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Advances in Automated Plating Technology Enable Global Competitiveness for Finishers

With the advent of the Internet and resultant increase in global competition, the entire parts finishing community has experienced purchasing pressure that demands the infamous double whammy: increased quality and reduced cost.

This situation has adversely affected job and captive finishing shops alike in North America, where the industrial wage base is highest. Yet, despite the tall order, these goals can be achieved through improvements in operational efficiency afforded by advanced computer controls and new automation technology.

Fortunately for all finishers, evolutionary improvements have arrived just in time to satisfy increased customer demands. Deliverables are achievable through investment in capital equipment that incorporates system automation, where labor reduction is a more-than-welcome by-product.

As if exacting quality and low cost isn't enough, on-time delivery has also become a statutory requirement in today's parts supply chain. Older shops with manual or semi-automatic machines suffer not only from inefficient operations and variable quality, but they also typically employ high-skilled, long-term, high-wage personnel. Materials, energy, and waste disposal increases aside, the profitability pinch is felt hardest at these locations.

All finishing shops can benefit tremendously from investment in new automation by operating faster,

more efficient machines that deliver timely production with repeatable quality and greatly reduced labor content.

With labor reduction as a driver, the dramatic improvements in computer controls, fabrication materials and coatings, ventilation systems, and chemical management devices make coating automation very attractive for metal finishers today.

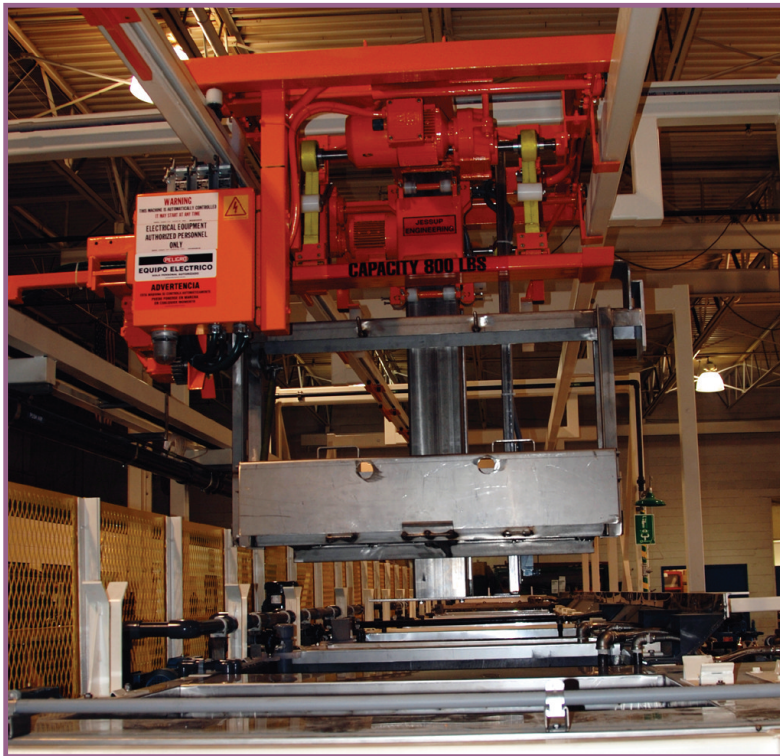
Given the weak U.S. dollar, now is an especially good time to consider

investment in North American built coating equipment.

However, there are a few *quid pro quo*. No matter how shiny-nice, new machines cost cash money, and return on investment must be carefully considered. Before committing to new plating automation, we first need to define what metal finishers want and need from their coating systems.

Here are the top requests:

- **Robust construction**



Computer-controlled hoist automation oscillates baskets in process tanks and in-line dryers.

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- Corrosion resistance
- Productivity-expandability
- Rapid installation and startup
- Intuitive, easy-to-use controls
- Easily adjustable process cycling options
- Minimal water and chemical consumption
- Efficient energy use and auto shutdown features
- Zero labor, zero downtime, and zero maintenance
- Readily available off-the-shelf component parts

Are these characteristics achievable? With the exception of zero labor and downtime, the answer is a most definite yes!

Enhanced technology includes such things as machine control through uninterruptible power supply (UPS) supported industrial personal computers (PC) over the top of programmable logic controllers (PLC). Also peripherals such as variable frequency motor drives (VFD), improved energy, chemical, and water management techniques, load-by-load quality monitoring, recording, and reporting, TS capable data storage, output, and reporting, shift productivity monitoring, recording and reporting, preset maintenance alerts, real-time fault monitoring, system diagnostics, and on-board troubleshooting ladders, recording and reporting.

