

Accepted Manuscript

The transition from micro- to macrocrack growth in compacted graphite iron subjected to thermo-mechanical fatigue

V. Norman, P. Skoglund, D. Leidermark, J. Moverare

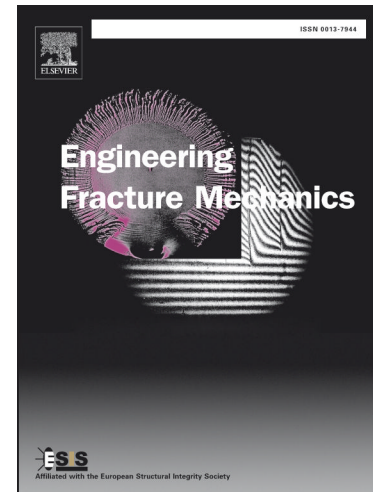
PII: S0013-7944(17)30626-4
DOI: <https://doi.org/10.1016/j.engfracmech.2017.10.017>
Reference: EFM 5720

To appear in: *Engineering Fracture Mechanics*

Received Date: 19 June 2017
Accepted Date: 20 October 2017

Please cite this article as: Norman, V., Skoglund, P., Leidermark, D., Moverare, J., The transition from micro- to macrocrack growth in compacted graphite iron subjected to thermo-mechanical fatigue, *Engineering Fracture Mechanics* (2017), doi: <https://doi.org/10.1016/j.engfracmech.2017.10.017>

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.



The transition from micro- to macrocrack growth in compacted graphite iron subjected to thermo-mechanical fatigue

V. Norman^{a,*}, P. Skoglund^{a,b}, D. Leidermark^c, J. Moverare^a

^a*Division of Engineering Materials, Department of Management and Engineering, Linköping University, SE-58183 Linköping, Sweden*

^b*Scania CV AB, Materials Technology, SE-15187 Södertälje, Sweden*

^c*Division of Solid Mechanics, Department of Management and Engineering, Linköping University, SE-58183 Linköping, Sweden*

Abstract

The complete fatigue process involving the growth of microstructurally small fatigue cracks prior to macrocrack initiation and the subsequent large crack propagation in notched compacted graphite iron, EN-GJV-400, specimens subjected to thermo-mechanical fatigue has been investigated. It is shown that microcracks are initiated at graphite tips within an extended volume at the notch which eventually leads to an abrupt microcrack coalescence event. As a macrocrack is generated in this way, the crack growth switches to conventional characteristics which is assessed in terms of elasto-plastic fracture mechanics parameters. Consequently, two important implications regarding lifetime assessment are identified; possible underestimation due to (i) how the stress is evaluated in view of the spacial distribution of microcracking and (ii) the crack retardation effect associated with the crack growth transition.

Keywords: Cast iron, Notches, Delta J, Crack tip opening displacement, Life prediction

1. Introduction

Due to increasing demands on sustainability exerted by the market and society, heavy-vehicle engine manufacturers are enforced to increase the

*Corresponding author. Phone: 0046 13 284695

Email address: viktor.norman@liu.se (V. Norman)

Preprint submitted to Elsevier

October 20, 2017

Download English Version:

<https://daneshyari.com/en/article/7169322>

Download Persian Version:

<https://daneshyari.com/article/7169322>

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