

SEMICONDUCTOR



Enhancing Pin Height Inspection Accuracy through Advanced Laser Profiling Technology

Problem Identified

The industry faced challenges in ensuring consistent pin height measurement during production, which directly impacts product quality and assembly reliability. Manual inspections were time-consuming, prone to human error, and not scalable for large pin arrays. The key issue was the inability to obtain precise measurements within a short cycle time while maintaining strict tolerances. Furthermore, the existing inspection software provided only overall OK / NG results without the ability to identify faulty pins individually, limiting root cause analysis.

Solution Provided

An advanced laser profiling system was implemented to measure pin height across groups of pins with high accuracy and speed. The system captured 3D point cloud data to verify height consistency across rows, with programmed tolerance ranges tailored for different pin rows. Processing achieved a scan time below 1.5s per row and data computation within 2s, ensuring fast and efficient inline inspection. While overall OK / NG judgement was provided, the data output allowed manufacturers to refine inspection parameters for future detailed analysis. This approach reduced reliance on manual inspection and increased repeatability in results.

Results & Summary

The new inspection method successfully verified pin counts and pin heights within the required tolerance, delivering a high level of measurement accuracy. Cycle times were significantly reduced, with each inspection row completed in under 3.5 seconds including scanning and processing. The automated approach improved consistency compared to manual checks, reducing variability in results and minimizing inspection errors. While individual pin-level NG judgement was not available, the system provided reliable batch evaluation that ensured production quality. These improvements led to greater efficiency, faster throughput, and enhanced quality assurance in manufacturing.

This study highlights how laser-based profiling technology effectively addressed a critical quality challenge in precision pin height inspection.

