

# Comparing AOI and AXI: Which is right for you?

## Why Automated Inspection?

Historically, a combination of manual visual inspection and end-of-line test (in-circuit, functional or both) has been the primary test method for PCB assemblies. A variety of factors, including product complexity and component miniaturization, have driven the need for more consistent automated inspection processes before end-of-line test. Electronics manufacturers are left wondering which automated inspection solution is right for them.

## AOI v. AXI

Automated Optical Inspection (AOI) and Automated X-ray Inspection (AXI) are the most widely used technologies for inspecting placement and soldering defects on today's PCB assemblies. Choosing the right technology requires that you look at board mix, capital budget and other business considerations. But most of all, you need to understand the typical characteristics of each technology.

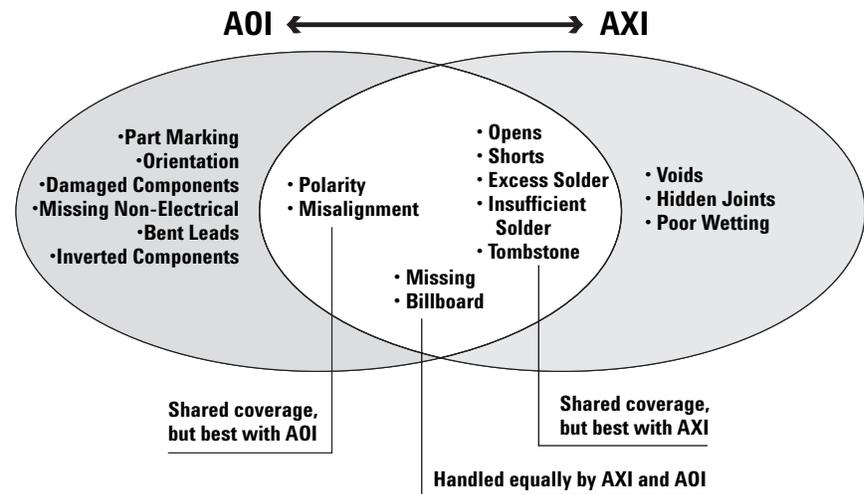
Here's a side-by-side comparison of AOI and AXI attributes, plus a look at the fault types covered by each technology.

### AOI

- Excellent for finding placement defects—missing, skew, incorrect polarity, part marking, etc.
- Excellent for measuring accuracy of component placement (pre-reflow).
- Capable of finding many visible solder joint defects.
- Capable of in-line speeds for most lines.
- Capable of specific process inspection and feedback (post-paste, post-placement, post-solder).
- Very fast ROI in most cases.
- Programming time typically less than one day.
- Lower capital investment than AXI.

### AXI

- Excellent for finding solder joint defects that often cause latent field failures.
- Excellent for measuring solder thickness.
- Capable of finding solder joint defects not visible to AOI or human inspectors.
- Capable of finding most placement defects.
- Capable of inspecting double-sided boards top-and-bottom in a single inspection cycle.
- Very fast ROI in most cases, especially for dense, complex boards.
- Programming time typically two to three days.
- Higher capital investment than AOI.



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## Decision Criteria

So which is best for you? Both AOI and AXI have individual strengths and complimentary capabilities. To evaluate them properly, you need to consider the following:

1. What is the primary need—process monitoring, defect detection, or both?
2. How complex are the products that need to be inspected? How many solder joints need to be covered?
3. How critical is line speed/cycle time? What will be the impact on other in-line inspection equipment?
4. Which defects are most common in your process? Which defects must be caught? Are most defects process related or solder related?
5. How important is the inspection of solder defects on area array packages such as BGAs, CSPs and others?
6. Does your product incorporate RF shields that are applied prior to solder, affecting post-solder visual access?
7. What's your budget? What's your ROI goal?
8. Do you produce a mission-critical product? How important is end-user quality, how costly is potential field failure?

To further explore AOI versus AXI, and to ensure that you make an informed decision, please talk to your local Agilent Sales Representative or go online: [www.agilent.com/go/manufacturing](http://www.agilent.com/go/manufacturing).

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