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● Accelerating environmental ageing of adhesive aluminium joints by changing the specimen geometry

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Abstract content

Since bonded joints in any application are exposed to environmental influences that can weaken them, durability must be ensured. Especially on metallic substrates, degradation processes such as corrosion can considerably weaken the joint even to the point of failure. In order to simulate these degradation processes under laboratory conditions, there are a variety of different standardised accelerated ageing tests and test methods available [1]. As a result, the strength reduction and the fracture pattern are usually used to assess the ageing effects.

A common sample form for this are single lap joints (SLJ). It has already been shown that the geometry of these specimens has a great influence on the strength values that can be achieved [2].

In this study, SLJs made of AlMgSi and their ageing behaviour in an accelerated ageing depending on the specimen geometry were investigated. For these investigations, aluminium adherends were pickling passivated, joined with a one-component toughened epoxy adhesive and subjected to an accelerated cyclic ageing test with corrosive medium. The effects of width, overlap length and adhesive thickness were investigated and from this a new “optimised” geometry was determined which shows particularly distinct degradation at the interfaces (figure 1). Additionally, an open-faced variant was tested.

The acceleration effect of the new geometry compared to the standardised one was determined and the specimen analysed to see if the degradation processes were comparable.

References

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1: effect of different bond areas of SLJ on ageing