



Effectiveness of Shot Peening in Suppressing Fatigue Cracking at Non-Metallic Inclusions in Udimet (Paperback)

By -

Bibliogov, United States, 2013. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****. The fatigue lives of modern powder metallurgy disk alloys can be reduced by over an order of magnitude by surface cracking at inherent non-metallic inclusions. The objective of this work was to study the effectiveness of shot peening in suppressing LCF crack initiation and growth at surface nonmetallic inclusions. Inclusions were carefully introduced at elevated levels during powder metallurgy processing of the nickel-base disk superalloy Udimet 720. Multiple strain-controlled fatigue tests were then performed on machined specimens at 427 and 650 C in peened and unpeened conditions. Analyses were performed to compare the low cycle fatigue lives and failure initiation sites as a function of inclusion content, shot peening, and fatigue conditions. A large majority of the failures in as-machined specimens with introduced inclusions occurred at cracks initiating from inclusions intersecting the specimen surface. The inclusions could reduce fatigue life by up to 100X. Large inclusions had the greatest effect on life in tests at low strain ranges and high strain ratios. Shot peening can be used to improve life in these conditions by reducing the most severe effects of inclusions.



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