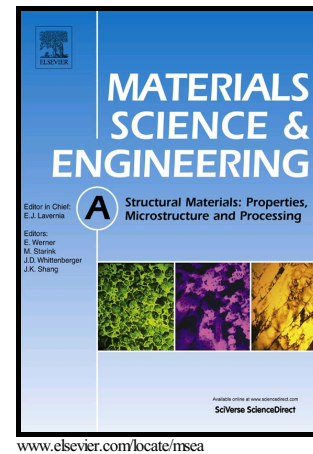


Author's Accepted Manuscript

Low Cycle Fatigue Behavior of Casting A319 Alloy under Two Different Aging Conditions

D.D. Tian, X.S. Liu, G.Q. He, Y. Shen, S.Q. Lv, Q.G. Wang



PII: S0921-5093(15)30726-7
DOI: <http://dx.doi.org/10.1016/j.msea.2015.12.023>
Reference: MSA33106

To appear in: *Materials Science & Engineering A*

Received date: 21 September 2015
Revised date: 8 December 2015
Accepted date: 11 December 2015

Cite this article as: D.D. Tian, X.S. Liu, G.Q. He, Y. Shen, S.Q. Lv and Q.G. Wang, Low Cycle Fatigue Behavior of Casting A319 Alloy under Two Different Aging Conditions, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2015.12.023>

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.

Low Cycle Fatigue Behavior of Casting A319 Alloy under Two Different Aging Conditions

D.D. Tian^{1*}, X.S. Liu¹, G.Q. He¹, Y. Shen¹, S.Q. Lv¹, Q.G. Wang²

¹ *School of Materials Science and Engineering, Tongji University, Shanghai Key Laboratory for R&D and Application of Metallic Functional Materials, Shanghai 201804.*

² *Gen Motors Co, Mat Technol, Global Powertrain Engrn, Pontiac, MI 48340 USA.*

*To whom correspondence should be addressed, Tel: (021)69585263, E-mail: 13ddtian@tongji.edu.cn

ABSTRACT

To determine the influence of peak- and over-aging on low-cycle fatigue (LCF) behavior of casting A319 alloy, the strain controlled low-cycle fatigue tests was studied at room temperature under different total strain amplitudes. At lower total strain amplitudes (0.2%-0.3%), the A319 alloy presented initial cyclic hardening and then, steady stage and cyclic softening; while at higher total strain amplitudes (0.35%-0.4%), it presented continuous hardening in the peak-aged specimens and constant softening in the over-aged specimens. At a given total strain amplitude, the hysteresis loops in the peak-aged specimens were relatively narrower than those in the over-aged specimens. The fatigue life of the peak-aged samples was higher than that of the over-aged samples at any given total strain amplitude. Fractographic morphology indicated that the size of the fatigue crack propagation zone at peak-aged condition was larger than that at over-aged treatment. The crack characteristic in the propagation region and the fast fracture zone also showed some differences between two aging conditions.

Keywords: A319 aluminum alloy, low cycle fatigue, peak-aging, over-aging, fracture morphology, fatigue life

1. Introduction

In recent years, Al-Si casting alloys have been widely used in automotive and rail transportation industries as important lightweight constructional materials because of their good castability, low density, low shrink rate, and relatively high specific strength, such as automobile piston, wheel, cylinder, transmission housing and arm bolster of maglev train, etc [1,2,3]. As most of those structural components are often subjected to cyclic loading, fatigue properties of these cast aluminum alloys is critical

Download English Version:

<https://daneshyari.com/en/article/7975547>

Download Persian Version:

<https://daneshyari.com/article/7975547>

[Daneshyari.com](https://daneshyari.com)