

Evaluation of Bondings in a Non-Destructive way

It bonds – or NOT – judged by NDT

Characterizing and evaluating the quality of bondings is of fundamental interest in various fields of application, such as 3D printing. Different non-destructive testing techniques, like Optical Coherence Tomography (OCT), Terahertz (THz) Imaging, or Laser Ultrasound (LUS) can deliver this information depending on the material and the required scale and penetration depth.

OCT, THz Imaging and LUS are becoming more and more popular in the field of non-destructive testing (NDT). These technologies can provide insights about bonding quality in a non-destructive way. OCT and THz Imaging are suitable methods for inspection of bonding at a scale of several microns in polymers or composites, such as polymer welding seams or bonded polymer biochips. In addition, testing of materials like wood or ceramics is possible as well. In contrast to that, LUS methods give insight into bonding quality of composites and metals.

This unique mix of technologies allows for the testing of most materials. The achieved resolution can be as low as a few micrometers. The penetration depth depends strongly on the material, but is typically ranging from some millimeters to several centimeters.

Measuring the thickness of adhesive layers or performing chemical characterization using spectroscopic technologies allow to extend the obtained structural information about cracks, voids, impurities, debonding or delamination.

Intrinsically relying on the quality of bonds are the various 3D printing or Additive Manufacturing (AM) techniques. Our NDT technologies can be applied for the Quality Control in polymer as well as metal AM.

Facts/Key-Values/ Features & Benefits

- Non-destructive and contact-free measurements
- Polymer, metal or polymer/metal bonding characterization
- 3D imaging capabilities in various wavelength ranges

Potential Users Fields of Application

- 3D printing (metal, polymer)
- Multi-material laminates
- Microfluidics and Biochip characterization
- Polymer weld seams
- Automotive & Aeronautics
- Polymer injection molding

Status – what do we offer?

- Feasibility studies, measurements
- R&D for probing and sensor configuration
- Consulting for your specific measurement and testing tasks
- Development of customized measurement solutions

Contact data

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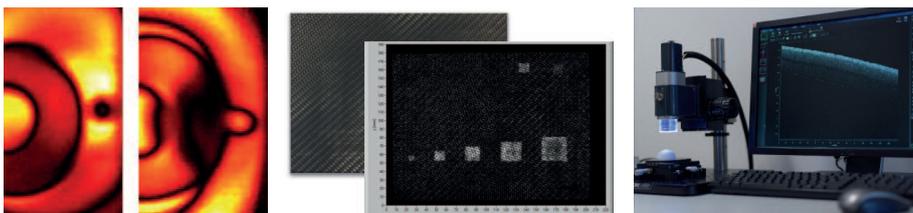


Figure: THz, LUS and OCT imaging applications: (left) THz image of glue layer intact (I) and with delamination (II); (middle) C-scan image from LUS testing of a scanned CFRP plate with induced delaminations; (right) OCT for probing multi-layer coffee capsules (Greiner Packaging International GmbH/RECENTDT).