



Printed Board Assembly By Design

SYLLABUS

INSTRUCTOR INFORMATION

Instructor: Dale Lee

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Best time to call: Usually available between 7am – 5pm Central Time USA.
Leave message anytime.

PROGRAM DESCRIPTION

Technology and industry requirements are changing traditional design for manufacturing (DFM) analysis. Some of these drivers include the electrification of the automobile (safety features, entertainment, intelligent driving, etc.), commercialization of space (low earth orbit satellites, tourism, exploration, etc.), medical electronics (wearable medical instruments, intelligent disposable devices, robotic surgery, miniaturization of diagnostic imaging systems, etc.) and growth in no touchup/rework allowed assemblies (reliability and customer technology driven). With this transition, DFM has migrated from general assembly guidelines primarily driven by assembly equipment capability to component specific requirements. Component package technology has changed from leaded to solder balls to solder bumps to leadless termination with finer and finer lead pitches. New technologies require understanding the DFM requirements for each solder connection of a single device location on the assembly. With limited internal manufacturing and/or outsourced assembly operations, designers have limited or no access to DFM guidelines or information. Manufacturing must be able to report DFM issues not only from an assembly impact level/process customization but also must be able to communicate with designers on potential design mitigation options and/or cost impacts. This course will highlight issues with today's electronic designs and impacts when material limitations, industry standards and assembly tolerances are not identified using traditional manual DFM reviews. This course designed to provide skills necessary to identify complex DFM issues:

- Limitations of industry standards
- Identification of component documentation issues
- New component package technology driven land pattern impacts
- Printed board fabrication impacts and limitations
- Printed board design impacts on standard PTH and SMT assembly



- Component package driven impacts on assembly process
- Component and assembly process driven tolerance analysis
- Change to manufacturing by design concept

Taught by an industry DFX expert with 40+ years of experience in the field, this one-week program utilizes interactive webinars and exercises to facilitate mastery of the key elements involved in the DFM for today's printed board assembly designs.

LEARNING AND PERFORMANCE OBJECTIVES

This program designed to provide Manufacturing/Process, Quality and Reliability Engineers, Managers or Technicians that are involved with the design, fabrication, assembly of printed board assemblies with a balanced foundation of theoretical knowledge and practical skills in DFM for today's complex designs. Upon completion, participants will be able to:

- General component package types.
- Component supplier documentation accuracy
- Component package design effects on assembly process compatibility.
- Board circular or other non-standard shape impacts on fabrication and assembly.
- Printed board design driven fabrication limits
- Printed board fabrication driven assembly issues
- Non-standard component packaging impacts on assembly process
- Thermal connection impacts to PTH and SMT assembly
- Impacts of material and finish selections on assembly
- Overview of design for aqueous cleaning
- Overview of assembly tolerance and process effects analysis.

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 conceptual design to final design production/inspection/test.
- 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.

IPC STANDARDS COVERED (PROVIDED WITH COURSE)

- IPC-7352 Generic Guideline for Land Pattern Design
- IPC-A-600 Acceptability of Printed Boards
- IPC-A-610 Acceptability of Electronic Assemblies
- IPC J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies
- IPC-SM-840 Qualification and Performance Specification of Permanent Solder Mask and Flexible Cover Materials

COURSE SCHEDULE

SESSION 1 – COMPONENT PACKAGING AND PRINTED BOARD DESIGN

Program overview outlining class schedule and options for accessing class materials and assignments. Class session will focus on component packaging and printed board design concepts.

Topics include:

- DFM History Overview
- Component Packaging Technology
- Supplier Documentation Completeness and Accuracy
- Printed Board Design and Fabrication
- Printed Board Design and Supplier Driven Assembly Issues
- Assembly Tooling, Materials and Process Design
- IPC Standards and Limitations

SESSION 2 – ASSEMBLY AND PROCESS DESIGN, TOLERANCE

Class session will focus on assembly and process design/limitations, and assembly tolerance analysis.

Topics include:

- Effects of Improper Assembly Tooling and Process Design
- Impacts of Design on Process Control
- PTH and SMT Thermal Connection and Non-STD Geometry Impacts
- Design for Aqueous Cleaning Overview
- Assembly Tolerance and Process Effects Analysis

Knowledge Check

- Complete during Session 2

