In this paper neuro-fuzzy technique is used for the first time in modeling eco-friendly furnace parameters to predict the melting rate of the molten metal required to produce homogenous and quality castings. The relationship between the process variables (input) viz. flame temperature, preheat air temperature, rotational speed of the furnace dome, percentage of excess air, melting time, fuel consumption and melting rate (output) is very complex and is agreeable to neuro-fuzzy approach. The neuro-fuzzy model has been developed out of training data obtained from the series of experimentation carried out on eco-friendly self designed and developed 200 kg capacity rotary furnace using bio-fuels. The results provided by neuro-fuzzy model compares well with the experimental data. This work has considerable implications in selection and control of process variables in real time and ability to achieve energy and material savings, quality improvement and development of homogeneous properties throughout the casting and is a step towards agile manufacturing.

Index Terms
Neuro-fuzzy Modeling of an Eco-friendly Melting Furnace Parameters using Bio-fuels for the Agile Production of Quality Castings

Computer Science  Artificial Intelligence

Keywords

Neuro-Fuzzy  Rotary Furnace  Bio-fuel  Artificial Neural Network (ANN)  Adaptive Network - based Fuzzy Inference System (ANFIS)

Agile Manufacturing Systems (AMS)