operational costs and transfer directly to the bottom line.

RESULTS

SICP and NICP Glycol Heating Systems: At the South and North Ice Cream Plants (SICP and NICP), hot water is currently used to melt chocolate for different products. Four lines at the SICP and two lines at the NICP use this process. In the process, water enters the plant at approximately 55 degrees Fahrenheit and is treated with water softener. The majority of the water is pumped to the production lines. Some water is routed to a natural gas fueled boiler for steam. This steam is sent to the production line where it is introduced to cold water using a steam and cold water mixing unit. This unit allows the operator to adjust a valve to control the amount of steam flowing through the pipe until a desired water temperature of 110 degrees Fahrenheit is met. At this time, the heated water is circulated around a tank of chocolate. If the water is too cold, the chocolate will harden and can clog the lines. If the water is too hot it will scorch the chocolate, leading to wasted product. After the water is used to heat the chocolate, it is treated with a chloride treatment chemical and is sent to the Le Mars Sewage Treatment Plant for disposal.

Using a closed-loop, glycol heating system to heat the chocolate on each line would significantly reduce usage of water, water softener, natural gas, and chemical at both the SICP and NICP. With a closed-loop system, the glycol solution would be heated up using an electric heater. The heated glycol would be circulated through the chocolate tank and back to the heater. This system would also result in a more consistent temperature for the chocolate.

To move forward with this recommendation at the NICP, equipment must be purchased and installed on each line using the current heating process. At the SICP, the equipment already exists and will only need to be installed.

NICP Air Compressor Cooling System: The NICP uses water to keep the air compressors at an optimal operating temperature. When the air compressors are in operation, heat needs to be removed from the oil in circulation. A shell and tube heat exchanger is currently being used, with oil passing through the tube and water passing through the shell. The water enters the heat exchanger at 55 degrees Fahrenheit and leaves at 95 degrees Fahrenheit. After this, the water is treated with a chloride treatment chemical and sent to the Le Mars Sewage Treatment Plant for disposal.

The recommended solution is to install a glycol cooling system for the air compressors. The shell and tube heat exchangers will have glycol running through them instead of water. The hot glycol would be pumped to a cooling tower where the lines are sprayed with water and cooled through evaporation. In summer months the cooling tower will not provide enough cooling, so a plate and frame heat exchanger using ammonia refrigerant will further cool the glycol. The cooled glycol will continue to circulate, repeatedly cooling the air compressors. This recommended system will result in a reduction of water and chemical use. Once implemented, the system will only use water for evaporative cooling and a blowdown process that removes high mineral content water. Upon approval of the project from management, the next step is to measure out an appropriate space on the roof for the cooling tower and space in the plant for the plate and frame heat exchanger.

PROJECT	ANNUAL COST SAVINGS	ANNUAL ENVIRONMENTAL RESULTS	STATUS
SICP GLYCOL HEATING SYSTEM	$31,580	47,713 therms 8,860,600 gallons water 104,949 lbs. water softener 234 lbs. chloride treatment chemicals	RECOMMENDED
NICP GLYCOL HEATING SYSTEM	$26,114	32,257 therms 5,990,400 gallons water 36,549 lbs. water softener 2,021 lbs. chloride treatment chemicals	RECOMMENDED
NICP AIR COMPRESSOR COOLING SYSTEM	$42,721	22,556,124 gallons water 6,904 lbs. chloride treatment chemicals	RECOMMENDED