WHAT YOUR CHEMICAL SUPPLIER SHOULD TELL YOU BUT DOESN'T

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ABSTRACT

This paper will outline procedures that platers have followed over the past 50 years, and in spite of the affect of improvement in both chemistry and equipment, such information is not disseminated in a fashion so as to minimize labor, solution loss, emissions, waste treatment and money. This paper will illustrate examples from platers like you who have solved problems relating to the above.

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Introduction

Have you ever considered what you really need from your Chemical supplier?

Obviously you need process chemicals that you can rely on. You also need good deliveries backed up by sound analysis, technical support and problem solving capability. As a plater your relationship with your chemical supplier is absolutely crucial to ensure a successful and efficient Finishing shop.

So what about equipment?

Does your Chemical supplier also have a duty to keep you abreast of current
Best Available Technology to get the very best out of his or her solutions and maximize your profit and make life as easy as possible….

I would ask you to consider the following questions:

1. **"What should he tell you?**

2. **"Why doesn't he tell you?**

3. **"Why should he tell any more than he does?**

To Question #1 **What should he tell you** - I'd say, everything that would allow you to plate faster, with highest possible quality at lowest possible cost.

To Question #2 **Why doesn't he tell you** - I can't answer, but might assume he (she) doesn't feel the need to mention anything not related to the requirements of using their chemicals.

To Question #3 **Why should he tell any more than he does** - My answer is that I feel it would help our industry survive, create fewer emissions, less costly rework and less waste, resulting in a more competitive and profitable industry.

Would better cooperation between chemical supplier, plater and equipment manu-facturer be beneficial?

Answer – Yes of course, if it made things better and accomplished a common goal, it certainly would be commendable.

There is clearly a close relationship between the solutions and the plant. Finishers using the same chemicals can operate with very large differences in profitability and efficiencies – the difference is in the equipment they use.

"Why Not Work Backwards To The Beginning" .

I find it hard to understand why authors in guidebooks ignore the need to place only clean parts in a plating, anodizing or E-Coat tank.

Why wouldn't mention be made of the different degrees of cleanliness of a screw or bolt when compared to a circuit board, a memory disc or wafer.

I suppose it should be assumed that all finishers would only work with clean parts, but if so, why does a filter pick up solids? Oh yes, slough-off from the anodes, airborne particles dropping in from above the tank or dirt introduced with air from a blower.

But doesn't a filter remove them? Yes, some, eventually.

But why let them get into the solutions - what can be done?

You might refer to my paper "Working Backwards".

It uses numbers to explain if only 50% of unwanted solids were prevented from getting into the finishing tank, that any filter would last twice as long.

We point out that surface tension leaves solids on a part in spite of repeated rinsing. The use of a skimmer with a filter and carbon if necessary could be a big help.

We suggest going all the way back to the pre-treatment tanks to extend their life and ask why wouldn't a cleaner clean better, leaving less on a part if it was in "like new" condition all the time.

Why pick up Monday's dirt on a part you take out of the cleaner on Wednesday, dirt that might reach the plating tank by Friday.

The attached chart (appendix 1) illustrates different types of filters, which can be useful for heavy solids down to the smallest equipment for relatively low amounts. Then note the addition of a coalescer to separate the oils, followed by carbon for continuous adsorption.

