Evaluation of mechanical properties of nanostructured Al 6061 alloy weldment during resistance spot welding process

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Abstract
In this study, The Al 6061 alloy sheets were produced by Cryorolling process and then were welded by resistance spot welding method. In this regard, the solution treated Al 6061 alloy cryorolled subsequently up to 90% reduction in thickness to produce nanostructure alloy. The cryorolled sheets were then subjected to aging treatment (130°C-30h) in order to obtain simultaneous strength and ductility. Tensile strength of 370 MPa, hardness of 135 HV, and ductility of 11% was obtained for the nanostructured Aluminum sheets. The Cryorolled samples were then resistance spot welded with different welding parameters, including welding current 50 to 100 kA, electrode force of 2.8 kN, and welding time of 0.1 s. The most tensile shear peak load of weld spot of nanostructured samples was 5580 N. The results for different welded samples showed that the nanostructured ones, have higher weld strength when compared with 6061-T6 Aluminum alloy samples with common grain size.

Keywords: Al 6061 alloy, nanostructured, Cryorolling, Resistance spot welding.