

## **NOVEL APPLICATIONS OF IN-SITU CT MEASUREMENTS IN ADHESIVE TECHNOLOGY**

### **ABSTRACT:**

Within the scope of adhesive bonding, industrial computed tomography (CT) offers a high potential for different advanced applications. In a current research project approaching the implementation of a new technique based on in-situ X-ray CT combined with particle tracking for measuring the internal displacement field in adhesives [1], optimization measures of scanning parameters and measuring setups for in-situ computed tomography measurements on marker particle filled adhesives were carried out.

A key benefit of this optimization measures was a significant improvement in detail detectability and discriminability between used marker particles and surrounding adhesive compound utilizing the use of flat metal filters as well as a lead collimator. In this regard, air voids became detectable in good contrast to the surrounding adhesive compound even if the adhesive was modified by particles with a high X-ray absorption coefficient like tungsten. Performing in-situ CT measurements with

the optimized parameter setups and investigating the particle behavior of specimens modified with glass beads as marker particles, delamination effects were observed under applied load. An achieved bonding enhancement by using a primer as pre-treatment for glass beads was also proven by means of in-situ CT. Furthermore, the parameter setups optimized for bulk specimen could be adapted on material combinations, e.g. single-lap shear specimen, by adjusting a few parameters.

Additional experiments demonstrate that CT measurements can also be used for analytical purposes, for instance to evaluate the mixing quality of so-called Quadro- or 2C mixers for two-component adhesives. In addition, specific characteristics in fracture behavior of adhesives were investigated via creating inhomogeneities within the adhesive.

[1] H. Kunz, E. Stammen and K. Dilger, J. Adhes., 93, 531 (2017).