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## **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<sup>-1</sup>. 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