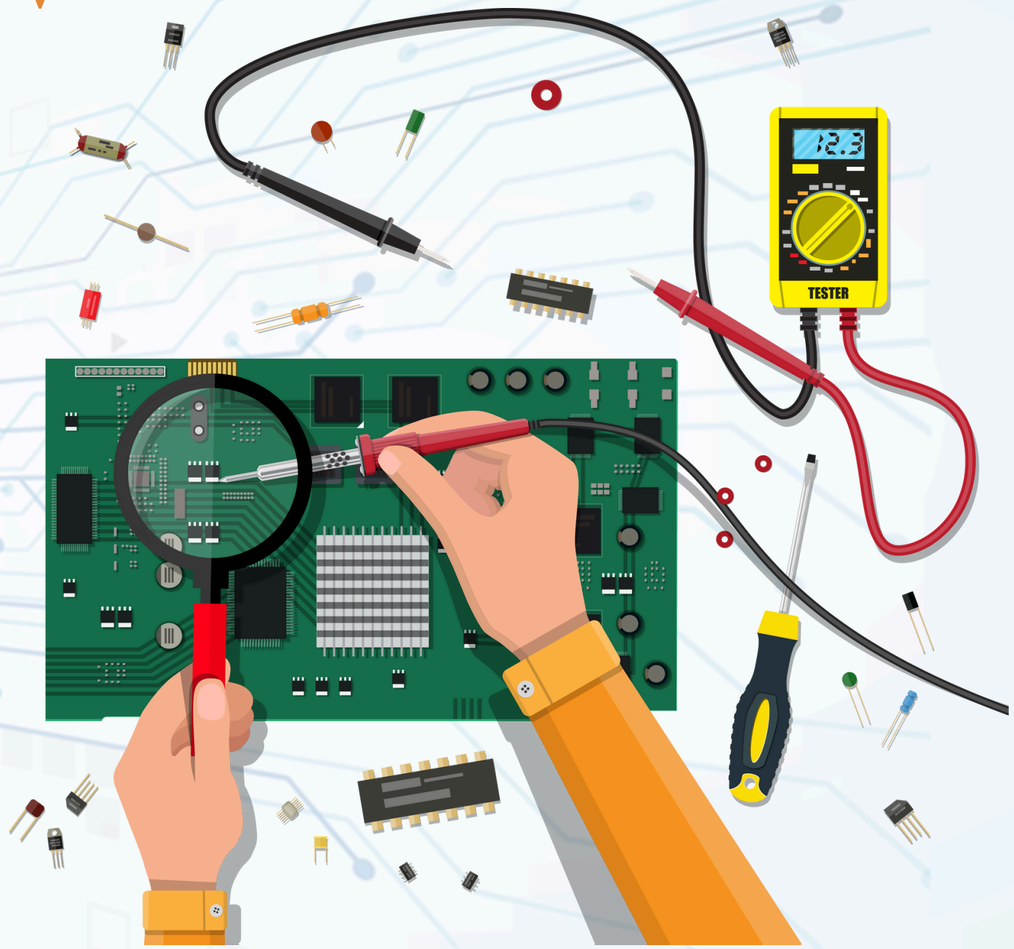
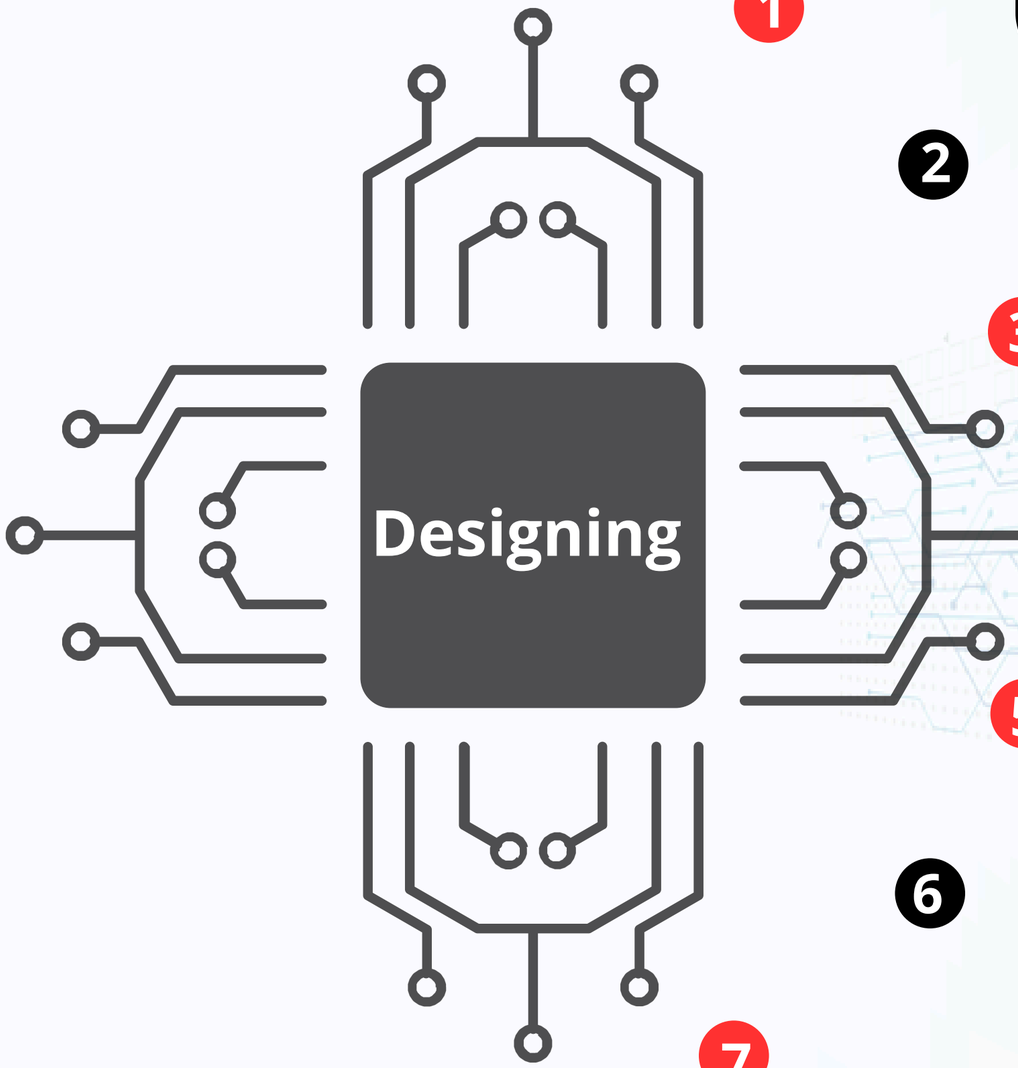
UNIT - V

