



PARTNERING

ACE, Ark-Les Team up to Boost Yields and Slash Production Time

By Michael L. Martel, Contributing Editor

Selective soldering, as a replacement for hand soldering, brings repeatability and consistency to the manufacturing process and saves a tremendous amount of time. To make it happen, though, the equipment supplier and the customer need to “partner” on process development and other areas; and it’s an advantage to both if the supplier can provide a “turnkey” package to the customer, a complete solution to the production requirement, beyond simply providing a production machine.

Ark-Les Corporation in El Paso, Texas, recently teamed up with ACE Production Technologies to do just that. Ark-Les is a supplier of connectors, switches, sensors controls and engineered user interface solutions to the appliance, telecommunications, motor control, data processing and controls markets with manufacturing facilities in the US and Mexico. Its Manufacturing Manager, Ruben Garcia, was confronted with the task of producing thousands of automotive fuel level switches in an efficient process, consistent with the firm’s commitment to high quality, reliability and economy. He turned to ACE and the company’s KISS-102 selective soldering system to meet this challenge.

“Because we’re primarily an engineering-oriented company, specializing in machine and tooling design, this was right up our alley” says Alan Cable, President of ACE. “Rather than just ship a machine, our policy is to provide a complete package, including process development and fixture design — when fixtures are needed — to make the whole process work seamlessly. Most importantly, we were able to help the customer meet and exceed his throughput and quality goals through selective soldering.”

20 Hand Solder Stations

In this application, as many as 20 hand-soldering technicians had been working, at the same time, to produce these switches with soldering irons. They were hand-soldering axial through-hole components on either end of an assembly that was 3/8 x 2-in. (9.5 x 51mm).



Special dual nozzle built for Ark-Les.

Complicating matters were a number of SMT components in the middle of the board that could not be disturbed, and white plastic molded housings that also could not tolerate soldering temperatures. Ark-Les needed to speed up production, and achieve greater consistency in the solder connections. Hand soldering was no longer an option. The process had to yield top quality, high reliability solder joints and needed

to be at least 8-10 times faster than technicians with hand soldering irons.

Working together, Ark-Les and ACE designed a selective soldering process utilizing custom product holding techniques and a specially-designed dual port solder nozzle. With this approach, the team was able to beat the process goal of one part every 4.5 seconds and achieved a 3.5 second cycle time.

Cable emphasizes that custom fixturing is only needed sometimes in selective soldering. “Fixtures are really only needed for non-traditional PCB assemblies” he says. “The vast majority of boards that are selectively soldered go into the machine without any fixturing. Odd-form parts, and particularly flex circuits, need fixturing occasionally. For example, some flex circuits must be held down flat; one has to ‘locate’ the flex circuit and then hold the components in place for the soldering operation.”

Short Cycle Time Needed

For Ark-Les, "They needed a cycle time of 4.5 seconds, per assembly, production time on the machine, and what we did was to design fast-load fixturing that would hold approximately 40 assemblies at a time, so an operator populates those components into the fixture, then puts the fixture onto the machine, and the machine, using a dual fluxer and a dual solder nozzle that we designed, cut the cycle time in half. We were able to get the cycle time down to 3.5 seconds per assembly, and the fixture allowed the two components on each board to be soldered simultaneously and separately without disturbing the SMT components or the plastic housing."

"We provided the design of the fixture, and we did all of the design in 3D modeling, seeing how it would work and how it fits on our machine" Cable says. "Also, we developed the process and designed the nozzles, so when the customer receives their product from us, it's a complete turnkey system ready to go to production and individualized to that customer's process and product manufacturing requirement, including fluxing. We've done literally dozens of these applications for our customers."

Automating the Process

The centerpiece of the system, the ACE KISS-102, is an automated, simple-to-use, low-cost selective soldering machine using the company's proven "traveling mini-solder wave". It is used to replace the high labor cost of hand soldering through-hole components on SMT boards without disturbing nearby SMT components. This process overcomes the limitations of operator-dependent soldering with a truly flexible automated flux application and molten solder delivery system.

The machine couples high throughput with precise process controls. The programmable features provide the tools to set all process parameters, including immersion depths, pre-heat dwells, travel distances and speeds, solder temperature and wave height. The machine will apply flux and solder to boards up to 12 x 12-in. (305 x 305mm) without intervention and up to 18 x 24-in. (457 x 609mm) with a manual step over.

"Today's equipment supplier needs to be more of a solutions provider, working in close partnership with the customer to provide a complete turnkey system that's individualized and engineered to the customer's specific application and manufacturing requirements," Cable says. "It's not enough to simply ship a machine to a customer and expect them to fit it into their manufacturing environment. The future for successful equipment providers is to become total solution providers."

ACE Production Technologies designs and builds simple, affordable selective soldering, lead tinning, and related systems suitable for lead-free electronics assembly. The company's line of rugged, reliable selective soldering systems includes the KISS 101, KISS-102, KISS-103, and the KISS-104 models — all with lead-free compatible solder pots — that are especially suitable for low-to-medium-volume assembly, prototyping, and rework, post-reflow offline assembly, and other soldering applications such as odd-form devices.

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