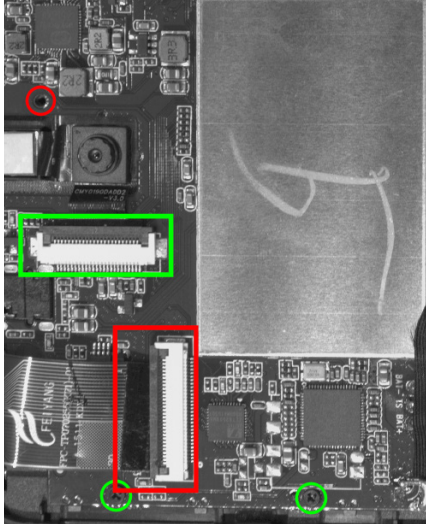
RADIANT
VISION SYSTEMS



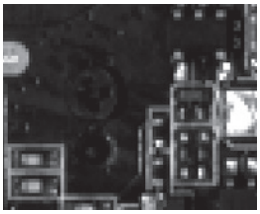
TECHNICAL NOTE:

When Machine Vision Inspection Comes Up Short: Is "Almost" Defect-Free Enough for Your Customers?

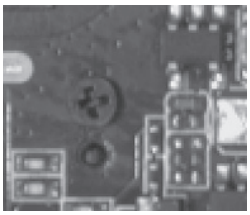
Traditional machine vision systems are sufficient for many types of inspection tasks, but they aren't effective for complex or low-contrast assembly verification. When absolute quality is critical, Radiant's photometry-based INSPECT.assembly closes the gap.

Machine vision systems are common in many assembly line inspection applications. These systems provide the quantifiable data necessary to automate processes, and offer speed to meet production demands. However, many vision systems today are limited in their ability to detect defects in complex assemblies—especially low-contrast components or those limited to very fine spatial tolerances. While human inspectors excel at identifying anomalies and subtle details, their inspection performance is slower and less consistent, limiting production efficiency and permitting costly escapes.

Advanced Vision. INSPECT.assembly from Radiant overcomes the challenges of both human and traditional machine vision inspection methods. The system is a fully integrated, turnkey inspection station that detects subtle defects in real time on the production line with more accuracy than machine vision and greater repeatability and consistency than human inspectors. Combining a photometry-based, scientific-grade imaging system with bright field lighting, specially configured software, a touch-screen HMI (GUI), and complete fixturing, the station rolls right onto your production line, taking up no more space than a human inspector.



Low resolution, low dynamic range



High resolution, broad dynamic range

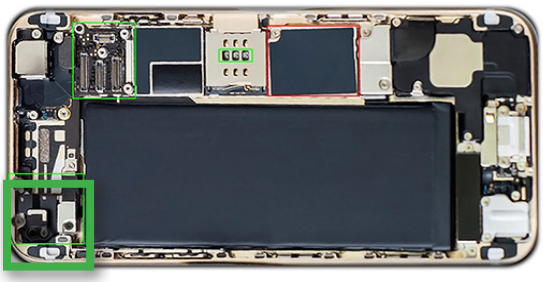
More Discerning than Traditional Machine Vision

High Resolution. The performance of a machine vision system relies on high-quality images that enable the system to "see" features and apply meaningful evaluations to these details. Photometry-based imaging systems maximize resolution to acquire more data from a single image than standard machine vision systems, capturing a greater number of pixels and more gray levels to evaluate contrasting regions that may indicate a defect. Most machine vision camera sensors offer 1-5 megapixels (MP) resolution.

INSPECT.assembly uses scientific-grade ProMetric® imaging systems from Radiant that are typically applied in light measurement. Our systems offer superior resolution combined with broad dynamic range to achieve unmatched image clarity for high-precision inspection.

Dynamic Range. ProMetric systems feature image sensors with broad dynamic range to capture the most contrast-level differences in images. Systems can visualize the smallest variations on part surfaces caused by changes in light (such as shadows that indicate a drill hole or spectral reflections that indicate a metal component). INSPECT.assembly can capture and classify defects with extreme precision, outperforming traditional machine vision systems. It can detect the most subtle defects that are missed by machine vision, such as the absence of tiny black screws on a black surface.

INSPECTING FOR BLACK SCREWS ON A BLACK SURFACE



STANDARD MACHINE VISION

Escaped: The traditional machine vision camera does not distinguish a black hole from a black screw, and the defective assembly escapes.

INSPECT.assembly SYSTEM

Detected: The photometry-based imaging system detects the missing screw, and the defective assembly can be corrected or rejected before progressing.

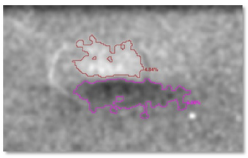
When Machine Vision Inspection Comes Up Short: Is "Almost" Defect-Free Enough for Your Customers?

Quantifying Defect Severity. Machine vision systems have a limited ability to discriminate between different defects based on their unique features or to grade their overall impact to device quality. In applications where a defect may be acceptable below a certain tolerance, such as the proximity of components within a margin, Radiant's advanced vision technology provides not only defect detection, but quantifies defect size, depth, or type, weighted against defined tolerances. This data can be used for production quality control, defect trending, and pareto analysis to reduce the number of rejected parts over time.

The Power of Photometry-Based Advanced Vision

Radiant's inspection systems include advanced image analysis software based on our leading photometric tools for light measurement. Our systems are able to detect defects in intricate detail because they use techniques for evaluating properties of light, such as software tools for detecting just-noticeable differences (JND) in visible light uniformity. This capability allows INSPECT.assembly to identify unknown defects (unpredictable features) in unknown locations (undefined points of interest), just like a human inspector.

Detection of blemish in an illuminated display



Detection of dent on a metal surface

Applications

INSPECT.assembly is ideal for applications requiring inspection of highly complex assemblies during sub- and final assembly. It detects subtle flaws in high-value components that may even pass human inspection and functional test, and which could result in latent failures after shipment. INSPECT.assembly detects:

- Component presence/absence
- Component position
- Connectors and connector pins
- Cable/wire routing
- Screws
- Fasteners
- Internal components (e.g., batteries)
- Labels and their location

It inspects for all of these issues simultaneously, at production line speed.

Automating—and Exceeding—Human Visual Acuity

INSPECT.assembly can detect defects that may go unnoticed by human inspectors, including misaligned cables and connectors, and gap variations of less than 1 mm between components. With tolerances so precise, INSPECT.assembly provides a production-level inspection solution with the objectivity, endurance, and repeatability of a machine vision system, while achieving visual inspection capability equal to and even surpassing human perception.

With advanced vision capabilities, INSPECT.assembly addresses manufacturing demands for both operational efficiency and absolute product quality in high-value and high-risk products.

Recognized for Innovation

Radiant Vision Systems was honored with a Silver-level award at the *Vision Systems Design* 2017 Innovators Awards for our INSPECT.assembly system (formerly the VIS-I system).

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