SMT Manufacturing Productivity and Yield - Mitigating Production Defects – Module 1

SYLLABUS

INSTRUCTOR INFORMATION:

Instructor: Dr. Jennie Hwang

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Best time to call: Between 3:00PM to 5:00PM ET USA. Leave message anytime.

PROGRAM DESCRIPTION

This course addresses common production challenges in tin-lead and lead-free systems that can reduce yield, increase costs, and compromise product reliability. It explores the root causes of these issues, their impact, and practical solutions to mitigate their occurrence, ensuring higher production yields and reliable outcomes.

The SMT Manufacturing Productivity and Yield - Mitigating Production Defects course is offered in two modules. Module 1 and Module 2 function as independent courses. Learners can take them separately and focus on specific topics of interest outlined in the course schedule. This course is taught by an international Hall of Fame inductee for women in technology and a renowned author of several groundbreaking, globally recognized books on lead-free technology, electronics manufacturing, and reliability, who is a record-holder in solving some of the industry's most challenging reliability and production issues. Drawing from extensive hands-on and advisory experience across both commercial and military applications, the course delivers comprehensive knowledge with unparalleled depth and breadth.

LEARNING AND PERFORMANCE OBJECTIVES

Module 1 of the course consists of two 2-hour sessions over one week, delivering practical knowledge and actionable insights to prevent and resolve production floor issues and defects. By understanding the root causes and contributing factors of common manufacturing problems, participants will gain a clear perspective on identifying, addressing, and mitigating defects. This module focuses specifically on manufacturing challenges related to solder joints and assembly, outlining effective remedies and preventive measures for each issue. Designed to help achieve high production yields while ensuring product reliability, the course is ideal for professionals involved in or interested in solving and preventing production problems. This includes designers, quality assurance specialists, manufacturing and reliability professionals, researchers, managers, and business decision-makers. It also caters to those seeking a broad-based understanding of production challenges and solutions. The course strikes a balance between real-world hands-on

practice and the engineering principles that support sound manufacturing practices. Participants are encouraged to bring their production floor issues for discussion.

COURSE STRUCTURE

- Instructor and participants meet online twice per week from the comfort of their own home.
- Participants can view recorded online sessions to review course content and class discussions.
- Participants apply key concepts to create a real-world design from concept to completion.
- All required materials are included in the course.
- Course materials are accessible 24/7 on the new IPC Edge Learning Management System.
- The course can be accessed on virtually any device with an Internet connection and major web browser, including Chrome, Firefox, Safari, Edge, and Internet Explorer.

SUPPLEMENTAL MATERIALS

- Book: (ISBN-0-07-143048-2) "*Lead-free Implementation: A Guide to Manufacturing*" McGraw-Hill, New York, 2005, Jennie S. Hwang.
- Book: (ISBN-0 901 150 401) "*Environment-Friendly Electronics—Lead Free Technology*", Electrochemical Publications, LTD, Great Britain, 2001, Jennie S. Hwang.
- Book: (ISBN-0-07-031749-3) "*Modern Solder Technology for Competitive Electronics Manufacturing*", McGraw-Hill, New York, 1996, Jennie S. Hwang.
- Book: (ISBN-0-90-115029-0*)"IC Ball Grid Array & Fine Pitch Peripheral Interconnections*", Electrochemical Publications, LTD, Great Britain, 1995, Jennie S. Hwang.
- Book: In Japanese, "*Solder Paste: Technology and Applications for Surface Mount, Hybrid Circuits, and IC Component Manufacturing*", Industrial Research, Japan 1990, Jennie S. Hwang.
- Book: (ISBN-0442-2075-49) "*Solder Paste: Technology and Applications for Surface Mount, Hybrid Circuits, and IC Component Manufacturing*", Van Nostrand Reinhold, New York, 1988, Jennie S. Hwang.

IPC STANDARDS COVERED (PROVIDED WITH COURSE)

- IPC-J-STD-001 - Revision J - Redline Standard: Requirements for Soldered Electrical and Electronic Assemblies - Redline
- IPC-A-610 - Revision J - Redline Standard: Acceptability for Electronic Assemblies
- IPC-9691 - Revision B - Standard Only: User Guide for the IPC-TM-650, Method 2.6.25, Conductive Anodic Filament (CAF) Resistance and Other Internal Electrochemical Migration Testing

- IPC-9701 - Revision B - Standard Only: Thermal Cycling Test Method for Fatigue Life Characterization of Surface Mount Attachments
- IPC-9703 - Standard Only: IPC/JEDEC Mechanical Shock Test Guidelines for Solder Joint Reliability
- IPC-7530 - Revision A - Standard Only: Guidelines for Temperature Profiling for Mass Soldering (Reflow & Wave) Processes

COURSE SCHEDULE

Module 1 will focus on production defects associated with solder joints and assembly – causes, remedies, and preventive measures. In this 4-hour course, you will learn and be updated on the following topics:

Topics include:

1. Premise
2. Solder joint surface crack
3. Fillet-Lifting
4. Solderability & wetting related issues
5. Solder balling / graping
6. Solder beading
7. Cold solder joint
8. Starved joint or open solder joint
9. Wicking
10. Head-on-pillow
11. Copper dissolution
12. Through-hole barrel filling
13. Wave and selective soldering issues
14. Black pad – lessons learned
15. Pb-contamination
16. Concluding summary

ASSIGNMENT:

Participants to bring further questions and issues for discussion.