Agenda

1. PCB Prototype Fabrication Process
2. Stencil Printer
3. PCB Assembly Process SMD
4. Wave Soldering
5. Quality Checking (QC)



Prototype Fabrication

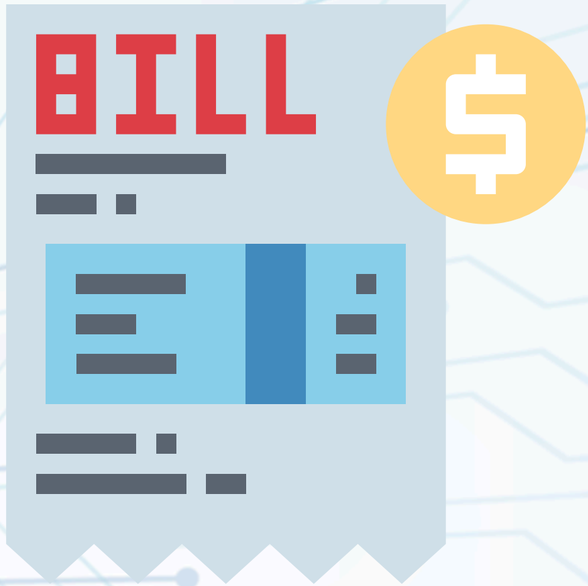


1. Gerber File
2. G Code
3. Sampling
4. Engraving
5. Masking
6. Drilling & Cutting
7. Assembly & Testing

#enthutech®

BOM Bill of Material

The BOM is a comprehensive list of all components, materials, and parts needed for manufacturing and assembling the PCB.



Importance of a BOM

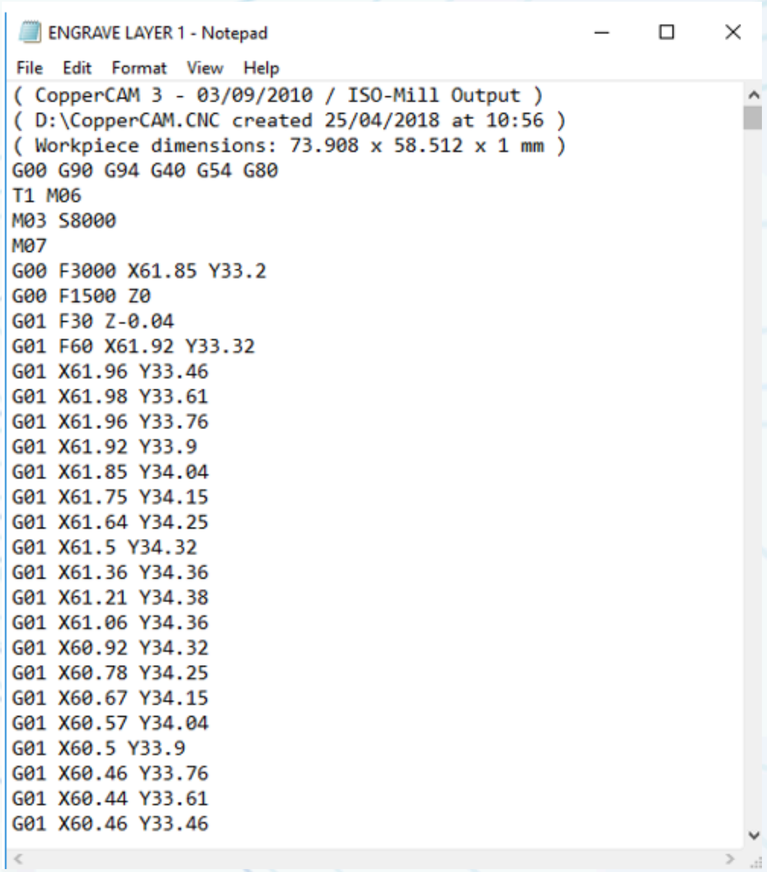
- Facilitates procurement and ensures all components are sourced correctly.
- Helps in cost estimation for manufacturing.
- Provides a clear roadmap for assembly teams.

