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Prediction and controlling of strip buckling during industrial continuous annealing process

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During the continuous annealing process in the steel rolling heat treatment procedure, the occurrence of buckling in strip is a common issue, especially in the heating and soaking zones. The lateral distribution of stress state of the annealing strip is the essential factor resulting in the phenomenon. However, accurately predicting it is very difficult. Many factors influence the stress state of strips subjected to industrial continuous annealing processes. Therefore, this paper proposes a stress lateral distribution calculation model for the industrial continuous annealing process, the mechanism of the buckling phenomenon is analyzed, and feasible control means are proposed. The mechanism and influencing factors of strip buckling are discussed in detail. A prediction model of strip buckling position during the continuous annealing process is established. It considers the differences in the stress characteristics of the strip at different positions. This model quantifies the influential factors such as transverse temperature differences, roll geometry, and set tension stress on the occurrence of strip buckling. Moreover, an online "Strip Buckling Position Predicting Software" is developed, which not only predicts the potential buckling positions but also provides feasible solutions. The software provides a theoretical basis for the intelligent continuous annealing process and the development of new steel grades.

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