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Clinching and resistance spot welding in advanced dual phase steel

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The aim of this article is exploring the joining technique of advanced first-generation dual-phase steel with a mechanical strength of 1300 MPa. The study focuses on the application of this steel in the automotive sector, where its ultra-high tensile strength makes it suitable for various components like side protection bars and floor reinforcements. The joining methods for this steel are resistance spot welding and a cold joining also known as clinching. These techniques can be performed using existing equipment, contributing to lightweight construction. The use of this steel is attractive for replacing components traditionally made through hot stamping (press hardened steel) in the automotive industry. Moreover, correlates aspects of clinching and resistance spot welding in terms of tensile strength test for shear and pull on laser-cut specimens showing that while resistance spot welding may introduce variations like reduced microhardness, it still exhibits 62% higher mechanical break strength in compared to clinching on average. Under the experimental conditions, clinching proves feasible for ultra-high-strength materials, suggesting a correlation of 3 clinchings for every 2 weld spots in quasi-static trials.