Hands-on Management

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Quality: An Industry-wide Concern

As technical director for a jobshop barrel plater, I help our team evaluate parts with their matching specifications, before any finishing occurs. These specifications are called out by the print or work order to ensure that the parts can be processed to mutual satisfaction.

Directional Plating

Barrel plating has its limitations, just as other finishing methods, and customer returns are unavoidable. Some rivets, for example were returned to our shop because of marks on the heads of the rivets. Evaluation of the problem revealed that about one-half of the rivets had a crescent-shaped mark located in the same area on each head. This was a "red flag," because barrel plating has a randomness to the rejects it generates. In any one barrel load, for example, there could be any or all of the following: A few parts over- or underplated, a few unplated parts, a few parts poorly chromated, and even a few mixed parts left over from a previous customer's load. The sheer number and "direction" of defects on these particular rivets—all of the same shape and in the same location—were not consistent with barrel plating. The rejects, therefore, were caused by the stamping operation and not during plating process. Logic (and a few stripped parts) had given us the answer to the problem.

Another directional reject situation involved a screw manufacturer who returned a bolt he felt was overplated. Electroplating can overplate the lead thread at the very end of a part—an effect known as "dog boning" because of the shape that a long, straight part takes on as plating continues. Some of you may remember an experiment in high school where a bar magnet was covered with a sheet of white paper and then sprinkled with iron filings. Most of the iron was found at the ends of the magnet, where the magnetic field was strongest, while almost no filings were found at the center. The electrical field surrounding a long part works in much the same way, with more electroplated metal deposited at the ends of the part than in the middle.

The bolt in question was tested with a nut, which started on the bolt but then stopped $3^1/_2$ turns up the threaded shank. If the bolt had been overplated, the nut would not have started on the threads. Again, logic (and a full page of X-ray thickness readings) gave us the answer.

In another case, machined steel parts were returned for poor plating adhesion. The parts were made from 12L14 steel, which contains lead to make the steel softer and easier to machine. Our jobshop has been making steady progress in reducing the number of rejects resulting from the lead in this type of steel. The parts have a machined outer surface and two counter-sunk surfaces placed one over another, and only the smaller counter-sunk tooling area was showing the lack of adhesion. Heat buildup from dull tooling may cause the lead to smear to a level that the cleaning cycle cannot handle. That's the "logic," but testing the surface of the parts for higher levels of lead at the one surface would have cost ten times more than the customer was charged for the job in the first place. Oh well ... you can't win them all.

This article has given you a lot of reasons why plating is *not* directional. Now here are a few examples of finishing *with* direction. Gases generated while plating can become trapped and cause a void only in the "up" side of the part. Codeposition of fine particles with electroplated metals will create dispersion-hardened alloys. If the part is plated vertically, about eight percent of the particles can be included in the deposit. Turn the part over to form a shelf in the plating solution (the particles will settle on the top of the horizontal side), and the codeposition can be increased to 25 percent of the deposit.

At the recent Eastern Canada Regional "Springfest" (a remarkable event sponsored by AESF's Toronto Branch), Dr. Donald L. Snyder of Atotech USA spoke on "The Evolution of Chrome Plating." He made note of two directional trends. The first concerned an effort to improve the quality of the copper-nickel-chromium plating system on chrome bumpers of cars on the road. In this study, the front bumper stood up to weathering better than the back bumper, because dirt and small stones hitting the back caused microcracking in the finish. Up until this time (*circa* 1960), crack-free chromium was favored to prevent corrosion. The second directional trend followed the overall quality of chromium plating in relation to consumer demand for the finish. As the quality of copper-nickel-chromium plating increased, so did consumer demand for products with this decorative finish. The study indicated that low prices caused a diminishing of finish quality. Less nickel plate, poor duplex systems and low pore count in the micro-discontinuous chromium all led to the exact opposite of what the consumer was looking for in the product's finish.

Poor quality hurts *all* finishers—not just the "do-it-cheap" shops. Consumers demand superior quality, as well as good value. If you need a good reason to make sure all the shops down the road are involved in AESF and its educational programs, this is it. Quality must be an industry-wide concern. **P&SF**