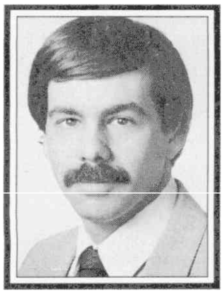

Finishers' Think Tank

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Have a problem on the finishing line? To send your question, use the convenient, post-paid form on our Readers' Service Card, or send a letter to: Finishers' Think Tank, 12644 Research Pkwy., Orlando, FL 32826-3298.

Fighting Particle Build-Up

Q. We use a water-reduced lacquer coating over brass. Ours is a dip-and-spin operation, for small parts. The lacquer builds up with particles and causes premature failure of the parts in salt spray. Filtration removes the particles, but it also reduces the viscosity of the coating solution and renders it unusable. Is there any other way to remove the particles besides filtration?

A. It appears that, if filtration damages the efficacy and the viscosity of the water-based lacquer systems, it is not being carried out properly.

Water-reduced lacquers are delicate organic/water blends that may be damaged, if handled improperly. Filtration systems should use the correct combination of filter media, pumps and pressures.

Temperature: High temperatures may result, if incorrector insufficient filter media is used and higher-than-necessary pressures are employed. High temperatures will reduce the viscosity of the system or corrupt the organic structure of the coating, so that it becomes unusable. Parallel filter mechanisms may be employed, to reduce the overall filter pressure and, hence, temperature.

Pumping:A diaphragm or piston pump should be used, to move lacquer solutions. At low flow, centrifugal pumps, which properly hold the organic materials in solution, will cause a shearing action on those organic materials. Centrifugal pumps will also cause higher temperatures to form, because of the turbulence in the volute areas, and action of the pump's impeller.

Finally—and probably most important—the coating should be applied as a final step in the finishing operation, and as such, the parts entering the lacquer solution should be free of particles.

Quality imperatives of the 1990s dictate that problems should be prevented, rather than fixed. Coatings over brass should be continuous and free of particles, so that the protection is complete. The short life cycle of your current coating technique (three-four weeks) shows that your quality declines to a point of unacceptability, which means your parts will be intermittently reliable and that will not make it in this day and age.

We went to Kurt Johansen, of Stanley Hardware, New Britain, CT, for providing the answer to this question.

What are the Pros and Cons of Trivalent Chromium Plating?

Q. We are looking for new methods for finishing motorcycle parts. What are the benefits and problems associated with trivalent chromium plating systems.

A. Trivalent chromium plating solutions have cornea long way since their commercial inception, some 15 to 20 years ago. They are chromium plating solutions, with these benefits:

- Generally are of low metal concentration and waste treatment is simple
- Do not aerosol materials like hexavalent chromium plating solutions
- Operate at relatively high pH levels
- Are not aggressive to incoming parts and substrates
- Deposit in lower current-density areas than hexavalent chromium
- Do not cause OSHA difficulties usually associated with chromium plating

Some of the problems associated with trivalent chromium systems include:

- Traditionally, there is a limitation with thickness of the deposit, which does not allow the process to substitute for hard chromium.
- Trivalent chromium protects, by virtue of a microporous surface, and the nickel under the chromium tends to oxidize and darken.
- Trivalent chromium is still fairly new and has not been fully accepted by auto makers or other industry leaders.

There are several types of chromium plating solutions available, each with special traits of its own. The chemical suppliers who advertise in this Journal can give you more specific information on the many proprietary solutions available.

Reducing pH in Cyanide Copper

Q. How do you safely reduce the pH in a cyanide copper plating solution?

A. The pH of a cyanide copper plating solution may be varied by different means. A solution that is made up by the additions of sodium carbonate, copper cyanide and sodium cyanide will usually stay in the range of pH 9.5-10.5. The pH of these types of solutions depends mainly on the concentrations and ratios of three species, hydroxide, carbonate and bicarbonate.

As the bath ages, there is the formation of first sodium carbonate and then, as the concentration of carbonate increases, there is the formation of bicarbonate in the solution.

If you want to decrease the pH of a bath, you can make calculated additions of sodium bicarbonate. These additions must be made after analysis of the solution and a preliminary test, made in the laboratory, under good ventilation. The pH should not be allowed to go below 9.5.

To make additions of sodium bicarbonate to a cyanide plating solution, predissolve the bicarbonate in hot water. Mix the solution well when adding the bicarbonate to the bath, to prevent localized drops in pH.

To determine the amount of bicarbonate needed, analyze the concentration of the hydroxide species by titration to an analine blue endpoint. It will generally take two times the weight value of sodium bicarbonate to react with one weight value of sodium hydroxide, to form sodium carbonate. This will generally lead you to a pH of 9.5. Keep in mind that the reaction will be slow, so allow adequate time. The additions should be made in a stepped, controlled manner, and proper mixing should be practiced at all times.

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Physical Aspects of Electrocleaning

Electrocleaners clean, in part, by the scrubbing action of the gases generated at the electrodes-one of which being the parts you are pressing, illustrated by the following reactions:

Anode Reaction

$$4(OH)^{-} - 4e \rightarrow 2H_2O + O_2\uparrow$$

Cathode Reaction

$$4H_2O + 4e \rightarrow 4(OH)^{-} + 2H_2\uparrow$$

In addition to generating gases in anodic cleaning metallic smuts are removed from the surface of the parts by dissolving the surface metallic oxide films into the cleaning solution. Aside from the gassing, the evolution of oxygen at the anode passivates the surface by creating light oxides on the anode surface. The generated oxides also tend to oxidize organics and allow them to be removed by the solution. If the oxidation did not take place, some organic materials may remain insoluble.

Electrocleaners and electrocleaner tank configurations are probably least-considered when setting up any plating line, because the operational window is rather large. But, like any other electrolytic process, the distribution of the current to the parts is very important. Current densities applied to the parts range from 10 ASF to 100 ASF. Though this is one of the most important aspects of the finishing cycle, it is the one most often taken for granted.

Steel tanks should never be used for electrode surfaces, because the current distribution from the tank is fixed and little control is gained. The tank itself is very difficult to clean and keep up. Care should be taken in positioning electrodes in a cleaning tank, and they should be scraped down and maintained on a regular basis.

Along with this notion of positioning electrodes, the other half of the reaction should be considered, and that is the positioning of the parts on the racks. They should be distanced properly from one another, as well as from the process electrodes. They should receive an equal amount of current density, no matter where on the rack they are positioned, if you require the same quality on the whole batch of the processed parts.

Today’s quality standards require that the whole part be processed efficiently and completely. The proper orientation of the part, in a properly designed system, is essential for the right kind of quality production. Ž