

Influence of laser welding parameters on the microstructure and mechanical properties of butt weld joints of a TRIP steel

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Advanced High Strength Steels (AHSS) including TRIP steels are usually produced by unconventional methods of heat and thermo-mechanical treatment. Multiphase TRIP steels generally contain ferrite, carbide-free bainite and retained austenite. During plastic deformation, the retained austenite is transformed into martensite, thus obtaining an exceptional combination of mechanical properties (strength, ductility and ductility) of TRIP steels [1-2]. Joining the TRIP steels by fusion welding processes leads to the destruction of developed microstructure in the fusion and heat-affected zones, which also results in the degradation of mechanical properties [3].

The paper deals with the assessment of the influence of welding parameters on the microstructure and mechanical properties of weld joints of newly developed TRIP steel prepared by laser beam welding. The butt weld joints of sheets with the thickness of 2 mm were produced by the TruDisk 4002 disc laser using different values of laser power, welding speed and beam fousation. Mechanical properties of experimental weld joints were evaluated by tensile tests and microhardness measurements. Microstructural analyses were carried out using NEO-PHOT 32 light microscope and the JEOL 7600 scanning electron microscope equipped with EDX analyzer.

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