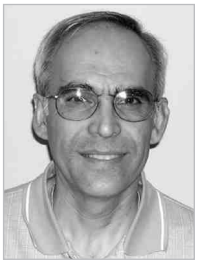
Finisher's Think Tank



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Rejects & Inattention—Simply Priceless

Plating lines, be they manual or automatic, are designed and operated to provide maximum output at reasonable process cost. Racks can be loaded with parts (front and back). Barrels may contain hundreds or thousands of parts. Just one load inspected after finishing could signal major problems.

Of major concern is the fact that one rack or barrel will be followed by several more, all containing rejects, perhaps as high as 50–100%. At this point, the problem has either been quickly corrected or the line has been shut down. No matter how quick the initial action, a well designed and operated line will produce a sizable volume of bad parts.

Several negative conditions now come into focus. First, there are some number of rejects to be handled. The particular situation in the shop will determine if the parts are salvageable or scrap. In either case, an unwanted expense related to reprocessing or lost productivity enters the bottom line. Increased labor costs and more time affects both conditions. Additionally, the expenses for: more chemicals, extra steps or revised cycle, equipment operation, power consumption, and demands on the waste treatment system, must be factored in. The bottom line could add three or more times to the cost of initial processing. At this point the parts may have to be reworked at a substantial loss to the plater or finishing department. Assuming an initially slim or manageable profit margin, there is no positive financial outcome. Disposing the parts automatically "red lines" the costs of: raw materials and freight, manufacturing, the initial plating cycle, and integrated labor. Adding the appropriate figures will usually confirm a simply priceless, negative expense.

Reprocessing or scrapping also puts the brakes on production, assembly, packaging, and delivery to the customer. That reject condition, can therefore reverberate quickly along the road of supply and demand. The problem is especially acute during this slow economic recovery where inventories remain low. Unfortunately, almost every customer will, because of these conditions, require a quick turnaround. Failure to deliver on time not only starves the industrial food chain, it also endangers the plater's position in today's highly competitive business situation.

Can rejects or related production stoppage be avoided? Certainly not. The reality is that problems can and will occur. There is no perfect line, cycle, or progression.

Can rejects be minimized or dealt with expeditiously? Yes, by adhering to and following an appropriate course of maintenance and remedial action. Less than 0.1–1% rejects can be an achievable goal. There is no magic involved, just adhering to a reasonable, workable, very cost affective game plan. Let's review some of these items, perhaps waking a few sleeping giants.

The Parts

Previous experience will determine whether the parts are amenable to barrel or rack processing. Equipment selection should focus on manageable load sizes. Workable barrel loads versus attainable current densities, rotation of parts without nesting or locking should be confirmed. Spacing on racks should be achieved to prevent thieving or blocking of critical current densities related to the entire rack or flight bar. The chemical solutions in the line should be compatible with the base metals being processed. For example a steel soak cleaner, electrocleaner, and acid pickle, would not necessarily be okay for zinc die castings or brass. A suitable strike formulation (*eg*. copper, Watts, or electroless) would be preferred for ferrous versus non-ferrous metals. Materials engineers, designers, and fabricators, should always include plating friendly aspects into their parts (improved drainage, racking ability, minimized surface imperfections, etc.) that will help promote more effective metal finishing.

Equipment—Barrels & Racks

When selecting racks or barrels, neither should be expected to be brand new or in spanking clean condition. Of paramount importance is that the equipment is ship shape and in prime operating condition. Deposit buildup on rack tips and barrel danglers should be minimal. Regular stripping will keep both clean. This promotes good contact, ensuring uniform, clean plating deposits. Rack tips should maintain the spring and locking characteristics they were designed for. Barrel clamps should lock doors securely. Otherwise parts will fall to the bottom of the tank, slowly corroding and contaminating the process bath. Barrel perforations should be clean and unplugged. Some people forget that the solution inside the barrel is most important. Failure to replenish the solution inside the barrel will have immediate repercussions on plating deposit quality. Contact of racks and barrels to the work bar must be complete and continuous. Red hot rack hooks and barrels floating off the saddles are very effective warning signs to the astute observer.

