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Monitoring of blast furnace wall pressure profiles and their relation to process efficiency

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The blast furnace process for Ironmaking is highly optimised and very energy efficient. At the same time due to its dependency on coke, not only as an energy carrier but also as a chemical reductant and provider of gas permeability, it is responsible for high CO2 emissions. Consequently, steel producers search for operation modes, e.g. such as increased share of hydrogen based reduction, to minimise emissions. For such new operational set points, operators have less experience in how to maintain a stable and most efficient process state. Experience at HKM is, that especially in the shaft region of the blast furnace most process instabilities arise from non-optional gas permeability of the burden column and non-uniform burden descend. Such process disturbances can be recognised already in a very early beginning state by careful monitoring of the gas pressures along the shaft wall.

This article explains how to automatically filter measurement readings from such sensors. Then a systematic data analysis is carried out to highlight relations between vertical pressure profiles and performance indicators such as gas utilisation. Finally, an online operation support system is introduced which automatically monitors and analyses the permeability profiles to identify arising issues. Such a system enables operators to rate the current operational risk for permeability disturbances, to prevent control actions which might further decrease the permeability and to decide about appropriate counter measures.

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