DIRECT ASSISTANCE PROGRAM

CASE STUDY

NYSP2I Assists Electronics Manufacturer with Waste & Water Management

CHALLENGE

Manufacturing electronics and their components is a water-intensive process. During full production a western New York facility uses approximately 25,000-35,000 gallons of water per day; a rate of consumption that exceeds ten million gallons over the course of a year. Because most of this water is used for process baths and does not become embodied within the product, such high consumption inherently creates high levels of wastewater generation.

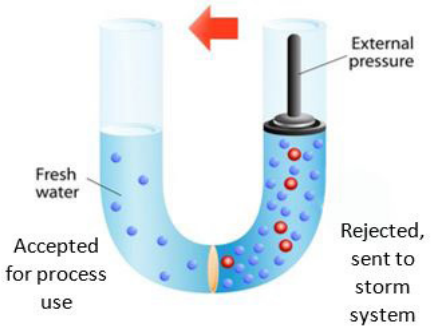
In the electronic manufacturer's current process, approximately 36 tons of waste sludge was generated in 2016. Process wastewater is treated on-site for which $60,000 is spent on fresh process water delivery. The electronics manufacturer spent an additional $267,000 on waste treatment, of which $100,000 was spent on treatment chemical costs alone. Accordingly, the company sought to explore opportunities to reduce the volume of water consumed in their manufacturing processes, and thereby simultaneously mitigate the costs and liabilities of waste and wastewater generation and treatment.

SOLUTION

New York State Pollution Prevention Institute (NYSP2I) identified practical, cost-effective options to better manage the costs and impacts of the manufacturer's waste and wastewater. According to the manufacturer's existing equipment control system, this reverse osmosis system is able to recover 43-percent of the input water for high-purity feedstock. The remaining 57-percent—though rejected from the high-purity input system—is not itself a chemical waste, and therefore does not need to be treated as such.

Consequently, this RO reject water— approaching six million gallons in 2016—is allowed to bypass the county sewer system (used for chemical waste treatment) and is instead sent directly to a rainwater runoff system. In practice, then, the volume of wastewater sent to chemical waste treatment is only the 43-percent of input water that was accepted through initial purification and used for manufacturing processes. Despite this diversion of nearly half of the purchased water to non-chemical waste treatment, the manufacturer incurs wastewater treatment (i.e. sewer) charges based on the assumption that all of the company's purchased water is used in process and thus becomes a chemical waste. NYSP2I engineers determined that by adding a flow meter to the non-chemical waste RO reject water system, the manufacturer could track exactly how much water was sent to the storm system and thereby avoid the excess charges presently incurred for sewer waste.

NYSP2I drew upon its experience with electroplating companies, whose processes are in many ways similar to those used in circuit board manufacturing, to analyze system parameters. This experience revealed that such process bath and rinse-based manufacturing process often use solution flow rates that are well above what are required to achieve adequate water quality of pH and conductivity. Thus, by reducing water flow rates in the manufacturer's seven highest-consuming lines by a conservative estimate of ten percent, NYSP2I estimated the company could save nearly 1.3 million gallons of water per year.



Reverse Osmosis diagram showing portion of purchased water not used in manufacturing processes

CHALLENGE

- This electronics manufacturer sought to explore opportunities to reduce the volume of water consumed in their manufacturing processes, and thereby simultaneously mitigate the costs and liabilities of waste and wastewater generation and treatment

SOLUTION

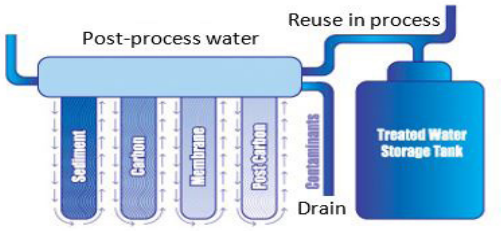
- NYSP2I engineers determined that by adding a flow meter to the non-chemical waste reverse osmosis (RO) reject water system, the manufacturer could track exactly how much water was sent to the storm system and thereby avoid the excess charges presently incurred for sewer waste
- By reducing water flow rates in the manufacturer's seven highest-consuming lines by a conservative estimate of ten percent, NYSP2I estimated the company could save nearly 1.3 million gallons of water per year
- Replacing the RO system's membrane filters and servicing the associated system equipment, could achieve the nameplate recovery efficiency, reducing the water sent to the storm system (i.e. wasted) by 17-percent

RESULTS

- The manufacturer may be enabled to reduce its fresh water usage and the costs associated with it—by up to 25-percent based on solutions uncovered during this project
- NYSP2I helped identify new chemical costs from alternate suppliers with a potential to save an estimated 20-percent

In addition to such logistical improvements, several technology-based solutions were identified. The manufacturer's reverse osmosis input water purification system, for example, currently operates a 43-percent recovery efficiency, meaning that over half of all purchased water is effectively wasted, sent to the storm management system without providing any form of utility or value. However, the RO equipment itself is rated by the manufacturer for a recovery efficiency of 60-percent. The NYSP2I team thus suggested that by replacing the RO system's membrane filters and servicing the associated system equipment, the manufacturer could achieve the nameplate recovery efficiency, reducing the water sent to the storm system (i.e. wasted) by 17-percent.

Further, NYSP2I found that the company does not currently employ any first-pass post-process wastewater purification in order to reuse spent process water after it has been treated. System engineers at NYSP2I therefore found that by adding a smaller-volume reverse osmosis system to filter post-process wastewater, the company could recover and reuse nearly 4,000 gallons of water per day, offsetting fresh input water need and thereby avoiding nearly a million gallons of consumption each year.



Adding reverse osmosis treatment for used process water could enable C3 to reclaim and reuse ~1M gallons of water per year

RESULTS

Considered together, all of these solutions provide significant opportunity to reduce water consumption. Between improving the yield of input water reverse osmosis processes, reducing purified water consumption rates, reusing spent process water through additional filtration, and reducing the amount of wasted input water sent back to the rainwater runoff system, the manufacturer may be enabled to reduce its fresh water usage and the costs associated with it—by up to 25-percent. In addition, by leveraging these improvements, NYSP2I also helped identify new chemical costs from alternate suppliers with potential to save an estimated 20-percent for the company. Collectively, these opportunities not only reduce the environmental footprint in terms of water consumption and waste generation, but also provide significant cost savings to create a competitive advantage for this New York State manufacturer.

NYSP2I PARTNERS

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