

Client Success Story: Columbia Manufacturing Company

Company profile

Application: Columbia Manufacturing Company of Westfield, Massachusetts began producing bicycles in 1877. The company, while still producing bicycles, transitioned its core product line to institutional furniture with chrome plated bases made from tubular steel. Large amounts of potable water were required for the old plating system. The company was using 180,000 gallons of potable water a day, which required extensive wastewater treatment. The excessive potable water usage, high wastewater treatment costs and the loss of valuable plating chemistry greatly affected the company's profitability.

Waste Description: The waste contained chromic acid, sulfuric acid, fluoride salts and sulfates from the chromium bath. Dissolved nickel salts from the nickel plating bath were also present, as well as combined ion exchange regeneration wastes and backwash waters from the GAC filters. Suspended and dissolved oils and greases are used to prevent oxidation of the steel tubing.



Former Process: The client was using standard hydroxide precipitation treatment to precipitate metal salts from their existing chrome over nickel plating operation. The existing wastewater system was clarifier based and utilized sodium hydroxide, coagulants and flocculants to treat the stream prior to discharge to the local POTW.

Waste Disposal Goals: The client's goal was to recover and recycle expensive chromium and nickel plating chemistries, recover and reduce the demand for potable water used in parts rinsing, eliminate wastewater permits as they relate to the plating line and minimize and or eliminate fees paid to the local POTW.

Wastewater treatment challenge

The wastewater treated by the conventional hydroxide precipitation system was permit discharged to the local POTW. The company had historic challenges with hexavalent chrome removal from the final treated effluent. The flocculated metal solids were dewatered using a plate and frame filter press and hauled as F-006 solid waste at a considerable expense.

CASTion solution

CASTion designed and implemented a Zero Liquid Discharge system that would, eliminate the old precipitation treatment system, reduce the potable water demand, eliminate costly and labor intensive wastewater treatment, and allow the reuse of the purified rinse waters while offering recovery of expensive plating chemistries.

CASTion installed a dedicated CAST 2000 GPD to treat the chrome rinse water and thereby recover chromium trioxide, a dedicated CAST 2000 GPD to treat the nickel rinse water and thereby recover nickel salts, a dedicated CAST 5000 to recover water from the mixed ion exchange regeneration wastes, an ultrafilter for the removal of organics, a duplex ion exchange system (cation and anion) to polish the distillates from the three CAST units to 1-5 megaohm resistivity and a porous pot for removing anionic contaminants from the recovered chrome chemistry. A combination of GAC and oil filtration media is used as a pretreatment for the ion exchange system. The final DI water is disinfected via circulation through a UV light source.

CAST 2000 GPD, treating chromium rinse waters, recovers 650 pounds of chromium trioxide and 10,500 gallons of distillate (clean water) weekly. CAST 2000 GPD, treating nickel rinse waters, recovers 98% of the nickel salts and 14,000 gallons of distillate (clean water) weekly. CAST 5000 GPD, treating 3000 gallons per day of ion exchange regeneration wastes commingled with 2,000 gallons of concentrated rinse waters from the front end of the plating line, recovers and returns 4,800 gallons per day of distillate to the ion exchange system for final polish and reuse in the plating line rinse tanks.

The distillate from the three CAST Flash Vacuum Distillation systems is pretreated with granular activated carbon and then directed to the duplex ion exchange system for final polish. The DI water is treated with UV light to minimize bacterial growth and then reused as rinse waters.

The still bottoms from the two dedicated 2000 GPD CAST Flash Distillation systems provide recovery for the chromium and nickel plating chemistries. The recovered chromium chemistry is purified by porous pot technology, and the nickel is purified using granular activated carbon and then returned to the respective plating baths. The still bottoms from the CAST 5000 GPD system (approximately 200 gallons per day) are delivered to a plate and frame filter press for dewatering.

Columbia Manufacturing required a POTW permit to discharge clarified effluent from the original hydroxide precipitation system. The POTW permit had strict discharge limits for BOD, metals and flow. The newly implemented CASTion Zero Liquid Discharge System eliminated the requirement for treated wastewater discharge entirely. Only normal septic wastes from the lavatories were discharged to the municipal sewer system. The sewer discharge plumbing from the plating line was removed, and the industrial sewer main was blocked.

Columbia Manufacturing became the first permit-free chromium plating operation in the United States. The Massachusetts DEP has exempted Columbia from air and water discharge permits. 98% of valuable plating chemistries are recovered and reused. Columbia is recovering 650 pounds of chromium trioxide weekly that would otherwise be sent to waste treatment and lost as solid RCRA regulated waste. The company received an exemption from RCRA hazardous waste treatment permits. Reduction in potable water demand by 97% was achieved. The potable water demand was reduced from 180,000 GPD to 6,000 GPD; the 6,000 GPD of potable water is only required to augment losses due to evaporation. Reduced metal content of the filter cake significantly decreased the solid waste disposal costs. The small system foot print minimized the real estate demand. The client had limited space on site, so the proposed system had to meet the restricted space requirements. The return on investment of the ZDL system was approximately two years.

Contact CASTion

With the CASTion solution, Columbia Manufacturing met their recovery and discharge goals, gaining chromium and nickel plating chemistries, recovering water and lowering their operating and waste disposal costs. Contact CASTion today to learn how we can help your company achieve its waste disposal and recovery objectives.