Top Production Defects and Issues: Causes, Remedies and Prevention

SYLLABUS

INSTRUCTOR INFORMATION:

Instructor: Dr. Jennie Hwang

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Availability: Usually available between 3 p.m. and 5 p.m., Eastern Standard Time. You may leave a message anytime.

PROGRAM DESCRIPTION

There are many difficulties that can plague the production floor. They often decrease yield, increase cost, and jeopardize reliability, but they're also tricky to solve or diagnose in the first place. To help combat these obstacles, this course aims to identify the primary causes and reasons for concern while providing plausible remedies and methods for mitigating these occurrences. Ultimately, the goal of this course is to help you achieve high production yield and produce reliable products.

This two-week program is taught by an international hall-of-famer of Women in Technology who has authored several groundbreaking, internationally recognized books on lead-free technology, electronics manufacturing, and reliability. Using all-embracing knowledge, the four two-hour sessions that comprise this course will provide deep and broad experiences for handling the toughest reliability and production issues in both commercial and military applications.

Focusing on solder joint and assembly defects in the first week and continuing with PCB and component issues and defects in the second week, this course strikes a balance between sound engineering fundamentals and real-world, hands-on practice. All who are involved with or interested in solving and preventing production problems, such as designers, researchers, managers, and business-decision makers, are encouraged to take advantage of the pragmatic perspectives and remedies provided in this course.

LEARNING AND PERFORMANCE OBJECTIVES

Upon completion, participants will:

- Discuss their personal production floor issues
- Identify root causes of production problems
- Use methods to prevent production issues and defects
- Achieve high-production and high-reliability yields

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-7530: *Guidelines for Temperature Profiling for Mass Soldering (Reflow and Wave)*
- IPC J-STD-033: *Handling, Packing, Shipping and Use of Moisture, Reflow, and Process Sensitive Devices*
- IPC-J-STD-001: *Requirements for Soldered Electrical and Electronic Assemblies*
- IPC-A-610: *Acceptability of Electronic Assemblies*
- IPC J-STD-020: *Moisture/Reflow Sensitivity Classification for Nonhermetic Surface Mount Devices*

COURSE SCHEDULE

WEEK 1

The session will focus on the causes, remedies, and preventative measures for production defects associated with solder joint and assembly.

Topics include:

1. Premise
2. Solder joint surface crack
3. Fillet-Lifting
4. Solderability & wetting related issue
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

ASSIGNMENT:

Participants to bring further questions and issues for discussion.

WEEK 2

The session will focus on the causes, remedies, and preventive measures for production defects associated with bare PCBs and components.

Topics include:

1. BGA solder ball drop
2. PBGA crack
3. BGA/CSP interposer heat damage
4. BGA/CSP co-planarity issue
5. Large BGA rework challenge
6. Ceramic capacitor damage
7. SOT issue

8. Tome stoning
9. 01001 component issue
10. PCB board sagging
11. PCB-related issues
12. PCB pad-cratering
13. PCB pad lifting
14. PCB bare board issues
15. Thermal damages
16. Overall defects and product failure prevention

ASSIGNMENT:

Concluding discussions.