Key Information in a BOM

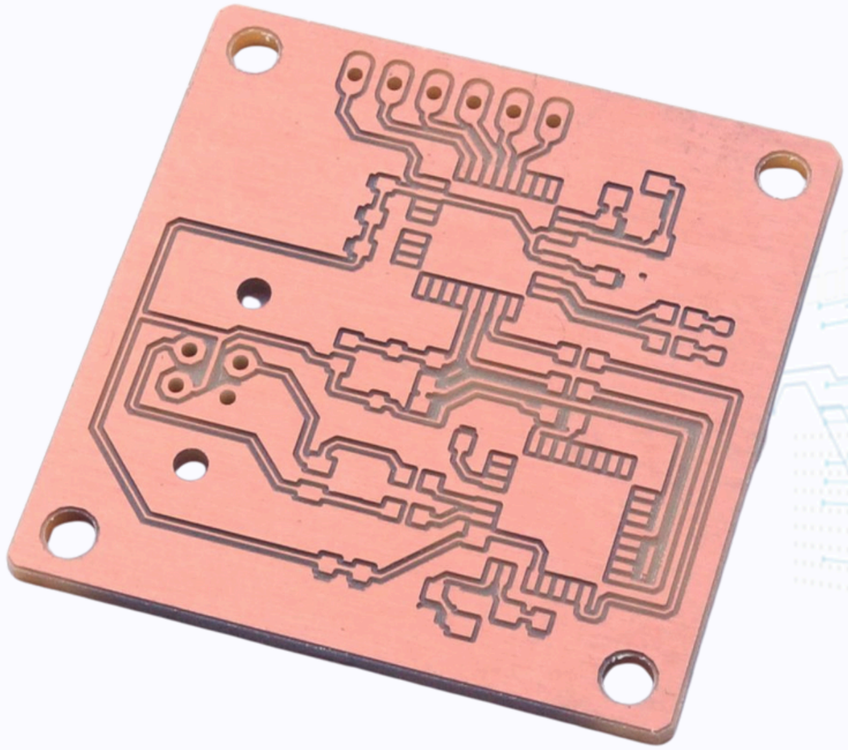
Component Name/Description	Names or part numbers for identification
Quantity	Number of units needed for each component
Reference Designators	Labels like R1, C2, U3 (matching the schematic/PCB layout)
Manufacturer & Part Number	Supplier and specific component details
Footprint	The physical layout or package type of the component

G-Code

G-code in PCB design refers to the machine control language used by computer numerical control (CNC) machines to fabricate PCBs (Printed Circuit Boards). It provides the instructions that tell the CNC machine how to move, drill, mill, and cut the PCB materials to produce the desired board layout. Essentially, G-code translates the PCB design (from CAD software) into a language the CNC machine can understand



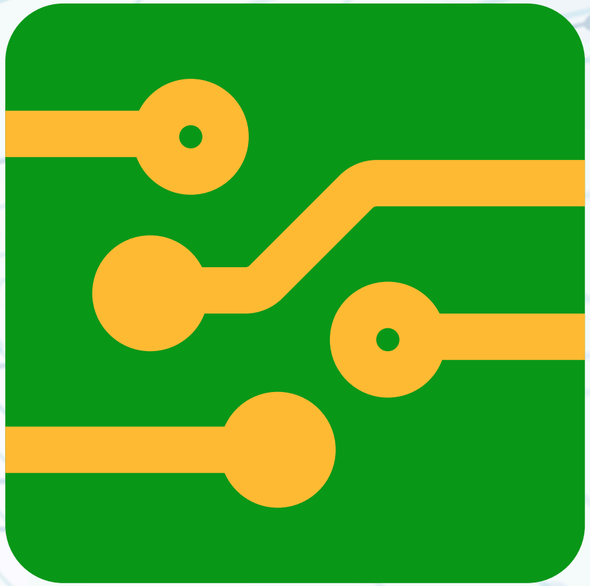
Engraving Process



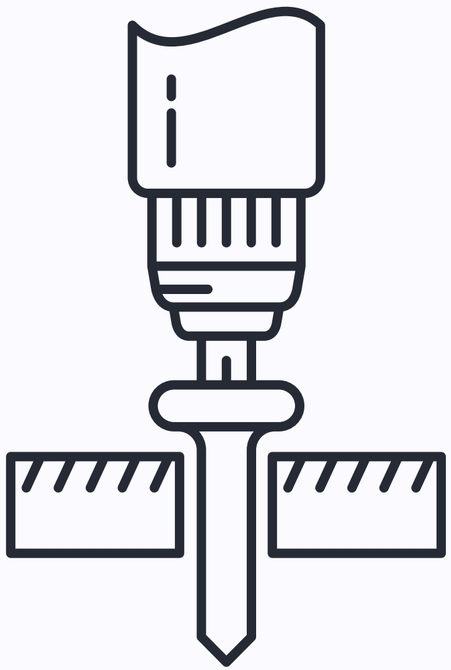
The engraving process in PCB (Printed Circuit Board) manufacturing refers to the etching or removal of unwanted copper from a copper-clad board to form the desired circuit pattern. It is a critical step in the PCB production workflow.

Masking Process

PCB masking refers to the application of a protective layer, typically called a solder mask, over the copper traces of a printed circuit board (PCB). This layer prevents unwanted contact, corrosion, and solder bridges during the assembly process. It is an essential step in PCB fabrication to enhance durability, reliability, and functionality.

