WHEN PLATING ON PLASTICS, KEEP IT CLEAN

No matter how much attention is given to preventing contamination of plating solutions from suspended solids, intank sedimentation, drag-in, and air-borne dirt, it is an unavoidable problem. With impurities present during either the pre-treatment, the electroless deposit or the electroplating steps of plating on plastics, the result is certain to be rough deposits causing unacceptably large number of rejects. Since it is impossible, from a practical operating standpoint to prevent contamination, the logical course is to remove the contaminants before they cause plating defects. The most efficient means for accomplishing this is by continuous filtration and/or carbon treatment.

Jack H. Berg, President, SERFILCO, Ltd., Glenview, IL discussing the cleanliness problem as it relates to plating on plastics at an ASEP Annual Meeting, offered some valuable suggestions on the use of carbon and the use and selection of filtering equipment.

CARBON TREATMENT

Drag-in introduces organic impurities into solutions, which, therefore, should be continuously purified with activated carbon to assure quality production. Berg reviewed carbon treatment to solve the problems in each step in the plating of plastics. First, the materials of tanks, hoses, racks, pumps, and filters should be carefully selected so that they will not be sources of either metallic or organic contaminants; all water used should be distilled or DI; tanks should be covered when not in use; ambient air should be clean as well as air used for agitation. Berg recommended two air agitated rinse tanks between each pre-treatment step, particularly to get rid of chrome (which will destroy catalysts) and palladium, which will decompose electroless baths.

Taking the treatment steps one by one, Berg said that soak cleaner and conditioner solutions probably do not require filtration since plastic parts have relatively "light dirt load". The catalyst activator should be filtered slowly. Carbon treatment is a "NO-NO" for the catalyst. Electroless plating baths should be continuously filtered with two 10 inch (3-5 micron porosity) cotton or flushed polypropylene cartridges per 100 gallons of solution.

Copper baths should be carbon treated periodically. This can now be easily done with the use of refillable carbon canisters. Batch treatment, with powdered carbon, can be used to remove large amounts of oil and grease. For small tanks, "a combination filter and carbon cartridge may be sufficient."

Bright nickel baths should be continuously filtered. An effective method is to pass solution from the filter to an activated carbon treatment. Refillable carbon canisters are available holding 3.8 to 10 lbs. of granular carbon. Bulk carbon is available for large tanks.

A Hull cell test should be used to determine the organic contamination in nickel and copper tanks. Visual examination cannot determine when carbon adsorption capacity is used up. Experience will determine the cartridge life and a regular maintenance schedule should be established for changing cartridges and carbon.

THE FILTER SYSTEM

Factors to be considered in selecting filter equipment are dirt load, flow rate, and frequency of filtration and purification. The dirt load should be the heaviest that will occur and filter media selected for particular loads and particle size. The coarsest possible cartridge should be used since it has largest holding capacity; longer life; increased flow rate; and is less expensive. Also with use, openings become smaller, and smaller particles will be removed.

Flow rate refers to the ratio of gallons pumped per hour to tank capacity; for example, 200 GPH into a 100 gallon tank is two turnovers per hour. The flow carries solids to the filter and brings solutions in contact with carbon. It is essential that filters have capacity commensurate with flow rate. Throw-away paper can be used, as can filter surfaces coated, with filter aid.

The **frequency of filtration and purification** for the average plating solution is once per hour. Berg recommended at least twice per hour and up to 10 turnovers per hour, if necessary. He emphasized that this turnover rate is to be the average, not the actual. For instance, starting at 1,000 GPH and reducing to 200 GPH would make the average about 600 GPH or only about one turnover per hour for a 500 gallon tank.

Depth type cartridges are most often used, obtainable for removing particles from 100 to 1/2 micron size and of materials compatible with the chemical solutions.

EQUIPMENT SELECTION

In selecting equipment, the basic considerations are: the clarity necessary for quality production; quantity of solutions and amounts of impurities in solutions; flow rate; type of carbon treatment, continuous or batch; pump specifications; and filter media porosity.

Berg commented with respect to pump specifications that all-plastic pumps may not offer sufficient pressure and may need staged impellers or be used in series. Pumps having magnetic couplings have become popular. There is no shaft opening, so a seal is not required. Some types are submersible. These may not be suitable for electroless solutions because they can "plate out" at the coupling and become immobilized.

Sump-type pumps do not require seals as the liquid acts to seal. These can be used with almost any kind of solution and on some solutions can be used for agitation without filtration. All pump systems, of course, must have the necessary auxiliary equipment such as valves, priming chambers, sufficient installation space and pressure gauges to indicate filter condition.

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