Contribution ID: **18** Type: **Oral Presentation**

Wear and Thermal-fatigue corrosion behaviour of Indefinite Chill Irons and Graphitic High Speed Steel for rolls

Tuesday, 10 September 2024 09:00 (40 minutes)

Wear and Thermal fatigue (TF) cracking represent very important damage mechanism in hot rolls.
The tribological contact between the roll surface and the hot strip causes wear, characterized by the loss of materials, as well as deterioration of surface finishing. Friction also plays an important phenomenon affecting the surface quality of rolls. The authors' experience learns that the microstructure of roll materials as Indefinite Chill Irons and Graphitic High Speed Steel can be tailored to minimize wear, and improve the service behaviour of hot rolls. Some important results concerning the influence of hardness, carbide fraction and type will be presented in this work.
The cyclic thermal exposure of roll surface combined with the deformation constrained by the core at different temperature, cause the formation of a crack network, which deteriorates surface finishing. The presence of corrosive agents in cooling water (e.g. chlorides) may interact with thermal fatigue, enhancing damage. In this review, the effect of corrosion on TF behavior of IC Irons and Graphitic HSS has been evaluated. It is confirmed that TF resistance of tested materials mostly depends on Carbide Volume Percentage. TF damage of IC Irons is influenced by cooling water compositions: increments of steady-state propagation rate due to 500ppm chlorine water vary between 10 to 35%. Graphite particles are preferential crack nucleation sites, while crack propagation follows eutectic carbide and carbide-matrix interface. The presence of 500ppm chlorine water led to pitting, interdendritic corrosion at the eutectic carbide/matrix interface, and intergranular corrosion. Corrosion promotes both, crack nucleation and propagation.

Speaker Country

Italy

Summary

the effect of corrosion on TF behavior of IC Irons and Graphitic HSS has been evaluated. It is confirmed that TF resistance of tested materials mostly depends on Carbide Volume Percentage. TF damage of IC Irons is influenced by cooling water compositions: increments of steady-state propagation rate due to 500ppm chlorine water vary between 10 to 35%.

Primary authors: PELLIZZARI, Massimo (University of Trento, Dpt. Industrial Engineering); Dr MARTINI, Francesco (University of Trento); Dr ELIZONDO, Leonel (Eisenwerk Sulzau Werfen (ESW), R&E Weinberger AG); Dr AIGNER, Michael (Eisenwerk Sulzau Werfen (ESW), R&E Weinberger AG)

Presenter: PELLIZZARI, Massimo (University of Trento, Dpt. Industrial Engineering)

Session Classification: Plenary Talk

Track Classification: Deterioration of rolls and its countermeasure