With correctly configured software, load-by-load quality statements and/or certificate of conformance (C-of-C) data is available for viewing with a few screen touches, and can be uploaded to your data highway for customer service use.

Don't be too taken by the concept of "new technology for technology's sake alone." There is much more to a complicated piece of electro-chemical processing machinery than meets the eye. In the end, simple design, rugged construction, and reliable operation are the key elements that will lead to long-term tractability and profitability. Let's carefully examine each of the top characteris-

tics and their effect on finishers.

ROBUST CONSTRUCTION

Custom-configured machine designs make it possible to install around pre-existing machines or building features. Proper materials selection, sizing, and engineering of structural components benefit finishers by enabling a 35-year usable life for system structures.

CORROSION RESISTANCE

You're well aware that unchecked corrosion can adversely affect machine uptime, quality, and house-keeping, and it may even reduce usable life. Strategic use of epoxy coated steel, stainless steel, and polymer or fiberglass components can make a significant impact on the price-vs-life expectancy value equation. Don't skimp on corrosion protection when considering long-term machinery.

PRODUCTIVITY-EXPANDABILITY

You need to be certain the proposed machine can accommodate current and future production needs. Best accomplished during the specification process, it's important to know whether or not a proposed machine design is capable of expansion, and at what cost future expansions might come. Your machine builder should willingly run additional cycle analyses to assist your decision making.

It may be prudent to include space for additional process tanks, rinses, or dryers in the initial design; alternately, the work package may be expanded slightly to allow increased capacity.

In general, your money is better spent adding additional length or width to a single machine, compared with the cost and space required to add another machine down the road.

RAPID INSTALLATION AND STARTUP

The speed and quality of installation can make an enormous difference where production must be maintained. Modularization offers about a 50% reduction in installation time



Modularization offers an approximate 50% reduction in installation time on the production floor, usually costs less than build-on-site systems, and is typically of higher quality.

on your production floor, usually costs slightly less than build-on-site systems, and is typically of higher quality. Experienced installers, skilled controls engineers, and efficient startup and on-site operator training are key to timely production start and return to your revenue stream.

The right builder has managed hundreds of complex installations, startups, and supports ongoing production operations. Their experience makes them efficient at installation, allowing you to do what you do best: uninterrupted parts finishing.

EASY-TO-USE CONTROLS

Machine operation must be intuitive. User-friendly, multi-lingual touch screen human machine interfaces (HMI's) are increasingly popular in today's finishing environment. Easily recognizable MS Windows based open-architecture controls software provide the most effective interface to machine PLC's and require no special programming skill.

Individual rectifier, chemical, level, temperature, ventilation, and wastewater management functions should be easily adjustable through a multi-level, security-coded touch screen interface. Operator initiated automatic shutdown and startup features should also be imbedded for energy reduction.

Naturally, schematics and operations manuals for the machine and key components should be accessible through the HMI; there should be no digging through files or electrical cabinets for drawings or manuals. These features add up to time and

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money savings for automation users.

EASILY-ADJUSTABLE PROCESS CYCLING OPTIONS

The value of well seasoned cycling professionals in their ability to balance process repeatability and productivity is inestimable. Pre-engineered cycling design assures quality, productivity, and profitability. A good rule of thumb is to hire the best available controls engineering upfront: there is no time for multiple developmental software iterations.

Though it may be enticing to allow a computer to make process cycle decisions, this scheduling methodology usually comes at the expense of throughput. Indeed, efficient cycle design is an art form that combines job-specific electro-chemical physics with electro-mechanical motion control devices operating in a human work environment. With pre-engineered cycle designs, simple process modifications may be entered and saved through an efficiently designed interface to create programmer-free recipe changes.

MINIMAL WATER, CHEMICAL CONSUMPTION

Given today's costs and the pressure to conserve resources, it's especially critical to make good use of water and chemicals. You shouldn't be surprised to learn that recent advances in fluid control devices and management techniques can dramatically reduce consumption. Naturally, computer controls are the core of water flow, replenishment, and chemical addition functions. Integrated with the latest in wastewater treatment technology, these improved controls greatly reduce industrial waste water disposal, or manage reasonably priced zero-to-drain for virtually any finishing operation.

EFFICIENT ENERGY USE AND AUTO-SHUTDOWN FEATURES

Once again, hardware selection and computer controls combine to make

better use of energy. Individual rectifiers and controls not only reduce energy consumption, but also improve process efficiency and on-part quality when integrated with in-process weighing or other workload control systems. Further, pre-programmed end-of-shift or weekend auto-idling or shutdown and auto-restart features further reduce energy consumption, and assure that your automated plating system is warmed up and ready to run when operations resume.

