



Electronics Manufacturing and SMT PCB Assembly Course: Solder Paste, Reflow, AOI and IPC-A-610



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Introduction:

Electronics manufacturing and SMT PCB assembly, from solder paste printing through reflow, AOI and IPC-A-610 acceptance, is a 1-week course for process, production, test and quality engineering staff, ending with an SMT Line First-Pass Yield Improvement Plan for a case plant. Plants lose output when stencil apertures, placement programs and oven profiles drift unchecked and joint defects surface late at test. Nominees already run or support a surface-mount line, and the course is taught as an inspection walkthrough of real boards, profiles and defect data. CoreConcept Training Center delivers this electronics manufacturing course.

Course Objectives:

- Set up a surface-mount assembly line flow from bare board receipt through printing, placement, reflow, inspection and test
- Specify stencil thickness, aperture ratios and printer parameters, and verify paste deposits with solder paste inspection data
- Programme pick-and-place feeders, nozzles and vision alignment for fine-pitch, BGA and passive components
- Develop and verify reflow thermal profiles for preheat, soak, time above liquidus, peak and cooling, and set wave and selective soldering for through-hole parts
- Configure AOI, X-ray and in-circuit or flying-probe test coverage and accept assemblies to IPC-A-610 product classes
- Analyse solder defect Pareto data and plan corrective actions that raise first-pass yield on a production line

Target Audience:

- Process engineering staff responsible for printer, placement and reflow settings on surface-mount lines
 - Production engineering staff responsible for line set-up, changeovers and output of board assembly cells
 - Quality engineering staff responsible for workmanship acceptance, defect data and corrective action on assembled boards
 - Test engineering staff responsible for AOI, X-ray, in-circuit and functional test coverage
 - New product introduction staff responsible for moving board designs from prototype runs to volume assembly
 - Supplier quality staff responsible for auditing contract electronics assemblers
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Course Outline:

Day 1: Surface-Mount Assembly Line Flow and Current-State Assessment

- SMT Line Layout From Board Loader to Unloader
- Surface-Mount Versus Through-Hole Package Families and Handling
- Bill of Materials and Centroid File Preparation for Assembly
- Moisture Sensitive Device Storage and Floor Life Control
- First-Pass Yield Baseline Audit of a Case Line

Day 2: IPC Workmanship Standards, Paste Chemistry and Stencil Design

- IPC-A-610 Product Classes 1, 2 and 3 Acceptance Criteria
- J-STD-001 Soldering Requirements Mapped to Line Work Instructions
- IPC-A-600 Bare Board Acceptance at Goods Receipt
- Solder Paste Alloy, Powder Size and Flux Type Selection
- Stencil Thickness, Aperture Area Ratio and Step Stencil Design

Day 3: Paste Printing, Component Placement and Reflow Profiling

- Printer Squeegee Pressure, Speed and Separation Setting Procedure
- Solder Paste Inspection Volume and Height Limits
- Pick-and-Place Feeder Set-Up, Nozzle Choice and Vision Alignment
- Reflow Profile Build With Thermocouple Board and Profiler
- Wave and Selective Soldering Parameters for Through-Hole Joints

Day 4: Inspection, Test Coverage and Solder Defect Control

- AOI Programme Tuning to Cut False Calls
- X-Ray Inspection of BGA Voids and Hidden Joints
- In-Circuit and Flying-Probe Test Coverage Planning
- Bridging, Tombstoning, Solder Balls and Poor Wetting Root Causes
- Electrostatic Protected Area Audit on the Assembly Floor

Day 5: Inspection Walkthrough and SMT Yield Improvement Plan Build

- Case Board Walkthrough Against IPC-A-610 Class Criteria
 - Defect Pareto Analysis From Case SPI and AOI Data
 - Reflow Profile Correction for a Case Defect Pattern
 - Process Control Plan for Printer, Placement and Oven
 - SMT Line First-Pass Yield Improvement Plan Completion and Review
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Skills You Will Gain:

- Stencil Aperture Design
- Solder Paste Process Control
- Placement Programme Set-Up
- Reflow Thermal Profiling
- Automated Inspection Tuning
- Workmanship Acceptance Judgement
- Solder Defect Root Cause Analysis
- Test Coverage Planning

Why Attend This Course:

- Hand an SMT Line First-Pass Yield Improvement Plan, with defect Pareto, profile corrections and a control plan, to the production manager and quality lead
- Decide whether a defect pattern calls for a stencil change, a placement correction or a new oven profile, using SPI, AOI and X-ray evidence
- Avoid scrapped boards, late test failures and field returns caused by unchecked paste volume, drifting profiles and static damage on the line
- Share the stencil design rules, profiling procedure, IPC-A-610 class checklist and defect Pareto template with line and quality colleagues

Conclusion:

Back at work, the participant presents the SMT Line First-Pass Yield Improvement Plan to the production manager, the quality lead and the process engineering team. The plan guides which line settings to change first, how inspection and test coverage are split between SPI, AOI, X-ray and in-circuit test, and which IPC-A-610 class the line accepts to. After the first production month under the plan, the unit should compare first-pass yield, AOI false call rate and solder defect counts with the baseline and update the control plan.

Frequently Asked Questions FAQ:

What should participants know before the electronics manufacturing and SMT PCB assembly course?

Participants should already work on or support a surface-mount assembly line and read assembly drawings and bills of materials. No prior IPC training is required. Bringing anonymised reflow profiles, SPI or AOI reports from their own line helps them apply each walkthrough.

How does the electronics manufacturing and SMT PCB assembly course differ from an electronics repair course?

It covers running a volume assembly line: printing, placement, reflow, inspection, test and yield. Electronics repair courses focus on fault-finding a failed board at component level and reworking it by hand, not on setting up and controlling production processes.

Why does SMT PCB assembly control solder paste printing so closely?

Paste deposit errors carry straight into reflow. Too much or too little paste, or a misaligned deposit, can lead to bridging, opens, solder balls and voids, so solder paste inspection finds the cause before components are placed.

What does a participant take back from the electronics manufacturing and SMT PCB assembly course?

Each participant takes back an SMT Line First-Pass Yield Improvement Plan for a case plant, with a baseline audit, stencil and profile corrections, defect Pareto, inspection and test coverage split and a process control plan ready to adapt to their own line.
