

State-of-the-art Equipment = Priceless

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Looking ahead to 2014, reflection and goal setting are key activities for leading organizations. We can learn from prior successes and failures, take action and affect future results. In this five-part series, I'll explore key areas of development that make significant differences when it comes to achieving state-of-the-art status: people, equipment, building, culture, and systems.

Last month, I explained how people are the "secret sauce" for state-of-the-art companies who build state-of-the-art products. However, the value of state-of-the-art equipment cannot be ignored. This month, I'll address key questions to ask about equipment and the related solutions, and illuminate the role equipment plays in achieving state-of-the-art status. But first, consider this:

- Surface mount technology (SMT) line = \$500,000
- SMT oven = \$100,000
- Automated inspection system (AOI) = \$100,000
- Quality PCBs built with state-of-the-art equipment = Priceless

What equipment do we need?

It is not news that electronics manufacturing today is a complex and detailed process. As technology changes, parts become smaller; designs, more intricate; cost models are less; and product turn cycles become shorter. As a result, much of the manufacturing operations have become automated and highly technical equipment is required for the majority of electronics manufacturing.



STATE-OF-THE-ART EQUIPMENT = PRICELESS *continues*

Equipment must allow you to achieve your business mission and it must be supported by your operations. Wise leaders purchase well with risk/reward considerations. Each company will have different specific equipment needs based on industry standards and customer requirements. But all companies must evaluate equipment initially and ongoing to remain competitive.

When startup occurs, companies should conduct due diligence to understand what is required to compete. Research includes evaluating competitors, trends, processes, regulatory issues, labor issues and available equipment options. Experienced experts hired initially or recruited in early stages provide significant insight and direction.

Equipment is sometimes acquired with a purchase or merger, and must be evaluated to ensure functionality that is appropriate for the existing business needs. If the company is a startup, then all equipment requirements will need to be determined and evaluated.

Mistakes at this stage of the game carry significant costs. Most equipment is a large capital investment and cannot be undone. Electronics contract manufacturers need SMT equipment including printers, pick and place machines, ovens, AOIs, and board washers—a minimum price tag of \$1 million—to start. Other inspection equipment inline or free standing may also be necessary. Selective solder machines and X-ray machines are additional options, and the list goes on.

Ongoing equipment needs should be evaluated annually and when new lines of business or new clients are taken on. With increased business through existing or new customers in the same business lines, a company may add additional pieces of the same equipment. Or sometimes new technology necessitates changes in equipment. Equipment may become non-functioning or outdated, requiring replacement. Favorable tax or other economic conditions may

trigger capital equipment evaluations and purchases, too. Finally, customers may request special operations that require specialized equipment.

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Another equipment need consideration regards efficiencies in maintenance and training. Choose the same manufacturer and even model when purchasing multiple pieces of the same type of equipment. This results in a shorter learning curve for employee training. Maintenance on similar machines is also more efficient when the equipment is from the same manufacturer, allowing for tools, processes and knowledge sharing.

Alignment between equipment on different lines simplifies things for the operator.

When transitions are seamless, productivity is greater. Software compatibility is a huge consideration when assessing equipment to acquire.

Determining equipment needs in each of these areas is required to achieve state-of-the-art status.

How do we get the equipment we need?

From your needs assessment, come up with a priority list and capital budget for your equipment. Capital equipment return-on-investment (ROI) analysis is a helpful way to evaluate and stay within your company budget. The calculation for return on investment is:

$$\text{Return on investment} = \frac{\text{gain from investment}}{\text{cost of investment}}$$

When all qualitative variables are equal, the higher the ROI means the more value the machine has for the company. Use this calculation to help create a detailed capital budget. From this budget, you will start to evaluate each machine.

For each machine required, make a short list of your top priorities for that machine. For example, priorities for a pick and place machine

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would include part placements, board size, component sizes, and machine footprint, to name a few. Use this to compare machine manufacturers across the board. This, however, will take time.

Establishing a team of internal experts to evaluate equipment is a good idea. Choose someone in your organization to lead this effort and do the advanced legwork. Then the team can engage in the review and decision process.

Strong EMS providers choose to keep equipment state-of-the-art. Since the primary equipment used in electronics contract manufacturing is surface mount lines, selecting the best manufacturer for pick and place machines, ovens, and printers, among others, is the way to go. One size does not fit all in the selection process. With strategic selections of equipment manufacturers, EMS providers see significant improvement in training, maintenance, and overall throughput.

Ultimately, you will work with capital equipment companies or possibly one or more capital equipment manufacturer representatives. EMS providers understand the complexities and choose to partner with capital equipment companies that also understand the business needs. Often manufacturer reps have experience and insight that saves time and money.

Trade shows are a great way to see equipment options, meet the players, and evaluate a lot of equipment in a short period of time. Regularly attend shows and stay abreast of technology trends so you are prepared when the need arises. Onsite visits and presentations are other options for interviewing manufacturers and assessing equipment.

In addition to internal training you provide for your teams, equipment manufacturers provide factory training for employees' maintenance recommendations. It is critical to follow factory recommendations and perform proactive maintenance. By tracking all maintenance

and repairs, operators can perform predictive maintenance and minimize or eliminate machine down time. This positively impacts ROI for that machine.

Consider the total acquisition cost of equipment and not just the purchase price. Training, installation, down time, and other costs of acquisition must be included to make the best decision. Now you have the information to acquire your equipment, install it and begin using it to achieve your business purpose.

How do we optimize equipment usage?

Part of continually evaluating equipment to assess value for the organization is to analyze and improve equipment usage and optimization. Most specialized equipment will also have software with optimization features. Reporting and analytics must be understood and used to tweak settings and processes. Do not overlook

this or the cost of your equipment, otherwise your ROI and your customer satisfaction will be impacted negatively.

Do not learn by trial and error. Instead strive to use every feature on your equipment as it was intended and avoid "customizing" to "the way you have always done it." Use new features as an opportunity to improve upon existing processes.

In addition to equipment, another way to stay ahead of the competition is by utilizing the newest software, support and tools. Often,

simply utilizing new peripheral tools will delay large capital expenditures. ROIs can be used to analyze these options too.

EMS providers work with vendors who are up to date on the latest technology. Vendors keep the EMS provider apprised of the latest options while the EMS provider keeps its focus on the core business of manufacturing for OEM customers.

Floor layout makes a difference in throughput and waste reduction. Take time on the front end to choose optimal floor layout. Do not

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hesitate considering changing the floor layout when the long term benefits outweigh initial change costs.

Equipment location matters too. Strong EMS providers continually evaluate customer requirements and make sure the equipment is in the right location and working optimally to get product out to customers. This means equipment is sometimes relocated from one facility to another, for instance, from the United States to Mexico or Mexico to the United States. The relocation costs can be high on the front end but service to the customer and overall efficiencies and costs reductions drive these equipment moves.

Investing in equipment continues after the initial acquisition. Practical application is using analysis and action to optimize equipment utilization.

Who wins?

Everyone wins when a company strives to have state-of-the-art equipment, especially the

customer! And we know that when the customer wins, shareholders, employees and vendors win too. To ensure equipment is a win at the beginning, middle, and end of the process, companies should analyze the right metrics to consistently evaluate performance. Then leaders can make decisions based on these metrics.

Technology and automation can make or break a company in our industry. Finish 2013 strong and take action today to make 2014 even better by evaluating and taking smart steps to have state-of-the-art equipment. Next month, I'll address the importance of having a state-of-the-art building. **SMT**



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Video Interview**Aqueous Cleans up With Batch Cleaning Process**

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