

The **information** you need to **enhance performance** and **profitability**

Your response to production or field failures is critical to your business. Reacting swiftly, decisively and fairly secures your reputation and resolves issues that will otherwise destroy profitability. But to achieve it, you must locate and rectify the root cause immediately.

That's a big ask when you are working with the most advanced components, leading-edge materials and techniques, and cost-sensitive assemblies. You need specialist tools to look beneath the surface of chip scale components, solder joints, circuit boards, and associated materials. You need specialist skills to manipulate those tools. And you need expertise across many disciplines, to correctly interpret the results.

Take the fastest and most cost-effective route to the failure data you need. Universal Instruments Failure Analysis services. We have already invested in specialized, precision analysis tools, and the knowledge of Topic Experts whose collective expertise covers every packaging and assembly technology in depth.

Your strategic advantage

The Universal Instruments SMT Lab has developed critical manufacturing processes for all component families. We have built a fundamental understanding of material interactions and environmental effects. And we actively participate in product development and design activities. Our experience positions us to deliver failure analysis that adds real value to your business:

- Rectify the root cause of the defect
- Increase production yield
- Improve field reliability
- Provide evidence to support product liability cases or vendor returns
- Deliver rapid return on investment (ROI)

The technology to succeed

Our extensive analysis and characterization equipment means no avenues are closed in the search for information to solve even the most obscure causes of failure:

- Specialist cross-sectioning equipment
- High resolution x-ray, optical and compositional analysis
- Scanning Electron Microscopy and Energy Dispersive X-Ray Analysis
- Incident and transmitted light microscopy
- Mechanical strength testing (materials, solder joints)
- Precision non-contact measurement equipment
- Solder joint performance and material wettability analysis
- Environmental testing chambers



BGA packages featuring nickel/gold plated interconnects frequently show high failure rates at end of line and in the field, over time. Detailed analysis of sample packages allowed us to characterize the weaknesses inherent in this metallurgy, and recommend changes to enhance product lifetime and end of line yield:

- Applied analysis:
 - Dye penetration, cross section, shear test
 - Solder rupture and inter-facial failure modes identified
 - Prediction of "time zero" and long term field failures
- Our response:
 - Recommend alternative finish materials
 - Qualification of substrates using "ball shear" and "torque" testing
 - Compile data to inform assemblers of the performance limitations of nickel/gold

Component level failure analysis

We have recommended further changes in emerging BGA packages, by performing failure analysis on behalf of assembly customers:

- Acoustic microscope imaging of BGAs to investigate package delamination.
 - We recommended changes in the package and materials to eliminate out-gassing of hygroscopic materials.
- Shadow Moiré analysis of BGAs during reflow to identify causes of corner bridging.
 - Universal failure analysis report successfully identified changes in encapsulation dimensions to minimize warpage at package-board interface

Emphatic return on investment for assemblers.

We have helped OEM and EMS assemblers to save big on scrap, rework and warranty costs

- Polarized light analysis quickly highlighted serious cracks in a batch of LEDs that had shown intermittent behavior in an OEM instrument panel. Our failure analysis also showed these cracks to be present at the point the LEDs were received at goods-in.

Our inexpensive analysis and rapid reporting pinpointed the problem, proved liability, and saved the customer over \$250,000.

- Using scanning electron microscopy and energy dispersive x-ray analysis, we quickly determined that the surface finish applied by the board fabrication house did not conform to the product specification ordered by the customer.

Our analysis allowed the assembler to return boards for credit and insist future boards be finished to specification. Estimated saving to the customer: \$100,000.

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