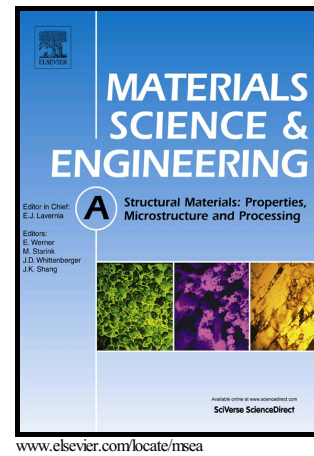


# Author's Accepted Manuscript

Stability of retained austenite in martensitic high carbon steels. Part II: Mechanical stability

Wen Cui, Marius Gintalas, Pedro E.J. Rivera-Diaz-del-Castillo



PII: S0921-5093(17)31429-6  
DOI: <https://doi.org/10.1016/j.msea.2017.10.103>  
Reference: MSA35706

To appear in: *Materials Science & Engineering A*

Received date: 18 August 2017  
Revised date: 27 October 2017  
Accepted date: 29 October 2017

Cite this article as: Wen Cui, Marius Gintalas and Pedro E.J. Rivera-Diaz-del-Castillo, Stability of retained austenite in martensitic high carbon steels. Part II: Mechanical stability, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2017.10.103>

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.

# Stability of retained austenite in martensitic high carbon steels. Part II: Mechanical stability

Wen Cui, Marius Gintalas, Pedro E.J. Rivera-Diaz-del-Castillo\*

*SKF University Technology Centre, Department of Materials Science and Metallurgy, University of Cambridge, 27 Charles Babbage Road, Cambridge, CB3 0FS, UK*

---

## Abstract

The mechanical stability of retained austenite is explored in martensitic bearing steels under cyclic compressive stresses up to  $\sim 10^6$  cycles at 3 GPa, combining X-ray diffraction and repetitive push testing. Finite element analysis and hardness testing were adopted to interpret the stress distribution across the specimen, and the stress-strain response was revealed. Austenite decomposition was observed for all samples regardless of the difference in their chemical composition and volume percentage. The decomposition is partial and a significant amount of austenite could be retained even after  $\sim 10^6$  stress cycles. A scenario revealing different stages of retained austenite behaviour under compressive stresses has been established. It is observed that retained austenite first decomposes during the first tens of cycles and at  $10^3$  cycles, whilst it remains stable at cycles ranging  $10^2$ – $10^3$  and after  $10^4$ . More importantly, results show the potential TRIP effect of retained austenite decomposition on dynamic hardening of bearing steels.

*Keywords:* Martensitic steel, Austenite stability, Work hardening, Fatigue test, Mechanical properties

---

## 1. Introduction

Retained austenite present in steels could decompose during plastic deformation, resulting in transformation-induced plasticity (TRIP) effect which not only enhances steel strength

---

\*Corresponding author

*Email address:* p.rivera1@lancaster.ac.uk (Pedro E.J. Rivera-Diaz-del-Castillo)

Download English Version:

<https://daneshyari.com/en/article/7974395>

Download Persian Version:

<https://daneshyari.com/article/7974395>

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