Low-Cyclic Fatigue of Adhesive Bonds

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An adhesive bonding technology is limited by a cyclic loading of an adhesive bond. The paper deals with a testing of a low-cyclic fatigue of single-lap bonds reinforced with glass beads (B159, a fraction size 90 ± 20 μm). The aim of the research is a study of a low-cyclic behaviour of structural adhesive bonds by means of a scanning electron microscopy (SEM). The research will contribute to a clarification of the fatigue behaviour (low-cyclic) of structural adhesive bonds. The aim of the study was to evaluate a service life of the adhesive bond in terms of its fatigue loading at a low-cyclic shear test. Values of a pulsating loading for the low-cyclic fatigue tests were chosen from this reason for tested adhesives from static tensile test determined a reference value of a maximum force gained at a statical test according to the standard CSN EN 1465. The number of cycles was 1000 at the 30 % strength reached at the static tensile test of the adhesive itself. The cumulative effect of the shear cyclic loading after 1000 cycles showed micro- and nanocracks in the area of the adhesive. The experiment results did not confirm the assumption that repeated cyclic loading could lead to the premature failure of the adhesive bond.

Keywords: Cracks, Glass beads, Polymer composite, Scanning electron microscopy, Structural adhesive

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