

Costly Hazardous Waste Reduction in Heat Treating Operation

A global leader in the design and manufacture of automotive chain systems and components has a facility located in New York State.

Challenge

The company utilizes salt bath quench tanks to heat-treat parts for their automotive assemblies. Periodically, the quench tanks need to be cleaned which requires the reusable salts to be removed from the tank temporarily. Water is then used for cleaning the remaining salts left in the tank. This generates a liquid waste brine that is pumped into totes for disposal as a costly hazardous waste. The company requested assistance from New York State Pollution Prevention Institute (NYSP21) to identify practical options to reduce the hazardous waste generated from the salt bath quench tank cleaning activities.

Solution

NYSP21 identified hazardous waste minimization alternatives, designed a cleaning process that will optimize the amount of water needed during cleaning, and validated solubility through testing the remaining salts. NYSP21 also tested the liquid waste brine to determine if the salt can be recovered and reused in the salt bath quench tank operation.

NYSP21 identified potential alternative methods for reducing and reusing waste solids and liquids generated during tank cleaning:

- **Minimize Waste Water Produced:** Use temperature and solubility principles to optimize the amount of water used to dissolve salt and contaminants in the quench tank cleaning
- **Process Liquid Waste Brine Through Salt Recovery Unit:** Removal of nitrate and nitrite salts from liquid waste brine to remove hazardous characteristic while capturing salts for reuse

Results

The hazardous waste minimization alternatives identified by NYSP21 confirmed that using heated water to increase solubility will reduce the amount of water necessary for the cleaning process. This water reduction has the potential for reducing the hazardous waste generated by approximately 13% and reducing the cleaning costs by over 14%. Furthermore, cleaning process time (and associated labor) can be reduced by approximately 77%.

In addition to using less water for cleaning, utilizing a Salt Recovery Unit to recover quench salts from the liquid waste brine creates the best opportunity for hazardous waste reduction and cost savings. NYSP21 was able to test the salts recovered from the Salt Recovery Unit and confirm that the salts could be reused in the salt bath quench tank operation. This results in direct cost avoidance (savings) by reducing the amount of replacement salt required for the

CHALLENGE

- The company wanted to identify practical options to reduce the hazardous waste generated from the salt bath quench tank cleaning activities

SOLUTION

- NYSP21 identified hazardous waste minimization alternatives, designed a cleaning process that will optimize the amount of water needed during cleaning, and validated solubility through testing the remaining salts
- Potential alternative methods for reducing and reusing waste solids and liquids generated during tank cleaning were identified by NYSP21

RESULTS

- The hazardous waste minimization alternatives identified by NYSP21 confirmed that using heated water to increase solubility will reduce the amount of water necessary for the cleaning process
- Using less water for cleaning, utilizing a Salt Recovery Unit to recover quench salts from the liquid waste brine creates the best opportunity for hazardous waste reduction and cost savings

IMPLEMENTATION

- Utilizing the Salt Recovery Unit reduced the amount of solid hazardous waste generated by up to 66% with just the solid carbonate waste remaining
- Avoiding the generation of liquid hazardous waste, a cost savings of over \$33,000 on hazardous waste disposal is realized
- The company experienced a total cost savings of over \$50,000 on the 50,000 pounds of liquid waste brine by processing the waste brine through the Salt Recovery Unit

operation and the associated cost. The impact of using the Salt Recovery Unit would yield an 84% reduction in hazardous waste and up to a 97% cost savings per cleaning.¹

Implementation

The company wanted to confirm the alternative option is viable for recovering salt and reducing potential hazardous waste. Should the Salt Recovery Unit show success, this could address one of the highest costs associated with tank cleaning, namely replacing approximately 20,000 lbs. of salt.

During a feasibility study, the company processed a total of over 50,000 pounds of liquid waste brine through the Salt Recovery Unit. This resulted in over 16,000 pounds of recovered salt (32% recovery rate). At a purchase rate of \$1.10 per pound of new replacement salt, this led to a cost avoidance of nearly \$18,000 for new salt.

Utilizing the Salt Recovery Unit also reduced the amount of solid hazardous waste generated by up to 66% with just the solid carbonate waste remaining. By avoiding the generation of liquid hazardous waste, a cost savings of over \$33,000 on hazardous waste disposal is realized.

Due to these efforts, the company experienced a total cost savings of over \$50,000 on the 50,000 pounds of liquid waste brine by processing the waste brine through the Salt Recovery Unit.

NYSP2I PARTNERS



New York Manufacturing Extension Partnership

Funding provided by the Environmental Protection Agency (EPA) and the Environmental Protection Fund administered by the New York State Department of Environmental Conservation. © 2018 Rochester Institute of Technology Conservation. Any opinions, results, findings, and/or interpretations of data contained herein are the responsibility of Rochester Institute of Technology and its NYS Pollution Prevention Institute and do not represent the opinions, interpretation or policy of the EPA or the State.

For more information please contact us:

111 Lomb Memorial Drive, Bldg. 78
Rochester, NY 14623

Tel: 585-475-2512
Web: nysp2i.rit.edu
E-mail: nysp2i@rit.edu

¹ Cleaning costs include waste management costs, fees, labor, and new salts added to the bath