39. AUTOMATED VISUAL INSPECTION

- The inspection process is the single largest manufacturing cost repair & rejects (trash)

- Categories
  - Printed Circuit Boards
  - Microcircuit photomasks
  - Chip Inspection
  - Alignment for bonding
  - Electrical & electronic assembly
  - Automobile parts/Aircraft parts
  - Metal processing
  - Others
PROBLEMS
- PCBs
  - SHORTS, OPENS, MISSING HOLES,
  - INCORRECT MARKINGS, OVER-ETCHING, ETC
- MICROCIRCUIT PHOTOMASKS
  - PATTERN DEFECT

DETECTION OF PCB PROBLEMS
- IMAGE SUBTRACTION
- FEATURE MATCHING
- DIMENSIONAL VERIFICATION
- SYNTACTIC APPROACH

DETECTION OF MASK PROBLEMS
- DIFFERENTIAL SCANNING
- FEATURE MATCHING
- DIFFRACTION AND SPATIAL FILTERING
Fig. 2. A PCB with defects.

**IMAGE SUBTRACTION**

**DIMENSIONAL VERIFICATION**

**SYNTATIC**
DIFFERENTIAL SCANNING

SIGNAL COMPARATOR

DEFECT MAP

Differential scanning diagram showing components such as scanners, detectors, and signal comparator.