

CASE STUDY: Amplate, Inc./ PRO-pHx

Location:	Charlotte, NC (Mecklenburg County)
Industry:	Electroplating (SIC: 3471)
Pollution Prevention Application:	Wastewater Reuse, Cleaning/Filtration
Annual Savings:	88% Reduction in Hazardous Waste
Payback Period:	Not applicable
Contact:	David French, President (704) 597-0688

Background

Amplate, Inc., performs nickel, zinc, and decorative chrome electroplating. The company also electroplates using heat chemical processes such as black oxidizing, passivation, and electroless nickel.

Tank Maintenance and Filtration

The company installed a countercurrent system on the rinse tanks and an ion exchange system to remove contaminants from the chromate rinse water. Contaminated overflowing rinse water is pumped through a pre-filter unit, a cation column to remove metals, and then an anion column to further purify the water. The water is then returned to the rinse tank for reuse. Once the ion exchange columns are exhausted, they are shipped off site for regeneration.

The company has been able to increase bath life of the alkaline cleaning solutions by proper selection of chemicals, in-tank filtration to remove insoluble contaminants, and treatment of other contaminants. These practices extended alkaline cleaner bath life from 3 months to over 18 months. A coagulant (DTC) was used periodically in the acid pickle tanks to remove metal contamination without the usual pH adjustment. However, organics would eventually build up and thus require acid bath disposal.

In the late summer of 2000, Gwen Wagner, President of Wagner Environmental Technologies, persuaded Amplate to test a new acid bath extender called, **PRO-pHx**, a decarboxylating agent. After successful test results on a small scale, the DTC was replaced by PRO-pHx late in the year 2000 and no acids have been disposed of since. Acid addition is required only to make-up for drag-out and evaporation.

Wastewater Reuse System

Amplate utilizes an electro-coagulation unit to treat and recycle the rinse water from the alkaline cleaners and the acid pickle rinses of the plating line. The pH of the wastewater is adjusted, but no chemicals are used to precipitate contaminants. Treatment is accomplished with an ionic generator, which utilizes UV light and a small rectifier. The UV light produces oxygen in the rinse water

stream, which then passes two probes powered by the rectifier. Wastewater floc accumulates on the probes, which reverse polarity every few minutes. When the polarity reverses, the floc is released from the probe and captured downstream by a conventional filter. Final treatment was accomplished when the water passed through an activated carbon filter to remove organics.

The carbon has since been removed from the system and PRO-pHx is being added at 1/12 of 1% to remove organics during filtration. Wastewater must be circulated through the system more than once to achieve desired quality standards, and therefore, a batch approach is utilized. Treated water is stored in a holding tank and reused for both alkaline cleaner and acid bath rinses.

In response to more stringent air emission requirements for chromium electroplaters, Amplate asks customers to consider electroless nickel as an alternative to hard chrome. Many customers have found electroless nickel to be a suitable and sometime superior replacement to hard chrome in some applications.

Waste Reduction and Annual Savings

Table1: Amplate Waste Reduction

Years	Acid Bath Disposal, lbs.	Hazardous Waste generated, lbs.	Hazardous Waste Disposed Costs	Acid and Caustic Purchases
1991	11,025	13,495	\$10,201	\$5,895
2001	0	11,700	\$ 3,891	\$2,358

It should be noted that all the reductions in waste generation and water conservation were achieved despite a **fourfold increase in total production**. Cost savings were not calculated for variables other than hazardous waste disposal costs and purchases of generic acids and caustic soda.

Other Activities

Amplate was recognized for Outstanding Achievement in the Small Business Category of the 1994 Governor's Award for Excellence in Waste Reduction competition.

Submitted by: Ray Guerrein, Consultant, Waste Reduction Partners