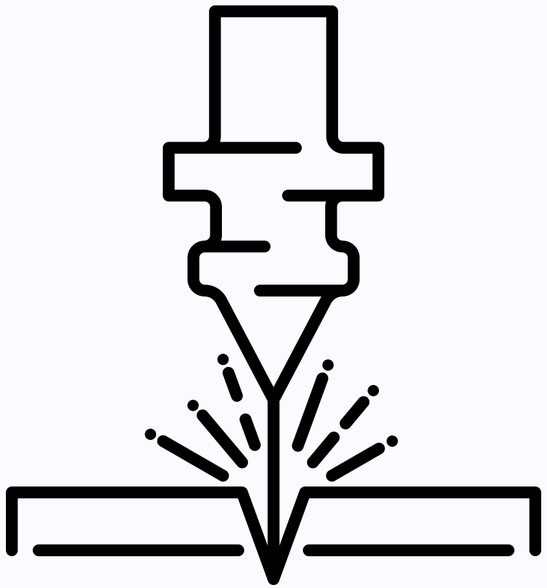


Drilling Process



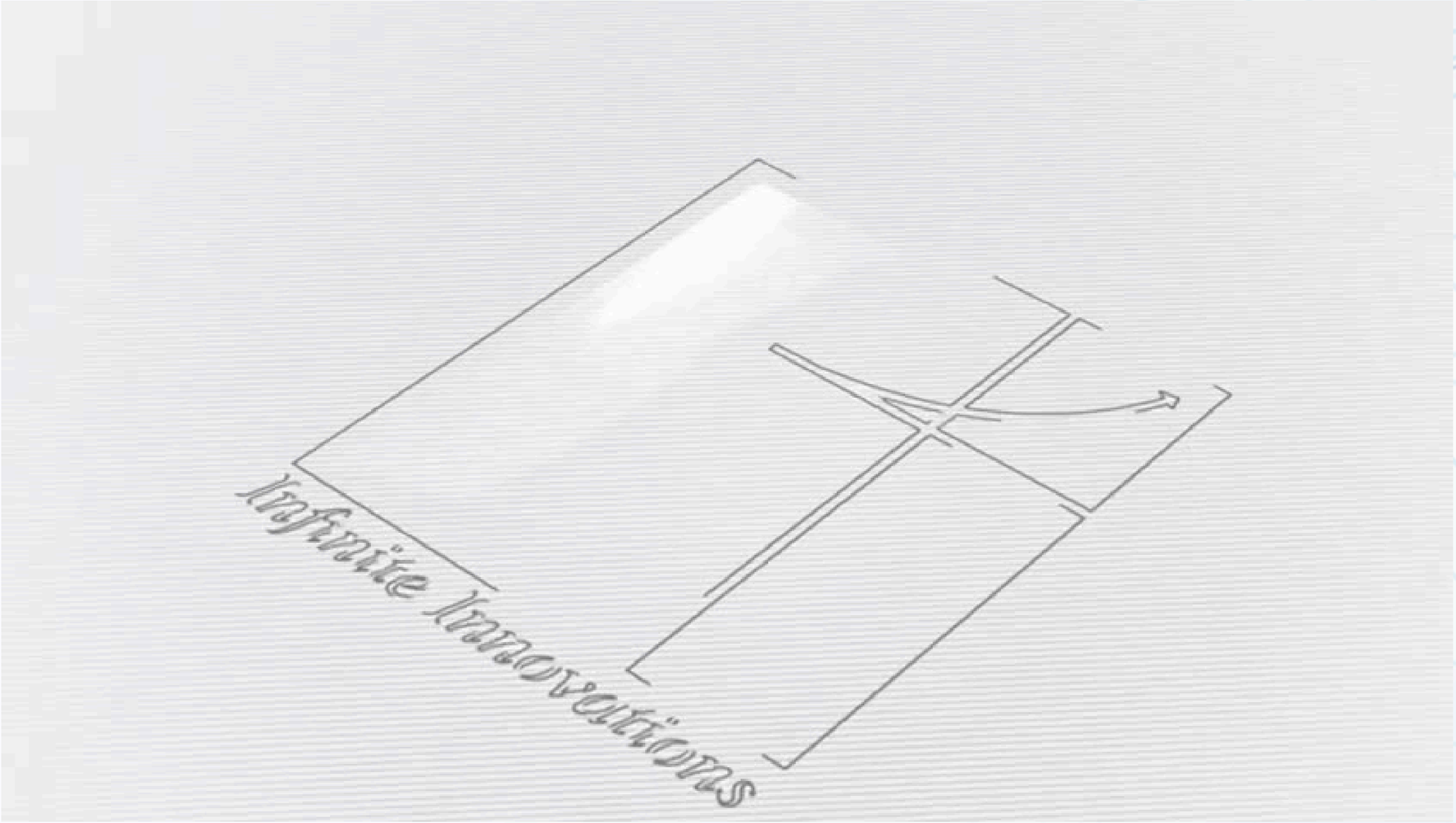
The drilling process in PCB (Printed Circuit Board) manufacturing is a critical step where holes are created in the PCB for electrical and mechanical purposes. These holes can serve as vias (connecting layers), mounting points, or component lead insertions. The accuracy and precision of this process directly affect the functionality and reliability of the PCB

