

MEDICALDEVICENOW

New EMS Technologies Result in Greater Efficiencies

But it takes more than the “latest and greatest” equipment to ensure high-quality products.

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Published March 22, 2011



It is essential to keep up with the latest technologies when working with complex medical devices—quality can never be in question. New equipment is faster and more accurate than ever before, which improves quality, speeds production, cuts waste, and lowers overall production costs.

However, it takes more than the “latest and greatest” equipment to ensure high-quality products—it also requires highly skilled workers and well-defined and controlled processes.

“Although the ‘latest and greatest’ equipment allows shorter machine time, without the right people, processes, and efficiencies in place, major problems can occur,” said Mike Duddy, project manager at WORLD Electronics in Reading, Penn.

Some of the equipment that WORLD Electronics uses includes Assembleon pick-n-place equipment, MPM screen printers, and Heller 16 zone convection reflow ovens. Offline component setup in feeder exchange carts improves pre-machine operations. SMT reeling stations allows the company to buy smaller quantities

(decreasing customer component exposure) and still gain the efficiencies of machine placement.

“We also utilize software that allows off-line programming, creating and updating the vision library, and determining component placement order and what parts go on what machines, based on package type,” added Duddy. “This allows us to automatically check the database library, as well as parts availability and set up.”

WORLD Electronics uses another software program that allows the manufacturing/engineering team to program the robotics through a vision file, where the robots teach themselves about component features such as thickness, width, type of part, length of leads, how close together they are, etc. “This can reduce set-up costs by up to 75 percent and we can pass this savings on to the customer,” said Duddy.

Circuit Board Inspection

Cirtronics Corporation in Milford, N.H. has enhanced circuit board inspection by upgrading its inspection cameras to the Mirtec MV-3 AOI platform, which provides much greater inspection capability through a five-camera system, rather than the single-camera system that some companies still utilize. “Benefits

include increased resolution of the cameras, greater clearance under the cameras, and the Intelli-Beam laser measurement," said Ted Trask, Cirtronics' quality manager.

The big feature that distinguishes this equipment from similar inspection equipment is the system of five cameras. In addition to a vertical camera, four additional side-view cameras permit inspection of areas that a single top-down camera can't see after PCB assembly, such as the marking on the sides of through-hole devices. This also helps the operator view all angles during the defect review phase of the inspection.

"The AOI system's laser beam feature provides accurate Z-height measurement of components that have critical co-planarity requirements such as BGAs and CSP devices," said Trask. "The laser measurement does a comparison of the component height at each corner in relationship to the PCB. This provides an automated way to verify placement to within +/- 1 mil tolerance. Besides the PCB boards that come off of our SMT lines, through-hole components as well as select secondary hand-assembled components are also inspected via the five-camera systems in some instances for maximum accuracy. This is especially true when we are working with medical devices."

Automated Placement

Cogmedix is a wholly owned medical device manufacturing subsidiary of Coghlin Companies in West Boylston, Mass. It manufactures a variety of Class I and Class II medical devices that incorporate in-house fabricated PCBs using a wide range of advanced manufacturing and inspection equipment, including MPM screen printers, MyData automated placement equipment, Speedline reflow ovens, Teradyne in circuit testers, and Mirtec automated optical inspection equipment. This equipment enables volume production of SMT, through-hole and hybrid/mixed technology.

The company runs flexible placement equipment capable of placing 0201 chips to BGA >1500 I/O in production (1005 chip capable) to accommodate a variety of customers with a wide range of production needs. Equipped with quick-change, cartridge-based MyData SMT placement lines and Speedline reflow ovens, the facility can handle applications that require 25 parts per year to those that need 2,500 parts per month. "Our MyData placement equipment provides high-quality results, high throughput, and quick job change capability, all of which are critical when performing typical batch runs of 50-5,000 assemblies for OEMs of all sizes," said Matt Giza, general manager for Cogmedix.

The MyData MY100DX14 system's dual placement heads are capable of placing eight components simultaneously and up to 34,000 parts per hour. The MyData automated placement lines paired with the Speedline/Electrovert reflow equipment run leaded and lead-free (RoHS) boards reliably in any volume, and accommodate no-clean and aqueous chemistry processes.

Once a customer's program is loaded into the machine and verified, the MyData system can easily call up that program information for future manufacturing runs. The system also verifies loaded parts and compares them to the requirements in the program. "The reel-based cartridge system enables job pre-loading for rapid changeover," said Giza. "The facility can run multiple jobs daily across multiple shifts on each line. This would not be possible with less-efficient or reliable equipment. This efficiency and throughput ultimately reduces customer costs, enhances quality, and improves overall product reliability."

Wave Solutions

As part of its lean manufacturing strategy, EPIC Technologies in Norwalk, Ohio, has taken a large-scale

systems approach that focuses on increasing factory throughput by optimizing and standardizing production. This emphasis on standardization works well with high-mix products with configure-to-order requirements because it minimizes and/or eliminates changeover time. In some cases standard equipment is used, but for other cases the company has either purchased specially-modified equipment or developed its own.

For through-hole technology assemblies, EPIC worked with a Swiss manufacturer of wave solder equipment to develop a duplex wave solution that supports both lead and lead-free solder processes while ensuring rapid changeover.

“This duplex wave system is a carrier-based system,” says Steve Fraser, vice president of North American operations for EPIC. “There are costs associated with the carriers, but to minimize this, universal tooling has been designed for standard PCB array sizes. Multiple product types can be soldered collectively without system changeover and multiple production lines building different product feed into a single machine.”

Because it is computer-controlled the system is less operator-dependent, making it ideal for a high-mix environment.

“For example, we wave solder thousands of through-hole LCD displays every day,” said Fraser. “In a normal wave these would either require significant heat shielding, masking, or they would simply get damaged. Comparatively, most manufacturers have one wave solder machine per line. Those machines are typically about three times less expensive on a per-unit basis, but when you can have one unit replace as many as seven conventional machines the total cost is much less. Operating costs and the factory floor space required to perform the operation are also reduced.”