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For News, Capability Updates and Success Stories at SigmaTron International

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About SigmaTron International

SigmaTron International (NASDAQ:SGMA) is a full service EMS provider with a network of manufacturing facilities in the United States, Mexico, China and Vietnam.

We focus on companies who want highly customized service plus a scalable global manufacturing footprint.

We serve a diversified set of markets which include: industrial, consumer and medical/life sciences customers. Our quality certifications include ISO 9001:2015, ISO 13485:2016, IATF 16949:2016 and AS9100D. We are also International Traffic in Arms Regulations (ITAR) registered.

Benchmarking Prevents Silos at SigmaTron

One of SigmaTron International's strengths is its culture of letting each facility innovate in ways that benefit the unique needs of its customer base. Facilities have tended to specialize by industry clusters attracted to their region, so some innovations only make sense within that production environment. Innovations that have universal benefit among facilities are propagated. This strategy has been particularly beneficial in proprietary IT and inspection/test strategies. While Lean disciplines have driven some platform standardization strategies in facilities building similar volumes and board complexity, there has also been a culture of informal discussion among facility and production management teams about equipment choices where there isn't a one size fits all best choice. Now these informal discussions are evolving into a formal benchmarking process.

Initially, virtual benchmarking questionnaires were used. The challenge was that answers reflected the questions rather than the full range of innovation that might be present. For example, a five-person team from the Elk Grove Village (EGV), IL facility recently visited the Acuna, Mexico facility. One of the areas being evaluated was selective soldering. The Acuna facility's high volume envi-

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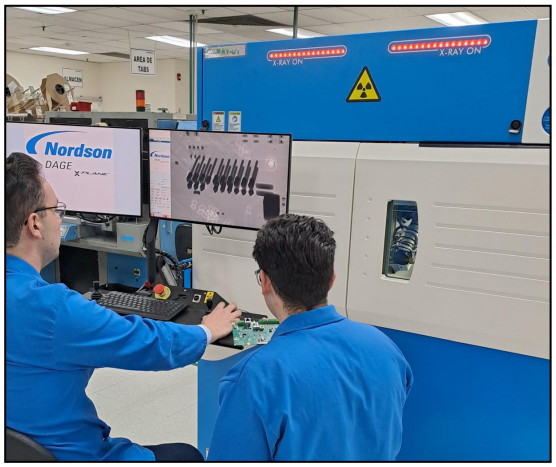
Chihuahua, Mexico Facility Investing in the Future

SigmaTron International's Chihuahua, Mexico facility is investing in equipment and capability upgrades to support the requirements of its diversifying customer base. Increasing product complexity predominately in automotive projects is driving upgrades in printed circuit board assembly (PCBA) manufacturing capability while a need for a higher level of cleanliness in final assembly for an industrial customer has driven the addition of a Class 100,000 clean room. Expanded inspection capabilities have also been added.

An ASM PT SX2 pick & place machine capable of placing odd form components was installed in Dec. This replaces older equipment and because it doubles line capacity on the line it is being added to, enables the elimination of one older SMT line. Ionic contamination detection capability was enhanced with the addition of a C3/CI tester in support of automotive product requirements. The tester enables the team to check specific areas of a PCBA to determine whether potentially detrimental residues are present. PCB singulation capabilities were enhanced



The Nordson Dage Quadra 5 3D X-ray system was installed in October.

in September with the addition of an Elite Automation – EM-5700N DML automated router that includes a vacuum system for dust collection. It will support automotive products with tighter component edge clearances which require more precise singulation.

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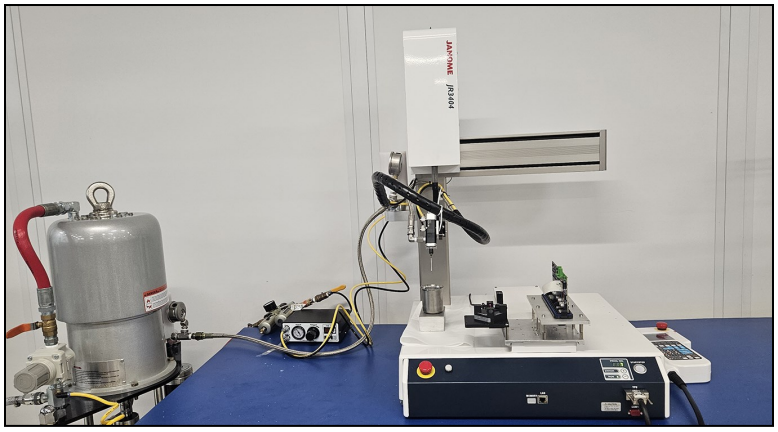
EGV Facility Continuing Equipment Upgrades

SigmaTron International's Elk Grove Village (EGV) facility has continued upgrading its SMT area. A third Fuji Aimex III placement machine has been added to replace older Universal equipment. The Fuji machines are 25% faster than older machines.

A nitrogen-capable Vitronics Soltec Centurion CT820 forced convection reflow oven installed earlier in the year has now been converted to nitrogen soldering and is in the profile set-up stage. The EGV facility elected to install nitrogen-generation equipment to provide the nitrogen. A second nitrogen reflow oven is being set-up and qualified this month. Use of nitrogen improves solder joint quality and cosmetics. The reflow ovens have 8 heating zones and 2 cooling zones for precise temperature control. The units also feature low energy consumption rates and a design that reduces maintenance requirements to help reduce cost of ownership. There is also a switch enabling users to switch from air to nitrogen for differing production requirements.



