



Active thermography – Non-destructive testing for quality, safety, and efficiency

Technology overview



Look inside the structure of an aircraft fuselage

What is active thermography?

Active thermography is an imaging, non-destructive testing (NDT) method that applies heat to a test object in a targeted manner and records its spread using an infrared camera. The dynamics of the heat flow reveal internal structures, material properties, and defects can be visualized—contactlessly, quickly, and reliably.

The technology enables precise analysis of surfaces and hidden structures – from tiny cracks to delamination in composite materials or uneven coatings.

Wide range of applications

Active thermography is universally applicable – from development to series production. It is used wherever quality, safety, and reliability are crucial:

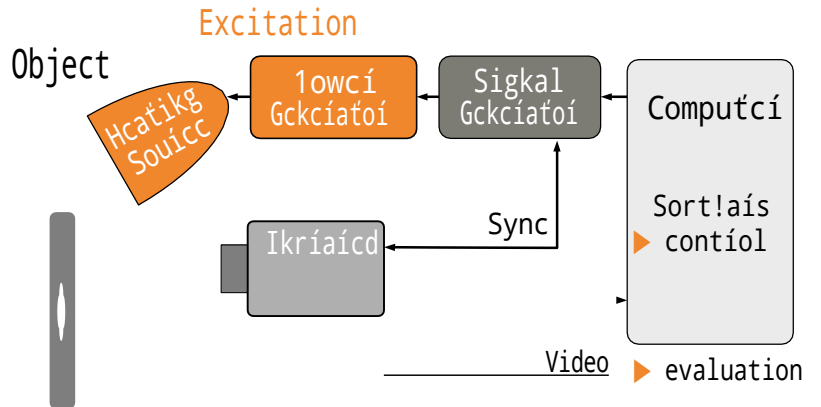
- Weld and solder seam inspection
Evaluation of joint quality, detection of bonding defects, pores, and cracks—inline and automated.
- Crack inspection of metallic components
Detection of the finest surface and subsurface cracks in castings, shafts, bearings, or housings.
- Inspection of fiber composite materials (CFRP, GFRP, sandwich structures)
Detection of delamination, inclusions, or incomplete bonding without damaging the material.
- Coating and paint thickness inspection
Analysis of layer thickness, adhesion, and homogeneity.
- Adhesive joints and bonding inspection
Visualization of unbonded areas, air bubbles, or inhomogeneities in structural bonds.
- Electronics and battery modules
Inspection of cell connectors, bond and solder joints, and thermal homogeneity of electronic assemblies.

The principle of active thermography

A laser, flash, or pulse heat impulse stimulates the material in a targeted manner. The infrared camera records the resulting temperature distribution and its temporal progression.

Defects, inhomogeneities, or interfaces alter the heat flow—and are detected. made visible.

Phase images and thermal signal analyses enable a quantitative evaluation that the thermography precise and reproducible Results – even with complex geometries.



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Technological advantages

- Non-destructive and contactless – no impact on the component
- Fast and efficient – measurement times in the range of seconds
- Automated and inline-capable – ideal for production environments
- High-precision results – quantitative evaluation instead of mere visual inspection
- Universally applicable – metal, plastic, composites, ceramics
- Cost-efficient – early detection of defects reduces scrap and rework

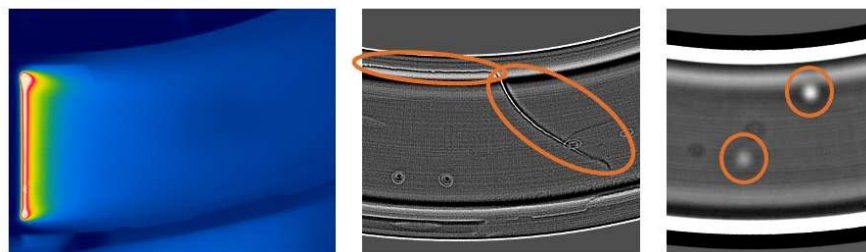


System solution from edevis

The systems developed by edevis combine high-precision laser, induction, ultrasound, or light excitation with state-of-the-art infrared imaging and intelligent software evaluation.

Specially developed electronics and image analysis software automatically detect and evaluate defects – inline, offline, or in laboratory environments.

The systems are modular in design and can be adapted to different excitation methods, materials, and testing tasks. Thanks to standardized interfaces (e.g., PROFINET, OPC-UA), they can be seamlessly integrated into automated manufacturing processes.



