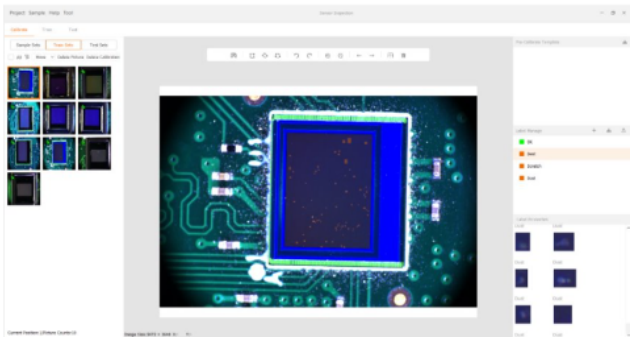
ELECTRIC & ELECTRONICS

Enhancing Sensor Quality Control with AI-Powered Defect Detection.

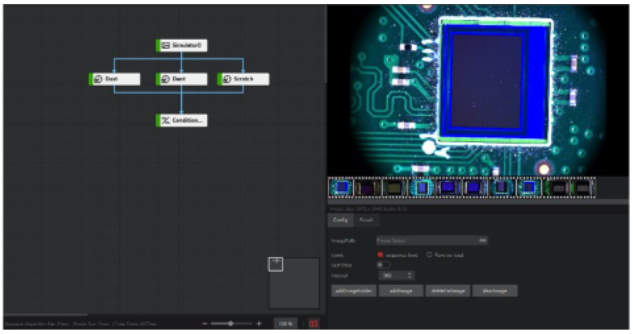
Problem Identified



The manufacturing process faced recurring quality issues due to microscopic defects such as dust, scratches, and dents on high-precision sensors. These defects were difficult to detect with traditional visual inspection methods, resulting in undetected flaws reaching the next stage of production.

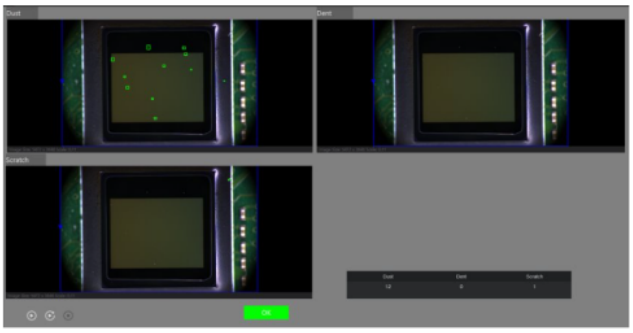
The limitations of human inspection, especially for detecting defects as small as a few microns, posed a challenge in maintaining consistent quality. This situation highlighted the urgent need for a faster, more accurate, and automated inspection process.

Solution Provided



A deep learning–based automated inspection system was implemented to identify and classify defects, including dust, scratches, and dents, on the sensor surface. The solution involved labeling defect images, training a model, and integrating it into an inline inspection setup. By leveraging advanced image processing and AI algorithms, it could detect small defects, with the potential to improve further through adjustments in field of view and capture process. This approach significantly reduced reliance on manual inspection while improving consistency and repeatability.

Results & Summary



The system successfully flagged multiple defect cases, including dust particles, scratches, and dents, during testing. Inspection time was reduced to just three seconds per unit, enabling faster throughput without compromising precision. The smallest detectable defect size was recorded at 7.2 µm, marking a substantial improvement over previous capability. Overall, the solution minimized undetected defects, reduced rework rates, and ensured a higher quality output.

This success demonstrates how advanced AI-powered visual inspection can address long-standing quality control challenges in high-precision manufacturing.