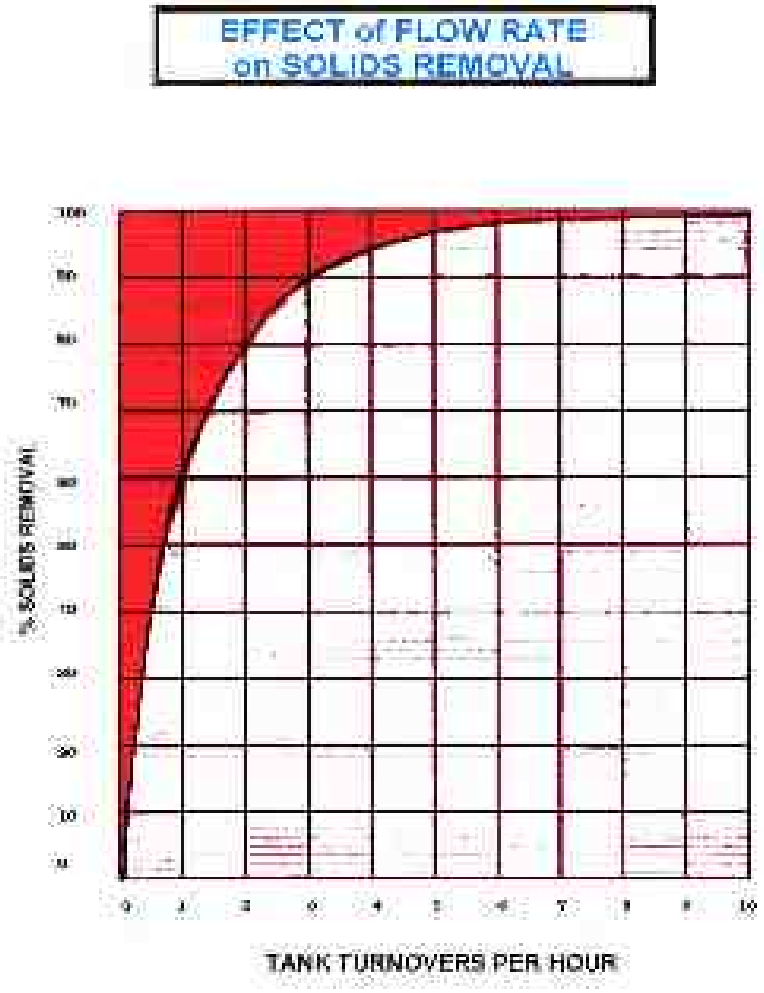
“Because you have a filter on a tank it does not mean you have a filtered solution”.

Perhaps you might tell us that you are following the above suggestions, to which we would ask if it was sufficiently large enough to be effective.

We have often said, “Because you have a filter on a tank does not mean you have a filtered solution”.

When you have a chance you might refer to an old article of mine from 1962 or 3, which explains the need for high tank turnover to be effective.

The Hydraulic Industry accepts fourteen turnovers per hour to have the entire solution pass through a filter even once. But platers have used one to two turnovers, and only recently five or more have been proven to be effective.



Note the recently published case history from the UK indicating that roughness-causing rejects were not eliminated until higher turnover rates were employed. The customer plating high quality bathroom fittings had experimented with finer absolute rated cartridges, as low as 0.5 micron, without success. The roughness problems were solved by increasing the tank turnover rate through the Nickel Filter from 3-4 turnovers per hour to 7-8 turnovers per hour.

This demonstrates that however fine and efficient a media is used – if the particulate never reaches the filter then it will remain in the tank.

Why, when you read about plating nickel, copper, zinc and other metals, aren't these points brought out? In fact, I have written to some chemical suppliers asking them to suggest that the reader refer to separate chapters, which cover these points.

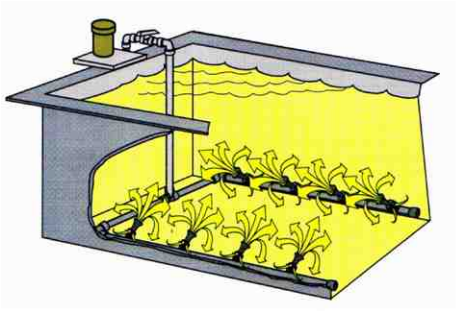
No filter can ever remove all the solids as they enter a tank, before they might deposit on a part. It is only with maximum turnover rate that the plater can come close to keeping up with "solids in" as "solids out".

Solution Agitation

I also wonder why these same authors still refer to the use of air for agitation. They know it affects brightness adversely, which generates the need for more carbon purification. They also know that air agitation cools hot solutions causing a waste of energy and that air introduces solids into solutions, which causes roughness. Finally, they also know that air is fundamentally non-conductive which increases the resistance in the electrolyte.

We introduced the use of eductors about twenty years ago. Eductors create a multiplied flow from a pump, but properly used eliminate the breaking of the solution like air bubbling out in gulps.

Eductor Nozzle



Typical arrangement
of Eductors in Process Tank

The government is demanding the reduction in surface emissions of fumes to the atmosphere and while it is a fact that the use of eductors would not eliminate 100%
of fume we know, according to papers presented by Dr Gabe of Loughborough University in England that about 90% reduction can be achieved.

European legislators are now recommending the use of Eductors as a means of controlling fume above tanks so -

Isn't it worth trying?

Wouldn't it be nice to tell the environment department that the plating industry has reduced emissions by 50, 60 or even 70%?

The reduction in emissions is just one of the many benefits you will enjoy by installing Eductor systems replacing air and Cathode agitation. Improved solution efficiency, reduced additive usage, metal savings through improved distribution and throwing power, better filtration as solution is truly homogenized and a general optimization of the Chemical process.

