

Heat treatment strategies for hot-rolled and cold-rolled medium-Mn sheet steels

Corresponding author:

Adam Grajcar, adam.grajcar@polsl.pl, Silesian University of Technology

Co-authors:

Mateusz Morawiec, Adam Skowronek, Jakub Dykas

Abstract:

Heat treatment strategies for advanced high-strength medium-Mn sheet steels are addressed. A review of the available thermal cycles for cold-rolled and hot-rolled sheets are presented. The benefits from the intercritical annealing following hot-rolling or cold-rolling are emphasized. The examples of intercritical annealing for the hot-rolled sheets of initial martensitic microstructure are provided. The heat treatment was performed in a temperature range of 680-720°C for various times from 1 to 5 hours. The material used in the experiment was a medium-Mn steel containing 0.16% C, 4.7% Mn, 1.6% Al, 0.2% Mo, 0.2% Si. The scope of the research included dilatometer tests, hardness tests and microstructural characterization. The effects of temperature and time on a stabilization of retained austenite are assessed. Intercritical annealing performed at 700 and 680°C allowed forming some stable retained austenite in the microstructure. Moreover, some coiling simulations for hot-rolled strips are described.

Key words:

Medium-Mn steel, intercritical annealing, hot-rolled steel, retained austenite