Kurdistan Region-Iraq

Salahaddin University - Erbil

College of Engineering

Mechanical and Mechatronics Engineering Dep

**Effect of** **Friction Welding Parameters on Torsion Test for Aluminium** **Alloy 6061 Rod**

A Project Submitted to the Mechanical Engineering Department

University of Salahaddin-Erbil

in the Partial Fulfilment of the Requirement for the Degree of Bachelor of Science in Mechanical & Mechatronics Engineering

Prepared By:

Mohammad Abdulkarem osman

Blnd Fars Nabi

Supervisor:

Dr. Gawhar Ibraheem Khidhir

2024 - 2025

**Abstract**

This study investigates the effect of friction welding parameters on the torsion testing of aluminium alloy Al 6061. Seven samples were joints by friction welding by selecting three categories. Three parameters such as rotational speed, friction time, and friction were varied while the others forging force and forging time were held constant. Firstly, rotational speed was changed as in samples 1, 2 and 3, secondly the friction time as in samples 2, 4 and 5, and lastly friction force was changed as in samples 2, 6 and 7. The experimental results show that the axial shortening will decreases as rotational speed, friction time, and friction force increased. Torsion tests performed and shear stress-shear strain curves were obtained for all samples included base metal and sample 1 to sample 7. Shear strain properties of the Al 6061 joints were greatly improved compared to the base material. The tests identified that sample 5 which welded by parameters: rotational speed of 1080 RPM, friction time of 40 seconds, and friction force of 33 MPa having the best efficiency among all the samples.