Neural Networks and Regression Modeling of Eco-friendly Melting Furnace Parameters using Bio-fuels

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Abstract

Rotary furnaces apart from being pollution efficient can maintain the quality standards set by the present methods of casting. The rising demand for high quality castings necessitates that vast amount of manufacturing knowledge be incorporated in manufacturing systems. Rotary furnace involves several critical parameters like flame temperature, preheat air temperature, revolutions per minute of the furnace, excess air percentage, melting time, fuel consumption and melting rate of the molten metal which should be controlled throughout the melting process. A complex relationship exists between these manufacturing parameters and hence there is a need to develop models which can capture this complex interrelationship and enable fast computation. In this paper the applicability and the relative effectiveness of the artificial neural networks as function approximators for rotary furnace have been investigated. The results obtained by these models are found to correlate well with the experimental data. Results obtained by the regression modeling are also found correlating well with the experimental data. This indicates that NN models and regression models can very well be used to model this complex relationship amongst various parameters in an eco-friendly melting furnace.

References

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Justification of Coke-less Cupola for Pollution Free Casting in Indian Environment with Special Reference to Agra; Indian Foundry Journal, Vol. 46, No. 8, pp. 18-27.


Index Terms

Computer Science          Artificial Intelligence
Keywords

Rotary Furnace  Artificial Neural Networks (ann)  Back-propagation (bp)  Levenberg-Marquardt (lm) Approximation  Regression Modeling