Analyses of Pressure drop in High Temperature Zone during Iron Ore Sintering

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ABSTRACT

Permeability and air flow rate in the bed during iron ore sintering is crucial in keeping control over the sinter quality and productivity of a sinter plant, due to its influence on the flame front speed. In the present work the permeability of the bed during sintering was analysed by means of measured pressure and temperature at multiple points in the bed during sintering. Three different zones were categorized i.e. sintered bed, humidified bed, and region of maximum resistance (high temperature zone) based on temperature and the different slope of the pressure curve along the height of the bed. Previous work has shown that the maximum pressure drop during sintering was due to several concurrent physico-chemical processes including dehumidification and calcination of fluxes, dehydroxylation of goethite, combustion of coke and melting of granules (>1200 °C). To quantify the effect of the different process, sintering experiments were conducted in a milli-pot (diameter 53mm, height 500mm) with relatively high spatial resolution of pressure and temperature measurements. Overall, six taps were fitted in the milli-pot with two taps in the upper half at 100mm distance and four taps were fitted in lower half at 50mm distance for better spatial resolution. It was found that in region of maximum resistance, coke combustion contributed to more than 50% of the pressure drop when compared to other processes. The pressure drop contribution of the coke combustion region increased as the coke addition rate increased.

Keywords: Milli-pot, Permeability, Pressure drop, Coke combustion, Region of Maximum Resistance