Prediction of Trace Elements in Blast Furnace Hot Metal

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Abstract

Molten metal from blast furnace is used as raw material for producing Ductile Iron, which provides better ductility properties than cast iron, due to its nodular graphite inclusions. Trace describes metallic or non-metallic elements that are not specified in the alloy grade, but an acceptable amount can be present without any detrimental effect on the alloy’s performance. For Ductile Iron Pipe manufacturing, few critical trace elements are - Cr, As, etcetera. Raw Materials charged into Blast Furnace are analyzed to determine the chemical composition of the burden and then fed into a mass balance model to estimate the chemistry of output Hot Metal. However, it is not possible to measure amount of trace elements entering into the blast furnace as the measuring instrument does not have sensitive detection limits for most of the trace elements. An alternative approach to understand the impact of input raw materials charged on the output Hot Metal trace element chemistry is suggested. The effect of different raw materials charged in Blast Furnace was studied by analyzing the historical data and a Machine Learning Model was developed to predict the levels of trace elements in Hot Metal, allowing for corrective action in downstream processes.

Keywords
Trace Elements, Blast Furnace, Hot Metal, Ductile Iron Pipe, Machine Learning

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