World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:10, No:08, 2016

Effect of Sulfur Content on Fatigue Strength of AISI 4140 Steel

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Abstract : MnS is the most commonly found inclusion in steel, which is desirable for machinability of alloy steels but only up to a certain limit, beyond which it weakens fatigue properties of steel. In present work, the effect of sulfur content and its inclusions on the fatigue behavior of AISI 4140 steel is studied (sulfur content 0.002% and 0.016%). Metallurgical analysis, Mechanical testing and Rotating Bending Fatigue (RBF) test were carried out. With the increase in sulfur content, ductility and toughness of the material decrease significantly and large scatter is observed in UTS and impact energy values. From the results of RBF testing, it can be observed that increase in sulfur content from 0.002% to 0.016% has a negligible effect on the endurance strength of AISI 4140 for similar hardness level. Fractography analysis was carried out to study the failure modes in testing.

Keywords : AISI 4140, sulfur content, MnS inclusion, rotating bending fatigue
Conference Title : ICMMSE 2016 : International Conference on Metallurgy, Materials Science and Engineering
Conference Location : Venice, Italy
Conference Dates : August 08-09, 2016