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Failure caused by multiple mechanisms that produce a premature localized wear of a steel ladle slag line

Elena Brandaleze and Edgardo Benavidez

High Temperature Physicochemistry Group, Metallurgy Department, Universidad Tecnológica Nacional-FRSN-DEYTEMA, Argentina

A post mortem MgO-C brick of a steel ladle (slag line) was studied to identify the main causes of a localized wear, produced at initial taps. The extreme low thickness of the lining provokes ladle removed from service. In addition, slag infiltration into the upper horizontal joint promotes corrosion. The slag line presents cracks with a propagation pattern considerably parallel to the hot face. In order to identify the wear mechanisms, the results of the postmortem study were compared with information of the characterization of one brick without use. The characterization includes: chemical composition determination, crystalline phases identification through XRD, microstructural study carried out by optical microscopy and scanning electron microscopy. The thermal behaviour was determined by thermal analysis techniques (DTA-TG-DSC). The results are correlated with a thermodynamic simulation applying FactSage, at industrial conditions. It was possible to clarify the reactions and transformations that caused lining degradation.

Biography

Doctor in Engineering. Head of the Metallurgy Department - Universidad Tecnológica Nacional – Facultad Regional San Nicolás, Argentina. Vice-Director of the Materials Center DEYTEMA. Director of the research groups: “Process Technology” and “High Temperature Physicochemistry” of UTN-FRSN.

ebrandaleze@frsn.utn.edu.ar