Electronics Assembly for Operators
SYLLABUS

The Electronics Assembly for Operators course introduces the key tools, materials, and processes for operators working in electronics assembly. This course is designed to encompass the entire assembly process, including a customizable selection of Modules to address the current needs and future goals of operators and organizations.

COURSE OBJECTIVE

After completing this course, you will be able to employ the key tools, materials, and processes required to assemble Printed Circuit Board Assemblies (PCAs) within an electronics manufacturing facility.

LEARNING OBJECTIVES PER COURSE MODULE

MANDATORY MODULES

MODULE 1: INTRODUCTION TO THE ELECTRONICS INDUSTRY

- Recognize the role of IPC standards
- Distinguish Class 1, 2, and 3 electronics products
- Identify IPC standards training levels
- Recognize topics covered by common IPC standards

MODULE 2: INTRODUCTION TO PRINTED CIRCUIT ASSEMBLY (PCA)

- Define the common features of a Printed Circuit Board (PCB)
- Identify the common components of a Printed Circuit Assembly (PCA)
- Describe the different attachment methods used in printed circuit assembly

MODULE 3: OVERVIEW OF ASSEMBLY AND SOLDERING PROCESSES

- Describe the assembly process of Surface Mount Technology (SMT)
- Describe the assembly process of Through Hole (TH) Technology
- Distinguish processes used in Surface Mount Technology (SMT) and Through-Hole (TH) Technology
- Identify the different post-processes within the electronics assembly process

MODULE 4: SAFETY

- Identify standard safety signs and symbols relevant to assembly operators
- Describe standard safety procedures for protecting assembly operators, equipment, and products
- Identify potential risks and hazards of standard materials used by assembly operators
- Describe safety concerns of using standard assembly equipment

MODULE 5: ESD & PRODUCT HANDLING

- Identify the cause and concerns of electrostatic discharge (ESD) in electronics assembly
- Demonstrate the function of personal grounding and static control devices
- Demonstrate proper handling procedures for PCBs and PCAs
- Describe cause and prevention of foreign object debris (FOD)

MODULE 6: COMPONENT IDENTIFICATION

- Identify types of components used in electronic assemblies
- Distinguish between component polarity and orientation
- Differentiate between wires, cables, and harnesses
- Identify types of terminals used in electronic assemblies
- Identify types of hardware used in electronic assemblies

MODULE 7: DRAWINGS, SPECIFICATIONS & MEASUREMENTS

- Explain how the Bill of Materials (BOM) is used in the assembly process
- Explain how assembly drawings are used in the assembly process
- Identify common measurement tools and symbols used in the assembly process

MODULE 8: BASIC PCB/PCA DEFECTS

- Define quality in electronics manufacturing
- Recall different quality conditions specified in IPC-A-610 and IPC-A-600
- Identify PCB and PCA defects according to IPC standards
- Use quality condition criteria to determine component acceptability

MODULE 9: IPC STANDARDS

- Define IPC standards in reference to the electronic manufacturing industry
- Identify the most common IPC standards relevant to assembly operators
- Compare IPC Certification programs with IPC Certificate programs

FINAL EXAM FOR MANDATORY MODULES 1-9

Participants must complete the Final Exam for Modules 1 through 9 with a passing score of 80% to access and download their Qualified IPC Assembly Operator Certificate. Students may attempt the exam up to three (3) times. Please note that a third and final attempt is permitted after 24 hours of the second attempt.

Make sure to re-download your updated certificate if you complete optional modules at a later date.

OPTIONAL MODULES

MODULE 10: INTRODUCTION TO HAND SOLDERING

- Explain the function of common hand soldering tools, equipment, and materials
- Identify best practices and methods for hand soldering
- Identify common hand soldering defects and soldering anomalies

MODULE 11: SURFACE MOUNT TECHNOLOGY

- Identify tools and materials used in surface mount technology (SMT) assembly process
- Describe steps in surface mount technology (SMT) assembly process
- Define the reflow soldering process for SMT assemblies
- Identify the cause and types of SMT defects within the soldering process

MODULE 12: THROUGH-HOLE TECHNOLOGY

- Describe the process and properties of through-hole (TH) technology
- Identify common through-hole insertion methods, tools, and machines
- Identify common through-hole assembly defects

MODULE 13: WIRE AND CABLE PREPARATION

- Identify characteristics of wire and cables used in electronics industry
- Recognize steps in wire preparation
- Identify inspection criteria for cutting, stripping, and tinning wire

MODULE 14: WIRES & TERMINALS TECHNOLOGY

- Identify types of wire terminations
- Differentiate between methods of connecting wires to terminals
- Differentiate between acceptable and defect soldered and crimped terminations

MODULE 15: CABLES AND HARNESS TECHNOLOGY

- Identify types of connectors used in wire harness technology
- Distinguish methods of connectorization
- Distinguish methods for making and evaluating wire splices
- Describe the wire harness assembly process

MODULE 16: HARDWARE

- Identify tools used in electronics assembly
- Recognize hardware and other materials used in electronics assembly
- Differentiate between acceptable and defect conditions of installed hardware and materials

MODULE 17: CONFORMAL COATING

- Identify equipment, tools, and materials used in conformal coating
- Explain steps in conformal coating process
- Classify causes and characteristics of conformal coating defects

MODULE 18: PRESS FIT

- Identify tools, equipment, and materials used in press-fit insertion
- Describe steps in the press-fit insertion process
- Identify common press-fit insertion defects

COURSE RESOURSES

Everything you need to successfully complete the Electronics Assembly for Operators course is included and available on the IPC EDGE Learning Management System.

MODULE COMPONENTS AND REQUIREMENTS

The Electronics Assembly for Operators program provides engaging videos, activities, and quizzes designed to help you learn, remember, and apply the knowledge and skills you will need to excel as an electronics assembly operator. Each module is composed of the components described in Table 1.

Table 1. Module Components and Description

Module Component	Description
Module Pre-Quiz	Short (3 to 5-questions) quiz designed to help you identify what you know and what you still need to learn
Module Sections	"Bite-sized" segments of text, videos, graphics, and activities that explain the key points of the Module content and provide opportunities for you to think about how you would apply electronics assembly processes at work
Module Post-Quiz	Five to 10-question quiz designed to help you confirm what you know, identify areas that still need work.

IPC EDGE LEARNING MANAGEMENT SYSTEM

Upon accessing the course for the first time, make sure to take a moment to update your personal profile. IPC EDGE 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 IPC Edge Learning Management System. If you need further technical assistance, please send an email to certification@ipc.org or call IPC Member Support at +1 847-597-2862.