

Optical 360° Hairpin Inspection for Electric Motors

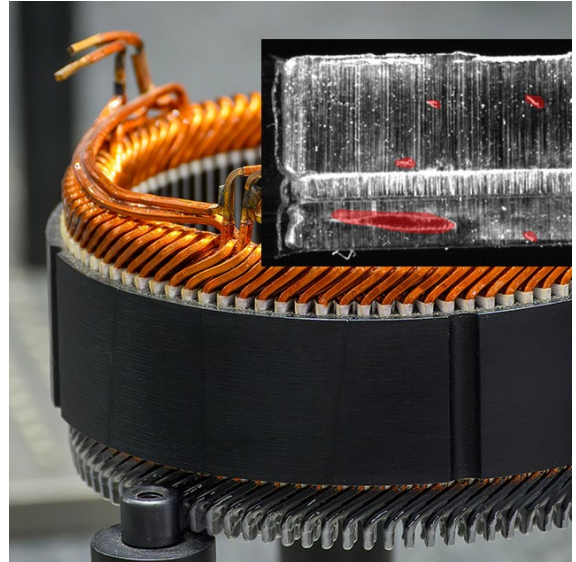
Hairpin technology has become the industry standard for manufacturing high-performance traction motors in electric mobility applications. Instead of conventionally wound copper wire, precisely formed rectangular copper conductors are used. This design enables higher power density, improved efficiency, reduced energy losses, and superior thermal conductivity. However, these advantages also place exceptionally high demands on the quality of each individual hairpin.

The **AIT Hairpin Inspection** system has been specifically developed for the requirements of e-mobility motor production.

During the manufacturing process – **before the actual winding and assembly stages** – every single hairpin is reliably inspected for coating residues and dimensional accuracy. This ensures that only defect-free components proceed to subsequent production steps, preventing costly downstream quality issues.

The optical inspection process features a comprehensive 360-degree quality control system that captures all relevant characteristics around the entire hairpin geometry. A powerful PC-based inspection platform, combined with four high-resolution cameras and optimized illumination, delivers highly repeatable measurement results even at high production speeds.

The system also compensates for wire vibrations during feeding, ensuring stable and precise inspection performance under demanding high-speed operating conditions.



Technical Highlights & Benefits

- **Process-Integrated Defect Detection:** Early identification of quality defects before costly manufacturing processes
- **360° Quality Control:** Maximum process reliability through complete 360-degree inspection
- **High-Speed Inspection:** High throughput with consistently precise inspection / inspection speed up to 0,4m/s
- **Cost-Optimized Quality Assurance:** Reduced scrap rated and minimized rework costs
- **Performance Through Precision:** Reliable quality assurance as the basis of powerful and long-lasting electric motors

With AIT Hairpin Inspection, manufacturers establish the foundation for efficient, stable, and future-proof production of high-performance electric motors.