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A study of mechanical properties of laser beam welded dissimilar high strength steels: 300M and DP 800

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The advanced high strength steels have been studied in the aerospace and automotive industries because of their excellent mechanical strength and ductility. The laser beam weldability for these steels has been shown viable and promising for the reduction of the melted zone and the heat affected zone. Since welding between dissimilar steels is a challenge because of different chemical compositions influencing the melting point and the formation of the phases. In this work, laser beam parameters were studied for welding between Dual Phase (DP800) and AISI 300 M sheets, using a fibre laser of 2 kW, under normal conditions and also subjected to two heat treatments. The quality and metallurgical characterization of the welds were done through tensile and Vickers hardness tests. A significant increase in hardness was observed in the weld compared to the base material, however without compromising toughness in the fusion zone. It was possible to verify dilution between the materials using light optical microscopy.