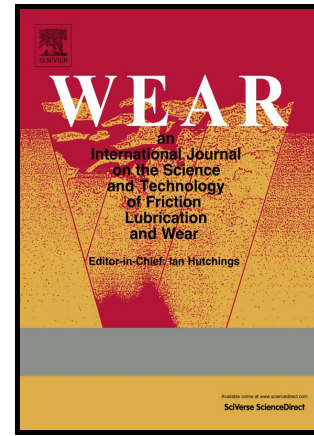


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of slag pots operating in steel production

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Thermal effects on wear and material degradation of slag pots operating in steel production

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Abstract

Slag pots are commonly used for the transportation of liquid slag from steel mills to slag dumps. A detailed failure analysis of slag pots is required to determine effects limiting their lifetime. Temperatures measurements were implemented throughout an ongoing operation to quantify thermal loading. Different microscopy methods, cross sectional analyses and hardness measurements were performed on a slag pot after prolonged usage. Material degradation mechanisms, wear and deformations found during and after slag pot operation were compared to performed finite element simulations of one transport cycle. Special focus was placed on weaknesses of the current design.

This study addresses thermal effects on wear, failure and degradation mechanisms present at slag pots. Additionally, attempts for specific solutions will be proposed. Results indicate that thermal shocks and oxidation lead to material degradation, which alongside the thermally induced deformation of the pot shape reduce the overall lifetime. Layers of solidified slag inside the pots further cause severe abrasive wear on the inner pot walls during the discharging procedure.

Keywords: High temperature, abrasive wear, thermal effects, tribology, finite element modelling, surface analysis

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