

Heat Loss Control in Stave Cooled Blast Furnace by Optimizing Gas Flow Pattern through Burden Distribution

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Abstract : Productivity of Blast Furnace is largely impacted by fuel efficiency and controlling heat loss is one of the enabling parameters for achieving lower fuel rate. 'I' Blast Furnace is the latest and largest Blast Furnace of Tata Steel Jamshedpur with working volume of 3230 m³ and with rated capacity of 3.055 million tons per annum. Optimizing heat losses in Belly and Bosh zone remained major challenge for blast furnace operators after its commissioning. 'I' Blast has installed Cast Iron & Copper Staves cooling members where copper staves are installed in Belly, Bosh & Lower Stack whereas cast iron staves are installed in upper stack area. Stave cooled Blast Furnaces are prone to higher heat losses in Belly and Bosh region with an increase in coal injection rate as Bosh gas volume increases. Under these conditions, managing gas flow pattern through proper burden distribution, casting techniques & by maintaining desired raw material qualities are of utmost importance for sustaining high injection rates. This study details, the burden distribution control by Ore & Coke ratio adjustment at wall and center of Blast Furnace as the coal injection rates increased from 140 kg/thm to 210 kg/thm. Control of blowing parameters, casting philosophy, specification for raw materials & devising operational practice for controlling heat losses is also elaborated with the model that is used to visualize heat loss pattern in different zones of Blast Furnace.

Keywords : blast furnace, staves, gas flow pattern, belly/bosh heat losses, ore/coke ratio, blowing parameters, casting, operation practice

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