

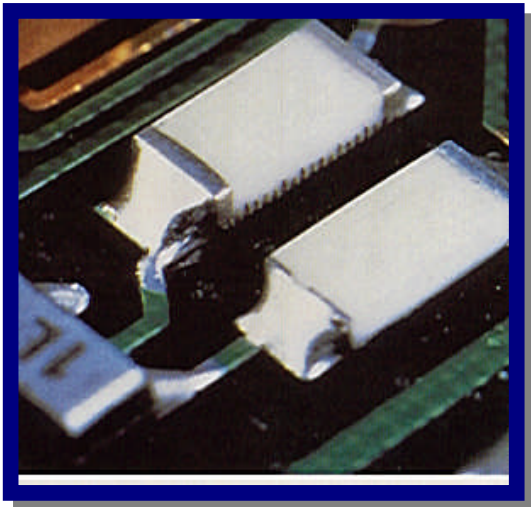
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**PCB
Quality Inspection
Student Manual**

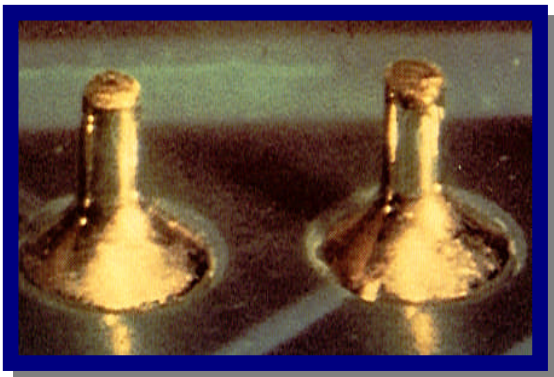
Unit 2: Inspection Overview

Section 2.1: Purpose of Inspection



What Is The Purpose of Inspection?

- There are 2 reasons why Inspection is performed:
 - To verify the product meets customer specifications.
 - To make sure the product meets workmanship standards
- Inspection is used through out the process to help monitor conformance, of the Printed Circuit Board (PCB), to the customer specifications and workmanship requirements.
- Inspections may be performed manually or by using automated inspection methods.



BLACKFOX

Unit 2: Inspection Overview

Section 2.2: Automated Inspection



X-Ray Inspection

- Many components, such as ball grid arrays, have connections underneath the component which are not visible. X-ray inspection is utilized for identifying defects with these components.
- X-ray inspection systems:
 - Are able to check all connections, even those underneath the component.
 - Detect and isolate process defects between a component connection and the circuit board.
- X-ray is commonly used for BGA inspection. looks for a variety of ball grid array problems during process development or the quality process, including:
 - Cracked Solder Joints, Excess Flux, BGA Separation, Bridging, Cold Solder Joints, Solder Pads, Contamination, Empty and Open, Improper Solder Paste Replacement, Joint Cracking, Ratcheting, Non-Contact

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Unit 2: Inspection Overview

Section 2.3: Manual Inspection



Visual inspection

- Definition of visual inspection according to the “New Century Dictionary”:
 - Visual - of or pertaining to sight.
 - Inspect (ion) - To look carefully at or over. To view or examine formally or officially, in order to ascertain condition or quality.
- Inspection of the solder connection after the soldering operation means you will be looking for component placement and proper wetting of the solder.
- Who is the visual inspector in your organization?
 - _____
 - Every employee that is responsible for producing the product is an inspector.

