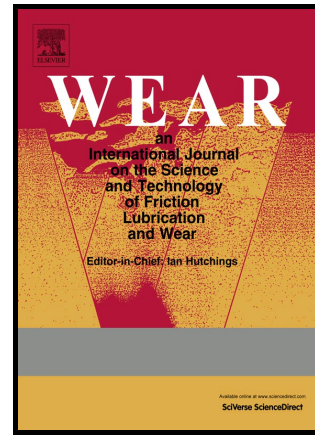


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Case Study: The effect of running distance on the microstructure and properties of railroad axle bearings

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Key words: Bearing steel; fracture toughness; gradient structure; grain refinement

Abstract

As a key component, axle bearings play an important role in transmission systems. Motivated by the rapid growth of railway network and the significance of bearing safety, we report here how different operating duration may alter the macroscopic and microscopic mechanical property of high speed train axle bearing's outer ring made of GCr15 steel, a high-carbon chromium bearing steel known for its superb contact fatigue resistance, good dimensional stability and excellent corrosion resistance. We characterized the structural and mechanical properties of the load carrying zone at operating duration of new, 1.2 Mkm and 2.4 Mkm bearing. In contact to the as-received ones, the outer ring samples show clear grain refinement, exhibit inhomogeneous hardness distribution and show a decrease of about 42% for the tensile elongation after 2.4 Mkm operation.

1 Introduction

Bearings are ubiquitous in industrial machinery. They are widely used to transmit rotary motion and support radial and thrust loads. As a result, their reliability is crucial

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