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Technical specifications

Specifications	Data
Infrarot Kamera	
Maximum frame rate	Up to 1000 frames per second
Camera viewing angle	5/10/20 degrees (typical)
Thermal resolution	20 mK typical
Sensor resolution	1280 x 1024 or 640 x 512 pixels
Spectral range	MWIR (3–5 µm) or LWIR (8–14 µm)
Anregungsquelle	
Halogen lamp	2 x 2kW excitation power (typical)
Flash lamp	Xenon flash, 6 kJ flash energy
Diode laser	100W .. 2kW, 900-1100nm
Induction (MF)	5kHz .. 60kHz, 3-5kW
Induction (HF)	100 kHz to 500 kHz, 5 to 10 kW
Software	
DisplayImg 7 Professional	Laboratory software for active and passive thermography
DisplayImg Automation	Software for automated operation in quality control in production lines
DisplayImg Viewer	Evaluation software for assessing measurement data
Betriebsparameter	
Typical measurement duration	< 1 second .. 60 seconds per measuring range
Measuring range	mm ² to m ² , depending on the excitation source
Possible test surfaces	Glossy and matte
Maximum cable feed length	30 meters between control cabinet and test head
Cable design	Robot-compatible
Data transmission	Standard CAT-6 cable, Gigabit Ethernet
Interface for automation	Profi.NET, OPC-UA, TCP/IP

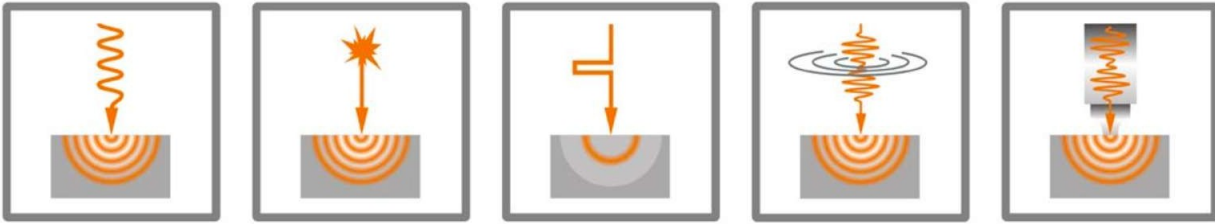
Cross-industry applications

Active thermography can be used universally – wherever quality, safety, and reliability are crucial. Our systems test metal, plastic, composite materials, and coatings – contactlessly, quickly, and precisely. Typical industries:

- **Automotive & e-Mobility:** Welded, soldered, and bonded joints, battery modules
- **Luft- und Raumfahrt:** CFRP structures, sandwich components, adhesives
- **Maschinen- und Anlagenbau:** Crack testing, surface inspection, mechanical components
- **Medizintechnik & Elektronik:** Microjoints, solder joints, thin films
- **Lebensmittel- und Verpackungsindustrie:** Quality control of packaging, coatings, seals
- **Forschung & Entwicklung:** Material characterization, process optimization, laboratory applications

Whether metal, plastic, composite materials, or thin coatings—active thermography provides **verlässliche Ergebnisse** that ensure production and safety standards.

From development to series production – edevis delivers technology that makes quality visible.



edevis – enhanced defect visualization

edevis GmbH, based in Leinfelden-Echterdingen, was founded in 2004 by Alexander Dillenz and Thomas Zweschper. The company specializes in imaging-based, non-destructive material and component testing using active thermography methods. Among other things, the experts at edevis plan and develop systems for testing fiber composite structures, crack testing on metallic components, and inspecting welded and joined connections. In its own testing laboratories, edevis conducts feasibility studies and series investigations for customers using a variety of different excitation methods. This enables rapid evaluation of testing technologies with low initial investment.

In addition, edevis offers product and technology training courses on its test systems and procedures, both in-house and at customer sites. The testing systems are now used in numerous industries: automotive, e-mobility, aerospace, plant engineering, research and development, medical technology, food and packaging, and many more. The company's established customer base includes Porsche, BMW, and thyssenkrupp Automation Engineering.

Contact



Emitec Messtechnik AG
Birkenstrasse 47
70634 Remmelsheim, Germany

+41 41 748 60 10
info@emitec.ch
www.emitec-industrial.ch



Emitec Group ■ ■ ■
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