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**Surface Mount
Hand Soldering
Instructor Guide**

Unit 1: Surface Mount Soldering Fundamentals

Section 1.1: Introduction to SM Soldering



Screen Printing

- Uses a stencil and squeegee to produce a solder paste pattern on the printed circuit board

Pick and Place

- Picks up components
- Aligns components
- Places component in correct location

Re-flow Soldering

- Melts solder particles in solder paste
- Solder wets to surface to be joined
- Cools connection to solidify solder

Adhesive Dispensing

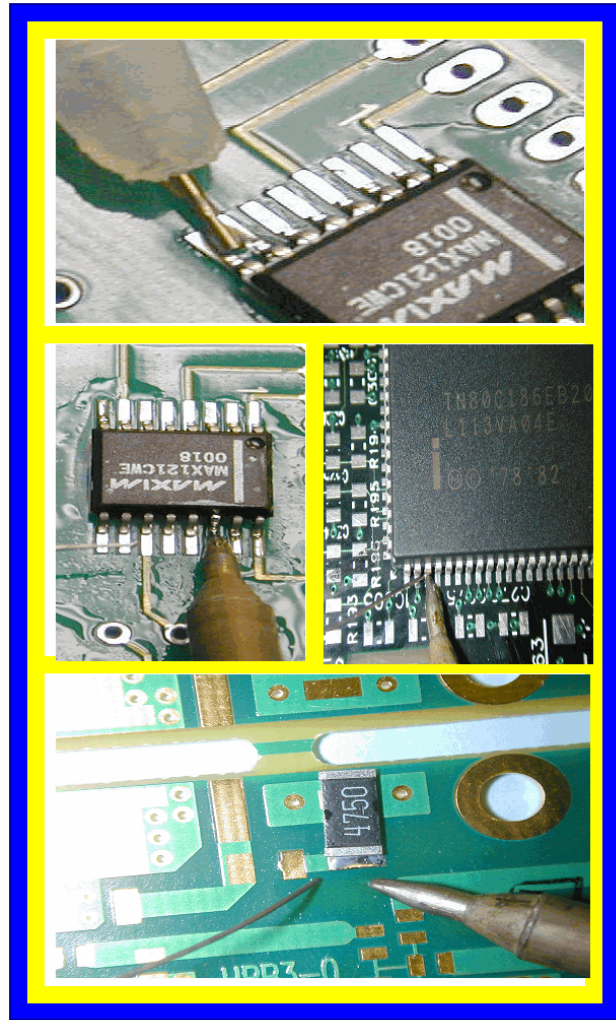
- Prevents component from falling off assembly
- Commonly used for mixed technology assemblies

Instructor Guide

- The information on this page is intended to give Students a quick overview of the machine processes used in SMT assembly. This will assist them in understanding their role in the Surface Mount process.
- Screen Printing: Solder paste is made up of solder particles, flux and solvent. The solvent holds flux in suspension.
- Pick & Place: Uses pre-established computer data for component placement and checking placement accuracy.
- Re-flow Soldering- uses:
 - Pre-established profile (computer program).
 - Heat tunnel to slowly bring the temperature to the point of solder melt.
 - Cooling zone to allow for solder solidification.
 - Usually runs on a conveyer.
- Adhesive Dispensing- Used in mixed technology (TH & SM). Printed circuit boards go through wave solder machine. Adhesive holds the components on the secondary side of the assembly.

Unit 5: Surface Mount Hand Soldering-Practice

Section 5.1: Solder Application



Point-To-Point Method

- Flux leads and land
- Place the iron tip at junction of land and component termination point
- Feed solder to side of lead/land area
- Remove wire solder and iron tip at the same time
- Watch for the solder to flow and form the connection, creating good wetting.

Watch for wetting
on the pad or land



Instructor Guide

- Estimated time: 10 minutes 1 page.
- Briefly review this information with students.
 - They will practice these techniques in the next lessons.
- Heat Transfer:
 - To create an acceptable solder joint you must have proper heat transfer. The area to be soldered must be heated evenly and quickly to ensure complete bonding between the solder, lead and land. This includes using the correct tip, the correct tip temperature, and the correct tip placement.
- Wetting:
 - Molten solder spreads along the base metal surface to produce complete and uniform solder coverage.
 - Good wetting is indicated by a low contact angle between the solder fillet and base metal. The lower the angle the stronger the solder bond.

Stress the importance of visually watching the solder form the connection.