Faribault Mill

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Organization Background

Faribault Mill is located along the Cannon River in Faribault, MN, where the Mill has resided since 1892. The facility is one of the last remaining vertically integrated textile mills in the United States. Raw wool comes into the Mill and leaves as a finished blanket, throw, pillow, or bag. The many steps of processing all happen in this one location. The Mill employs around 100 people to run these processes, which range from sewing to heavy machine operation.

FARIBAULT MILL
SINCE 1865

"My experience working with MnTAP and Faribault Mill helped me to branch out of the classroom and theory into some really interesting projects. The Mill presents a unique environment, and I am glad I got to spend a summer learning as much as possible about the world of textile manufacturing." ~ PB

Project Background

Three main areas for investigation were electric motors, fluorescent lighting, and compressed air systems. With high runtime, even minor gains in these three areas can cut energy use and emissions significantly over the lifetime of the equipment. Furthermore, the Mill has been in the process of investigating a water heater upgrade to fully utilize the equipment that it feeds.

Incentives to Change

In the energy space, the Mill consumes around 2.2 million kWh of electricity per year and 110,000 therms of natural gas per year. Electricity is primarily consumed by electric motors and lighting, while natural gas is used for various heating tasks, such as boilers, water heaters, and driers. Much of the energy-consuming equipment is older than recent standard updates and government efficiency regulations, so opportunities to save energy exist almost everywhere. The price of electricity has increased by 65% from 1999 to 2018, and a further 24% rate increase over current prices is proposed by 2024. Cutting down on electricity use not only lessens the environmental impact of the Mill but can also save a significant amount of money. All three areas were investigated to find energy savings and several upgrades were recommended in lighting, compressed air, and water heating.

SOLUTIONS

Purchase Direct-Contact Water Heater

The current water heater puts out 4.5 million BTU per hour of heat, supplying 90 gallons per minute of hot water to the process. This is not enough to fully utilize the wet-dry department, which is adding a machine this year, so an upgrade is necessary for the Mill to achieve improved production capacity. In order to feed all four machines, a water heating system capacity of 8.7 million btu/h is necessary. Water can be heated via 3 methods: natural gas water heater, electric water heater, or via steam from a natural gas boiler.

Due to the high efficiency available, it is recommended that the Mill install an additional 5 million btu/h natural gas water heater using the direct-contact heating method. These units are up to 16% more efficient than a steam heating system, and cheaper to operate than an electrical system. The upfront costs are higher than the other two options, but the lifetime costs are significantly lower and the natural gas savings are significant.

Upgrade Production Lights

The Mill, like many older facilities, is equipped with fluorescent lighting in the form of tube lamps. These lamps

Solutions

are not only power-hungry and put off a lot of heat, but also require ballasts in order to run, which consumes additional electricity. Production floor lights consume 144,700 kWh of electricity each year, and the storefront consumes an additional 14,300 kWh each year. The Mill is advised to replace these production floor fluorescent lights with LED tube lamps and the storefront track light bulbs with LED bulbs.

Retrofitting the current light fixtures to LEDs allows the Mill to cut energy usage by a total of 91,500 kWh each year. These lights are also drawing power during peak demand each month, and a reduction in their power draw would reduce monthly demand by 38 kW each month. Installing the lights for production requires a contractor, which would cost $37,000 after rebates. The track lights can be installed by on-site staff and would cost roughly $700.

The energy savings these improvements would create will save the Mill $12,600 each year in electricity costs using current usage and demand rates and improve light levels on the production floor. These savings provide a payback period of 3 years when both lighting projects are grouped together.

Additional Opportunities

There are many incremental changes that add up in efficiency projects like these, and each component contributes to the overall energy savings. For instance, a single compressed air leak may only cost the Mill $200 per year but repairing the overall system can save nearly 20,000 kWh per year. While little savings was found in replacing healthy, running motors, the choice to repair or replace a failed motor offers an energy savings opportunity. It is possible to recoup the incremental cost of purchasing a new motor via energy savings, and the Mill would get a new motor out of the deal.

"Faribault Woolen Mill had a great summer with our MnTAP intern. Payton was very diligent and took an interest in everything we were doing at the mill and worked well with everyone. He helped troubleshoot some of our machinery issues and was there to see the installation of our new dryer. He compiled valuable information that will assist us in making informed decisions to reduce energy costs at our facility. The MnTAP program is a valuable resource, and we appreciate the dedication and work ethic the interns bring to their projects"

~ Joyce Raesner, VP of Production, Faribault Mill

Recommendation	Annual Reduction	Annual Savings	Status
Purchase Direct-Contact Water Heater	increased production	$600,000	Recommended
Upgrade Production Lights	79,308 kWh / year 33.628 kW / month	$11,000	Investigating
Upgrade Storefront Lights	14,300 kWh / year 5.03 kW / month	$1,950	Recommended
Repair Compressed Air Leaks	19,000 kWh	$1,500	In Progress

MnTAP Advisor: Jon Vanyo, Engineer