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A Study on reducing the dispersion of the mechanical properties of hot coils through the dynamic adjustment of the coiling temperature

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The mechanical properties are the most basic quality of the hot strip products. Normally, the mechanical properties are gained with the design of chemical composition and the control of the process factors such as finish rolling delivery temperature (FDT), strip speed, cooling rate, coiling temperature (CT), and so on. These factors are not dynamically adjusted in the conventional system, and we should frequently change them based on the result of the statistical analysis in case the defect happens continually. However, there is a steel grade with the dispersed mechanical properties. In this case, it is not easy to improve the defect with the conventional method.

In this study, thus, we devise how to adjust the coiling temperature dynamically in order to reduce the dispersion of the mechanical properties. Throughout the big data method, we first derived a prediction model utilizing various factors including chemical compositions, temperatures, specific heat, and so on. In the middle of the rolling, the mechanical properties are predicted with the derived prediction model and the actual values. Then, it is determined how much the CT should be adjusted to meet the mechanical property requirement. In hot rolling, the prediction accuracy must be not high compared with that in cold rolling. However, it is shown that through the dynamic adjustment of the CT, the dispersion of the mechanical properties can be reduced and it can contribute to improve the defect.

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