Hot deformation behavior and Hansel–Spittel constitutive model of Cr5 alloy for heavy backup roll

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ABSTRACT

The heavy backup roll is a key component in large steel rolling production line, as it supports the work roll to prevent any excessive deflection. The backup rolls are traditionally produced by large-scale forging process. To accurately describe the high-temperature flow behavior of a newly developed roll material Cr5 alloy for numerical forging simulation, a thermal simulation testing machine, Gleeble-1500D, is used in this work. The isothermal compression experiments are carried out to study the flow behavior of Cr5 alloy at temperature range of 900–1200°C, and strain rate range of 0.005–5 s⁻¹. Hansel–Spittel model is thus used to establish the constitutive equation of the material under hot deformation. The accuracy of the constitutive equation is analyzed by using correlation coefficient r. The validation shows that this equation can accurately predict the thermal deformation behavior Cr5 alloy.

KEYWORDS: Cr5 alloy steel, hot deformation, Hansel–Spittel model, dynamic recrystallization