The effect of processing route and parameters on microstructure and texture of ferritic stainless steel

Antti Kaijalainen*[1], Anna Kisko[1], and Tapani Ylimäinen[2]

[1]Materials and Mechanical Engineering, University of Oulu – Finland
[2]Outokumpu Stainless Oy – Finland

Abstract

The effect of processing route and parameters on the microstructure and texture of stabilized high-Cr ferritic stainless steel EN 1.4509 was investigated. The initial hot-rolled steel sheet was studied with the various combinations of hot band annealing, cold rolling (35% and 70%) and annealing temperature (910 ∘C and 980 ∘C). The aim of the study was to optimize these parameters to increase cost-efficiency, reduce annealing temperatures, and enhance energy efficiency. The texture and microstructure of the steel sheets were characterized using electron backscatter diffraction (EBSD) technique at the (sub)surface and centreline. Texture and microstructural studies showed that the processing parameters affect the final steel sheet properties. The initial hot-rolled sample at the centreline mainly contained _˜{554}, _˜{001}, _˜{112} and _˜{112} texture components. Hot band annealing effects to the formed texture, since weaker a- and g- fibres and texture component of _˜{001} were detected. After cold rolling, sharper and more intense a- andg- fibres were observed at the (sub)surface and centreline. An increase in cold rolling reduction led to the increased intensities of texture components. It was also noticed that annealing at 910 ∘C was insufficient to obtain a fully recrystallized microstructure for 70% cold-rolled samples despite hot band annealing.

Keywords: high, Cr ferritic stainless steel, hot rolling, cold rolling, rolling texture, microstructure

*Speaker