Equipment—Tanks

Nothing lasts forever. Especially not in our industry. Corrosive solutions prey on tanks. Routinely inspect the integrity of welds and liners for any wear. Bulging liners only mean one thing. Excessive and prolonged heating also takes a toll on plastic tanks. Scheduling replacement or

repair of tanks, replacement of liners, is much cheaper when scheduled during off production time.

Equipment Heaters & Chillers

The correct temperature means not too hot or not too cold—rather just right. If the cleaner is too cool, the oils and grease may not be sufficiently removed. Too much heating may result in dry on stains that leave a haze pattern seen after plating. A cooled nickel bath may cause high current density burning, while excessive heating would drive off excessive brighteners and promote thermal oxidation. An inoperative or defective chiller may affect efficiency and additive consumption in tin and zinc. Every process bath was developed to operate best within a specific temperature range. That is why heating and cooling control is so important. Be certain the heater will not be chemically attacked by the specific process solution. Take care to isolate heaters from any charges that would result in anodic dissolution.

If the heater or chiller is fine, don't overlook the thermostatic control. Thermostats will malfunction or stick.

Equipment—Rectifiers

Putting Faraday's Law into motion, the rectifier amperage with accompanying voltage is set for the plating step. How confident are you in the respective readings? Proper calibration should maintain confidence that what is set is actually what is being delivered. Most rectifiers are in close proximity to the plating baths. This exposes the equipment to the continued effects of moisture and corrosive mists. Although shields and guards are in place, nothing lasts in perfect condition. The rectifier is the heartbeat of the plating bath. Keep it running strong, steady, and accurate.

Equipment—Filtration

It does a lot more than just filter. When properly used and maintained, filtration efficiently removes organic contaminants, fine particles, oils and grease. Filtration also provides very important solution agitation or movement. This minimizes burning during plating, helps to develop uniform deposits, facilitates the distribution of addition agents and treatments, and maintains solution temperature throughout the bath. Filtration also removes oils and grease from cleaners, thereby, increasing the bath service life. Every bath can experience the benefits of filtration, that is cleaners to post plating. Manufacturers and representatives of flitration equipment can recommend the suitable units for the specified requirements.

Solutions —Chemicals

Most manufacturers and suppliers of commodities and proprietaries are certified for adhering to specific procedures as documented in ISO, NACD, and other agencies. As such, the companies insure that chemicals used in manufacture of products will meet or exceed performance based on guaranteed purity and quality control testing. It is recommended that the chemical balance of baths be maintained with these high-grade products.

Solutions—Analysis & Control

Every bath operates to varying degrees of effectiveness within a specific operating range. Therefore, analysis and control becomes very important. What to analyze for and how often depends on the bath, the requirements and operating times. Analysis of cleaners and acids may indicate an appropriate daily addition of product to keep the concentration at close to the initial make up. The chemistry of plating baths changes every time the rectifier is turned on. Where recommended by the supplier, automatic dosing equipment (amp hour meter) replenishes additives that are consumed during plating. Analysis for salts and other additives with hull cell test should be done routinely. No matter the bath, consumption without replenishment results in serious under concentration. This ultimately affects the finishing steps or treatments.

Solutions—Purification

Again, the importance of filtration cannot be overstated. Other solution purifications involve chemical and mechanical treatments. Plating baths—especially those more sensitive to certain metallic contaminants—should be routinely dummy electrolyzed. Or, where more applicable, treated with chemical additives (*eg*., peroxide, permanganate, polysulfide) to precipitate metallic contaminants. Cleaners can be treated by oil separation techniques, including coalescing, ultrafiltration, and additives to chemically destabilize emulsions. Treatments to the acid bath include additives to prevent immersion deposits of metals, stabilizers, and inhibitors.

These are some important considerations for inclusion into an easily manageable service and maintenance program. The benefits include offsetting any of the realistic, large expenses due to rejects. In fact, anticipated expenses for routine maintenance and control, may already be included in the operating budget. We acknowledge no fool proof method to prevent rejects or downtime. However, "an ounce of prevention" as detailed in this article of maintenance tips, will surely amount to a "pound of cure." ***P&SF***