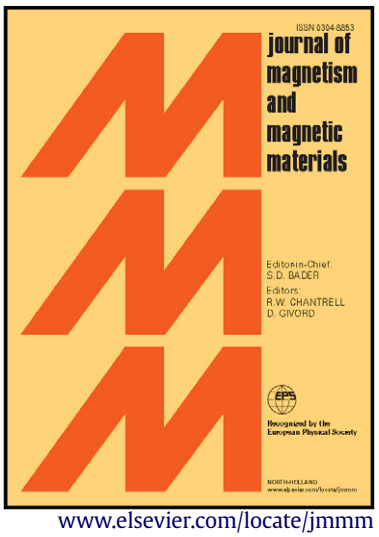

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Effect of Asymmetric Hot Rolling on Texture, Microstructure and Magnetic Properties in a Non Grain Oriented Electrical Steel

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Abstract

In this study, both asymmetric hot rolling (AHR) and conventional hot rolling (CHR) were carried out to study the effect of the hot rolling conditions on the evolution of the texture and microstructure in a non grain oriented (NGO) steel. The microstructure and texture in the subsequent processing stages were characterized and related to the final magnetic properties. The results show that AHR, compared with CHR, tends to homogenize texture through thickness of the hot band strips. AHR results in a higher fraction of the θ-fibre ({001}<uvw>) and a lower fraction of the γ-fibre ({111}<uvw>) in the hot band strips, which are favourable features in relation to the magnetic properties of the strip. However, the favourable features observed in hot rolled AHR strips are eliminated after cold rolling and annealing. Contrarily, the required θ-fibre is decreased and the unwanted γ-fibre is intensified in the AHR sheet after cold rolling and their strength is maintained in the subsequent process steps. On the other hand, AHR does not produce a discernible change in the grain size in the hot band annealed strip and in the final annealed sheet. Except that the magnetic anisotropy in the AHR is improved after skin pass and extra annealing as the result of the redistribution of the texture components within the θ-fibre, no significant improvement of the magnetic properties as a direct consequence of the application of asymmetric hot rolling has been observed under the current AHR experimental conditions.

Keywords: Asymmetrical rolling; Texture; Magnetic Properties; Non Grain Oriented Electrical Steel