

Accepted Manuscript

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PII: S0301-679X(17)30334-1

DOI: [10.1016/j.triboint.2017.07.002](https://doi.org/10.1016/j.triboint.2017.07.002)

Reference: JTRI 4807

To appear in: *Tribology International*

Received Date: 20 April 2017

Revised Date: 28 June 2017

Accepted Date: 2 July 2017

Please cite this article as: Xu L, Fan X, Wei S, Liu D, Zhou H, Zhang G, Zhou Y, Microstructure and wear properties of high-speed steel with high molybdenum content under rolling-sliding wear, *Tribology International* (2017), doi: 10.1016/j.triboint.2017.07.002.

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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

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