**Role of Spot Weld Electrode Geometry on Liquid Metal Embrittlement Crack Development**

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Advanced high strength steels (AHSS) used in automotive structural components are commonly protected using zinc coatings. However, the steel/zinc system creates the potential for liquid metal embrittlement (LME) during welding. The effect of welding electrode geometry on LME development has been studied to some degree, but present literature has not completed a comprehensive comparison between standard electrode types. Major differences in both LME crack length and location were observed between three standard electrode types. LME severity was determined to be directly related to the electrode geometry, as a radius tip electrode showed minimal cracking while a truncated cone shaped showed severe LME, particularly in the shoulder region. Thermo-mechanical simulations from the commercial software Sysweld® showed the significance of the thermal contact at the outer region of the electrode/sheet interface. It was observed that as the water-cooled electrode presses into the steel during welding a sudden local cooling of the weld shoulder occurs, leading to contraction and tensile stresses leading to LME. The pressure profile of the electrode governs the thermal contact and location of effective heat transfer showing the significance of electrode geometry.

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