

Detection of Delaminations and Flaws in Composites

Tomographic look inside with Ultrasound

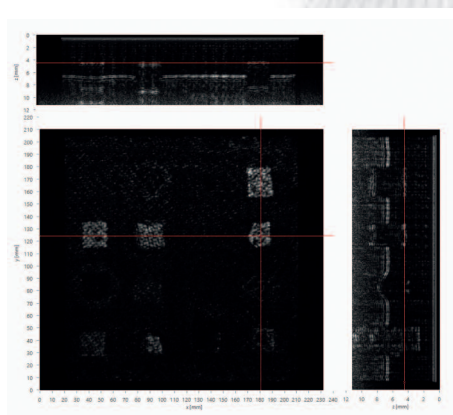
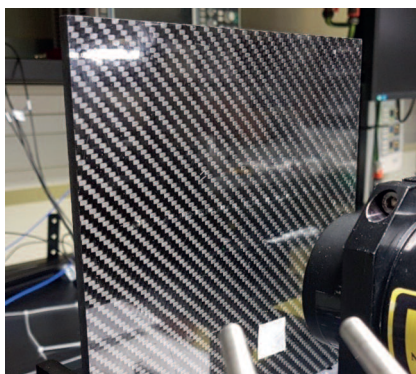
Existing state-of-the-art composites, such as carbon fiber reinforced polymers (CFRP) but also laminated polymer-metal multilayer sandwich structures, offer much better fatigue strength- and elastic modulus to weight ratios than metals. However, the risks of both, internal delaminations and impact damages leading to structural failure are higher. Therefore, a reliable detection method is needed which has to reach deep into the material.

Structural defects inside a CFRP-part can lead to a complete loss of integrity and strength, while it still looks fine from outside. Non-obvious delaminations and flaws inside constitute a severe threat for lightweight constructions.

But not only impacts, that can lead to delamination without leaving marks on the surface, also other problems during the production of parts can turn out dangerous. Dry spots or wet spots, inhomogeneities of the fiber-distribution and -orientation, curing defects in the resin – all these defects have to be detected in the manufacturing process. Laser Ultrasound (LUS) is a laser-based Non-Destructive Testing (NDT) method, capable of providing tomographic 3D

representations of the inner structure of a component with a very high resolution. LUS can image fiber-layers in various fiber-reinforced materials and shows delaminations and flaws like wet-spots or dry-spots. Together with spectroscopic techniques, also chemical information on the resin/polymer matrix can be obtained, which is interesting for the evaluation of the curing state.

All these multi-layer characterization capabilities of LUS can also be utilized for many multi-material structures, multi-layered laminates and sandwich-structures made of metals, polymers etc., if only ultrasound can propagate inside.



CFRP-plate with deliberately built-in defects scanned by our Laser Ultrasound method.

Facts/Key-Values/ Features & Benefits

- Non-destructive/non-contact
- In-line automation with fast scanning
- For CFRP, GFRP, other polymers
- For multi-material laminates

Potential Users Fields of Application

- Aerospace industry
- Automotive industry
- Lightweight construction

Status – what do we offer?

- Measurements and analysis in RECENDT-labs
- Development of methods to solve your specific problems
- Development of customized systems for your lab or fab

Contact data

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