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# Orientation dependence of static vs. dynamic recovery in Interstitial Free steel deformed in torsion

Leo A.i. Kestens<sup>\*1,2</sup>, Estefania Sepulveda Hernandez<sup>1,3</sup>, Sai Vikas Chalamalasetty<sup>2</sup>, Konstantina Traka<sup>2</sup>, Tuan Nguyen-Minh<sup>1</sup>, Felipe Castro Cerda<sup>3</sup>, Beatriz Lopez<sup>4</sup>, and Kees Bos<sup>2,5</sup>

<sup>1</sup>Ghent University – Belgium

<sup>2</sup>Delft University of Technology – Netherlands

<sup>3</sup>Universidad de Santiago de Chile [Santiago] – Chile

<sup>4</sup>CEIT and Tecnun – Spain

<sup>5</sup>Tata Steel – Netherlands

## Abstract

Most theories on the formation of recrystallization textures in steel have been developed and validated for the case of flat rolling followed by (isothermal) annealing. At this conference our research group presents a detailed study on the dependence of the recovery structure in IF steel on the rolling temperature (cold vs. warm rolling case). By statistically post-processing the EBSD images in terms of local orientation gradients, it was found in this study that the static recovery after cold deformation and annealing does not reduce the level of plastically stored energy to the same extent as observed in the warm rolled samples. In the present paper the experimental and modeling results of the work on these rolled samples are compared to the observations obtained for a very similar IF steel but deformed under torsion instead of rolling. To this purpose an IF steel sample was given (an) average true torsion strain of 1.38 at room temperature, 100°C and 300°C so as to obtain samples that can be compared to the reference condition of cold and warm rolled sheet. The results on the torsion samples exhibit qualitatively similar tendencies compared to the rolled samples. These observations are of significance with respect to the orientation selection during static recrystallization.

**Keywords:** Rolling, Torsion, Dynamic Recovery, Static Recovery, Stored Energy Gradient, Deformation Substructure

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\*Speaker