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Some features of the ductile and gray iron microstructures providing increase of their impact resistance

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Low impact resistance of the ductile and especially gray irons is well known problem of their performance. Commonly accepted statements concerned with the problem are dominant graphite particle morphology ill effect on the resistance and impossibility to improve the morphology by means of any type of heat treatment. Aim of the report is to outline basic microstructure features for the above industrial pearlite matrix irons in their states with high impact resistance provided by developed novel heat treatment. The treatment comprised typical austenitizing, 2-7 hours isothermal holding at 600-900 °C during cooling or heating and final air-cooling. The ménage impact tests were conducted at room temperature. The results obtained showed considerable increase in the impact strength of both the above optimally heat treated irons (up to KCU~550 kJ/m²) comparing with their conventionally normalized states: KCU ~ 65 kJ/m² and ~ 20 kJ/m², respectively, for the gray and ductile iron. The revealed performance improvements are attributed to the phase transformations preferable development on the hetero-phase interfaces with further cementite decomposition and initial graphite particle partial solution among the ferrite fine grain surroundings. Initial and resulted microstructures of the investigated irons are shown on the figures.

Biography

Igor Tkachenko is Doctor of Technical Science (DSC (Eng)), Professor of Material Science Department of Priazovsky State Technical University (Mariupol, Ukraine). He has over 30 year experience in improving quality and reliability of bulk structural alloy steel industrial products for demanding applications.

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