

IDENTIFICATION AND CONTROL OF KEY PREDICTOR OF SILICON CONTENT IN HOT METAL USING ARTIFICIAL NEURAL NETWORKS

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Abstract

The production of pig iron involves complicated chemical reactions and causes complex relationships between the various chemicals used. The quality of pig iron varies depending upon the composition of various materials and the parameters like temperature pressure, volume etc when it is tapped from the blast furnace. The relationships among the parameters are nonlinear and difficult to estimate using statistical techniques. An attempt has been made to determine the key predictor of silicon using correlation and was verified using multiple regression method. Finally a neural model was build to predict the silicon content when provided with the values of key predictors. Initially the blast furnace data was collected. Then correlation coefficient was calculated to get the relationship in Silicon content in hot metal and other parameters inside the blast furnace. It is found that the Al_2O_3 and Ash has highest positive correlation coefficient with silicon content in hot metal. Same result was also achieved when stepwise multiple regression was performed. Finally neural network was designed and was trained with the important predictors. The trained network was able to predict the silicon content of hot metal when the important predictors were given.

Keywords: Correlation, Stepwise multiple regression, Artificial neural networks.