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Unlocking Performance: Leveraging Molybdenum for Enhanced Properties and Microstructure in Advanced TMCP-Processed API 5L-X80 Steel Plates

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The investigation into the effect of molybdenum content on rolling parameters and microstructure in API 5L-X80 steel plates, produced via Thermo-Mechanical Control Process (TMCP) combined with accelerated cooling, constitutes a pivotal inquiry in steel metallurgy. Molybdenum, recognized for its potential in augmenting steel's strength and corrosion resistance, serves as the focal point in this study. Through meticulous experimentation, we scrutinize the interplay between varying molybdenum content and critical rolling parameters—such as temperature, speed, and reduction ratio—alongside their resultant impact on microstructural attributes. This exploration extends beyond traditional boundaries, aiming to uncover multifaceted benefits associated with optimal molybdenum content. Such optimization promises enhanced productivity, cost reduction, and equipment depreciation mitigation, presenting significant advantages from the producer's perspective. Furthermore, the study delves into properties enhancement, including improved mechanical strength, toughness, and corrosion resistance, thereby elevating the overall quality of API 5L-X80 steel plates. The research culminates in tangible technical results, indicating that by increasing the molybdenum content to a certain threshold, a notable enhancement in mechanical properties, including tensile strength and hardness, is achieved, thus underscoring the practical significance of optimizing molybdenum content in steel production processes.

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