Special Issue

Thermal Fatigue Behavior of Roller Steel

Message from the Guest Editor

Rolling is one of the most important bulk forming technologies. Rollers are thermally fatigued over numerous cycles due to the high temperatures attained during contact with hot workpieces and subsequent water spray cooling.

There has been much debate about the thermal fatigue of roller steel and inconsistencies during testing. Although the pathways to results are often not comparable, the investigation of damages and surface-layer degradation characterization tell similar stories. It is often found that crack nucleation, crack propagation (growth), their linking and subsequent material spalling, as well as material oxidation are related to the microstructure and more specifically to the properties of carbides present in roller steel. Studies of complex phenomena linking nucleation, growth, and oxidation and their interlinked effects leading to surface-layer damage based on observations provide a better understanding of degradation mechanisms and their temperature-related intensity. This is considered to be of fundamental importance and of technological industrial relevance.

Guest Editor

Dr. David Bombac

Faculty of Natural Sciences and Engineering, University of Ljubljana, Ljubljana, Slovenia

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Metals
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
metals@mdpi.com

mdpi.com/journal/metals

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Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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