Plating NEWS

2017 Highlights

Summer/Fall 2017

IN THIS ISSUE:

Machining, 3D Objects, Smart Cathode Shields

Machining

Readers communicated to us urging follow up to something said in the last Plating NEWS issue, specifically the statement made about hard chrome plating and a need to "grind off the excess deposit thickness". Further, the "We'll get to that later" comment had readers anticipating the "later" that never arrived. So, let's get to it…..

First, we weren't denigrating hard chrome plating or platers. We merely point out that hard chrome is not always plated to exacting thickness specifications. Since precise, working dimensions of many of the plated parts are important, tolerance for deposit thickness differences necessarily needs to be small. Machining, or "grinding" off the excess metal deposited is typically the industry's solution.

The optimum plating set-up can minimize or even eliminate machining after plating. We all know "Trial and Error" set-up experiments, seeking optimum plating thickness uniformity, can be time consuming, costly and generally not that accurate. As a result Trial and Error on the plating line is seldom utilized.

A good 3D computer simulation model however can allow numerous Trial and Error plating set-ups in a matter of minutes. There is a cost for this computer modeling of course. Whether you do the modeling or have it done by someone else, there definitely is a payback. In the case of hard chrome such payback can be realized in the reduction or elimination of post plate machining. Too few platers consider this as an option.

It's somewhat understandable and history says that, by nature, 3D objects will not plate uniformly. Electroplaters don't easily relate well to plating thickness uniformity simply because they've never had it.

3D Objects

The 3D objects we're referring to in the example above are the cathodes, e.g. the parts we're plating. The 3D objects we touched on in the last Plating NEWS and that which we shall discuss now are not cathodes. In fact, they're not even electrolytic. Early computer modeling research performed in the 1990's demonstrated that current flow patterns could be manipulated by placing non-electrolytic barriers between an anode and cathode. All the available current would eventually reach the cathode of course. It could be somewhat misdirected and almost muted to some cathode areas that would ordinarily receive much more current. Think overplating and then think about resolution of that overplating!

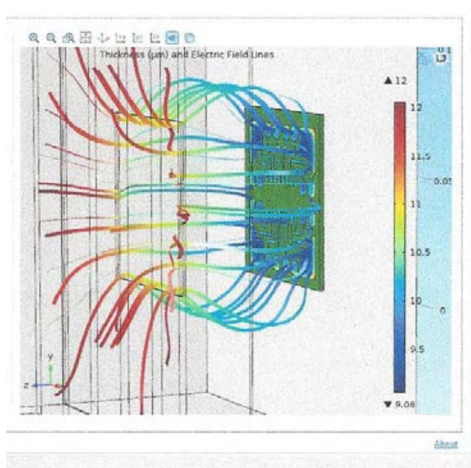
The Smart Cathode Shields referred to in our published papers (see the Downloads Section on our website) have always been flat. Although not yet attempted to any great extent, we suspect flat shields could probably be bent to a curved shape. A good computer model could validate such a curved flat panel but we can't think of any reason why it would be needed if technology today can go beyond that.

Non-electrolytic, 3D Objects however can redirect current according to their shape, size and orientation to the plating fixtures and their cathodes. Early 3D object plating shield experimentation was accomplished by hanging spheres directly in the current patterns. It was interesting seeing how the current flow was so manipulated. Spheres radiate somewhat uniformly when current is directed at them. Imagine what a myriad of 3D shaped objects could do to positively redirect current flow in a plating cell? We'll get to those in a future issue.

Regrettably we can't publish graphic representations yet but we've seen a 2D, curved shape representation that will give you a hint…………..

Plating NEWS *2017 Highlights, page 2*

As we've amply stated before, we are partial to the "passive" method of using simple, non-electrolytic shields that effectively block stronger current flow and redirect it to areas that need more current. In our experience anything that's electrified, such as a current robber or on the opposite pole, an auxiliary anode, requires maintenance and upkeep for it to perform consistently. It's functional but in the end too complex to work consistently well.



This graphic from our last Newsletter is not a detailed example of a smart cathode shield but it does point out the basic difficulty in electroplating cathode panels to achieve uniform metal deposit thickness. Shield construction ensues using a pattern suggested by evaluating the plating thickness uniformity on the panel and affixing a non-conductive barrier to the rack, so positioned between the anode and cathode that average current density across the panel surface is made more uniform.

WHAT DOES THE FUTURE HOLD?

We should all be acquiring better Electrochemical Intelligence. Intelligently configured flat shields, Smart Cathode Shields and now 3D Objects, properly placed in the anode to cathode electrical field, will be future state-of-the-art. As we said in our last issue, "If you got there without a computer model, then all the better for you!" It gratifies us to see adoption and use of plating shield technology on any level and by any means, including trial and error.

THANKS FOR READING

This edition of Plating NEWS has been written and edited by Roger Mouton and guest staff at Advanced Plating Technologies. We welcome submissions for publication in future issues of Plating NEWS.

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