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Evaluation of resistance welding parameters on liquid metal embrittlement in "dual phase" high-strength steels of the automotive industry.

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In the automotive industry, dual-phase steels have the function of reducing weight through their thinness, offering ductility and impact absorption, and are used in structural and reinforcement parts. These steels are coated with electrogalvanized (EG), galvanized (GI) or galvannealed (GA) zinc as corrosion protection. The technique commonly used to join the steels is resistance spot welding (RSW). The welding parameters selected can produce liquid metal embrittlement (LME) due to the migration of the zinc coating between the grain boundaries in the base metal. In this work, we will investigate the effects of the welding parameters and the gap on the formation and position of the LME welding joint. The methodology to be applied is based on evaluating the welding parameters and gap for samples that will be analyzed through tests such as liquid penetrant, where surface cracks can be verified; macro and micro structure tests to examine the types of cracks and their extensions; hardness test to identify the thermally affected zone (HAZ) since a weld with inadequate hardness may be more susceptible to cracks, fractures or premature failure in service; fatigue test to determine how the welded joint will behave under service conditions subject to repeated loading and unloading cycles; tensile test to verify the strength of the welded joint. Based on the parameters defined, it is hoped to find the condition in which cracks begin to form in the area of the weld point in order to understand how to deal with dimensional variations and guarantee the integrity of the weld joints in the resistance spot welding process.