

Are you familiar with our industrial-grade accredited inspection services?

- Accredited laboratory in line with DIN EN ISO / IEC 17025, to qualify and validate new non-destructive testing (NDT) processes for industrial applications
- Accelerated time-to-market and opportunity for qualified, norm-compliant deployment in industrial applications as well as for new in-house developments or custom adaptation of innovative NDT technologies, even in fields where norms have not been established
- Certification of the corresponding quality management system in accordance with DIN EN ISO 9001

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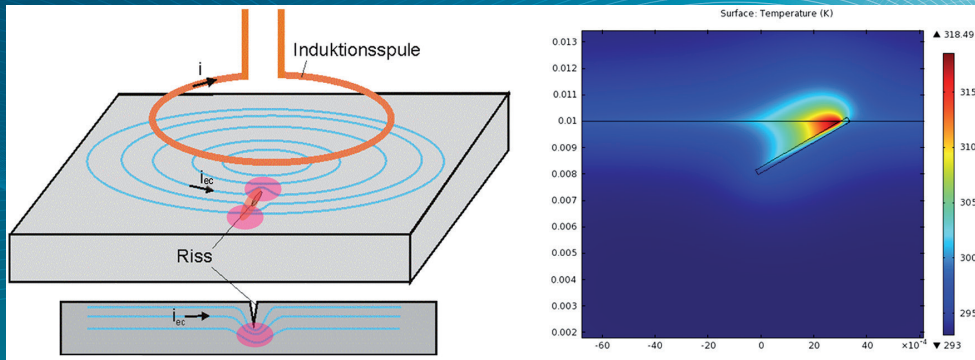
 **Fraunhofer**
IZFP

Sensor and Data Systems for Safety,
Sustainability and Efficiency



Exhibit of a inspection system for fully automated crack detection of railroad wheels with inductively excited thermography

Active thermography by inductive excitation



Left: Induction thermography – principle; right: Temperature distribution near a crack

Active thermography by inductive excitation

In the railroad industry and many other industrial sectors, nondestructive 100% in-process examination of safety relevant components like railroad wheels for surface-breaking cracks is mandatory. Nondestructive testing techniques are preferred for this purpose that don't need any previous surface preparation. Additional requirements are high sensitivity, reliability, objectivity plus eligibility for full automation.

Induction thermography works allows the surface crack detection in steel components without need for prior surface preparation. The method can be automated regarding the mechanics. It is sensitive, reliable, objective and provides the ability to determine the defect depth. It is well suited for fully automated test systems (production line) for 100% testing.

Fraunhofer IZFP has the technical equipment for different excitation variants of active thermography:

- Optical pulse and lock-in excitation
- Ultrasonic excitation and inductive excitation by electromagnetic alternating fields
- Different infrared camera systems for near, medium, long-wave infrared radiation range providing a noncontact infrared technology
 - Temperature resolution up to 15 mK
 - Time resolution up to 50 microseconds
 - Frame rates up to 20 kHz and resolutions up to 1024 × 768 pixels
- Robots and linear mechanical devices for fast, automated testing
- Specialized software to perform



Left: Railway with squat (inclined crack); Middle: Covered crack in a steel profile; right: Covered crack in the micro-section

- Control of inspection systems
- Data processing and analysis of measured data
- Automated defect detection and defect reconstruction

Our services

- Fundamental theoretical, experimental investigations
- Test measurements, feasibility studies for industrial applications
- Accreditation-compliant inspection
- Design, planning, construction of mobile test systems
- Design, planning, construction of fully automatic systems for online component testing (production line), including robot-based inspection systems

Benefits

- Nondestructive, contact-free and fast inspection method for detection of surface-breaking cracks
- Inspection of components with complex geometry
- Crack depth estimation

- Detection of subsurface (covered) imperfections
- Objective and reliable inspection of components in industrial production
- Easy automation without large efforts regarding the mechanics
- Suitable for fully automated systems with 100% inspection of components in the industrial production line
- Eco-friendly since no fluorescent particles liquid is needed

Applications

- Crack detection in forged components
- In-process crack detection of long steel products
- Surface crack testing of rails/railroad wheels
- Delaminations detection in metallic composites
- Replacement of magnetic particle testing
- Crack detection in solar cells
- Crack detection in turbine components
- Detection of broken fibers in CFRP