

Division 8.4

Acoustic and Electromagnetic Methods

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Mission

Ultrasound and electromagnetism as well as human factors analysis in the field of non-destructive testing (NDT)



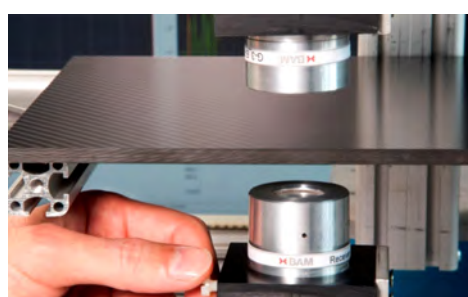
Core Competence

- Design and development of optimized NDT procedures
- Research of advanced methods for material testing and -characterization
- Simulation and modeling of test methods
- Visualization and reconstruction of test data for improved defect detection and evaluation
- Validation of NDT procedures and reliability
- Influence of human factors on NDT reliability



Vision

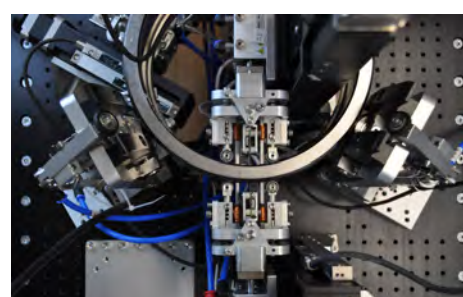
Providing solutions for safety-related testing demands in the sectors of environment, mobility, infrastructure and energy



Transmission measurement of a CFRP laminate with self-developed air-ultrasonic ferroelectret transducers made of cellular polypropylene

Air-coupled Ultrasound

Ultrasonic testing with air coupling is particularly suitable for examining light-weight materials (e.g. fiber-reinforced composites) with sensitive surfaces as well as plate-shaped components.



Automated magnetic flux leakage testing of a bearing shell using magneto resistive sensor arrays

Magnetic Flux Leakage Testing

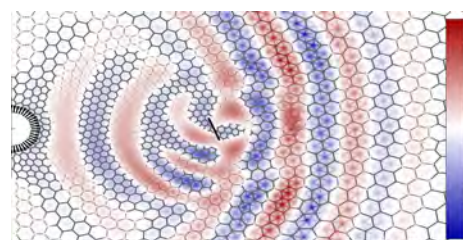
Sensor based magnetic flux leakage testing is suitable to investigate surfaces of ferromagnetic materials. By means of highly resolving sensors, defects and grain changes can be detected on and near the surface.



High resolution UT C-scan of the surface at 100 MHz with a spatial resolution of 10 µm compared to a photograph

High Resolution Immersion Tank Testing

Our Immersion tank testing systems are optimized for high resolution ultrasonic testing. For a precise scanning the probe and the component can be moved in relation to each other in up to seven degree of freedom.



Simulation of an ultrasonic wave interacting with a crack in a plate (computed on a polygonal mesh)

Numerical Methods

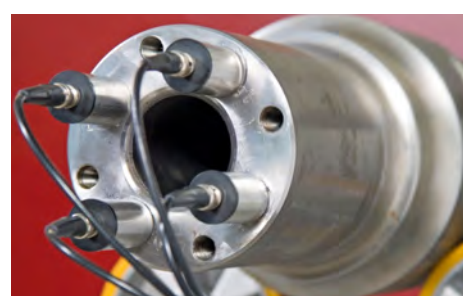
Development of numerical methods and their application for non-destructive testing, structural health monitoring and materials characterization.



Eddy current testing of composite pressure vessels

Eddy Current Testing

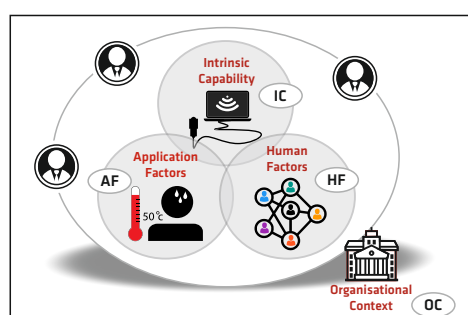
Eddy current testing is used for evaluation of electrically conductive parts like metals and carbon fiber reinforced plastics. Hereby defects and inhomogeneities on and near the surface can be detected.



Online structural health monitoring of railway axles

Guided Waves and Structural Health Monitoring (SHM)

Test methods using guided waves are particularly suitable for ultrasonic inspection and structural monitoring of plate-like components, pipelines and fibre composite materials.



Different factors influence the reliability of NDT

Reliability of NDT

Human factors, (HF), among others, affect the overall reliability of NDT. We use psychological and statistical methods to cast light on these HF and contribute to development and safety of socio-technical systems and understanding of trust and acceptance of new technologies.



Testing of turbine blades using array technique

Robot-assisted NDT

Robot-assisted non-destructive testing of components with complex surface geometries. Application of ultrasonic array technology, eddy current or sensor-based magnetic flux leakage technology.

Sicherheit in Technik und Chemie