Plating NEWS

2015 Highlights

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IN THIS ISSUE:

**History of Modern Computer Modeling of the Electrolytic Process,
Continuing Innovation in Computer Modeling, SURFIN Conference 2015**

History of Modern Computer Modeling of the Electrolytic Process

There have been communications received at Advanced Plating Technologies suggesting it's time to provide a little history of the development of modern computer modeling of the electrolytic process. Doing this may cover more than one issue of Plating NEWS.

For this author computer modeling of the plating process was first observed in a small exhibit booth at SURFIN Cleveland in 1996. The graphics I observed were simple and 2 dimensional but suggested that someone had gone to the trouble of figuring out how to model electrodeposition and thus begin to predict plating deposit thickness if they knew the electrolyte, the anode/cathode sizes and amount of current induced.

As a Product and Business Development Manager for one of the chemical suppliers in the electronics industry I was on the lookout for new technologies or products. Our company especially wanted to bring our growing customer base a long sought solution to a nagging plating problem: **non-uniform copper plating thickness distribution on printed circuit boards**. The printed circuit board plating thickness problem was 2 fold.

- Thin deposits in the holes.
- Thick and thin deposits on the board surface.

For an industry that was pushing multilayer counts higher, making boards thicker and drilling through-holes smaller, precisely plating circuit boards became a formidable task. For the most part the problems listed above were not related to each other. Thin deposits in the holes were more the result of poor solution circulation through the holes as copper ion concentrations were becoming depleted much faster than on the board surface. Thin hole deposits resulted and often presented problems.

The board surface plating thickness non-uniformities presented their own problems. Extra thick dry film plating resists were and are still needed and many solder masks need to be thicker as well. Some manufacturers even resorted to mechanical sanding of the board surface to level out the plated copper thickness.

Many years prior and long before the advent of plating simulation I'd had personal experience with a unique plating set-up in a Silicon Valley research facility that plated what I'll call a "special" circuit board. The target plating thickness achieved was 5 mils. everywhere on the board surface: traces, holes, pads. The current distribution was modified to do this with simple, non-conductive shields placed between the anode and cathode.

Fast forward to the late 90's and plating simulation. The initial thinking was that if the deposition was well enough understood and could be predicted then it might be possible to manipulate the plating set-up to improve the current distribution, thus mediating the non-uniformities on the board surface. All this using simple, inexpensive shields derived from real board design data. Gradually this use of enhanced electrochemical intelligence led to the concept of smarter plating through the use of "smart" cathode shields derived from trial and error.

History of Modern Computer Modeling of the Electrolytic Process continued

Now, fast forward again…….to the year 2000. With the advent and widespread use of 3 dimensional CAD systems, advancement of FEA software codes and then the marriage of these 2 with electrochemical data it became practical to model a plating cell and predict it's plating performance. Some of us said this was the Holy Grail of plating technology but there was only one problem: it couldn't be made available to everyone. Why?

- Cost appeared to be prohibitive. It really isn't cost prohibitive if you have a big enough plating problem but the decision maker on purchase of such software rarely saw anything so expensive and plating technology at the executive level was still not without its "Black Magic" reputation.

- CAD engineering skill was needed. Not every plating facility has a CAD engineer. And though some of the captive plating facilities do have CAD engineers they perform a variety of other engineering tasks for their employers.

  Example: we interacted with a large multinational tool and internal combustion engine manufacturer in South America to advise them on optimizing their hard chrome plating thickness distribution on internal combustion engine parts. At stake was the reduction of significant post-plate machining and huge plated metal cost savings. They became enamored of our plating optimization product, AccuPlate3D, but didn't want to buy it for their people to do the work. They said, "We want YOU to do the engineering."

In short, the supplier of the software wasn't able to take on engineering of this magnitude. It would be several years before any plating software company began doing this kind of contract work. It is routinely being done today and is well worth the investment but it just wasn't thought of back in the day.

What was worse, the North American supplier of AccuPlate3D at that time, a plating equipment manufacturer, found itself in a serious quandary. They saw conflicts in selling software to optimize plating set-ups and they really wanted (and needed) to be selling new equipment. So, what to do?

- fix customer plating problems and/or improve their plating operations with computer modeled plating technology or,

- sell new equipment.

This conflict resulted in the CEO of the equipment manufacturer, after being asked questions by potential equipment customers about new computer modeling software, responding that the new software was only available if new plating equipment was purchased. It wasn't true of course but the other marketing people didn't know their CEO was undermining software sales efforts. In the end, the equipment company ceased operations and AccuPlate3D went elsewhere for a time and then vanished.

It was an inauspicious beginning for computer modeling software in North America and it took years for genuine interest, acceptance and customer appreciation to take effect. Later, an innovative company in Europe, Elsyca, managed to integrate the popular CAD software, SolidWorks, with other electrochemical software parameters and solvers to produce PlatingMaster. It was a huge leap in the availability of the technology.

The electrolytic processing industry now had a much more practical solution to electrolytic process problems using CAD engineering software that was more familiar to them and that could be more easily assimilated into their existing facilities. Later, offers of contract engineering services were made available and this generally made plating optimization via computer modeling appealing to an even wider range of customers.

Continuing Innovation in Computer Modeling

It is often asked by customers in the intense manufacturing environments of today's world economy, no matter what the industry, e.g. electronics, automotive, hardware etc., "What have you done for me lately?"

I'm happy to report there has been a revolution of sorts in the field of computer modeling for plating. If you're at all familiar now with the current software available you know it can be expensive and difficult for most to use. It has been more than worth it for those who've made the investment but Elsyca has just introduced their newest innovation for advancing state-of-the-art process modeling, PlatingManager.

- It costs significantly less.
- It's easy to use.
- It's customized just for your shop.

The demo I saw was quite amazing. I've been around this fancy technology for over 15 years now and was very impressed with what I saw. We love this new stuff at Advanced Plating Technologies. Add to that, I have a 12 year old grandson and I am confident he could learn to use PlatingManager. Awesome!

A data sheet is available for download at www.smartcatshield.com Also you should look up the significant electrochemical intelligence available at www.elsyca.com Awesome as well!

SURFIN Conference 2015

This of course brings me to suggest you look into PlatingManager for your shops. What better way to do this than visit with Elsyca at SURFIN in Chicago next week and see for yourself. This recent innovation now makes optimized plating via computer modeling available and obtainable for most all plating facilities.

At SURFIN visit with Elsyca, Booth 1016 for a demo!

THANKS FOR READING

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

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