

Weld Interface Characteristics of Copper in Collision Welding

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Abstract. Collision welding is a promising material closed joining process for metals without any additional heat. Although the process is already industrially applied, the working mechanisms of bond formation have not yet been understood completely. Less process understanding results in lower process reliability. Therefore the design of new component joints and welding processes has to be carried out mostly experimentally with a high effort in order to ensure a high reliability.

In this paper the formation of the weld interface is investigated for copper-copper-joints, which is an interesting application in the fields of future electro mobility. Especially the full formation of the weld interface is critical in lower energy welding processes like electromagnetic pulse welding. For this purpose welds with different collision angles and impact velocities were produced by a purely mechanical driven test rig and observed by a high speed camera. Subsequently, the welded areas were analyzed by a 2D-ultrasonic scanner. The results show a dependence of the amount of welded area on the collision angle and the impact velocity. It is shown, that this second parameter correlates with the available energy for the bond formation. Moreover different types of weld interfaces can be identified from the measurements.