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Decorative Precious Metal Plating

A program to improve and control the quality of a metal product should start at the desk of the designer. The metal finisher is restricted in what he can do by certain basic principles of mechanical finishing and of electroplating. The engineer should understand the limitations imposed by shape and size of components to facilitate quality finishing at an acceptable cost. The designer can exert as much influence on the quality attainable in finishing a part as can the electroplater himself. ASTM Standard B-5O7 can provide the designer with helpful information

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DECORATIVE NICKEL

Introduction

Today's bright nickel processes are vastly superior to earlier processes. Current nickel processes provide outstanding leveling characteristics and excellent physical properties. Most employ a WATTS electrolyte which can be modified to satisfy specific plating requirements. For example, a high chloride WATTS type bath is employed where plating speed is important; a low chloride WATTS is more suitable for applications that require excellent ductility and low stress. Typical basic formulations are shown below.

Decorative bright nickel electrodeposits are often used as an undercoat for precious metal coatings. Nickel undercoats provide brightness to improve reflectivity and leveling to smooth out surface defects. They also improve corrosion resistance, reduce porosity and can act as a diffusion barrier to prevent the base metal from migrating into the precious metal topcoat.

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COPPER ELECTROPLATING

A wide range of types of functional or decorative copper electrode position processes are presently available. The type of copper to be used is defined by regulatory laws, speed needed, substrate utilized, and appearance requirements. The general types of copper electrode position utilized at the present time are:

ACID COPPER DEPOSITION

Decorative, bright, high leveling for rack or barrel, electroforming, rotogravure and other functional coatings, high speed functional for wire, strip and rods, electronic copper (ductile, high throw baths) acid copper strike undercoat for plastics, electro winning and electro refining of copper

ALKALINE COPPER DEPOSITION

Alkaline, cyanide-free copper for rack or barrel , Alkaline, cyanide copper deposition , Alkaline, cyanide copper strike undercoat

All but the cyanide copper baths deposit from a divalent copper ion, taking twice as many ampere hours to deposit the same amount of copper. However, since the acid copper baths and some of the alkaline baths are able to operate at higher cathode current densities, the negative aspect can be easily removed.

All the types of alkaline copper baths utilize some type of complex ion in order to tie up the copper ion and prevent it from precipitating out. This complex typically can be cyanide, tartrates, pyrophosphates, or phosphonates. Acid copper, on the other hand, deposits right out of a plain copper ion, whether the anion in the bath is sulfate, fluoborate, or other. Acid

A copper strike puts on a barrier copper coating which allows subsequent deposits to go on trouble-free. In the case of plastics, the strike increases the thickness of the electroless coatings, allowing for conductivity and stability under higher voltages. A copper strike is essential for the subsequent acid copper plating of zinc based die castings and tin based castings.