Author's Accepted Manuscript

Internal crack initiation characteristics and early growth behaviors for very-high-cycle fatigue of a titanium alloy electron beam welded joints

Yichao Zheng, Zihua Zhao, Zheng Zhang, Weimeng Zong, Ce Dong



PII:S0921-5093(17)31104-8DOI:http://dx.doi.org/10.1016/j.msea.2017.08.106Reference:MSA35454

To appear in: Materials Science & Engineering A

Received date:25 May 2017Revised date:23 August 2017Accepted date:24 August 2017

Cite this article as: Yichao Zheng, Zihua Zhao, Zheng Zhang, Weimeng Zong and Ce Dong, Internal crack initiation characteristics and early growth behaviors for very-high-cycle fatigue of a titanium alloy electron beam welded joints, *Materials Science & Engineering A*, http://dx.doi.org/10.1016/j.msea.2017.08.106

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 galley proof before it is published in its final citable 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. Internal crack initiation characteristics and early growth behaviors for very-high-cycle fatigue of a titanium alloy electron beam welded joints Yichao Zheng^{a,b}, Zihua Zhao^{a,b,c}*, Zheng Zhang^{a,b,c}, Weimeng Zong^{a,b,c}, Ce Dong^{a,b,c} ^a Key Laboratory of Aerospace Materials and Performance (Ministry of Education), School of Materials Science and Engineering, Beijing University of Aeronautics and Astronautics, Beijing, People's Republic of China

^b The Collaborative Innovation Center for Advanced Aero-Engine (CICAAE), Beijing University of Aeronautics and Astronautics, Beijing, People's Republic of China

^c Beijing Key Laboratory of Advanced Nuclear Materials and Physics, Beijing University of Aeronautics and Astronautics, Beijing, People's Republic of China

Abstract

The very-high-cycle fatigue has become an important issue in recent years. The crack initiation mechanism and early crack growth behaviors of electron beam welded joints of TC21 titanium alloy were discussed. In order for the subsurface crack growth to be observed, a repeated two-step fatigue test was performed for the beach mark formation. Two kinds of initiation modes of microcracks could exist. One is the initiation from microvoids and the other results from the dislocation accumulation. During early growth, the microcrack path could deflect when it passed through the boundaries, leading to the FGA region formation. The crack closure could also occur during growth. By the Paris' law integration, the crack propagation life was discovered to occupy only a small number of the fatigue life.

Keywords: very-high-cycle fatigue, crack initiation, early propagation, beach marks

^{*} Corresponding author. Tel: +86 010 82313264 fax: +86 010 82317108

E-mail address: zhzh@buaa.edu.cn

Download English Version:

https://daneshyari.com/en/article/5455193

Download Persian Version:

https://daneshyari.com/article/5455193

Daneshyari.com