

Microstructure-Mechanical Property Relationship
and Austenite Stability in Medium-Mn TRIP steels:
The Effect of Austenite-Reverted Transformation
and Quenching-Tempering Treatments

Z.C. Li, H. Ding, R.D.K. Misra, Z.H. Cai



PII: S0921-5093(16)31400-9
DOI: <http://dx.doi.org/10.1016/j.msea.2016.11.048>
Reference: MSA34374

To appear in: *Materials Science & Engineering A*

Received date: 20 October 2016
Revised date: 11 November 2016
Accepted date: 12 November 2016

Cite this article as: Z.C. Li, H. Ding, R.D.K. Misra and Z.H. Cai
Microstructure-Mechanical Property Relationship and Austenite Stability in
Medium-Mn TRIP steels: The Effect of Austenite-Reverted Transformation and
Quenching-Tempering Treatments, *Materials Science & Engineering A*
<http://dx.doi.org/10.1016/j.msea.2016.11.048>

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.

**Microstructure-Mechanical Property Relationship and Austenite
Stability in Medium-Mn TRIP steels: The Effect of
Austenite-Reverted Transformation and Quenching-Tempering
Treatments**

Z.C. Li^{1,2}, H. Ding^{1*}, R.D.K. Misra^{2*}, Z.H. Cai¹

¹School of Materials Science and Engineering, Northeastern University, Shenyang, 110819, China

²Laboratory for Excellence in Advanced Steel Research, Department of Metallurgical, Materials and Biomedical Engineering, University of Texas at El Paso, El Paso, TX 79968, USA

dinghuaneu@163.com

dmisra2@utep.edu

*Corresponding author:

Abstract

In the present study, we fundamentally explore the reasons underlying differences in mechanical properties in hot-rolled 0.2C-1.6Al-6.1Mn-Fe TRIP steels subjected to different heat treatments. Comparing with austenite reverted transformation annealing (ART) process, quenching and tempering (Q&T) process was effective in obtain excellent mechanical properties. [Q&T (UTS: 902-1235 MPa, TEL: 18-42%); [ART (UTS: 885-945 MPa, TEL: 13-28%)]. In the ART process, long time annealing led to excessive C and Mn enrichment in austenite, which rendered austenite too stable and deteriorated TRIP effect. Furthermore, long time annealing reduced dislocation density and led to low work-hardening rate. The Q&T process enabled appropriate enrichment of elements and hence desired stability for significant TRIP effect to be observed. Thus, the steel quenched from 625 °C exhibited best combination of mechanical properties (UTS: 1038 MPa, TEL: 42%, UTS × TEL: 43.6 GPa%)

Download English Version:

<https://daneshyari.com/en/article/5456394>

Download Persian Version:

<https://daneshyari.com/article/5456394>

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