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Optimization of Operating Parameters for Sponge Iron Production Process using Neural Network

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Abstract: In the present study, estimation of optimum input parameters corresponds to desired values of output parameters is carried out for a sponge iron production process. For this purpose two different data sets, Data-1 and Data-2, are collected from a typical sponge iron plant, which correlate the input and output parameters. Data-1 includes temperatures profiles and air inlet at positions, AT-1 to AT-3 and MF-1 and MF-2, inside the kiln whereas, flow rates of iron ore, feed coal, slinger coal and sponge iron is accounted as Data-2. Total sixteen topologies are proposed for each data set to optimize the regression coefficients (R), which are solved through ANN. These topologies are used to identify optimum value of output parameters based on value of R. The values of output parameters meet the process requirements. The % errors observed in industrial values and that predicted through ANN software fall within $\pm 5\%$ for Data-1 and Data-2. Further, a better option is found to compute optimum input parameters correspond to desired output. The analysis predicts optimum input parameters within 4% deviation than that are used in the process.

Keywords: Sponge iron process, Rotary kiln, ANN topologies, Optimum input parameters.

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