## POLLUTION PREVENTION TIPS



## WATER CONSERVATION FOR ELECTROPLATERS: RINSE WATER REUSE

### **Techniques for Rinse Water Reuse**

Rinse water does not have to be discharged to the sewer after it is used only once, but can be recycled through the production line. This technique for water reuse, known as reactive rinsing, takes advantage of the chemical makeup of the rinse water to not only reduce water usage but to actually increase rinsing efficiency, thus improving plating quality.

A good example of this technique can be found in the nickel plating line. As shown below, water consumption can be reduced by two-thirds in a typical line by recycling the rinse water.



### Nickel Plating Line

In this example nickel rinse water is recycled back to the acid dip rinse tank. This allows nickel plating solution dragged out of the process bath to be dragged back into the bath. This will not harm the rinse step and will allow the fresh

# POLLUTION PREVENTION PROGRAM

water feed to the acid rinse tank to be turned off. The acid rinse water can then be recycled to the alkaline cleaner rinse tank. This not only allows the feed water to this tank to be shut off, but it will improve the rinsing efficiency by helping to neutralize the dragged in alkaline solution. This will prolong the life of the acid bath as the rinse water dragged into it will already be partially neutralized. Thus the acid bath will not have to be dumped as often. In this example rinse water use was reduced from 9 gpm to only 3 gpm.

This concept can be taken one step further and the rinse water can be recycled between process lines. One facility used this technique to reduce water usage in three process lines from 48 gpm to 16 gpm by being able to shut off 8 fresh water feed lines. The scheme used is shown below:



Example of Interprocess Reactive Rinse System

Some replumbing is all that is needed to set-up a rinse water reuse system. The rinse water can be either gravity fed or pumped to the next rinse tank. Only a small amount of head pressure is needed to run a gravity system. One way to supply this pressure is to use building bricks to elevate the tanks. PVC pipe can then be used to connect the tanks together. If the rinse tanks cannot be elevated or the water must be piped across the shop, then a pump system can be used. A simple system can be constructed by using small submersible pumps (2-5 gpm) and <sup>1</sup>/<sub>2</sub>" PVC pipe. As a safety measure level controls can be added to regulate the flow of water between tanks.

The reuse of rinse water cannot be used indiscriminately as it could contaminate process baths and reduce plating quality. However, if care is taken in evaluating each potential use, then the use of this technique can produce significant water savings.

#### Capital and Operating Costs

Rinse water reuse is one of the most cost effective water conservation techniques available. The typical costs per application (i.e. connecting together 2 rinse tanks) is shown below:

#### o Gravity fed system:

- Cost of 10 feet of <sup>1</sup>/<sub>2</sub>" PVC pipe and necessary fittings is about \$5.00.
- Cost of installation, 4 man hours, and contingencies is about \$85.00.
- Total cost is about \$90.

#### o Pump system

- Cost of a 3 gpm submersible pump, 30 feet of <sup>1</sup>/<sub>2</sub>" PVC pipe and necessary fittings is about \$70.
- Cost of installation, 8 man hours, and contingencies is about \$180.00.
- Total cost is about \$250.

There is no direct operational costs associated with this technique. However, the equipment should be included in the facility's routine inspection and maintenance program.

#### Pay Back

The pay back period for installing a rinse water system will depend on the quantity of water saved and the water costs. For example, if a system is installed on a typical nickel plating line the water flow rate can be reduced from 9 gpm to 3 gpm. Assuming water and sewer charges are \$2/1000 gallons, then the pay back period for a gravity system will be about 6 weeks and for a pump system it will be about 18 weeks. After this initial pay back period the water reuse system will reduce operating costs by \$1,500 per year, through water savings.

In addition to these direct costs savings, a water conservation program can reduce the capital cost of any required end-of-pipe wastewater treatment system. A rough "rule of thumb" is that a precipitation system costs about \$2,000 per gallon of flow per minute. Thus a substantial reduction in water flow can produce corresponding savings in treatment system costs. However, small or token reductions will yield very little, if any, savings.

#### Additional Information

For additional information on water conservation in the electroplating industry or other pollution prevention techniques, contact:

Pollution Prevention Program Department of Pollution Prevention and Environmental Assistance N.C. Department of Environment, Health, and Natural Resources 1639 Mail Service Center Raleigh, NC 27699-1639

Telephone: 919-715-6500

#### COPYRIGHT: 1985

Pollution Prevention Program Department of Pollution Prevention and Environmental Assistance N. C. Department of Environment, Health, and Natural Resources

#### Reprint with permission