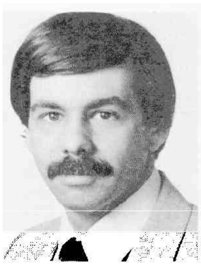
Finishers' Think Tank

By Marty Borruso



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Practical SPC

Q. I'd like to orient my company to implement SPC. How should I start?

A. You're wise to head in this direction. A good SPC program can help improve quality and production, and control costs. Here are some guidelines.

1. *Identification of systems that require control*

A broad spectrum of process tanks should be marked for control.

a. Inclusion of all tanks in the process system is extremely important for determining the significance of each step in the operation.

b. A record of the quality of the finished parts should be kept as a reference for the effectiveness of the control system.

II. *Identification of control parameters*

a. Records should be kept of the concentrations and temperatures of all process tanks, including rinse and drag-out tanks.

b. A combination of historical data and industry parameters should be compiled and used to determine which data are valuable enough to be included in the control system.

c. Once the significant control points are identified, high and low values must be established for the system. Initially, these values may be wide enough to accommodate the existing control set-up and are referred to as the upper and lower control limits. The frequency of analysis of the control system should be adjusted to tighten the control limits for more ideal process control.

d. A regular routine of analysis and recording of data will make it easy to tighten control parameters to increase process integrity.

e. Controlled parameters should include but not be limited to:

- Pertinent chemical concentrations and ratios
- Temperature
- Ž TDS of rinse tanks
- pH of all significant points in the process
- Process times

Statue of Liberty

Q. How can I duplicate the coloration of the Statue of Liberty on brass-plated statues?

A. The coloration of the Statue of Liberty is called a *verdigris patina,* a color derived from formation of copper carbonate on copper or copper alloy surfaces. Much effort has been made to reproduce this kind of finish and the easiest way to do it is to make your parts anodic in a solution of sodium bicarbonate and sodium carbonate in the following quantities:

Sodium carbonate	4 oz/gal
Sodium bicarbonate	8 oz/gal

Use a current density of 10 to 25 A/ft^2 and a temperature of 125 to 160 °F. Proprietary solutions are available, too, that are simple to use. The suppliers will also provide support if needed. Unfortunately, your greatest problem is likely to be in producing a specific color because of the many variables in the process.

Nickel on Aluminum

Q. What is the difference between electrolytic and electroless nickel deposits on aluminum?

A. The main differences are the the way each interacts with the zincate coating commonly used. Electrolytic nickel deposits directly over the zincate coating, or directly over the copper strike on the zincate if a copper strike is used prior to nickel plating. Most alloy zincates will allow direct deposit of nickel from a Watts bath—the preferred method—because copper will accelerate corrosion of the deposit and the nickel coating will be undermined. Undermining occurs if there is any porosity in the coating. The result is lifting of the nickel coating and premature failure of the part. Since nickel protects by sealing the part from the environment rather than by sacrificial corrosion, the part is susceptible to any porosity in the coating as a point of failure. Electroless nickel, on the other hand, removes the zincate layer and deposits directly on the aluminum surface, first by a substitution reaction replacing the zincate and, second, by an autocatalytic process to build up a nickel layer so that there is no zincate residue on the part. Electroless nickel is also amorphous and seals the pores of the aluminum surface. The corrosion resistance of electroless nickel is well known, and if surface porosity is properly treated, the surface is fairly immune to attack in most atmospheres.

Excess Copper Build-up

Q. I have a cyanide copper strike that keeps building up copper metal. Why is this happening and what can I do to prevent it?

A. Cyanide copper plating baths used as strike solutions are usually run with low cathode efficiency intentionally because of better parts coverage and increase in cleaning and activation of the parts. Generally the baths used as a strike are controlled by the ratio of copper metal to free cyanide. At 125 °F, a solution with a concentration of copper of three oz/gal and free cyanide (NaCN) of two oz/gal at a pH of 10 has a cathode efficiency of approximately 55 percent. Because there is such a high concentration of free cyanide in the bath, the anodes remain unpolarized and copper from the anodes freely dissolves. Anode efficiency is then in excess of 90 percent, so there will be a net gain of copper metal. ❑

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