

## More Productivity, No Lost Skills: Selective Soldering Replaces Hand Soldering

One of the quandaries facing small to medium sized electronics assemblers today is the need to increase production through the addition of automation, while keeping valuable, skilled employees who are long-time assets to the company. There has long been a false perception that adding automation puts employees out of work, while in fact the opposite is true. At the same time, manufacturers realize that in order to increase productivity volume, and achieve greater product consistency, automating certain processes, such as soldering, is a must.

For decades, well back to the beginnings of electrical products, manufacturers depended on skilled personnel to conduct hand soldering operations. Well before the invention of the printed circuit board in the 1950's, skilled operators with soldering irons assembled entire products such as early radio sets using point to point soldering techniques.



*Soldering with the ACE 104 at Onset Computer*

Skilled hand soldering personnel have always been the backbone of electronics assembly operations. They can complete connections that are problematic for machine soldering, and are essential to the rework and repair department. However, in terms of production, hand soldering is slow and inconsistent. The

quality of the results is entirely dependent upon operator skill, and can vary from day to day and hour to hour.

As circuit boards have become more complex and difficult to manufacture, due to miniaturization and/or topography, more and more individual, offline, or challenging soldering operations are being achieved through the use of selective soldering machines. This is especially true for high-mass assemblies or components that simply cannot be effectively hand-soldered. Selective soldering machines, semi-automated or automated, offer the features and consistency needed to handle a high product mix with challenging individual soldering tasks, such as connector attachment. They also require trained operators.

Onset Computer Corporation of Bourne, Massachusetts, at the gateway to Cape Cod, manufactures small, battery-powered HOBO<sup>®</sup> Data Loggers and weather stations for use in indoor, outdoor, and underwater monitoring applications. Onset products are used by more than 50,000 customers in a broad range of environmental research, industrial, and energy/HVAC applications. As a result, Onset has a low-volume, high mix manufacturing environment.

Onset Computer Corp.'s management had set a company-wide goal of double-digit growth for 2007. In order for manufacturing to achieve this goal, the company would have needed to hire 10-12 additional technicians for hand soldering operations. However, Onset's location in Bourne is somewhat problematic; Cape Cod is a long-time vacation destination, not known for an abundance of lower-cost labor. The high cost of hiring (and possibly training) these new technicians, in addition to the ever-present issue of quality consistency, led management to consider automating the soldering process.

The large-format, in-line KISS 104 Selective Soldering System from A.C.E. Production Technologies ([www.ace-protech.com](http://www.ace-protech.com)) was chosen as the most cost-efficient and capable system for the job. This large-format machine (26" x 19"

work area) with automated features has in-line capability, as well as quick and easy changeover between lead and lead free solder pots.

Once Onset brought the system online, results were almost immediate. Since the installation in March 2007, Onset has experienced an 20% improvement in productivity.

The jump in the number of assemblies processed since the machine went online tells the story:

March (partial month, machine start-up):	3986
April:	6582
May:	8531
June:	8075

The SMEMA-compatible, in-line KISS 104 does not require any special user intervention or additional setup steps. With the 104, the user can place more boards in the work area and take advantage of the Step-and-Repeat feature of the system's unique operating program and automated capability as an in-line or stand-alone system. The 104 system incorporates an easy to use, intuitive, upward-looking camera for automatic point-to-point programming.

The fully programmable KISS 104 uses ACE's 'traveling mini-solder wave'. This system overcomes the limitations of operator-dependent soldering with a flexible molten solder delivery system. It is designed to deliver repeatable soldering performance without the expense of robotic selective soldering machines. The KISS 104 can also be easily integrated with A.C.E.'s line of preheat modules. The system also features a dual head fluxer option that facilitates quick changeover of flux types. This fluxer is especially designed to meet the needs of selective soldering applications that demand quick change over from leaded to

no-lead solders. It is a spray-type, system, with controllable spray point size, pattern and deposition volume. The maintenance-free spray head is controllable down to a spot size of 2mm.

“Productivity increased dramatically when we brought the ACE machine online” recalls Jack Sample, President of Onset Computer. Sample cites three product examples wherein the cycle time for each product was shortened considerably with the new ACE system (a ‘cycle’ includes board loading, soldering, inspection and cleaning).

Product A - cycle time was 1 min. 45 sec. - now reduced to 30sec.

Product B - cycle time was 23 min. - now 4 min. 30 sec.

Product C - cycle time was 27 min. 25 sec. - now 6 min.

The ACE cycle has relieved the assembly operation of masking time and hand soldering. The inspection process has been shortened due to fewer errors to verify and note. Touch-up time has been significantly reduced, or in many cases, eliminated. The cleaning process is shortened because this process eliminates certain residues left by previous methods.

Onset’s manufacturing managers report that an additional goal of providing a faster response to special orders has also been exceeded. In the past, it took one week to fill a special order request, which caused considerable production line disruption. Now, with the ACE system, a "mid-run" change over can be accomplished by calling up a program and set of system parameters. It now takes two days to fill the same special request that once took an entire week.

Bringing the ACE selective soldering machine online increased production without adding labor costs, and significantly, without putting anyone out of work. The machine has brought higher productivity and more consistent product quality through fewer soldering defects. Since the ACE system has been brought on-

line, less labor is required in soldering, inspection, rework/repair Although there are fewer technicians within the facility dedicated to hand soldering, reducing labor costs, two employees have been reassigned to other tasks, one left the company, and another moved to customer service. No one lost their employment due to bringing the ACE 104 selective soldering machine on board. Operating the ACE selective soldering machine (one shift per day) requires two operators, for loading, operation, and subsequent unloading and inspection.

“We have fewer stock-outs and reduced overhead costs” Sample adds. “This machine has been a great investment for us, and its contribution to our productivity has exceeded our expectations.”

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