Corrosion Prevention

Sophisticated finishes are developed and specified for many industries, these include medical, aerospace, military, engineering, consumer, construction, energy, and a host of others. Application requirements such as thickness, color, appearance, ductility, deposit consistency, post dips (along with others), all mesh to improve field performance and minimize corrosion. Only through the development and use of quality coatings can this be achieved.

NACE (National Association of Corrosion Engineers) recently stated that the direct costs to our nation of corrosion totals $276 billion/year. Where does the metal finishing industry fit in to address corrosion? In a basic sense, corrosion defines the wearing away of metals, mainly through oxidation. Corrosion produces, through chemical reactions, by products, such as rust. This leads to breakdown and failure of finished parts, typically assembled in critical portions of operating devices, equipment, infrastructure, and other items or materials. This demands substantial upgrades in field performance and exposure of these related items that make progress possible. Add to this the importance of environmental stewardship and we can clarify the role of metal finishing in continually minimizing corrosion. Let us check into how different steps in any given process can be critical to quality finishing as it relates to corrosion prevention.

Raw Material Stock & Manufactured Parts:

Some examples of the variables that can impact the surface finishing process and problems, include raw materials and storage issues that need to be addressed. Metal finishers can only produce quality coatings if the incoming base materials exhibit the required surface characteristics. Simply put, “garbage in, garbage out”. To save money, a metal stamper purchased cheaper coil stock. The poor surface quality and excessive carbon smuts, gave the plater fits, until the problem was addressed and corrected by the stamper.

In another instance, incoming aluminum sheets were purchased through a different supplier. The stock was stored outdoors until ready to be fabricated and plated. Nothing could be done to correct plating blisters. Not even replacing process baths. The problem was found to be the paraffin paper sandwiched between each layer of aluminum sheet. In the hot sun, the paraffin softened and transposed on to the aluminum sheets. The surface preparation cycle could not remove this film. Eliminating the paraffin paper corrected the problem.
A different problem was related to fabricating a steel coil into parts, that would be nickel & chrome plated. Unfortunately, the brightness and leveling characteristics of the nickel deposit suddenly dropped off. Analysis of the nickel bath and plating tests confirmed this was not the problem. Neither was there an electrical or mechanical problem. Inspection of the incoming coil found it to be to the customer’s specifications, one side bright the other side satin. The bright side should be formed as the exterior and the satin side as the interior. The coil was mounted in the stamping machine in reverse, causing the finishing problem.

In a different application, wire goods were inspected after plating and found to exhibit numerous micro cracks. It was believed that aggressive surface preparation was causing this problem. It was not, but only aggravating a bad condition at the manufacturing site. The wire was being poorly extruded, resulting in the micro cracking. Correcting the problem improved quality of the extruded wire.

Process oils can be very important. Without consulting anyone a purchasing agent on pricing consideration switched from a mineral oil to a chlorinated paraffin. The plater could not remove the new oil in his cleaners that were satisfactory for the mineral oils. Working with the supplier, they changed cleaners to now satisfactorily remove the chlorinated paraffin. These are some varied examples of how the condition of parts and what is coating them can very important to quality finishing as it relates to minimizing corrosion. Equipment, old and new can also be critical to the finishing cycle.

**Equipment Considerations:****

A unique problem occurred as soon as a brand new automatic plating line was installed and began operation. This multimillion-dollar line only produced non-plated parts. Chemically, all process baths were found to be at optimum. The bussing was connected in reverse. It took a few minutes to correct the buss connections.

At another installation, a highly anticipated trivalent chromium alternative to hexavalent chrome plating was being installed. Part of the startup consisted of dummy electrolyzing to condition the electrolyte. Upon test plating, the chrome deposit was pewter in appearance, not like the blue white it was supposed to be. It was found to be another incidence of reverse bussing to the plating tank rectifier. Unfortunately, the new bath was so grossly contaminated with metallic
contamination, it had to be replaced with a new make-up. This resulted in plating the desired chrome deposit.

Carbon filtration is very important to maintain clarity of plating solutions and remove organic contaminants. If the equipment is properly serviced or used, the benefits of proper filtration will not be achieved. We have experienced many situations where filtration equipment was inoperable due to broken or worn parts. A lack of filtration can result in dull plating, roughness, and poor ductility. Sometimes the obvious corrective approach is bypassed in favor of adding more brighteners or other additives to the plating bath.

There have also been problems related to lack of equipment maintenance. How can a trickle filter return possibly benefit the purification turnover of a 1,000-gallon nickel bath? Rectifiers can be considered the nerve center of the plating application. Without current the parts don’t get plated. Without proper current, the parts will not be plated to the required specification. Rectifiers need to be serviced on a regular basis by capable personnel.

If corrosion is to be minimized, and the service life of parts improved, attention to every portion of the finishing process must be in focus. The examples given highlight problems and failures that adversely impacted the condition of the incoming and finished parts. Some instances were obvious, while others were more complicated, requiring intuition and patience.

Our people. Your problem solvers.

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