Steel Dust as a Coating Agent for Iron Ore Pellets at Ironmaking

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Abstract : Cluster formation is an essential phenomenon during direct reduction processes at shaft furnaces. Decreasing the reducing temperature to avoid this problem can cause a significant drop in throughput. In order to prevent sticking of pellets, a coating material basically inactive under the reducing conditions prevailing in the shaft furnace, should be applied to cover the outer layer of the pellets. In the present work, steel dust is used as coating material for iron ore pellets to explore dust coating effectiveness and determines the best coating conditions. Steel dust coating is applied for iron ore pellets in various concentrations. Dust slurry concentrations of 5.0-30% were used to have a coated steel dust amount of 1.0-5.0 kg per ton iron ore. Coated pellets with various concentrations were reduced isothermally in weight loss technique with simulated gas mixture to the composition of reducing gases at shaft furnaces. The influences of various coating conditions on the reduction behavior and the morphology were studied. The optimum reduced samples were comparatively applied for sticking index measurement. It was found that the optimized steel dust coating condition that achieve higher reducibility with lower sticking index was 30% steel dust slurry concentration with 3.0 kg steel dust/ton ore.

Keywords : reduction, ironmaking, steel dust, coating

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