Integration of AOI in a Total Quality Management Program

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The AOI Challenge

- Non-value added
- Undeniable contribution to quality
- Implementation can be expensive
- Defects still escape
- Accurate data collection difficult

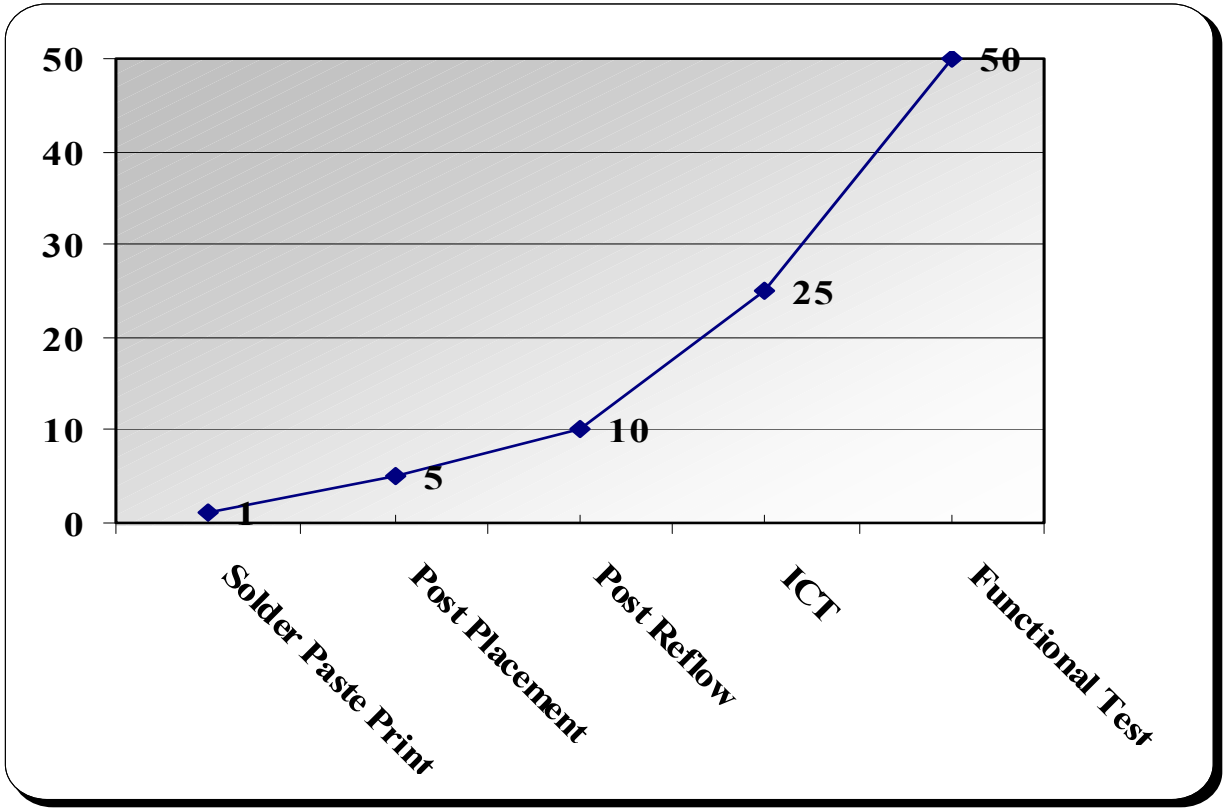
Introduction of AOI Technology

- Fractional in most cases
- Mixed quality systems – Manual + AOI
- Limited potential for integration

Goals

- Short term
  - Find defects at earliest possible stage
  - Repair
  - Documentation
  - Feed data back into process

Repair Cost


50
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Solder Paste Print
Post Placement
Post Reflow
ICT
Functional Test

Long Term Goals

- Process improvement
- Eliminate causes of defects

Limitations of AOI

- No universal solutions
- Each has limitations & advantages
- Full color vs. gray scale
- Programming
- Ease of use

Defect Ranking

- Shorts / bridging
- Misaligned components/Tombstoning
- Opens
- Solder quality
- Missing components
- Polarity

Optimize Decision Matrix

- Optimize system criteria and goals
- Provide “clean” data

Criteria

- Analyze the process
- Identify
  - Product types
  - Mix
  - Types of components
  - Production rate
  - Process characteristics
  - Customer acceptance criteria

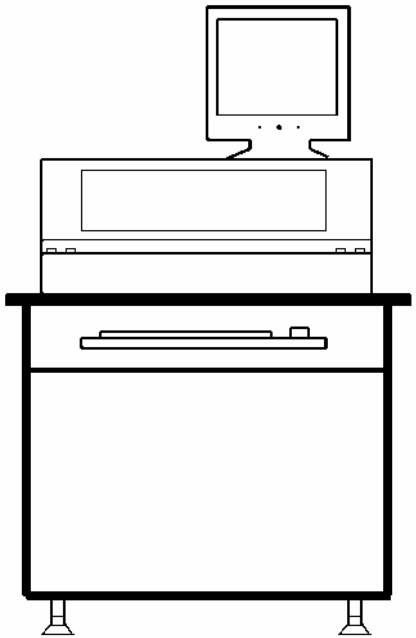
AOI Applications

- Paste inspection – 2D or 3D
- Component verification – Pre-reflow
- Component verification – Post-reflow
- Solder quality inspection

