Reduction in Hot Metal Silicon through Statistical Analysis at G-Blast Furnace, Tata Steel Jamshedpur

Authors : Shoumodip Roy, Ankit Singhania, Santanu Mallick, Abhiram Jha, M. K. Agarwal, R. V. Ramna, Uttam Singh Abstract : The quality of hot metal at any blast furnace is judged by the silicon content in it. Lower hot metal silicon not only enhances process efficiency at steel melting shops but also reduces hot metal costs. The Hot metal produced at G-Blast furnace Tata Steel Jamshedpur has a significantly higher Si content than Benchmark Blast furnaces. The higher content of hot metal Si is mainly due to inferior raw material quality than those used in benchmark blast furnaces. With minimum control over raw material quality, the only option left to control hot metal Si is via optimizing the furnace parameters. Therefore, in order to identify the levers to reduce hot metal Si, Data mining was carried out, and multiple regression models were developed. The statistical analysis revealed that Slag B3{(CaO+MgO)/SiO2}, Slag Alumina and Hot metal temperature are key controllable parameters affecting hot metal silicon. Contour Plots were used to determine the optimum range of levels identified through statistical analysis. A trial plan was formulated to operate relevant parameters, at G blast furnace, in the identified range to reduce hot metal silicon. This paper details out the process followed and subsequent reduction in hot metal silicon by 15% at G blast furnace.

Keywords : blast furnace, optimization, silicon, statistical tools

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