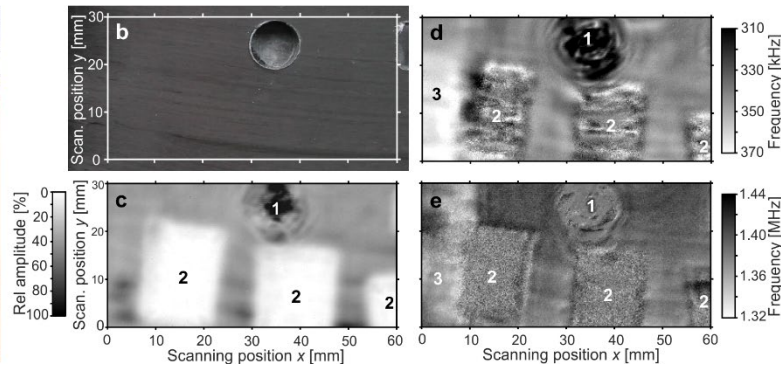
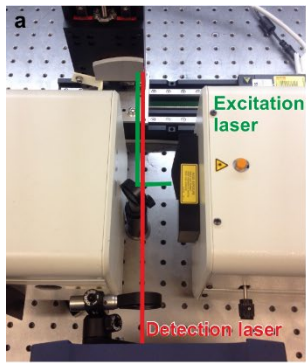


# Functional coatings for efficient laser-based ultrasound generation and detection



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Keywords

Contact-free quality control  
Internal damage inspection  
Laser-generated ultrasound  
Laser interferometer

Intellectual Property

Laser-Based Ultrasound  
Inspection System

Publications

[Internal damage inspection](#)  
[Comparison of techniques](#)  
[Thickness measurement](#)

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## Description

Ultrasound is excited by a fast thermal expansion and contraction induced by a short laser pulse. The high-frequency mechanical response, detected by a laser interferometer, is highly sensitive on the presence of internal damages, as well as on the geometric and material properties of the test object.

Efficiency of the ultrasound generation and detection by lasers is improved by specially developed coatings easily applied (and subsequently removed) on specimen surfaces with double functionality.

The first functionality is that higher share of laser pulse energy is converted to the ultrasound energy propagating in the specimen.

The second functionality is that the amount of the laser light reflected to the measuring device is increased. The signal-to-noise ratio of the detected ultrasound is therefore improved.

## Advantages

The method is broadband, contact-free, robust, and can easily be automated and integrated in a production line using a laser scanning system.

It is suitable for a large range of inspection tasks including small (below mm), fragile, soft, corrosive, or hot objects.

## Applications

- Quality control of precious metals
- Inspection of materials for aeronautics (aluminium or carbon-composite plates with the thicknesses of up to 10 cm)
- Certification of safety-critical infrastructures (turbine blades, high-pressure vessels, pipelines, support structures, high-load or high-velocity components)
- Inspection of additive manufacturing parts with complex geometries