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Use of Molybdenum for Recrystallization Control and Microstructure Development in Compact Strip Production

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Thermomechanical processing of flat rolled steel products manufactured by the compact strip process is limited by numerous physical constraints. Alloy and process designs are limited by the necessary avoidance of peritectic chemistry, relatively low equalizing furnace temperatures relative to traditional integrated mill methodologies, generally high baseline nitrogen levels, and the constrained balance of static recrystallization during roughing and strain retention during finishing from a reduced slab thickness. Accordingly, molybdenum may be employed as a strategic alloy addition independent of solubility constraints to control both post-recrystallization grain growth during roughing and strain retention of austenite during finish rolling. This contribution details the use of molybdenum in the manufacture of selected high strength low alloy and advanced high strength steel grades with the specific focus of molybdenum effects on austenite recrystallization kinetics during hot rolling and associated product microstructure and performance. Molybdenum is shown as a solute to improve product performance consistency, in part due to its mechanistic independence from both nitrogen variation and solubility considerations. Additional beneficial effects of molybdenum on microalloy carbide precipitation and austenite decomposition are presented within the frame of the compact strip process.

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