

EFFECT OF ADHEREND SURFACE PREPARATION ON THE MECHANICAL PROPERTIES OF ALUMINIUM BONDED JOINTS

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ABSTRACT

The surface treatments play an important role in improving the adhesive bonded joint strength and durability. However, each adhesive and adherend material will require different types of surface treatment to make the right balance between the joint strength and fracture modes. In this study, the effect of adherend surface preparation on the mechanical properties of aluminium adherends bonded with a modern tough adhesive used in the automotive industry was investigated. Aluminium adherends were treated with three different surface preparation: solvent degreasing, sand abrasion and grit blasting with low and high blast pressure. The treated surfaces were analysed using a portable surface roughness tester and the effect of surface roughness on the joint strength was examined by testing single lap-joints (SLJs). Results showed an increase in bond strength with increasing surface roughness and the maximum strength was obtained for the grit blasted specimens. The higher surface roughness leads to better mechanical interlocking between the adhesive material and the aluminium surface. The fracture surface of the joints reveals a progressive increase in cohesive failure mode as the surface roughness increase.

KEY WORDS: single lap-shear tests, surface treatment, aluminium, fracture surface

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