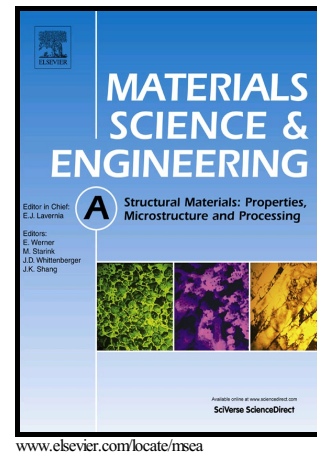


Author's Accepted Manuscript

Micromechanics of multiaxial plasticity of DP600:
Experiments and microstructural deformation
modeling

Shipin Qin, Ross McLendon, Victor Oancea,
Allison M. Beese



PII: S0921-5093(18)30297-1
DOI: <https://doi.org/10.1016/j.msea.2018.02.078>
Reference: MSA36165

To appear in: *Materials Science & Engineering A*

Received date: 10 January 2018
Revised date: 19 February 2018
Accepted date: 20 February 2018

Cite this article as: Shipin Qin, Ross McLendon, Victor Oancea and Allison M. Beese, Micromechanics of multiaxial plasticity of DP600: Experiments and microstructural deformation modeling, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.02.078>

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.

Micromechanics of multiaxial plasticity of DP600: experiments and microstructural deformation modeling

Shipin Qin¹, Ross McLendon², Victor Oancea², and Allison M. Beese^{1,*}

¹ Department of Materials Science and Engineering, Pennsylvania State University,

University Park, PA 16802

² Dassault Systemes SIMULIA Corp., Johnston, RI 02919

*Corresponding author: amb961@psu.edu

Abstract

Multiaxial plasticity behavior of Dual Phase (DP) 600 steel was evaluated through macroscopic testing and predicted through both continuum and micromechanics simulations. The stress state dependent mechanical properties of the material were examined through multiaxial loading under five stress states. The proposed continuum plasticity model was found to accurately predict the multiaxial mechanical response of the material through macroscopic simulations. The microstructure of DP600 contains a relatively soft ferrite matrix and relatively hard martensite particles, suggesting a more complex deformation behavior at the microscale compared to single phase materials. To understand the deformation mechanisms, a representative volume element (RVE) model based on the observed microstructures was built, which was able to predict the macroscopic multiaxial plasticity behavior of the material from the microstructural level. The local deformation inhomogeneity and stress states were also examined through this RVE model. The simulation results showed that in the DP steel studied, closely situated martensite particles

Download English Version:

<https://daneshyari.com/en/article/7972893>

Download Persian Version:

<https://daneshyari.com/article/7972893>

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