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A.J. Kaijalainen, P.P. Suikkanen, L.P. Karjalainen,  
D.A. Porter



PII: S0921-5093(15)30725-5  
DOI: <http://dx.doi.org/10.1016/j.msea.2015.12.030>  
Reference: MSA33113

To appear in: *Materials Science & Engineering A*

Received date: 3 September 2015  
Revised date: 4 December 2015  
Accepted date: 11 December 2015

Cite this article as: A.J. Kaijalainen, P.P. Suikkanen, L.P. Karjalainen and D.A. Porter, Influence of Subsurface Microstructure on the Bendability of Ultrahigh Strength Strip Steel, *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2015.12.030>

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# Influence of Subsurface Microstructure on the Bendability of Ultrahigh-Strength Strip Steel

A.J. Kaijalainen<sup>1</sup>, P.P. Suikkanen<sup>2</sup>, L.P. Karjalainen<sup>1</sup> and D.A. Porter<sup>1</sup>

<sup>1</sup> Centre for Advanced Steels Research, University of Oulu, P.O. Box 4200, 90014 Oulu, Finland

<sup>2</sup> SSAB Europe, P.O. Box 93, 92101 Raahe, Finland

Corresponding author: antti.kaijalainen@oulu.fi

Emails: antti.kaijalainen@oulu.fi, pasi.suikkanen@ssab.com, pentti.karjalainen@oulu.fi, david.porter@oulu.fi

## ABSTRACT

The bendability of thermomechanically rolled and direct-quenched martensitic – bainitic ultrahigh-strength steels can be very anisotropic. Unlike in most steels, it can be good when the bend axis is parallel to the rolling direction but poor when the bend axis is perpendicular to the rolling direction as a result of shear band formation. This paper shows how bendability can be significantly improved and made more isotropic by modifying the subsurface microstructure to include a relatively soft polygonal ferrite and granular bainite layer. It is shown that the thickness of this layer should be at least 300  $\mu\text{m}$  to prevent shear band formation and thereby improve bendability during transverse bending. The results are interpreted in terms of the opposing effects of geometric softening and the strain hardening of the different subsurface microstructures. The role of subsurface shear texture in explaining the anisotropic nature of geometric softening and shear band formation is discussed.

**KEYWORDS:** Austenite deformation; direct quenching; bendability; texture; strain localization; hardness;

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ANTTI KAIJALAINEN, Ph.D. Candidate, L. PENTTI KARJALAINEN, Emeritus Professor, and DAVID A. PORTER, Professor, are with the Centre for Advanced Steels Research, University of Oulu, P.O. Box 4200, 90014 Oulu, Finland. PASI SUIKKANEN, Ph.D., Development Manager is with SSAB Europe, P.O. Box 93, 92101 Raahe, Finland.

Contact email: antti.kaijalainen@oulu.fi

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