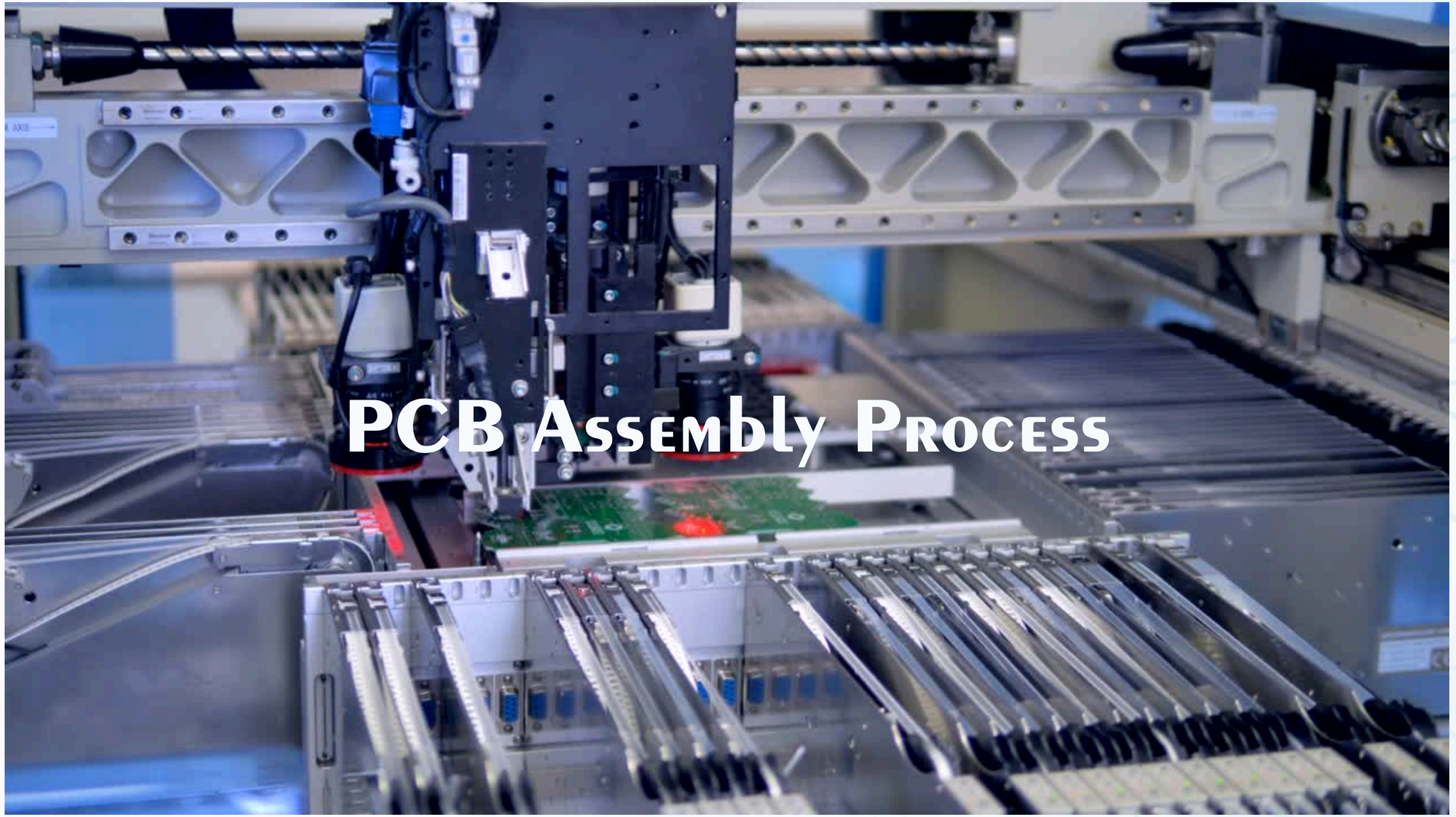
Cutting Process



The cutting process in PCB (Printed Circuit Board) manufacturing involves shaping the PCB into its final dimensions and separating individual boards from a larger panel. This step is essential for ensuring the PCB matches its design specifications and can fit into its intended mechanical assembly.

