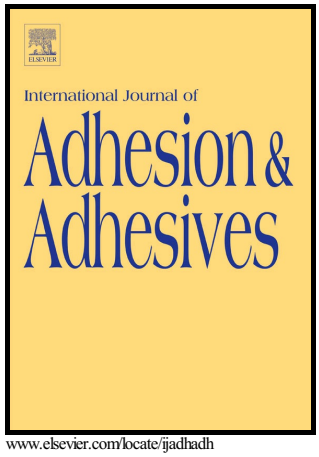

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Fatigue resistance of an aluminium one-component polyurethane adhesive joint for the automotive industry: Effect of surface roughness and adhesive thickness

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Abstract

Fatigue is a crucial type of loading for many structural components that contain adhesive bonding systems such as the automotive industry. One of the main advantages of adhesives is their weight-reduction aptitudes. Furthermore, adhesively bonded joints allow a good damping to the fatigue's solicitation with fewer sources of stress concentration. In addition, a suitable surface treatment allows a great joint interface adhesion under cyclic loading. Hence, the mechanical preparation of the bonded surface influences directly the bonded joint performance. Therefore, a careful consideration should be given to the choice of the bonded adhesive thickness. The aim of this paper is to investigate the influence of surface roughness of an aluminium alloy and the adhesive thickness of a one-component polyurethane adhesive, to be used in several parts for buses structure, on the fatigue behaviour of single lap joints. To achieve this purpose, four different surface roughnesses were prepared on aluminium specimens, with an arithmetic average height from Ra ≈ 0.6 µm to Ra ≈ 1.5 µm. Bonded specimens with four adhesive