Carbon Purification

Now we also ask - Why has the acceptance of granular carbon to replace powdered carbon taken over thirty years? – Is it because the chemical supplier doesn't recognize it's easy to use, requires less labor and downtime, saves money and achieves more uniform ductility, which virtually eliminates batch treatment except under special circumstances?

I've asked: -
Isn't uniform ductility the main reason for carbon treatment?
Why let a solution produce a plate, which has less ductility on parts plated in July versus those plated in January.

With time permitting, I'll go on my soapbox a little longer.

Perhaps some of you may have noted that Jack Berg hasn't said much about filtering with cartridges and granular carbon for purification instead of filter aid and powdered carbon.

Plate and paper filters coated with powdered carbon slurry may effectively provide suitable treatment, but it just as effectively reduces the filtration rate by restricting the flow through the filter. Using cartridges as the filter media and by-pass Granular Carbon for purification provides for much larger solids holding capacities and a large spectrum of micron retention.

Using Granular Carbon in a separate chamber provides an easily controlled method of removing organics continuously from pre-filtered solution without adversely affecting the Filter flow rate, the consequences of which have been discussed above.

For larger tanks, an Automatic Permanent Media Filter System can be employed. This eliminates consumables, and solution losses completely and also maintains high flow rates to ensure maximum clarity of solutions. Just another technology that could be recommended by your chemical supplier as a means of optimizing the process and saving you money.

Please see (appendix 2) which shows a cost comparison, recently presented to us by a plater here in Illinois, where the running costs of a pre-coat paper/disc filter are compared to the initial capital required to purchase an Automatic Permanent Media Filter. Surprisingly, it points out that with cost savings after 18 months it also eliminates roughness.

So in conclusion, this paper has highlighted some methods of using equipment to get the best out of your chemistry to make you more profitable and competitive, and I hope that the synergy that exists between Process Plant and Process Chemistry, and the fact that both rely on each other, is now clear.

To finalize, I might ask our government why specifications don't demand the clarity of the parts and solutions before the parts are finished instead of asking them after as an indication of reliability. But then, I don't expect to ever fly to the moon and experience a problem from a part finish failure.

Appendix 1

Types of Filter Systems available for removing various types of solids – this chart shows a small number of the options available

	Automatic Disposable Fabric Filtration Systems for High Dirt load applications. Automatically indexing media allows continuous filtration, even with varying input or solids content. Ideal for Phosphate processes, cleaners, waste water, copper stripping and water wall spray booths. Operating costs are very low
	Automatic, Permanent media, High flow systems for Metal Finishing Processes, Cleaners and for polishing Clarified waste streams. Recycle water back to non-critical rinses. Maintains crystal clear plating solutions without any solution loss or media and labor costs. High flow rates maintained by micro processor controlled backwash cycle
	Cartridge Filters are available with a wide range of flow rates and micron retention levels. Depth wound cartridges optimize solids retention levels and when correctly sized will help maintain flow rate. Systems are available in a variety of materials to satisfy any chemical resistance requirements. Pumps can be double "Aqua Seal", Magnetic Drive or Vertical Sealless.
	Combine a Cartridge Filter with a Carbon Chamber and Slurry tank to provide clean, easy and effective Carbon Purification and the resulting consistent ductility or maybe a Resin Chamber to remove dissolved metals. Maximise Dirt holding capacity with step down filtration by using two filter chambers in series. Slurry tank can be used for pump priming, chemical additions and pre coating if required

COST JUSTIFICATION FOR AN AUTOMATIC PERMANENT MEDIA FILTER FOR ZINC PLATING SOLUTION

Labor- hrs/wk - 2.5 hrs	Wks/yr - 52	Labor hrs/yr - 130	$/hr - 14	**Annual Costs - $1820**
Filter Media/wk -20 lbs	Wks/yr - 52	$/lb - 2.1976	Weekly cost - $43.952	Annual costs - $2286
Filter Paper/wk -30	Wks/yr - 52	$ Each - 0.81	Weekly cost - $24.30	Annual Costs - $1264
Solution Loss/ Filter change 15 USG	Cost - $22/gal	Annual Solution loss 390 USG	Weekly cost - $330	Annual Costs - $8580
		Disposal/yr - 4 CuYd	Disposal cost/cuyd - $400	**Annual Costs - $1600**
			TOTAL FILTRATION COSTS -$15549	
		COST OF NEW AUTOMATIC PERMANENT MEDIA FILTER- $25000		

NB - Based on the assumption that the Filter is changed twice per week

PAYBACK IN YEARS = 1.61