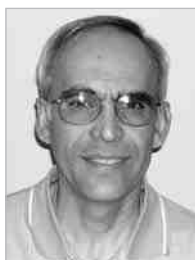


Finisher's Think Tank



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Analysis . . . Observation . . . Maintenance

Metal finishing processes, based on their make-up and operating requirements, are subject to depletion of chemical constituents. Cleaners react with surface oils and grease, either by displacement or emulsification. Acids remove oxides, scales and rusts. Plating baths promote the deposition of preferred metals and alloys. Post finishes are used to apply protective top coats, such as chromates or lacquers. These are examples of processes that to varying extents are depleted upon use, either by immersion or electrolytically. There are many other baths and processes that are similarly affected when in use. Appropriate replenishment is the critical factor in maintaining the desired operation of any process bath, be it surface activation, finishing or post finishing. This is typically accomplished by adding specified quantities of bath components. Individual salts, additives or product concentrates, may comprise what is needed to keep any particular system at optimum. As such, the bath will perform with the desired effect, adhering to the prescribed operating parameters. Let us review some of the procedures that should contribute to satisfactory performance of most baths.

Analysis

Proprietary surface preparation baths and generic blends (cleaners and acids) are normally controlled by a titration analysis. The alkalinity or acidity is converted to a concentration of the proprietary product or additive. Maintenance additions are based on the requirement to re-establish the initial make-up or bath charge. This can be in the form of adding a product concentrate or specific additive (e.g., caustic or acid). Routine analysis may confirm a fairly consistent consumption pattern. Therefore, additions can be made on a specified basis, such as by working shift.

Plating baths present a more complex analysis procedure. This can be separated into wet analysis, instrumental analysis and plating testing. Chemical constituents of the bath (salts and additives) change on an ampere-hour basis. An appropriate schedule for the bath analysis is related to its production use, results of past checks and vendor recommendations. Wet analysis consists of determining the concentrations of bath components (such as metal, salts, acids or bases, as well as certain plating additives) by titration. Instrumental analysis may include determining metal contaminants (atomic absorption), brighteners and other plating additives (chemical separation and UV or visible spectrophotometric). Surface tension is used to measure the concentration of anti-pitting agents or fume suppressants, using an appropriate tensiometer.

Hull cell testing provides a profile of the deposit by covering all the plating current densities, brightness, leveling, ductility, coverage and throwing power. Deposit faults or defects may be confirmed by a lack of or excess of any constituents that were analyzed beforehand. Additions of salts, brighteners or other additives can initially be made to the Hull cell, confirming expected improvements, adjustments or purification. This is especially critical when the desired additions or treatments are first checked in the Hull cell volume (267 or 500 milliliters) before implementing them in a production plating tank. Analysis and control of the plating bath is not as complicated or time consuming as it may seem. Many plating shops maintain and operate a control lab. Suppliers of proprietary systems provide on-site technical assistance and the services of their regional labs.

Observation

The quality or lack thereof in the surface preparation or plated finish can be readily seen. A problem in the appearance of the conditioned metal surface can help the observer focus on what process or portion of the cycle may be suspect. Poor cleaning or activation may be noted by water breaks after rinsing. Surface smuts may be detected by wiping parts. Pitting may be due to cleaning (attacking base metal or under concentrated electrocleaner) or aggressive acid activation. Poor cleaning and surface smuts may result in brittleness or poor adhesion of the subsequent plating deposit, haze or clouds. Plating defects occurring in the process bath may include: brittleness, dullness, poor leveling, pitting, poor throw or coverage, off color, roughness or burning, to name some frequently encountered problems. At worst, observed problems may be due to a combination of surface preparation and plating.

Maintenance

Proper maintenance includes analytical control as was previously discussed. In some instances, maintenance additions can be factored into the production schedule. Properly spaced replenishments will keep concentrations closer to the desired operating range. This eliminates the problem of under concentration severe enough to affect the finishing quality, followed by large corrective additions. Automatic dispensing of plating additives by delivery through ampere-hour meters is an excellent method of replenishment and concentration maintenance. Liquid cleaners also exhibit this benefit, dispensing product concentrate to maintain solution conductivity.

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chosen as speakers will be among a select group of industry leaders. Each year, conference organizers spend months searching and reviewing abstract submissions to bring the best of the best to the event. The conference planners are looking for presentations that:

- Focus on real-world applications
- Show the cost-effectiveness of a new approach
- Demonstrate how and why a technology or process worked or didn't work
- Explain leading-edge as well as every day use of the technologies
- Provide comparisons that allow users to better choose hardware and software
- Offer in-depth as well as quick hits of information attendees can use immediately
- Break the status quo of how things are done

For additional information, including topics of interest, submission guidelines and submission forms, visit www.sme.org/3dscanning.

Call for papers for RAPID 2007

Concurrent with 3D SCANNING 2007 Conference (above), RAPID 2007, the premier rapid technologies and additive manufacturing event, will be held May 1-3, 2007 at the Marriott Renaissance in Detroit, Michigan. The annual conference and exposition, presented by the Society of Manufacturing Engineers (SME), is looking for speakers to offer practical information on selection and applications as well as discussions of new technology advances. Experienced users are invited to take an active role in this cutting-edge program as a conference speaker. The conference planners are looking for presentations that match the criteria above for the 3D SCANNING 2007 Conference, listed above.

For additional information on RAPID 2007, including topics of interest, submission guidelines and submission form visit www.sme.org/rapid/.

ISAAT 2007, SME International Grinding Conference join forces

ISAAT 2007 (The International Symposium on Advanced Abrasive Technology) and the SME International Grinding Conference will join forces September 25-28, 2007 at the Hyatt Regency in Dearborn, Michigan to create a signature precision grinding and abrasives machining technology event. The Society of Manufacturing Engineers (SME), the International Committee for Abrasive Technology (ICAT) and the Japan Society for Abrasive Technology (JSAT) are partners in this endeavor. The event will be a three-day conference of three tracks with more than 80 peer-reviewed technical papers covering all aspects of abrasive technology, including:

- Abrasive machining using conventional and superabrasives
- Grinding wheel and abrasive grain technologies
- High-speed and high efficiency machining
- Micro- and nano-machining and fabrication
- Machining with nano-precision
- Grinding fluids, filtration application and management
- Surface characterization and surface metrology
- Machine tools and their design
- Surface finishing processes from polishing to lapping to superfinishing
- Brittle material machining
- Processing of semi-conductor materials
- In-process measurement and process control
- Process modeling and adaptive control
- Eco-sensitive machining
- Machining the next generation of materials

Speakers will be selected from the most prominent researchers and industrialists from all over the world. For more information on ISAAT 2007 and the SME International Grinding Conference, visit <http://www.SME.org/ISAAT2007>. *P&SF*

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Another aspect of maintenance is the importance of equipment operation and service. For the plating bath, filtration, rectification, temperature controllers, racks and barrels, contacts and liners should be serviced regularly. This greatly helps to minimize plating problems. This also holds true for the equipment needs of surface preparation.

Rejects can easily double or triple the related costs for reprocessing parts. Alternatively, reject parts would be scrapped. By implementing and maintaining a practical system of analysis, observation and maintenance, rejects can be substantially avoided. In fact, the quality of finishing can meet the requirements, specifications and specific quality control parameters. These benefits can be realized on a continual basis, from load to load. Analysis, observation and maintenance may be simple concepts to implement. However, their merits can be easily overlooked. Don't lose sight or focus. *P&SF*

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