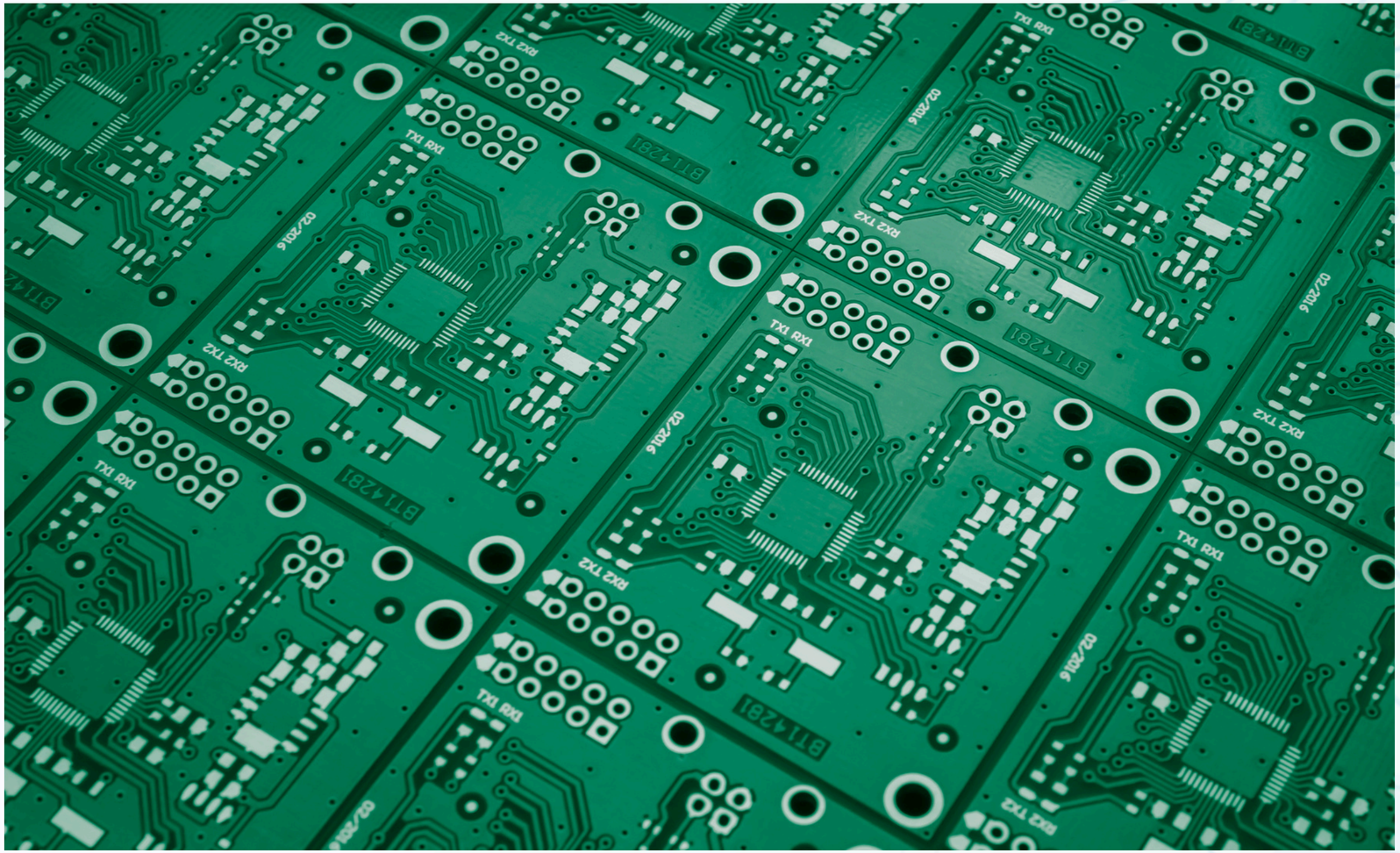
Prototype Fabrication





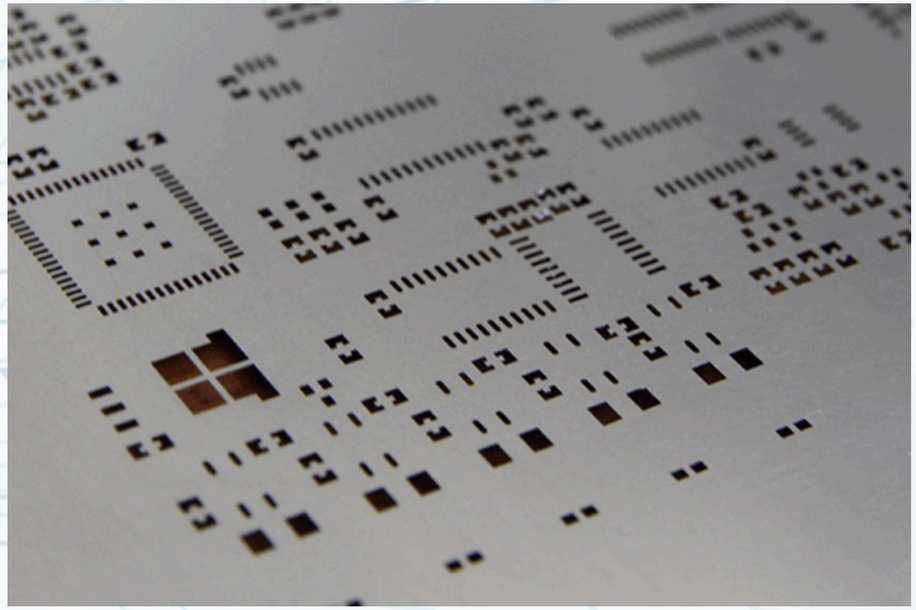
PCB Assembly Process

Bare Board

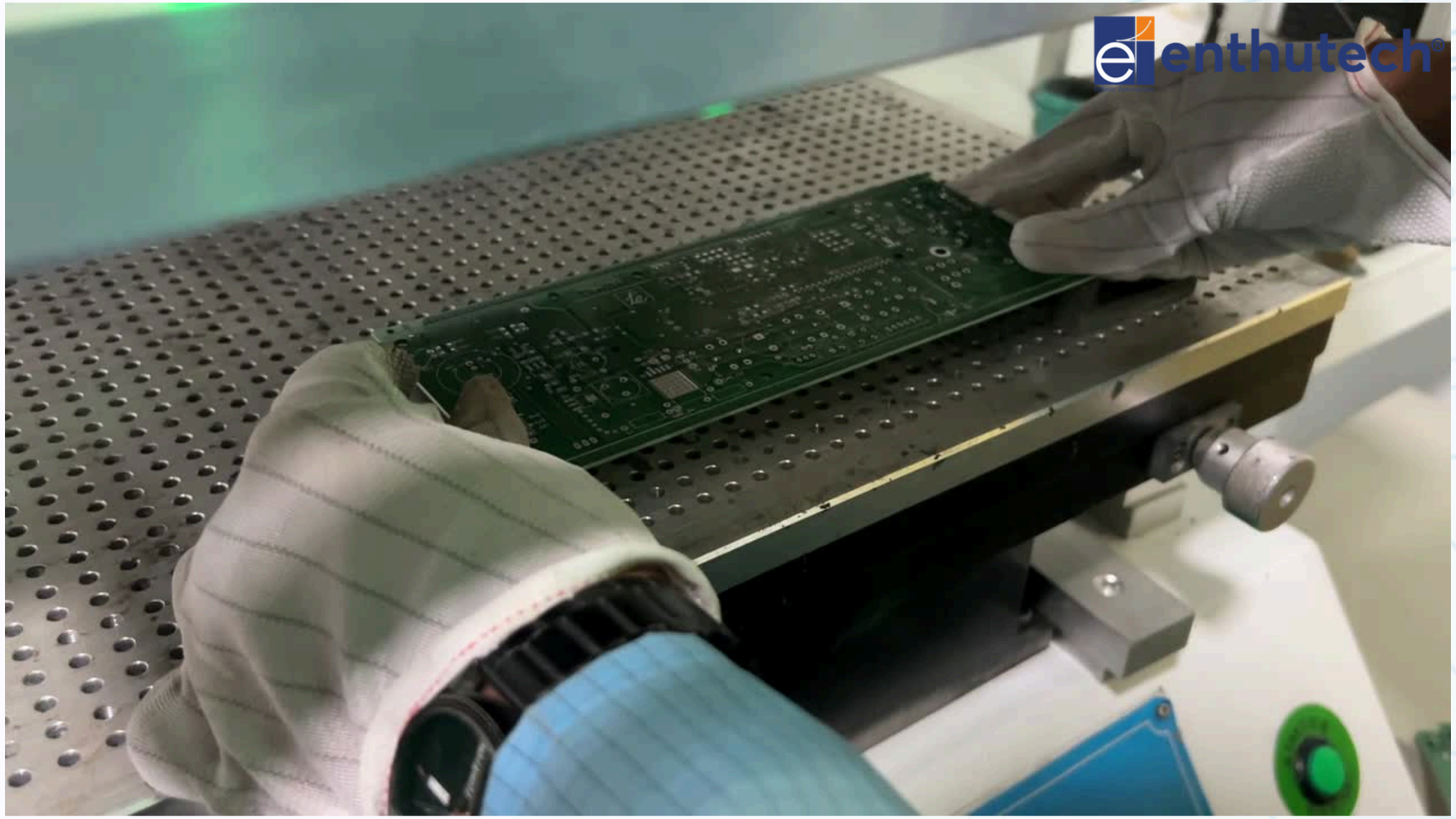


Stencil Frame

A stencil frame in PCB (Printed Circuit Board) manufacturing is a rigid frame that holds the stencil in place during the solder paste application process. Stencils are thin sheets of stainless steel (or sometimes other materials) with cutouts that correspond to the positions of the surface-mount device (SMD) pads on the PCB. The frame ensures proper alignment and stability when applying solder paste to the PCB.

