Electronics U
by Global Electronics Association

SYLLABUS

Introduction to PCB Design for Manufacturability

PROGRAMDESCRIPTION

This series of ten short modules introduces the key concepts required to optimize the design of printed circuit boards for manufacture.

COURSE OBJECTIVE

After completing this course, you will be able to employ the key concepts required to optimize the design of printed circuit boards for manufacture.

TARGET AUDIENCE

This series of modules is ideal for engineers, technicians, and other individuals who are new to DFM and want to familiarize themselves with the key concepts involved in optimizing the design of PCBs for ease of manufacture.

MODULE 1: INTRODUCTION

- What is Design for Manufacturing?
- Why is Design for Manufacturing important?
- Design & data flow
- Why do design data packages have issues?

MODULE 2: PCB FABRICATOR CAPABILITY

- What are the major PCB cost factors?
- How does the design impact the cost?
- How does PCB technology relate to plant capability?
- Fabricator capability design rules
- Supplier business model selection

MODULE 3: PCB MATERIAL SELECTION AND STACKUP SELECTION

- What are the primary materials used to make a rigid PCB?
- What are the primary materials used to make a flexible PCB?
- Additional materials
- What are key factors in determining the correct materials?

MODULE 4: CONDUCTIVE FEATURES

- Function & design rules for PCB conductors
    - Dimensional characteristics
    - Physical properties

MODULE 5: DRILLED HOLES AND SLOTS

- Plated hole types
- Non-plated hole types
- Slot formation
- Hole feature size and quality
- Key design for manufacturing issues
    - Hole reliability
    - Routing density
    - Overall quality

MODULE 6: MECHANICAL FEATURES

- Mechanical Features
    - Depaneling
    - Routing
    - V/cut scoring
    - Punching
- Special mechanical features
    - Countersinks and counter board holes
    - Milling
    - Beveling
- Locational tolerances
- DFM Issues related to mechanical features and tolerances

MODULE 7: MASK AND INKS

- Why are solder masks and inks important?
- Solder mask selection
- Legend ink
- DFM issues related to solder mask and legend

MODULE 8: IMPEDANCE AND SIGNAL LOSS

- Impedance control
    - Resin content
    - Frequency
    - Test method

- Signal loss control
    - Surface roughness
    - Material control
    - Via back-drilling
    - Line width adjustments
- Stackup issues

MODULE 9: FLEXIBLE AND RIGID-FLEX PCBS

- Composition of flexible PBCs
- DFM questions related to flexible PBCs
- Composition of rigid-flex PCBs
- DFM questions related to rigid-flex PCBs
- Collaborating with suppliers

MODULE 10: DOCUMENTATION QUALITY

- Elements of a data package
- Technical queries
- Graphical data issues
- Document package issues
- The perfect data package

CERTIFICATE OF COMPLETION

Participants who complete all 10 modules in the series can access and download a Certificate of Completion.

COURSE RESOURCES

Everything you need to successfully complete the Introduction to Design for Manufacturing course is included and available on the Electronics U Learning Management System.

ELECTRONICS U LEARNING MANAGEMENT SYSTEM

Upon accessing the course for the first time, make sure to take a moment to update your personal profile. Electronics U supports the most recent versions of Google Chrome, Firefox, Safari,Internet Explorer, and Microsoft Edge. Courses can be accessed on desktops, laptops, tablets, and mobile phones. Please refer to Browser Settings under the Start Here! Tab on your dashboard to make sure your browser is set to function seamlessly with the Electronics U Learning Management System. If you need further technical assistance, please send an email to support@electronicsu.org or call Global Electronics Association Member Support at +1 847-597-2862.