Plating NEWS

2016 Highlights

Spring/Summer 2016

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SURFIN Conference 2016

The National Association for Surface Finishing (NASF) SUR/FIN Tradeshow and Conference returned to the South Point Hotel in Las Vegas, Nevada in early June 2016. There were numerous technical presentations covering advanced plating technologies, not the least of which is computer modeling of the plating process.

As the surface finishing industry evolves, keeping up with advancements in research, design and manufacturing is critical for business success. SUR/FIN is the only tradeshow and conference sponsored by the NASF, the industry's leading organization for surface technology. It is a premier resource for keeping up and getting ahead.

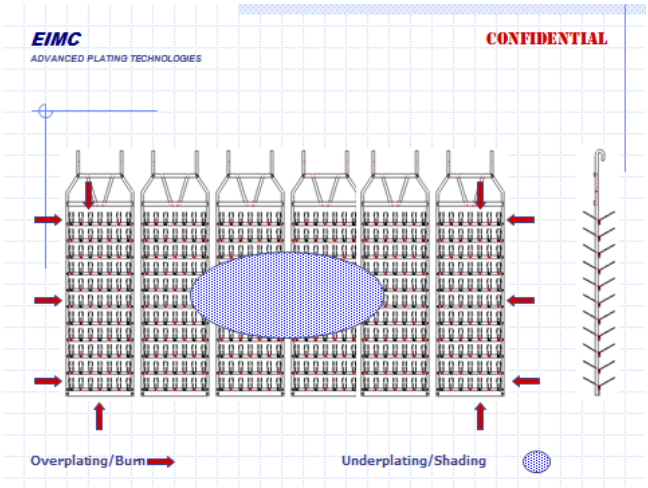
Congratulations and Best Wishes to Coventya's Erik Weyls. He is the incoming President of NASF and has a sharp eye for technology advancements that positively affect the surface finishing industry. In addition, his years of overseas experience with exposure to all forms of finishing will serve him well as NASF's new leader.

Economics of Successful Computer Modeling

Keeping up with advances and getting ahead around here at Advanced Plating Technologies almost always means helping a client understand and reduce or eliminate excessive plating, e.g. more deposit thickness than the specification calls for. Hard chrome platers in aircraft maintenance and aerospace industries do it all the time…..overplating. Then they grind off the excess deposit thickness. We'll get to that later…….

Plating cells that benefit from Before and After re-engineering will on average consume 20% less metal. If you're into decorative finishing, e.g. home hardware, plumbing fixtures or automotive accessories then think in terms of your nickel anode costs/year. Is 20% nickel anode cost a lot of money to save or is it just so, so?

In the cost calculation you will later come to consider scrap loss and plating cycle time reduction. Example: the racks in the graphic below, positioned on a flight bar, produced significant scrap loss due to burning and shading.

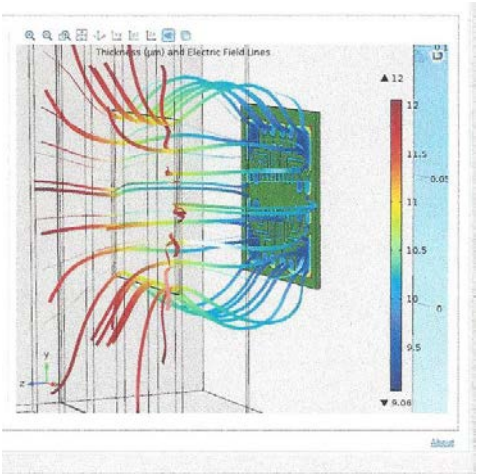


Overplating wastes valuable resources and there are options to minimize it.

EIMC Advanced Plating Technologies is partial to the passive method of using simple shields that block stronger current flow and redirect it to areas of the cathode that normally would receive less current. We've been gratified to know that the various technical dissertations and references at www.smartcatshield.com have given rise to innovations resulting in greatly improved plating efficiencies.

As a reminder, the "cat" in smartcatshield is short for cathode. When you selectively shield the cathode there is a redirection of plating current. If shielded correctly plating current goes preferentially away from high current density areas to areas of the cathode that would ordinarily have thin plating deposits.

One example for selective plating of printed circuit boards is seen below:



This graphic is not a detailed example of a smart cathode shield but it does point out the basic difficulty in electroplating flat cathode panels with 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.

In this example the cathode exhibits the "picture frame" effect, meaning the cathode's perimeter deposit thickness is greater on the edges and thinner in the center. Using a picture frame shield goes a long way to mediating the wide range of current densities encountered in most all anode/cathode relationships.

It sounds so simple so why aren't more people doing it? The short answer is that more finishers than we realize are following these shielding and set-up practices. Plating technology advancements can become closely guarded secrets. It used to be that when something new hit the market everyone knew about it. Trade shows, expos and/or association chapter meetings were an excellent source of information on the "latest". And everyone knows that vendors (any vendor) can rarely keep a secret. Not any longer…..

Perhaps this is an isolated example but it illustrates a point: one of our plating software customers, a very large finisher, asked us what it would cost to keep the product OFF the market for a year. In other words, keep the product out of a competitor's hands. We've reported this before. The "exclusivity" didn't happen of course but it shows how valuable something new can be in a highly competitive finishing industry.

When shields and/or other ancillary devices are used and the set-up is correctly engineered, what follows next?

For plating circuit boards it means that surface deposit plating thickness uniformity is preferentially improved. The overall plating current density can then be increased, assuming fresh copper solution can be better introduced into the holes. Example: 35 A.S.F is VERY healthy for an acid copper bath plating circuit boards but you'll not find any pwb platers coming close to that current density and for 2 reasons:

1) surface copper non-uniformity

2) "dog-boning" in the holes.

Dog boning is a plating defect found in drilled holes where the electroplated copper is thin in the center and thicker at the knee of the hole. And we will once again emphasize: dog boning in the holes has nothing to do with current density in the holes. It has EVERYTHING to do with copper starvation in the holes because fresh copper electrolyte is depleted more rapidly in the holes. This is because the fluid dynamics present in the cell don't facilitate the bulk electrolyte getting into the holes to replenish the cathode surface diffusion layer as it would on the board surface. Sometimes we dislike having to emphasize this so much. It came up again….

WHAT DOES THE FUTURE HOLD?

How about 3D objects? We'll give you a peek, sort of. Intelligently configured flat shields, Smart Cathode Shields, properly placed in the anode to cathode electrical field, can pretty much be considered state-of-the-art. 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.

Now consider this……. Solid, inert objects placed in the anode/cathode field set-up will radiate plating current according to their shape and size. Think about that one for a second. Sorry but we can't show any pictures yet. Something was published however in a small software product brochure several years ago. Sadly the images represented were 2D only. In actual practice the inert solid object simulation and subsequent plating thickness verification on a real cathode matched up pretty well.

We're not sure very many plating process engineers got the long term implication of this practice of plating current redirection but it holds tremendous promise for future plating optimization.

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.

EIMC - Advanced Plating Technologies - www.smartcatshield.com

Your source for electrolytic process optimization**……..**

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