University of Baghdad	
Department	Mechanical Engineering
Full Name	Dina Abduljalil Raoof
Thesis Title	Mechanical and Microstructural Properties along the Thick Section of Friction Stir Welded 7075-T6 Aluminum Alloy
Year	2014
Abstract	The present work investigates the feasibility of friction stir butt-weld of a (25 mm) thickness of the high strength aluminum alloy 7075-T6. Welds were made in single and double sided by using a conventional milling machine and special profiled tools. Subsequently, Non-destructive tests (Visual Inspection and X-ray) and destructive test (tensile test, micro-hardness and microstructure) were carried out to determine the best welding procedure to be used, through studying the mechanical and microstructural properties. The friction stir welded specimens were subjected to tensile and hardness tests on the transverse cross section of weld within five layers at different depths from the weld top surface. Furthermore, the average grain size of the stir zone was examined by utilizing an optical microscope. The experimental results have shown the priority of the double sided welding procedure over the single one where the overall efficiency of the single sided weld was (62.64%) at a travel speed of (32 mm/min) and the rotational speed was (208 rpm). While the efficiency of the double-sided weld was (68.86%) at travel speed of (45 mm/min) and rotational speed of (288 rpm). The hardness map has shown an average drop in hardness in the HAZ of approximately (76 HV) in the single-side weld, and (74 HV) in the double-sided weld. While the grain size in the stir zone has experienced a significant growth starting from the weld bottom towards the weld top surface in both welding procedure, the single and the double sided welds due to the high difference in temperature profile produced during the welding of thick section aluminum alloys