

THE EFFECT OF SALT WATER AND OIL COOLING MEDIA ON THE TENSILE STRENGTH OF ST 42 STEEL FRICTION WELDED JOINTS

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ABSTRACT

This study aims to analyze the effect of cooling media variations, namely salt water (NaCl) and SAE 40 oil, on the tensile strength of friction welded joints of ST 42 steel. The welding process was carried out using a friction welding machine at a constant speed of 1450 rpm, with friction times of 10 seconds and 12 seconds, and an axial pressure of 150 bar. Following the welding process, the specimens were immediately immersed in their respective cooling media until reaching room temperature. Tensile testing was conducted using a Hydraulic Universal Material Testing Machine in accordance with ASTM E8/E8M-13a standards to obtain values of yield strength (σ_y), ultimate tensile strength (σ_u), strain (ϵ), breaking point (f), and modulus of elasticity (E). The results indicate that salt water (NaCl) produced higher tensile strength values compared to SAE 40 oil, with the best yield strength of 422.27 N/mm² at a friction time of 10 seconds and the best ultimate tensile strength of 465.42 N/mm² at a friction time of 12 seconds. In contrast, SAE 40 oil produced the highest modulus of elasticity at 280.71 MPa at a friction time of 12 seconds, indicating a stiffer material characteristic.

Keywords: *friction welding, ST 42 steel, cooling media, salt water (NaCl), SAE 40 oil, yield strength, ultimate tensile strength, strain, breaking point, modulus of elasticity.*