The RTV dispensing platforms use a pneumatic controller arm for precise dispensing and can dispense any adhesive in addition to RTV.

EGV now has two forced convection reflow ovens that can do both nitrogen and air soldering.

Two new Janome JR3404 robotic (room temperature vulcanizing silicone) RTV dispensing platforms have also been installed this quarter. The desktop robot works with a pneumatic controller and can dispense any adhesive as well as RTV.

The RTV is utilized in a new agricultural equipment product as a protective barrier for components that could otherwise be damaged by external environmental factors during use.

"The complexity of our customers' products is increasing and we are continuing to enhance our capabilities to ensure we meet those requirements. One of the advantages we have as a facility is the ability to work with other facilities within SigmaTron who have been doing similar types of production longer for equipment recommendations and reduced learning curve during setup," said Anita Tucker, EGV's General Manager.

Chihuahua Equipment

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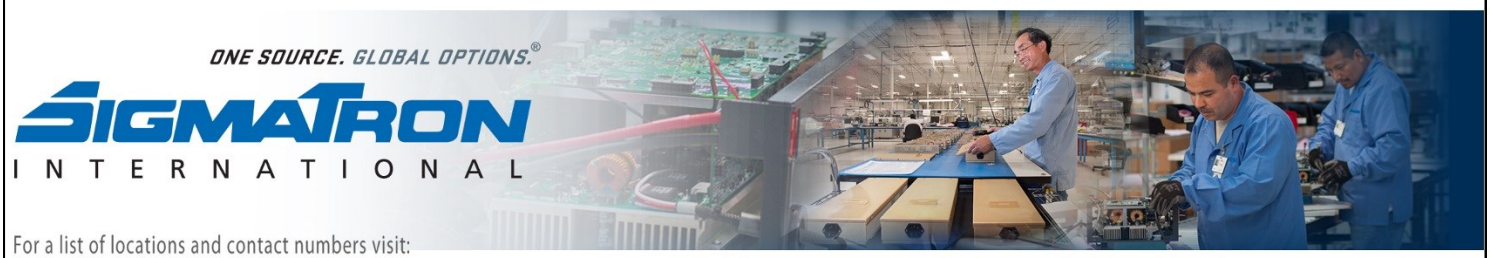
In October, the facility installed a Nordson Dage Quadra 5 3D X-ray system to support sampling and analysis of BGAs, QFNs and mBGAs. A new industrial project will be increasing mBGA placement requirements in Q2 2024.

Construction of a Class 100,000 spec clean room was completed in November to support an industrial product with stringent cleanliness requirements for its display assembly. The clean room also features new LED sealed lamps that are brighter and utilize less power.

Finally, the facility's proprietary manufacturing execution system (MES), known as Tango, is being enhanced with the addition of a separate total predictive maintenance (TPM) system. It will measure equipment efficiency and create a predictive maintenance schedule in support of automotive project requirements. Personnel training has been completed and the preventative maintenance database has updated, which marks the completion of phase one of the installation. The TPM system should be operational early in 2024.

"Our goal is to ensure that our capability and capacity continue to meet our customer's needs. Overall production complexity is increasing in terms of product technology, PCBA density and the scope of activities. These investments ensure we continue to deliver the rigorous quality requirements that come with these projects," said Alvaro Grado, the facility's Manufacturing Engineering and Quality Manager.



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Benchmarking

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ronment has made it expert in solder pallet design and its team has been designing EGV's solder pallets to requirements specified by EGV's team.

"When we toured the facility, we realized that Acuna's solder pallets had additional features driven by poka-yoke that weren't incorporated in the pallet designs we had provided the specifications for. The Acuna pallet design poka-yoke had features that made it impossible for an operator to place a component incorrectly. We'd been using transparent overlays as a poka-yoke to eliminate this defect opportunity, but the Acuna poka-yoke was better. Additionally, some pallets had been modified to shield the printed circuit board assembly (PCBA) from flux overspray. We'd had this issue in conformal coating on some products and realized we could adapt the Acuna shield design to help in this area. Without the visit we wouldn't have known these options existed," said Anita Tucker, EGV's General Manager.

The team included both technical and managerial resources. Teams comprised exclusively of technical personnel tend to focus on production processes and equipment. Broadening the team to include managerial resources enabled better analysis of non value-added but necessary processes, such as planning and release of kits from the stockroom for potential improvements. Quality practices were also reviewed. The Acuna facility's higher volumes make it very data-driven and focused on inspection efficiency. Operators check the work of the previous station as part of this process. Additionally, acceptable quality level (AQL) data is utilized to determine sampling plans, and in some cases, specialized short-term inspection operations are set up to address specific issues.

"Acuna's higher volumes make AQL-driven quality strategies very cost effective, as well as necessary in the consumer product realms in which they compete. Comparatively, our EGV volumes are lower and the average lot size is smaller. We do sampling inspections and testing, and utilize that data in sampling plans, but not at the same level as Acuna's team. Viewing their production operations is giving us ideas about ways we could incorporate some of their best practices in our processes," added Anita.

In addition to benchmarking activity, SigmaTron also set up a Virtual Technology Center in Q2 2023. Technology leaders have been designated at each facility. When a facility has a technical issue or is evaluating the need for new equipment, they can submit a request to the Technology Center and technology leaders with appropriate expertise will assist. This further leverages the expertise spread across SigmaTron's global network of facilities.

"Setting up this collaborative structure cost nothing and force multiplied our technical issue solving capabilities. It's a win-win for our facilities and our customers," said John Sheehan, SigmaTron's President.