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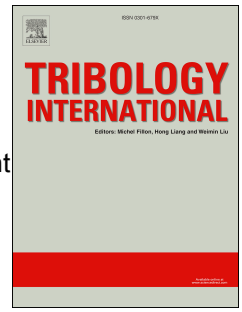

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Microstructure and wear properties of high-speed steel with high molybdenum content under rolling-sliding wear

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Abstract: This paper focuses on the microstructures and frictional wear behaviors of high-speed steel (HSS) with high molybdenum content under different rolling-sliding conditions using self-made wear tester. Results showed that the molybdenum element in HSS mainly formed M_2C-type carbide ($(Fe_{27.42}Mo_{48.26}Cr_{24.32})_2C$). M_2C (21-1) is coherent with α-Fe (110). The sliding ratio has a significant influence on frictional wear behaviors. As sliding ratio increases from approximately 1% to 10%, the frictional coefficient rises and then decreases, and the wear weight loss rises obviously because the wear mode varies from fatigue to sliding wear. The high stress rolling-sliding contact can cause not only fracture and desquamating of M_2C, but also martensitic transformation in subsurface. The martensitic transformation contributes in improving hardness and wear resistance.

Key words: High-speed steel, Molybdenum carbide, Rolling-sliding, Wear failure

1. Introduction

The materials used for work rolls are continually innovated with the development of steel-rolling technology. Forged steel that contains approximately 1.8% Cr and 1% C is the initial basic