NON-DESTRUCTIVE TESTS

Non-destructive testing and structural health monitoring of mechanical components

Description
Experimental and numerical activities regarding non-destructive testing and structural health monitoring of structural materials (metals, composites and polymers) and mechanical components are performed. Traditional and advanced techniques are applied, while innovative ones are developed considering production, maintenance and service stages. In-service monitoring and prognostics are studied and applied, as well.

Accredited Staff
• III level ultrasonic testing according to ISO 9712: 1
• III level magnetic particles testing according to ISO 9712: 1
• III level liquid penetrants testing according to ISO 9712: 2
• II level magnetic particles testing according to ISO 9712: 2
• II level liquid penetrants testing according to ISO 9712: 2
• II level visual testing according to ISO 9712: 3

Certifications

References
Activities

Experimental and numerical characterization of NDT capabilities
• Characterization of experimental “Probability of Detection” curves for different NDT methods.
• Characterization of numerical “Model Assisted Probability of Detection” curves for different NDT methods.
• Interaction between NDT capabilities and the damage tolerant design approach.

Traditional and advanced ultrasonic testing of materials and components
• Phased array monitoring of fatigue crack propagation in adhesive bonded composite lap-joints.
• TOFD inspection of welded and seamless metallic pipes.
• Guided waves monitoring of pipes and rails.
• Residual stress measurements in railway wheels by EMAT.
• Application of creeping waves to coarse grain metals.

Structural health monitoring by ultrasonic Lamb waves
• Determination and characterization of dispersion curves in metallic, composite and polymeric components.
• Definition of an innovative way to induce a single anti-symmetric propagation mode of Lamb waves.
• Analysis of the reflection and transmission of Lamb waves through artificial delaminations in composite laminates.
• Analysis of the reflection and transmission of Lamb waves through natural defects, obtained by low energy impacts, in composite laminates.

Structural health monitoring of railway axles by acoustic emission
• In-service monitoring of railway axles by means of acoustic emission.
• Comparison of acoustic emission response with optical and ultrasonic NDT approaches during crack propagation tests.
• Comparison of acoustic emission response with low frequency vibrations during crack propagation tests.

Eddy current testing of corrosion-fatigue phenomena
• Experimental eddy current measurements of developing corrosion-fatigue damage in small-scale specimens and full-scale components.
• Correlation between damage and eddy current response at different stages of corrosion-fatigue life.
• Numerical simulations of eddy current response at different stages of corrosion-fatigue life.

Instrumentation & Facilities
• Harfang X32: phased array ultrasonic flaw detector with 2.25, 5 and 10 MHz probes.
• RDG500 and RDG2500 ultrasonic flaw detectors with straight, twin, angled and creeping probes.
• UWG1000 TOFD ultrasonic detector with probes and encoders for C-Scan inspections.
• Dedicated equipment for managing Lamb and guided ultrasonic waves.
• CIVAnde software dedicated to NDT simulations.
• Nortec 1000S+ eddy current flaw detector with probes working at a 500-2000 Hz frequency range.
• Magnetoscope, different yokes and permanent magnets for color contrast and fluorescent magnetic particles.
• Color contrast and fluorescent liquid penetrants.
• Lenses, mirrors and dedicated white and black lights for visual testing.
• AST X-Stress 3000 portable X-ray diffractometer.
• Equipment for holographic interferometry and for transmission and reflection photo-elasticity.