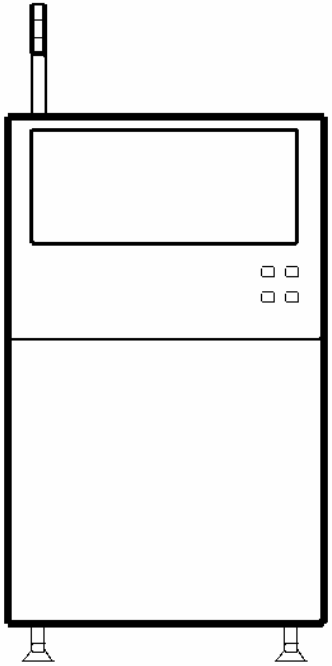
In Line vs. Off Line

- High mix/low volume
- Industrial applications

Benchtop + In-line Machines



Benchtop AOI



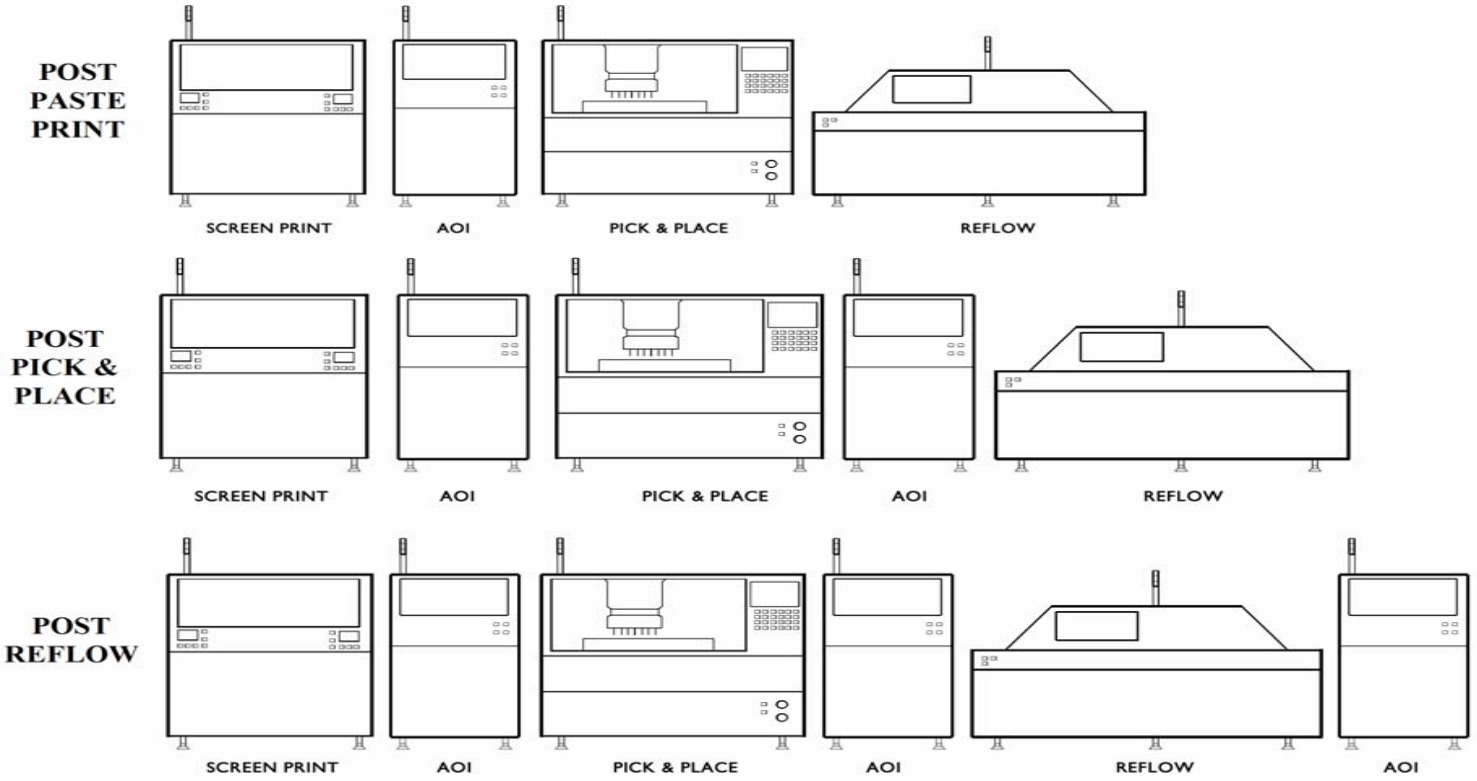
In-line AOI

Regional Differences

- Asia
  - Benchtop systems common
  - Driven by real world economics
- Europe & North America
  - In-line systems common
  - Driven by OEM;s seeking comprehensive solutions

Trade-offs Can Be Considerable

AOI Locations



The Holy Grail

- A Universal Solution

Psst!!

It Doesn’t Exist !

Classification/Quantification

- Critical to quality & process control and customer service.

AOI Will Define Categories of Defects But …

- Non-conforming but acceptable vs. fatal defects
- Review & classification critical
- Repair in situ not advisable
- Once verified data can be integrated with P&P and ICT.

Data Must Be Refined

- Categorization critical
- Consistency of definitions
- Input/output formats
- On-line is impractical

Verification/Repair Function

- 12-15 categories
- Common definitions across platforms
- Rapid response
- Corrective action

Line Monitoring

- Rapid upload of data from individual systems
- Real time inspection monitoring
- Comparison with historical data

Standardization of Data

- Fiducial points
- Output formats
- X/Y axis definition
- Defect codes
- Reference designators
- Date/time stamps
- Information sequencing
- Graphics files

File Server

- Program storage
- Ready access
- Archival software

Serialization/Bar Coding

Summary

- Proper equipment selection
- Know your application
- Optimize equipment performance
- Adhere to consistent, objective standards
- Establish common terminology
- Ensure communication across platforms
- Ensure results are regularly and accurately entered in to data base

Integrated Data Management