

The Usage of SEM for Fatigue Properties Evaluation of Austenitic Stainless Steel AISI 316L

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Fatigue failure is a process resulting first from change of mechanical properties, then fatigue crack initiation occurs and progressive growth of crack (propagation of fatigue crack) leading to final fracture. The failure can occur either in low number of cycles ($\leq 10^4$ cycles; low cycle fatigue) or over millions of cycles (high cycle fatigue). The fatigue behavior of AISI 316L austenitic stainless steel on microstructure was investigated. The fatigue fracture was investigated after three point cyclic bending test which was realized on V-notched testing bar. Fatigue crack nucleated from several sites under the notch. The failure mechanism proceeded afterwards by repeated episodes of fatigue striations as examined under scanning electron microscope. Before the fracture surface observation the surface hardness was measured under the originated crack where the area of plastic deformation can be found. In this area the hardness values raised approximately to 379 HV due to plastic deformation strengthening. With the increasing distance from the crack the hardness values decreased approximately to 246 HV.

Keywords: Austenitic Stainless Steel, Fatigue Failure, Plastic Deformation, Three Point Cyclic Bending Test

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