# Fracture of Aluminum/steel welds imaged in 2D and 3D.

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**Abstract**

Dissimilar welding of aluminum (Al) alloy to steel suffers from the formation of a brittle intermetallic layer (IML) at the weld interface. The brittle interface limits the strength of the welded joints and their use in industrial applications. In this study, the mechanical behavior of Al/steel joints produced by TIG arc welding is investigated at different scales, from macroscopic tensile shear tests monitored *in situ* by Digital Image Correlation (DIC) to their miniature version under 3D X-ray tomography on top of local probing of the different weld zones. It is shown how the addition of selected alloying elements in the weld pool can improve the weld strength and affect crack propagation at the interface. Image-based finite element modeling using a Cohesive Zone Model (CZM) allows to clarify the contribution of the modified intermetallic layer at the interface on the fracture process.

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