P&SF Retrospective

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Golden opportunity

Q: ***A couple of custom car dealers in our area would like to apply a gold finish to already-plated automotive accessories. The objective is at least two years of exterior product life. Because our gold tank is not big enough to handle a bumper, what would you recommend?***

A: Perhaps you missed the April 1983 issue of *P&SF*. An article entitled "Brush Plating Makes a DeLorean Golden," by Bob Brookshire of Brushtronics, Laurel, MD, spelled out what was needed and used to brush plate a whole stainless-steel car. Brush plating is a versatile tool that allows you to plate without a tank. Almost all selective plating is done between 5 to 30 V, so a controllable power source must be used. Anodes of the metal being plated cannot be employed. Soluble anodes tend to polarize at the high voltages used, so a special, high-density prepurified carbon anode may be preferred.

The same principles of plating still must be followed. Clean surfaces, proper rinses and correct deposit thicknesses are needed. If the dealers' parts are already plated with copper / nickel / chromium, you can probably strip the chromium or use special proprietary strike baths before gold plating. It should be noted that a hardened 23-karat gold alloy was used on the DeLorean car [stainless steel automobile body] and, yes, color matching was a problem. Just the same, brush plating could be the answer to your inquiry. Modern, high-speed brush plating systems are readily available, and after a little practice, this art may become science at your shop.

Another option may be to apply an organic finish. Charles Storms, president of Red Spot Paint & Varnish Co., Evansville, IN, recommends a transparent polyurethane coating containing a light-fast gold-colored pigment. Prior to painting, the parts should be thoroughly cleaned in soap and water. If chromium plated, a 5-min etch in 3% chromic acid is suggested, followed by rinsing in deionized water, drying and painting. Mr. Storms says the polyurethane film at a minimum thickness of 0.5 mil would have good adhesion and hold up for at least the two years you're looking for. Tight thickness control of the paint is necessary in order to control color uniformity

Copper on stainless

Q: ***We electroplate stainless-steel wire coils with copper. The copper acts as a lubricant when the wire is reduced to a smaller size by cold drawing through a die. Appearance of the plate therefore is not important, but adhesion must be excellent. We preclean the wire coils in acid, activate, flash copper plate using a commercial displacement method, rinse and plate with cyanide copper. Halfway through the plating cycle, the coils (Fig. 1) are rotated one-quarter of a turn in an effort to get a more uniform plate thickness of 0.0002 to 0.0005 in. The waste disposal of sludge and the potential hazards of using cyanide are problems we would like to avoid. Another problem is the lack of a concentric plate. It is heavier on the side of the wire closest to the anodes. Any suggestions?***

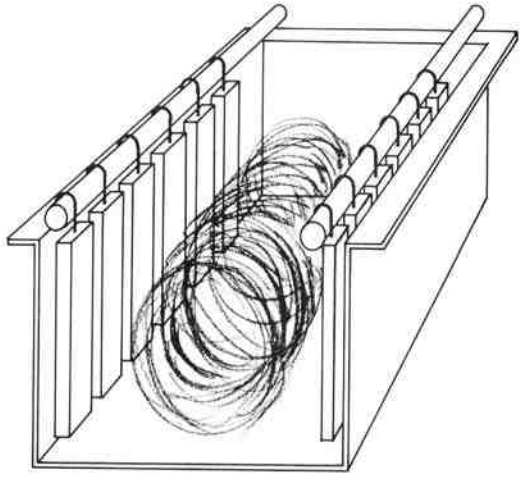

Figure 1—Apparatus for plating copper on stainless steel coil. Anodes are stainless steel baskets filled with chopped copper plate.

A: Good uniformity of plate thickness is difficult to obtain when plating coils. To improve uniformity however, individual coils should be spread apart as much as possible. Increasing the ratio of cyanide to copper should also improve thickness uniformity.

Elaborates Ed Seyb of M&T Chemicals Inc., Rahway, NJ, "Adherent copper electroplate could be obtained without cyanide using the pyrophosphate bath. In fact, the deposit characteristics may be even better for drawing purposes. However, it would be difficult for any non-cyanide bath to better a well-adjusted cyanide solution in terms of providing concentric deposits, although the pyrophosphate bath has excellent throwing power."

A number of formulations for pyrophosphate copper baths can be found in various plating books, including *Modern Electroplating* (by Lowenheim) and *Electroplating Engineering Handbook* (by Graham). Proprietary solutions are also available.

Filter hard chromium?

Q: ***Is it advisable to filter our hard chromium plating solution? This is a daily hassle between my boss and me.***

A: If roughness is present, a thick chromium deposit will certainly show it. If this problem doesn't surface, however, you should be able to get along without filtering the bath.

Because the filtration of chromic acid solutions is rarely necessary and requires special equipment and filtering media, the use of practices that restrict the pickup of dirt particles is usually preferred. For example, good cleaning before plating will remove semi-adherent particles from workpieces. A good idea is to separate the plating room from grinding, polishing and buffing operations.

Gold outdoors

Q: ***We have several signboards to be gold plated for outdoor use. Some are made of 304 stainless steel and the others are brass. They are to be used purely for decorative purposes near a street with busy traffic. Also, relative humidity sometimes climbs to 90% in the area. We need a minimum of three years' service life and a bright color. What thickness of gold is recommended? Do we need a lacquer topcoat?***

A: According to Robert Duva of CathoIyte, Inc., Paramus, NJ, you shouldn't have to use lacquer if you follow the right plating scheme.

"To protect against corrosion," he says, "gold should be plated directly onto the stainless steel. This can be accomplished using a gold strike prior to gold plating. The brass parts should be plated with 0.2 mil (5 μm) of nickel followed by 0.08 mil (2 μm) of tin-nickel prior to gold plating.

For protection against erosion, Mr. Duva recommends a minimum of 0.2 mil of gold in the environment you describe. "In this application," he says, "a low or compressively stressed gold would perform better than any other in that exfoliation would not occur in service. A sulfite gold will do the job." *P&SF*

The edited preceding article is based on material compiled by Mr. Ronald Kornosky, then of Hager Hinge Co., in Montgomery, AL, as part of the Finishers Think Tank series, which began its long run in this journal 26 years ago. It dealt with everyday production plating problems, many of which are still encountered in the opening years of the 21st century. As we have often said, much has changed ... but not that much. The reader may benefit both from the information here and the historical perspective as well. For many, it is fascinating to see the analysis required to troubleshoot problems that might be second nature today. In some cases here, words were altered for context.