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Impact of elevated phosphorus content in hot metal on crude steel quality and the phase formation of slag

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In steelmaking, the phosphorus content of the hot metal is an important input parameter which can have a direct impact on the quality of the produced steel. Due to the diminishing quality of iron ore deposits, it can be assumed that the input of phosphorus into the blast furnace will increase in the future. For this reason, there is a need to develop effective phosphorus slagging strategies for the LD converter which acts as the main dephosphorization unit.

Operational trials were carried out at the voestalpine Stahl GmbH production site in Linz, in order to simulate these expected future conditions. In the course of these trials, the phosphorus content of the hot metal was deliberately increased step by step. The effects on the BOF process were recorded and evaluated.

The present paper describes the operational results of these trials. In addition to determining the achieved phosphorus content in the crude steel after special BOF treatment, the mineralogical composition of the formed slags has also been determined using analytical methods, such as LOM, SEM-BSE/EDX and XRD. In a further step, the results of the metallographic analyses are compared with calculations using the FactSage 8.1 software.

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