Troubleshooting & Defect Analysis for Electronics Assembly
SYLLABUS

INSTRUCTOR INFORMATION

Instructor: Jim Hall

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Contact Procedure: Usually available between 10 a.m. and 4 p.m., Eastern Standard Time. Leave message anytime.

PROGRAM DESCRIPTION

We don't assemble electronics in a "perfect world." Problems happen! This course explores troubleshooting through failure and root-cause analysis of PCBA defects. The presentation starts by providing clear definitions of the generic types of defects and continues by examining their impacts, such as reducing functionality, reliability, and more.

The course will also discuss detection methodologies and procedures, followed by an extensive analysis of defect cause and effect, all while remaining relevant to specific processes, equipment centers, and materials. This methodology is then applied to the most common types of defects in electronics manufacturing, including a detailed example of "solder bridges" or "shorts," followed by a summary analysis of more specific defect types. Key causes of assembly problems and low yields are identified, and possible solutions are presented where possible.

Taught by a well-known industry expert with more than 40 years of experience in the field, this two-week program will help you gain a deeper understanding of troubleshooting assembly defects in your unique production environment.

LEARNING AND PERFORMANCE OBJECTIVES

Upon completion, participants will:

- Understand the nature of defects and how to identify them
- Evaluate material, equipment, and process factors that contribute to defect formation
- Apply this background to identify the root cause of specific defects
- Use this knowledge to optimize assembly processes to prevent defects

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.
- All required materials are included in the course.
- Course materials are accessible 24/7 on the 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.

IPC STANDARDS COVERED (PROVIDED WITH COURSE)

- IPC-A-610: Acceptability of Electronics Assemblies

SUPPLEMENTAL MATERIALS

- Troubleshooting Electronic Assembly: Wisdom from the BoardTalk Crypt (Phil Zarrow, Jim Hall, PragmaMedia)

COURSE SCHEDULE

WEEK 1 – SESSION 1

Session 1 provides an overview of the program: defining, identifying, and analyzing the root cause of defects. It establishes the methodology of troubleshooting, which will be presented in detail in subsequent sessions.

Topics include:

- Introduction
- Defect Definitions
- Defect Identification
- Causes of Defects
- Root Cause

WEEK 1 – SESSION 2

Session 2 will present, in detail, process relationships that contribute to the formation of defects.

Topics include:

- Process relationships that Interact with multiple processes:
    - Incoming materials

    - MSD
    - ESD
    - Handling (including time)
- Specific Processes (Part 1):
    - Generic: wrong processes, equipment problem, etc.
    - Labeling
    - Printing
    - Placement
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- Embedded components
- Formed passives
- Inserted passives
- Cavities
- IPC Standards

ASSIGNMENT:
    - Knowledge Check

WEEK 2 – SESSION 1

Session 1 completes the detailed presentation of process relationships and presents an in-depth example of the application of this troubleshooting methodology using the common defect, solder short.

Topics include:
- Specific Processes (Part 2):
    - Soldering
    - Cleaning
    - Singulation
    - Coating
    - Mechanical Assembly
    - Inspection & Test
- Detailed Troubleshooting Example: Solder Short:
    - Defect Definition
    - Detection
    - Cause
    - Relevant Process Relationships

WEEK 2 – SESSION 2

Session 2 will present troubleshooting summaries of other common defects using the established methodology. It will explore how to modify current assembly processes to prevent future defects.

Topics include:
- Troubleshooting Summaries of Common Defects:

    - Opens
    - Delamination
    - Solder Balls
    - Etc.
- Preventing Defects:
    - Specific existing strategies
    - Process Development and Validation
    - DFM
    - Continuous Improvement