

AUTOMOTIVE



Defect Detection in Motor Rim Drill Holes through Advanced Machine Vision Systems

Problem Identified

The manufacturing industry faced a persistent challenge in detecting small defects in motor rim drill holes during the quality inspection stage. Traditional inspection methods often failed to simultaneously capture both the hole position and the hole surface, leading to missed defects. This limitation created risks such as compromised product quality, increased rework costs, and potential safety hazards. The inability to maintain consistent and reliable defect detection also slowed down production efficiency and reduced overall process reliability.



Solution Provided

To overcome this challenge, an advanced machine vision solution was implemented using a high-resolution 25MP monochrome camera paired with a 35mm lens. Multiple illumination setups were tested, including flat backlight and dome direct lighting, to optimize defect detection. The combination of back illumination and dome lighting (Setup A) enabled clear visualization of both hole position and surface details, solving the limitations observed in previous methods. This approach provided a more reliable and precise inspection process, ensuring accurate detection that traditional inspection systems could not achieve.



Results & Summary

The implementation of the optimized vision system demonstrated significant improvements in inspection outcomes. In Setup A, the system successfully captured both positional accuracy and surface defects of the motor rim holes, whereas setups with single lighting sources only detected one aspect. This dual-capability inspection reduced the likelihood of undetected defects, improved production quality, and minimized rework. By quantifying the improvement, defect detection accuracy increased to cover both dimensional and surface-related flaws, strengthening overall process reliability and boosting manufacturing efficiency.

This study highlights how advanced machine vision technology addressed a critical inspection problem in the automotive and manufacturing industry.

