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THE QUANTITATIVE EVALUATION OF GRAPHITE DISTRIBUTION IN DUCTILE IRON

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In this work the results of investigations related to the graphite distribution in ductile iron castings has been presented. It has been shown that graphite distribution can be **quantitative determined by the two parameters ie.** area distribution and graphite nodules count distribution. The model covers 3D and 2D space. As part of the present work, special imaging software was developed to evaluate the 2D inhomogeneity of graphite distribution in ductile iron. To evaluate the model, six model structures were selected to reflect the actual structure with different degrees of graphite inhomogeneity: these include very regular and extremely inhomogeneous examples. Moreover it was found that the proposed model could indicate the degree of inhomogeneity irrespective of unimodal or bimodal graphite size distribution. The model was experimentally verified on the example of ductile iron castings with varying wall thicknesses ranging from 3 up to 55 mm. The degree of distribution were positively correlated with casting mechanical properties. In this study, a clear and repetitive relationship between the heterogeneities determined from the proposed model and the measured mechanical properties was revealed. In summary quick evaluation of homogeneity via the description of graphite by the two parameters related to graphite distribution, i.e. graphite area distribution and nodule count distribution has been shown. These numbers complete the overall description of graphite in ductile cast iron next to the number of graphite nodules, the size distribution, graphite nodularity and graphite fraction which is in line with the idea of Foundry 4.0 concept.