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Achieving Process Stability through Automation and Process Optimization at H Blast Furnace Tata Steel, Jamshedpur

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Abstract : Blast Furnace is a counter current process where burden descends from top and hot gases ascend from bottom and chemically reduce iron oxides into liquid hot metal. One of the major problems of blast furnace operation is the erratic burden descent inside furnace. Sometimes this problem is so acute that burden descent stops resulting in Hanging and instability of the furnace. This problem is very frequent in blast furnaces worldwide and results in huge production losses. This situation becomes more adverse when blast furnaces are operated at low coke rate and high coal injection rate with adverse raw materials like high alumina ore and high coke ash. For last three years, H-Blast Furnace Tata Steel was able to reduce coke rate from 450 kg/thm to 350 kg/thm with an increase in coal injection to 200 kg/thm which are close to world benchmarks and expand profitability. To sustain this regime, elimination of irregularities of blast furnace like hanging, channeling, and scaffolding is very essential. In this paper, sustaining of zero hanging spell for consecutive three years with low coke rate operation by improvement in burden characteristics, burden distribution, changes in slag regime, casting practices and adequate automation of the furnace operation has been illustrated. Models have been created to comprehend and upgrade the blast furnace process understanding. A model has been developed to predict the process of maintaining slag viscosity in desired range to attain proper burden permeability. A channeling prediction model has also been developed to understand channeling symptoms so that early actions can be initiated. The models have helped to a great extent in standardizing the control decisions of operators at H-Blast Furnace of Tata Steel, Jamshedpur and thus achieving process stability for last three years.

Keywords : hanging, channelling, blast furnace, coke
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