World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:12, No:08, 2018

Fatigue Strength of S275 Mild Steel under Cyclic Loading

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Abstract : This study examines the fatigue life of S275 mild steel at room temperature. Mechanical components can fail under cyclic loading during period of time, known as the fatigue phenomenon. In order to prevent fatigue induced failures, material behavior should be investigated to determine the endurance limit of the material for safe design and infinite life, thus leading to reducing the economic cost and loss in human lives. The fatigue behavior of S275 mild steel was studied and investigated. Specimens were prepared in accordance with ASTM E3-11, and fatigue tests of the specimen were conducted in accordance with ASTM E466-07 on a smooth plate, with a continuous radius between ends (hourglass-shaped plate). The method of fatigue testing was applied with constant load amplitude and constant frequency of 4 Hz with load ratio (Fully Reversal R= -1). Surface fractures of specimens were investigated using Scanning Electron Microscope (SEM). The experimental results were compared with the results of a Finite Element Analysis (FEA), using simulation software. The experiment results indicated that the endurance fatigue limit of S275 mild steel was 195.47 MPa.

Keywords : fatigue strength, fatigue life, finite element analysis(FEA), S275 mild steel, scanning electron microscope (SEM)
Conference Title : ICMSM 2018 : International Conference on Materials and Strengthening Mechanisms
Conference Location : Dublin, Ireland
Conference Dates : August 16-17, 2018