Using Thermal Analysis to Predict the Microstructure of Cast Iron

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ABSTRACT

The thermal analysis of test samples of iron melts has always been the traditional method of predicting the likely microstructure to be found in a grey iron casting produced from the melt. This study was concerned with examining the reliability of existing thermal analysis-based microstructural predictive schemes for nodular graphite cast iron, with a view to determining the effects of minor amounts of impurities upon the microstructure, based on its thermal analysis results. Computer-Aided Thermal Analysis (CATA) has been used to carry out the interpretation process.

The metallurgical process variables studied for their effects on solidification using the CATA technique included nodulizer type and melting additions of Ti, Sb, Pb, Bi and rare-earths (RE). It was found that the thermal analysis results are not only microstructure- (graphite morphology) sensitive, but also nodulizer- and trace element-sensitive. Based on these findings, a predictive scheme of graphite morphology for cast iron melts treated with different nodulizers has been proposed.

The Prediction of the Microstructure of Cast Iron using Thermal Analysis

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USING THERMAL ANALYSIS TO PREDICT THE MICROSTRUCTURE OF CAST IRON

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