Plating NEWS 2024

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Three Dimensional Shields, Auxiliary Improvements, Chemical Changes

Three Dimensional Shields are the most sophisticated barriers yet conceived and devised to more uniformly redirect plating current to the cathode. This is accomplished without auxiliary electrodes, either anode or cathode.

It then makes some sense that because there are so many three dimensionally shaped cathodes, three dimensional, non-conductive shields, properly shaped and placed, could provide the ultimate in plating thickness uniformity over an entire cathode, be it large or small.

Example: imagine a three-dimensional cathode, requiring a 1 mil. minimum deposit thickness and having that 1 mil. measured most anywhere on the cathode. There's some small-scale work going on currently that points to this as viable and worth pursuing. Initial testing has been promising.

3D Printing……it has also come into the picture as a tool to make three dimensional shields. The first one showed promise in its function. Still to be determined is the composition of the shield and questions such as: "Will it be capable of withstanding repeated exposure to plating line chemical processes.?"

Cost implications of better plating are especially high on the list of priorities. Obtaining electrochemical intelligence is a first step, made possible by the plating simulation technology available today.

One of the first things this author learned about optimized plating is that the cost of metal to adequately cover a given cathode decreases considerably. Averages of **18-24% anode cost reductions** were generally seen in plating installations where "overplating" to meet a minimum thickness specification was normal.

Although it's not common, or even necessary, to physically "weigh" the deposits of two different plated objects, it's possible to simulate the weight in a computer model: one from a conventional plating cell and the other from an optimized plating cell. Thus, it can be done on individual parts. The end-result will be less metal consumed overall and ultimately this is reflected in the bottom line.

Processing time is naturally reduced because it takes less plating time to cover an object with the minimum thickness required. There has been some speculation, and indeed some initial testing, proving that waste treatment is affected when the overall plating cycle time is reduced. More racks of parts are hitting the rinse tanks subsequent to plating. There's been measurable evidence of this and it's something to consider. And note that the cycle time up to the actual plating station would be the same in any case, e.g. cleaning, rinsing, acid dips etc.

Overall **plating capacity is increased** which ultimately leads to more parts out the door or more parts for the next manufacturing department to handle, inspect and pass along. It's not fantasy to know that a ripple effect, down the line as it were, can be very real. We've seen a couple of instances where an operation subsequent to plating falls a little behind. It's a good problem to have.

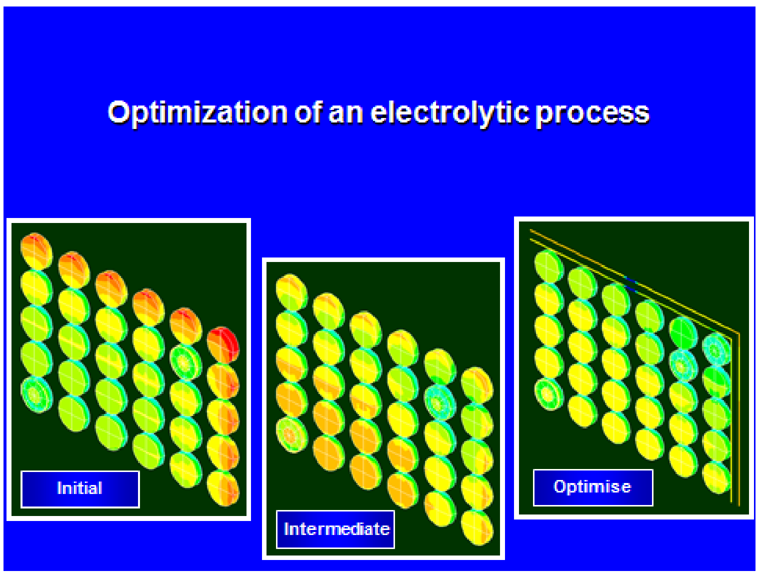
It goes without saying that plating quality and production improve with the implementation of computer simulations and plating cell optimization.

Auxiliary Improvements

We were again asked to comment on a previous Plating NEWS reference to plating optimization and its effect on **plating additive behavior**. Think high current density additives/low current density additives.

Organic plating additives, often referred to as brighteners or grain refiners, are commonly used in electronic, industrial and decorative electrolytic process applications. These additives are composed of many different and measurable organic compounds. Some are specifically formulated to function in low current density areas of the cathode, e.g. the cathode recesses or blind holes. Others are formulated to control metal deposition in high current density areas, especially where "burning" can occur.

When a plating cell is optimized, the high current density areas are either reduced or in some cases eliminated. It then follows that the consumption of the high current density component of the additive is reduced, in some cases significantly. This could eventually point to the utilization of a reformulated plating additive while also reducing plating additive consumption. As a reference to this optimization we draw your attention to the graphic below. The organic additives in each instance below behave according to the relative current densities.



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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