

## Non-Destructive Testing of Carbon Fiber Reinforced Plastic by Infrared Thermography Methods

**Authors :** W. Swiderski

**Abstract :** Composite materials are one answer to the growing demand for materials with better parameters of construction and exploitation. Composite materials also permit conscious shaping of desirable properties to increase the extent of reach in the case of metals, ceramics or polymers. In recent years, composite materials have been used widely in aerospace, energy, transportation, medicine, etc. Fiber-reinforced composites including carbon fiber, glass fiber and aramid fiber have become a major structural material. The typical defect during manufacture and operation is delamination damage of layered composites. When delamination damage of the composites spreads, it may lead to a composite fracture. One of the many methods used in non-destructive testing of composites is active infrared thermography. In active thermography, it is necessary to deliver energy to the examined sample in order to obtain significant temperature differences indicating the presence of subsurface anomalies. To detect possible defects in composite materials, different methods of thermal stimulation can be applied to the tested material, these include heating lamps, lasers, eddy currents, microwaves or ultrasounds. The use of a suitable source of thermal stimulation on the test material can have a decisive influence on the detection or failure to detect defects. Samples of multilayer structure carbon composites were prepared with deliberately introduced defects for comparative purposes. Very thin defects of different sizes and shapes made of Teflon or copper having a thickness of 0.1 mm were screened. Non-destructive testing was carried out using the following sources of thermal stimulation, heating lamp, flash lamp, ultrasound and eddy currents. The results are reported in the paper.

**Keywords :** Non-destructive testing, IR thermography, composite material, thermal stimulation

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