An Investigation of the Surface Characterization of Laser Surface Remelted and Laser Beam Welded AISI 316L Stainless Steel

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In this study, AISI 316L austenitic steel was joined by CO₂ laser beam welding method and the microhardness and the surface characteristics of joints were investigated. Also, surface modification was applied on the laser welded and non-welded samples by means of Nd:YAG laser source at laser power 50W, 100W, and 150W. The main materials and the welding seam surfaces of the laser welded samples on which no laser modification had been applied and the surfaces of the samples on which laser surface modification was applied were characterized via SEM, Elemental Mapping, atomic force microscope (AFM), and at the same time, the changes in their surface hardness were identified. As a results, it was identified that the main material surface and the welding seam region of the laser welded sample on which no surface modification had been implemented had less roughness (R_a) than the samples on which laser surface modification had been applied. It was observed that the highest surface roughness belonged to the laser welded sample on which surface modification was applied via 150W laser power. No significant change was observed in the hardness values.

Keywords: Laser beam welding, Laser remelting, Austenitic stainless steel, Surface topography.

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