

Solder joint inspection - LEADOUT photolibrary on the road

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Inspection of lead-free joints has been a hot topic over the last few years, and now with staff trying to come to grips with real world pressure of interpreting good from bad, urgent support is necessary. Standards do exist as a reference but often they are a collection of images with very little of the process information provided for reference.

As this is an obvious concern to the industry, the LEADOUT team developed a specific activity within the EU funded project to address these issues. Looking at boards soldered with one alloy can look completely different on any of the popular surface finishes like tin, silver, OSP copper or gold over nickel. Determining if a board is gold or copper OSP is fairly simple, but telling the difference between silver and tin can be more demanding, even for the experienced engineer.

If it's difficult for production staff, it can also be challenging for Automatic Optical Inspection (AOI) machines. Recent trials with four different surface finishes on flexible and rigid circuit boards illustrated how using different lighting can enhance the inspection cycle and reduce false calls in manufacture. Lead-free assembly can be successfully handled by modern AOI systems just like x-ray, but some process optimization is still necessary. Obtaining more information on the process and materials package helps the interpretation and, ultimately, corrective actions.

One of the key outputs from LEADOUT is a searchable photo-inspection library of solder joint images taken during assembly and reliability trials carried out in the project. The Photolibrary will be of particular use to inspection and quality staff as a source of reference, training and technical material. Importantly, the images have associated joint information such as the solder alloy, assembly method, component/joint type, printed circuit board surface finish and, where available, component finish. This extra data allows the library to be searchable, so that users can specify material and process

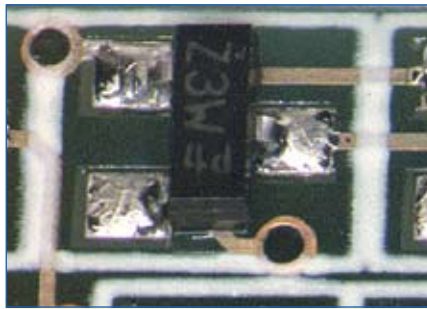


Figure 1. A SOT package with a tin termination finish, reflowed with SAC alloy onto an immersion tin printed circuit board.

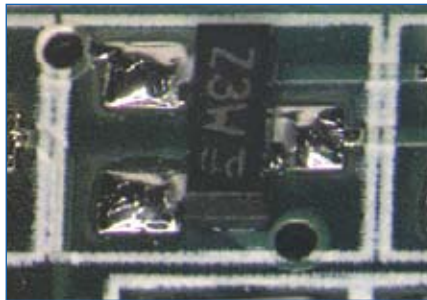


Figure 2. A SOT package with a tin/lead termination finish, reflowed with tin/lead alloy onto a tin/lead HASL printed board.

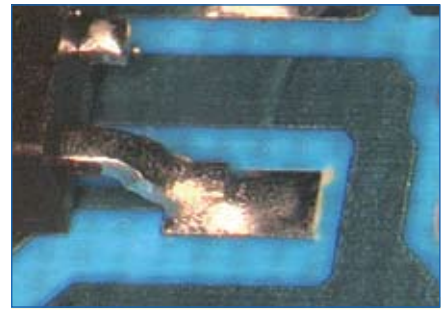


Figure 3. A DPAK package wave soldered with tin/copper/nickel alloy onto an OSP coated printed board.



Figure 4. A leaded device with tin/lead plated leads wave soldered with tin/copper/nickel alloy onto an immersion gold/electroless nickel printed board.

combinations and locate the relevant pictures. Knowing more information about the assembly process allows a better assessment on the benefits that could be derived by changing process materials or finishes to enhance inspection.

In addition, because the assembly trials were designed to manufacture products with both lead-free and tin/lead solder, users of the library are also able to directly compare similar joints made with the different alloys under similar magnification and lighting conditions. Soldering defects will also be included and, where possible, reliability data related to the joints in the images will be stated. There are some lead-free defects that are considered by industry to be fundamentally cosmetic

issues; the LEADOUT research should be able to provide documented support to not reworking some joints unnecessarily.

Although this part of the project is not true research it is a very good illustration of how all the project material and the results obtained from LEADOUT are being put to good use on a practical level to support SMEs across Europe.

For further information on the Photolibrary contact Simon Mason
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The photolibrary images will start to become available later this year via the LEADOUT website at:
www.leadoutproject.com