

Federal Cartridge Company



Kaylea Brase
Chemical Engineering
Calvin College, Michigan

Company Background

Federal Cartridge Company (FCC) is a small arms ammunition manufacturer located in Anoka. Since 1922, Federal Premium® Ammunition has been providing hunters and shooters with high-quality shotshell, centerfire and rimfire ammunition. A wholly-owned subsidiary of ATK, Alliant Techsystems, the company employs nearly 1,800 employees. The facility is located on 175 acres in Anoka County and spans the border of Anoka and Coon Rapids, with half a million square feet of manufacturing space.



“Through the MnTAP program, I developed the initiative and confidence needed to work with others to help the company and the environment. The job is almost like being a detective, trying to identify problems, meet the people involved, track the history of the situation, brainstorm solutions, and implement changes. The best part is seeing the numbers add up at the end, both in waste reduction and cost savings.”

Incentives to Change

By reducing the amount of water FCC uses in the manufacturing process, the company can lower operating costs, improve efficiency of the on-site wastewater treatment plant, reduce environmental impact, and avoid SAC charges. The Sewer Availability Charge (SAC), equivalent to 274 gallons of water per day on average, is a measure of wastewater volume. Every three years, a charge is assessed by Metropolitan Council

Project Background

Small arms ammunition manufacturing involves many metalworking operations, including pressing, stamping, annealing, and washing of the ammunition jackets and cases. Because many of the metalworking operations are automated, the metal components require tempering and lubrication steps. The process chemicals and lubricants must be rinsed before proceeding to the next step, so large rinsing processes are employed.

Water is used for cooling, washing, rinsing, and hydrating explosive material. The water piping system has suffered from scale and deposits from the dissolved minerals and rust in the hard water, which can clog nozzles and alter valve settings. Most of the equipment is designed to reuse water in a closed loop system or to fill on a timed-rinse basis; however, many of the settings and valves have been by-passed due to clogging. Valves are typically manually adjusted based on operator experience.



Environmental Services (MCES) for each SAC unit above the assigned baseline for a facility. To avoid heavy SAC charges, FCC applied for a MnTAP intern to identify water conservation opportunities and aid in implementation.



Solutions

Install Timed Rinse Faucets

Faucets run continuously in areas where explosive material, or primer mix, is charged into the primer cups. The faucets are used to clean the charging equipment and to prevent explosive material from collecting in the piping system. Nine faucets run continuously at high flow rates, representing approximately 8% of the industrial water use at FCC. A significant amount of water could be saved by installing faucets that turn on for one minute and turn off for one minute. Installation would result in approximately \$40,900 in savings annually.

Install Wash Tub Spray Nozzles

FCC has approximately fifty wash tubs throughout the facility, which constitutes about 16% of the overall industrial water use. Water is dumped on the components via an open pipe end. The process could be improved if a wider fan spray pattern were used to impact a larger area of the components inside the tub. Spray nozzles would allow the pressure to be increased, while the flow would be decreased. About \$2,500 in annual water savings could be realized if only two of the spray nozzle opportunities were implemented.

Recycle Effluent

The on-site wastewater treatment plant uses a continuous flow of water to clean the sand filters, which act as a polishing step to remove suspended solids from the wastewater. If a portion of the exiting water is recycled back to the sand filters to assist with cleaning in lieu of using city water, a total of \$28,300 could be saved annually. This process would allow effective cleaning and circulation of the sand filters, reducing the high cost of water.

Install Automatic Shut-Off Valves

The inline washers represent about 37% of FCC's industrial water use. Water continuously flows over the rinse tank cage at approximately 5 GPM, at times without product in the cage. By installing valves that would automatically shut off the water flow when product is no longer running through the machine, \$11,400 could be saved annually.

Install Chiller

The condenser for an environmental test chamber is cooled by de-ionized water, flowing at 5 GPM. This water is sent directly to the drain. Instead, the water could be recycled by installing a chiller to return the water to initial temperature. In addition to reducing maintenance and upgrade costs to the de-ionized water delivery system, the chiller would save about \$11,700 annually in water costs.



Recommendation	Reduction	Annual Savings	Status
Install timed rinse faucets	2,803,000 gallons water	\$40,900	In progress
Install wash tub spray nozzles	173,000 gallons water	\$2,500	In progress
Recycle effluent	1,752,000 gallons water	\$28,300	In progress
Install automatic shut-off valves	778,500 gallons water	\$11,400	In progress
Install chiller	54,750 gallons water	\$11,700	Under review