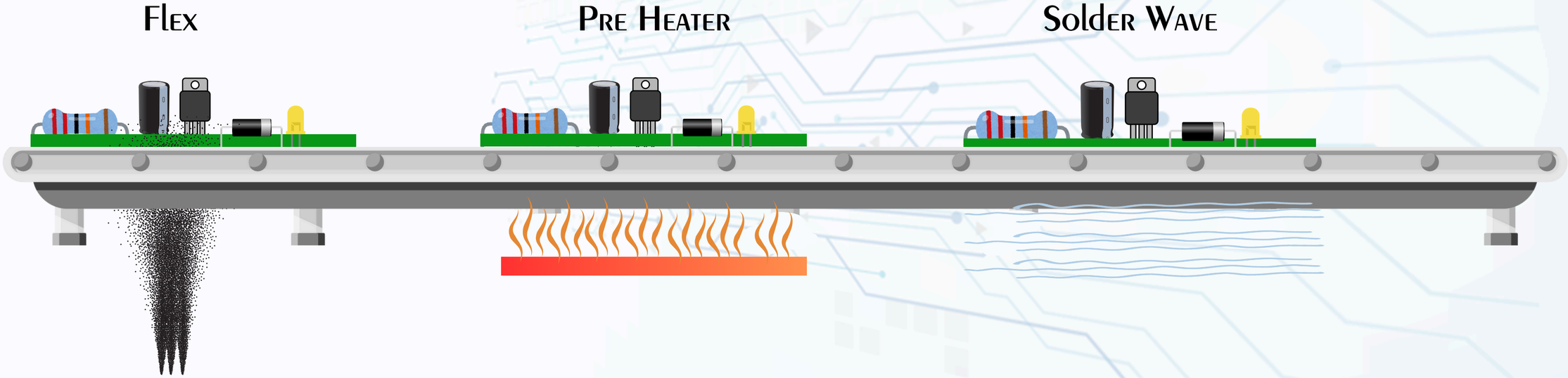


Stencil Printer

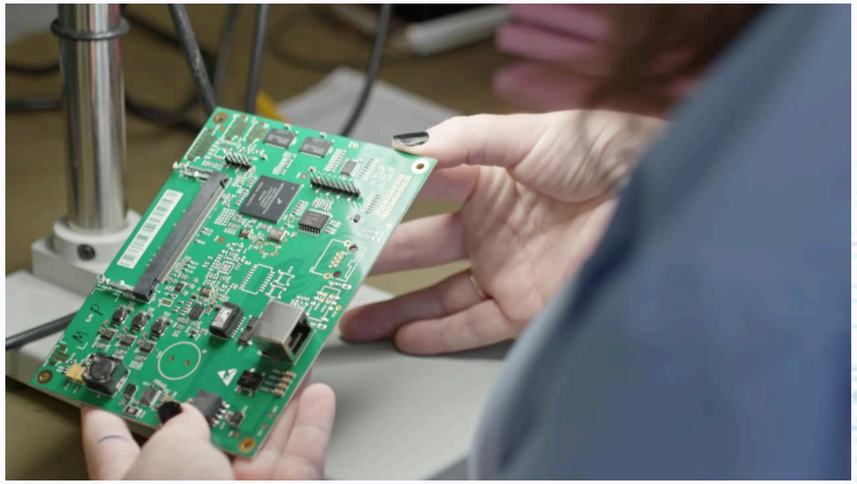


PCB Assembly Process

Wave Soldreing

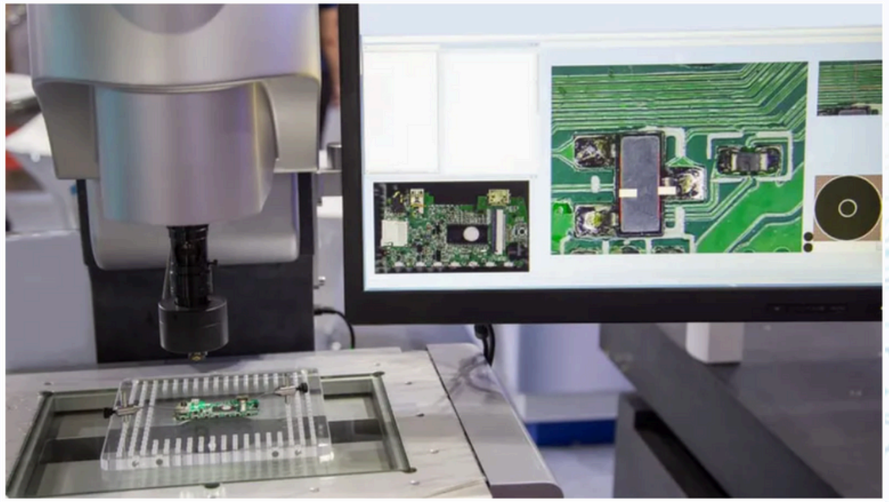


Quality Checking



Quality Control (QC) in the PCB assembly process ensures that assembled boards meet design specifications, function correctly, and are free of defects. It involves:

