

Achieving High Reliability for Lead-Free Solder Joints - Materials Consideration

(Full day course)



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What You Can Learn From This Course:

This course covers the detailed material considerations required for achieving high reliability for lead-free solder joints. The reliability discussed includes joint mechanical properties, development of type and extent of intermetallic compounds (IMC) under a variety of material combinations and aging conditions and how those IMCs affect the reliability. The failure modes, thermal cycling reliability, and fragility of solder joints as a function of material combination, thermal history, and stress history will be addressed in details, and novel alloys with reduced fragility will be presented. Electromigration, corrosion, and tin whisker will also be discussed. Furthermore, the reliability of through-hole solder joints will be reviewed, and recommendation will be provided, particularly for thick boards. The emphasis of this course is placed on the understanding of how the various factors contributing to the failure modes, and how to select proper solder alloys and surface finishes for achieving high reliability.

Course Content:

1. Implementation Status
2. Prevailing Materials
3. Surface Finishes Issues
4. Mechanical Properties
5. Intermetallic Compounds
6. Failure Modes
7. Thermal Cycle Reliability
8. Reliability of Through-Hole Joints
9. Fragility
10. Reliability – Electromigration
11. Reliability – Corrosion
12. Tin Whisker

Who Should Take This Course:

Any one who care about achieving high reliability lead-free solder joints and like to know how to achieve it should take this course.

About The Instructor:

Ning-Cheng Lee is the Vice President of Technology of Indium Corporation. He has been with Indium since 1986. Prior to joining Indium, he was with Morton Chemical and SCM. He has more than 20 years of experience in the development of fluxes and solder pastes for SMT industries. In addition, he also has very extensive experience in the development of underfills and adhesives. He received his PhD in polymer science from University of Akron in 1981, and BS in chemistry from National Taiwan University in 1973. Ning-Cheng is the author of “Reflow Soldering Processes and Troubleshooting: SMT, BGA, CSP, and Flip Chip Technologies” by Newnes, and co-author of “Electronics Manufacturing with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials” by McGraw-Hill. He is also the author of book chapters for several lead-free soldering books. He received 1991 award from SMT Magazine and 1993 and 2001 awards from SMTA for best proceedings papers of SMI or SMTA international conferences, 2008 award from IPC for Honorable Mention Paper – USA Award of APEX conference, and Best Paper Award of SMTA China South 2010. He was honored as 2002 Member of Distinction from SMTA, 2003 Lead Free Co-Operation Award from Solderotec, 2006 Exceptional Technical Achievement Award from CPMT, 2007 Distinguished Lecturer from CPMT, 2009 Distinguished Author from SMTA, and 2010 Electronics Manufacturing Technology Award from CPMT. He served on the board of governors for CPMT and on the SMTA board of directors. Among other editorial responsibilities, he serves as editorial advisory board of Soldering and Surface Mount Technology, Global SMT & Packaging and as associate editor for IEEE Transactions on Components Packaging Manufacturing Technology. He has numerous publications and frequently gives presentations, invited to seminars, keynote speeches and short courses worldwide on those subjects at international conferences and symposiums.