

GENERAL MOTORS

Effect of Welding Parameter on the Mechanical and Metallurgical Properties of Dissimilar TWIP/AKDQ RSW joints

Motivation

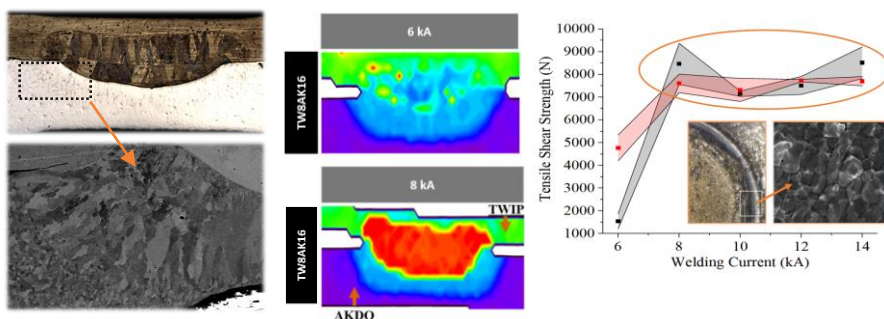
In a body-in-white manufacturing chain, individual components need to be further assembled by means of joining processes. Structures responsible for ensuring passenger safety usually requires improved strength. These are favorable components to be manufactured of TWIP and other AHSS. Components without high mechanical loading demands are made using plain carbon steels. Therefore, dissimilar welding procedures and the effect of different RSW parameters need to be understood when assembling cars' body.

Objective

The objective of this study is the identification of the welding parameters' influence on the properties of dissimilar TWIP - Aluminum Killed Drawing Quality (AKDQ) steel RSW joint

Approach

Three TWIP-AKDQ joint configurations exhibiting variation in coating and sheet metal thickness have been investigated. The joints are made with different welding currents ranging from 6 to 14 kA. The mechanical properties of the joints, assessed by tensile-shear test, tend towards that of similar joints. SEM analysis and optical microscopy enable the identification of three failure modes with specific micromechanisms of failure. Vickers's Hardness test and EDS analysis along with XRD analysis were used to correlate mechanical properties, dissolution intensity, phase to the welding parameters.



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