ZERO LABOR, ZERO DOWNTIME, AND ZERO MAINTENANCE

Though zero labor may not be possible, it can be approached. The definition of a good automated plating system today is one where the only labor expense used is for loading and unloading an otherwise fully-automated finishing machine. Barrel plating operations benefit the most, where the only operator needed is a forklift driver. Manual racking and fork lift functions can be accomplished with lower-cost unskilled labor while your automation does the work.

Likewise, zero downtime may not be possible, but 2% certainly is. Top equipment builders should be willing to show you machine examples that deliver exceptional uptime performance. An up-front, design-for-service supplier philosophy and a customer-based supply of spare parts dramatically reduce downtime.

READILY AVAILABLE, OFF-THE-SHELF COMPONENT PARTS

Reputable suppliers strive to enable the customer to maintain their machine independently. Maintenance-free materials selection and service-minded layout and installation are critical to maintainability.

The best-designed machines accomplish this through use of commercially available components, minimizing the need for made-to-order (MTO) components wherever possible. A machine-specific perishable components list should accompany every machine installation.



Turn-key coating lines may include multiple hoists, process tanks, in-line dryers, and automated load and unload equipment such as tote box dumpers, vibratory feeders, and automatic barrel cover handling devices.

Customer stocking of critical parts is essential to maintain minimal downtime in the event of a component failure. These efforts reduce or eliminate production losses faced while obtaining MTO components.

HOW TO BEGIN?

As you can see, the road to success is paved with details. Understanding what to look for, how exactly do you begin? The acquisition process begins with a thorough knowledge of your chemistry and process parameters. You must then secure knowledge of local/state wastewater and air quality requirements, then fold in your production throughput requirements and business growth plan.

From this information, you can develop a machine specification, including needs and wants. Then comes the big question: who should you commission to build it? To guide your builder qualification process, here are a few questions you should ask potential automation suppliers during the quoting process:

- **How long have you been in business?**
- **What are your current annual sales?**
- **Have you ever filed for bankruptcy?**
- **How many machines have you built?**
- **Have you ever built a machine like the one requested?**
- **Where is your service team based?**
- **What is typical service response time?**
- **Do you integrate ventilation and**

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Barrel processing operations offer finishers many benefits, particularly as it relates to the application of labor. Here, the only operator is a forklift driver.

wastewater treatment?

- **Where are your controls engineers based?**
- **Who does your installation work?**
- **What type of training is included?**
- **What is your warranty policy?**
- **Do you take full responsibility for turn-key installations?**

These questions may be hard to ask, and the qualification process may seem like a lot of work, but considering the cost and complexity of capital equipment—it makes good business sense to go the distance.

During the process, you'll also get a chance to judge the responsive-

ness, philosophy, and culture of your supplier team. Look for a willingness to listen and respond to your needs, demonstration of a helpful, confident attitude, and exacting professionalism in every exchange. Of course, a hands-on tour of your supplier's operation and an example machine is desirable. You wouldn't consider spending a million or more for a new home without examining some of the builders' previous work and interviewing a customer or two!

CONCLUSIONS

In summary, advances in automation technology do make it possible to compete in today's global market, and current exchange rates make it a favorable time to purchase from North American automation suppliers.

Whether you're a job shop or a captive finisher considering entry into the finishing business, the acquisition process is the same. Examine your throughput, work in process, and quality requirements. Determine available cube space. Review your business model and profitability requirements to determine what level of automation is right for you. Develop a machine specification package, and then qualify your business partner through the quotation process.

Given the long useable life of fin-

ishing automation, you want to choose the candidate that offers the best long-term value for your investment. Your goal is to purchase the most simple, rugged, reliable machine available. Ease of operation, productivity, energy efficiency, and maintainability are key to your current and future profitability.

BIO

Timothy J. Kurcz, director of sales for Jessup Engineering, Rochester Hills, Mich., is also responsible for market and product development. A member of the surface engineering community for more than 30 years, Kurcz acquired a B.S.B.A. from Lawrence Technological University, and spent 26 years at Loctite Corporation in the Automotive and Industrial groups, later creating the Integrated Equipment Solutions Division. He was awarded U.S. Patent #6292973 for a "Device for Providing Surface Preparation," and has authored technical papers for the automotive, marine, and aerospace industries. Kurcz also has four years of plating (electro and electroless), polymer coating, and salt bath nitro-carburizing experience with the KC Jones Plating Company. His specialties include application development, assembly process, and machine automation. Kurcz can be reached at 248-853-5600, or via e-mail at tkurcz@jessupengineering.com.