Accepted Manuscript

Effect of the presence of macrozones on short crack propagation in forged two-phase titanium alloys

K. Zhang, K.V. Yang, S. Lim, X. Wu, C.H.J. Davies

PII: S0142-1123(17)30292-X
DOI: http://dx.doi.org/10.1016/j.ijfatigue.2017.07.002
Reference: JIJF 4398

To appear in: *International Journal of Fatigue*

Received Date: 11 May 2017
Revised Date: 30 June 2017
Accepted Date: 4 July 2017

Please cite this article as: Zhang, K., Yang, K.V., Lim, S., Wu, X., Davies, C.H.J., Effect of the presence of macrozones on short crack propagation in forged two-phase titanium alloys, *International Journal of Fatigue* (2017), doi: http://dx.doi.org/10.1016/j.ijfatigue.2017.07.002

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Effect of the presence of macrozones on short crack propagation in forged two-phase titanium alloys

K. Zhang[a,c], K.V. Yang[b], S. Lim[b], X. Wu[b,c], C.H.J. Davies[a]

[a] Department of Mechanical and Aerospace Engineering, Monash University, Australia

[b] Department of Materials Science and Engineering, Monash University, Australia

[c] Monash Centre for Additive Manufacturing, 11 Normanby Road, Notting Hill, Australia

Abstract

Macrozones, which are regions containing grains with similar orientations, are commonly reported to be present in two-phase titanium alloys and to be detrimental to their fatigue resistance. The effect of macrozones on fatigue crack initiation is established, but their effect on short crack propagation remains unknown. In this study, the effect of the presence of macrozones on short crack propagation is investigated under four-point bending fatigue testing on both as-forged and powder hot isostatic pressed Ti-64. Micronotches were machined into the samples as crack initiation sites and the short crack propagation behaviour was recorded by replica. It was found that the crack propagation in macrozones can be faster than in random texture because most of the crack planes in the grains of the same macrozone are aligned. Furthermore, macrozones oriented favourably for basal<a> slip systems are less resistant to short crack propagation than macrozones oriented favourably for prismatic<a> slip systems. This is because the basal planes of the grains within the same macrozone are aligned, while the prismatic planes of the grains within the same macrozone may not be aligned. This study provides an important fundamental understanding of the effect of macrozones on short crack propagation in forged two-phase titanium alloys and thus on

Download English Version:

https://daneshyari.com/en/article/5014998

Download Persian Version:

https://daneshyari.com/article/5014998

Daneshyari.com