



About EPE Corp.

www.epecorp.com

EPE is a leading supplier of high-reliability Electronic Manufacturing Services. Our deep manufacturing and engineering expertise, strong financial position, and passionate dedication to quality and integrity are at the foundation of an established structure that supports the electronic manufacturing needs of customers in diverse industries – and a demanding marketplace

GOAL

Pinpoint sources of excess solder, insufficient solder or potential solder shorts prior to wave solder process step

APPROACH

Installation of color 3D solder paste inspection (3D SPI) device at post solder paste screen print.

Color 3D solder paste inspection connects 2D colored images with 3D measuring data to provide detailed and accurate 3D color images that allow defects and potential defects to be discovered prior to reflow soldering

RESULTS

- Volume Throughput
- Faster Assembly Time
- Reduced Labor
- Vastly Improved Quality
- Dramatic Shift in Pareto Issues
- Mitigation of 3D X-Ray

HIGH RELIABILITY EMS provider EPE Corp. sees dramatic improvements in quality, throughput, and costs with SPI investment

In the electronics manufacturing environment, the first assembly operation involves the application of solder paste to the areas of a printed circuit board where components will be placed and reflowed. Critical to the prevention of subsequent quality problems – such as excessive or insufficient solder and solder shorts and opens – is the screen printing of a precise volume of solder paste. A troubling problem for assemblers has always been that the capture of potential solder defects typically involves using an operator at an AOI machine performing 100% manual inspection and then quarantining defective product for touch up, repair, or rejection. These are costly remedies in terms of time and labor.

Indeed, the application of solder paste using stencils and a screening process is dependent upon many variables such as: The blade quality of the squeegee, its direction/orientation/stability during a pass, the leveling of the screen printer, and the quality/caliber of paste being applied. It is the balancing act between these and other variables that make screen printing of solder paste a vital aspect of subsequent soldered joint quality.

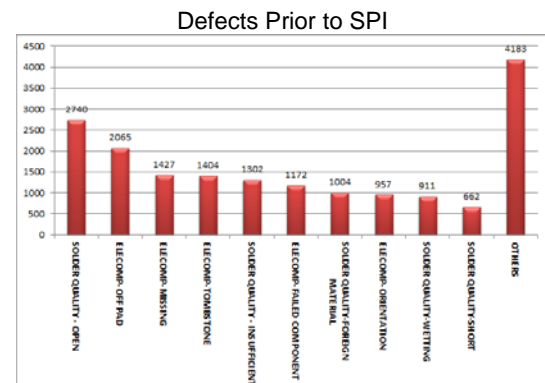
With the relatively recent advent of precision Solder Paste Inspection (SPI) equipment, significant economies of scale, throughput, cost and quality are available. EPE Corp. seized the initiative and has reaped the rewards of installing a robust SPI station in its assembly lines; ensuring higher reliability in all of its assembled products.

Pre-SPI Challenges

Prior to its SPI investment, EPE Corp. was faced with a daunting set of quality challenges revolving around excessive/insufficient solder and opens/shorts that were captured in a highly manual process involving a dedicated operator and a repair station. This slowed throughput, forced surplus labor costs, and affected overall quality control. Line stops, products arrested at AOI, and bottle-necking were common occurrences. Unable to pinpoint whether component placement or screen printing was causing potential defects, the quality system was geared toward examining ‘trends’ in the incidence of solder shorts versus a line ‘stop’ function based around certainty of cause.

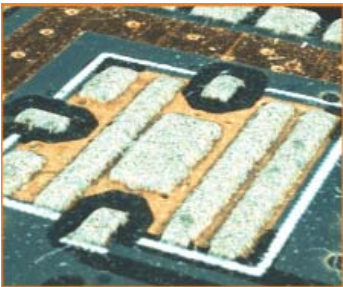
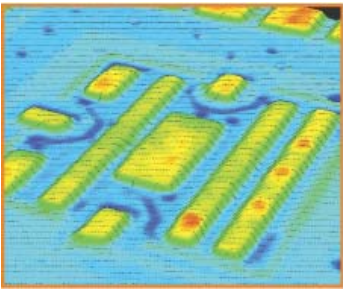
“Companies pay us to make solder joints...how do you control those? How can a customer be sure they've been made right?”

-Matthew Amidon, Director of Manufacturing Operations



The Search for a SPI Device

3D COLOR SPI

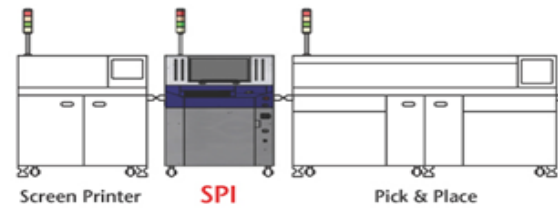


Images from Pemtron

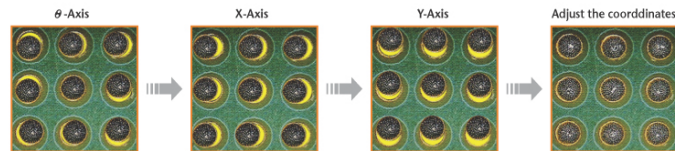
With the implementation of SPI, EPE can actually determine whether a defect originates as a design, process, or tooling issue. This allows the company to accurately pinpoint the cause of error and to arrest and correct any anomalies.

The accuracy and reliability of the SPI unit is such that costly auxiliary investments in 3D X-Ray and other equipment may actually be mitigated. Statistically, the repeatability of excellent solder joints is a robust, highly reliable process.

EPE Corp. was introduced to the concept of SPI during an industry conference and set about investigating alternative approaches. There were a small handful of available SPI suppliers and three of these – Koh Young, Pemtron, and Parmi – were investigated. After on-site inspections and rigorous examinations, the company settled on Pemtron and its TROI™ 5700 series of SPI equipment. The repeatability, ease of programming, footprint, and cost factors were some of the deciding factors, but the technology combines 2D and 3D color image diagnostics: A major advance over 2D black & white imagery.



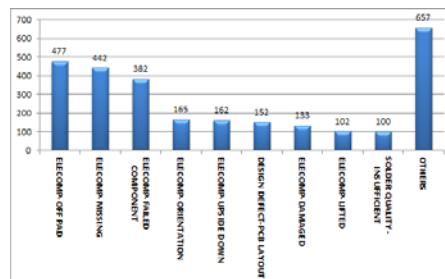
Screen Printer Stabilization Result



Images from Pemtron

Implementation and Benefits

Once the SPI unit was installed, the EPE team began producing work using the station as an integral post-screening addition to the assembly line. Almost immediately, the benefits began to emerge: Implementation of the new SPI technology meant the end of surplus labor costs; the ability to create a 'line stop' where potential problems are arrested right at the SPI machine; and rapid identification/correction to problems that otherwise would have required an AOI operator and a review process. Moreover, EPE found that they could essentially integrate the AOI and inspection functions using a 'Rule of 5' concept: A 5-board buffer on the assembly conveyor to catch and limit any defects from affecting follow-on production. If a board fails at SPI, it gets cleaned/reprinted at the screen printer where min/max tolerances are adjusted and attenuated to optimize the next pass. Importantly, EPE does not use the SPI unit as a substitute for AOI, but rather as a rapid means for assuring best-precision solder paste application. If the paste is applied with precise attributes, the subsequent component placements and wave-soldering steps will statistically ensure higher reliability and quality.



Defects After SPI

An 84% reduction in overall defects...elimination of 5 pareto defect categories...reduction of observable SMT defects per month from >200 to <40

