

KIC: Cooking Up Recipes

Some say that the reason people buy computers is to run software. Are advances in machine software making the same true for process equipment? The subject of this month's interview, Björn Dahle, has been president of KIC Thermal Profiling (kicthermal.com) since early 2000. As he told CIRCUITS ASSEMBLY's Mike Buetow, the bar for soldering equipment has lifted to the point where users are not taking full advantage of the capabilities. For that reason, he thinks new tools (read: software) will now take center stage.

CA: How did you get your start in electronics manufacturing?

BD: I am an old hand in this industry, having joined Amistar Corp. in 1987. At the time, Amistar was primarily involved with insertion equipment and hired me as product manager for their private label SMT equipment.

CA: Tell us how profiling changes for lead-free solders.

BD: Lead-free solders require a much tighter process window due to several factors such as a higher melting temperature, component tolerances, etc. As a result, finding the appropriate reflow oven or wave solder recipe that yields an acceptable profile is more difficult and time-consuming. A second concern

is that, to achieve the acceptable profile, conveyor speed may slow to the point that the thermal process becomes the bottleneck in the line. Lead-free manufacturers are therefore finding that trial-and-error profiling is inadequate. They are now using software that acts as an oven recipe search engine to quickly find the appropriate oven or wave solder setup. A more stable process results from both an optimized conveyor speed and a profile centered in the process window. Many manufacturers have now replaced their daily or weekly profile checks with continuous thermal process monitoring.

CA: Why is real-time thermal management important?

BD: Over the last few years, the biggest driver for real-time thermal monitoring has been the EMS clients' requirements for process traceability. When an OEM outsources manufacturing, its reputation and profitability are still attached to the long-term quality of the products that carry its name. It is therefore understandable that OEMs want documentation on the quality procedures at the manufacturer, as well as the capability to trace a field failure back to the processes that the product in question experienced during initial production. Such information may also be used to prevent future field failures.

A second driver is the industry's intense pressure to deliver the required quality at steadily lower prices. To

achieve this, a manufacturer is looking to constantly improve its process to build it right the first time, rather than relying (exclusively) on inspection to screen bad parts at the end of the line. Real-time thermal management provides process engineers the information required to constantly improve their processes.

Finally, the tight process window for lead-free electronics allows little drift in the process, requiring manufacturers to move from the weekly profile check to the real-time and continuous monitoring.

CA: It appears the biggest advances in reflow equipment in the past few years have been on the software side. Would you agree?

BD: I am perhaps biased, but I definitely believe this statement to be true. Going back, it is clear, for instance, that reflow ovens became a lot better in the early 1990s with the introduction of full convection. Since then, manufacturers have steadily improved the stability and capabilities of ovens. The improvement of flux management systems is one example. In the last few years, the industry has witnessed dramatic improvement in software capabilities. It is easy to focus on elaborate and powerful software features for ovens or thermal management systems. Perhaps the most significant capability, however, is that "easy to use" software now allows a process engineer strapped for time, or an operator with limited experience, to achieve the desired results in record time.

It is also worth mentioning that we are now in the exciting early stages of using software to achieve a whole new level of quality and productivity. By providing real-time process control and host computer interface to shop-floor management systems, and by sharing pertinent data with sister factories or clients anywhere in the world, software is changing the way manufacturers build their products.

CA: Is the attention being paid to the process windows of lead-free solders exposing "flaws" in conventional soldering equipment and, if so, what do you expect will come of that?

BD: There might be a little of that in isolated cases, but I believe it is typically the other way around. Soldering equipment has for the most part become extremely good. It has been the inability of users to take advantage of the capabilities of the equipment that has held them back. Users need new tools that help take advantage of equipment capabilities that already exist. For example, KIC has calculated that a typical modern reflow oven offers trillions of alternative setups. When processing lead-free solders, only a tiny fraction of those recipes will be acceptable. As a result, new tools are required to identify the correct recipe(s) in a timely fashion.

— Mike Buetow



KIC's Björn Dahle