Quality Checking

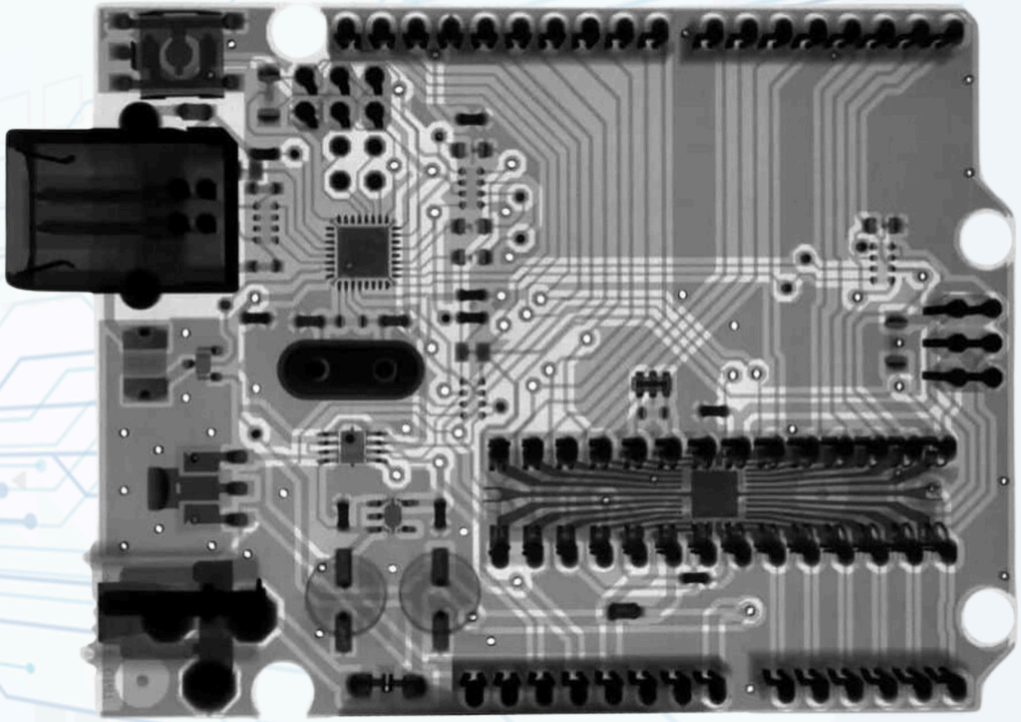


1. **Inspection:** Verifying component placement, soldering quality, and alignment through techniques like Automated Optical Inspection (AOI) and X-ray inspection.
2. **Testing:** Performing functional testing and in-circuit testing (ICT) to check electrical performance.

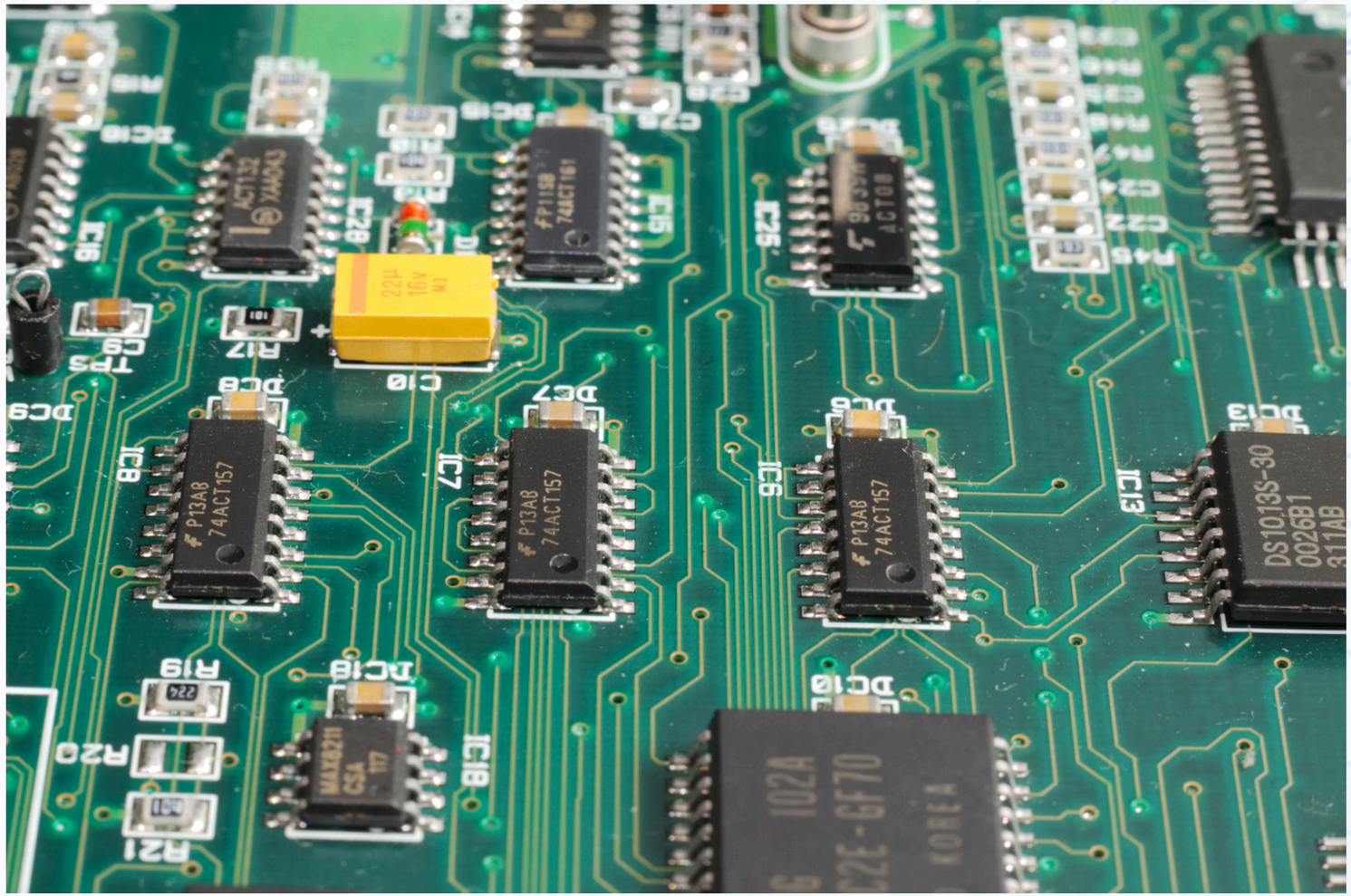
Quality Checking

3. **Process Monitoring:** Controlling reflow soldering, wave soldering, and assembly steps for consistency.

4. **Defect Detection:** Identifying and addressing issues like solder bridges, missing components, or weak joints.



Final End Product



Thank You