

WMRC Pollution Prevention Case Studies

Recycling of Cleaning Solution at the Ford Stamping Plant

Wasted Cleaning Solutions

Solutions used to clean floors and dies at Ford's Chicago Heights, Illinois stamping plant contribute over 1.1 million gallons annually to the facility's wastewater treatment burden. The wasted cleaning solution tends to emulsify other oily wastes in the wastewater causing the current wastewater treatment system's inability to efficiently separate the water and oil under existing conditions. As a result of these factors, Ford has had a difficult time meeting the local sanitary district standards for fats, oils and grease (FOG) discharges and has paid \$32,000 over the past 3 years as a result of exceeding FOG standards. Ford spends over \$600,00 annually to operate their wastewater treatment operations and treatment of the spent aqueous cleaning solutions is a major component of this expense. Additionally, this facility uses over 110,000 gallons per year of concentrated aqueous cleaning solution at an annual cost in excess of \$200,000.

Project Execution

Waste Management and Research Center (WMRC) engineers conducted this project to evaluate the technical and economic potential for ultrafiltration to recycle aqueous cleaning solutions used at the Ford Stamping Plant. Membranes selected for this project were chosen for their ability to remove oil, grease, and particulate contaminants from aqueous cleaning solutions. An ultrafiltration system equipped with a series of 8 (10 foot long) Koch tubular membranes with a total membrane surface area of 17.6 square feet was retrofitted to the existing Ford die washing system and evaluated for a period of 6 weeks. The system ran for approximately 575 operating hours and generated over 20,000 gallons of recycled "permeate" solution during the course of the project.

Recycled Solution Quality

Ford employees who cleaned dies and floors using the recycled solution claimed that it cleaned as well or

better than fresh, unrecycled cleaning solution. Analytical tests on the quality of the recycled cleaning solution indicate that it was essentially free of oil and grease and particulate contaminants. Cleaning chemical quality was also maintained at high levels with the exception of a nonionic surfactant removed by the ultrafiltration process. This surfactant comprises only 2.2% of the concentrated cleaner (0.22% of the cleaning solution as it is actually used) and was easily metered back into the cleaning process during operation. It is estimated that total cleaning chemical consumption would be reduced by 80 to 85% through installation of a full-scale ultrafiltration system. Additionally, discharges of oily wastewater to the sewer would be reduced by over 1,000,000 gallons per year.

Compelling Economics

A capital investment of \$52,500 would be required to install a permanent ultrafiltration system in this operation. Approximately \$77,000 (1997 dollars) would be required annually to operate and maintain the system and purchase the small quantities of chemicals required to clean dies and floors. However, an estimated \$237,000 in savings would be realized in reduced chemical consumption and reduced wastewater treatment and disposal costs. Investment in a permanent ultrafiltration system in this facility should pay back in less than 7 months.

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