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The influence of the metallic charge on the solidification of grey irons

The influence of the metallic charge on the shape and on the distribution of the lamellar graphite leaks in the metallic the matrix, represents a very important clue in the modified (with FeSiSr) and of the unmodified grey irons solidification, obtained in an electric induction furnace of medium frequency (8000 Hz) and with a capacity of 8 kilos.

1. Introduction

Starting with the study made on the hypoeutectic grey iron through computer registration of the cooling and of the contraction parameters, in the primary and in the secondary transformation of six charges of hypoeutectic grey irons during the solidification and during the cooling process, we have extended the study in order to determine and to analyze the casting parameters and the structure of the cast iron.

In order to elaborate the grey irons we used an electric induction furnace, of medium frequency (8000 Hz), with a capacity of 8 kilos, starting with three variants of metallic charge (Table 1). The grey irons were casted in study samples in an unmodified state, but also in a modified state. For the modification (inoculation), we used FeSiSr [4], in a quantity of 0.3% of charge.

Table 1

The content of the metallic charge of the electric induction furnace

Charge No.	Charge variant	Modification (Inoculation)	Metallic charge
1	I	Neinoculated	Blast pig iron
2		Inoculated	Grey iron offals Scrape iron (steel) offals
3	II	Neinoculated	Grey iron offals
4		Inoculated	Scrape iron (steel) offals

5	III	Neinoculated	Synthetic pig iron
6		Inoculated	Grey iron offals Scrape iron (steel) offals

2. The results of the experiments

The chemical compositions of the grey irons are presented in Table 1 of the paper [4]. Were, also, are presented in Table 1 (this paper) and in the paper [4] the metallic charge variants and, in the Figure 8 from the paper [4], the metallographic structure were presented, respectively the shape and the distribution of the lamellar separations, of the six charges already studied.

Thus, in Table 2, we show the whitening tendency of the grey irons studied, expressed by the height of structural grey irons on the samples studied and in Figure 1, we can see the graphic presentation of these results.

Table 2

Structural properties of the hypoeutectic grey irons. Whitening tendency [mm]).

Charge variant	Charge No.	Sample height	WI	MI	GI
I	1	55	45	10	-
	2	55	20	5	30
II	3	55	30	25	-
	4	55	8	10	37
III	5	55	5	25	25
	6	55	5	8	42

Table 3

The metallographic structure of the hypoeutectic grey irons

Charge variant	Charge no.	Ferrite	Pearlite	Ledeburite + Carbide
I	1	2	98	10
	2	2	98	-
II	3	-	100	1
	4	-	100	1
III	5	2	98	-
	6	2	98	-

3. Conclusion

Starting with the considerations presented in the paper [4] and considering that all the six charges of grey irons studied are characterized by degrees of saturation (with close chemical composition), the influence of the metallic charge

on the structural characteristics of the unmodified and of the modified (with FeSiSr) grey iron are highlighted by the following:

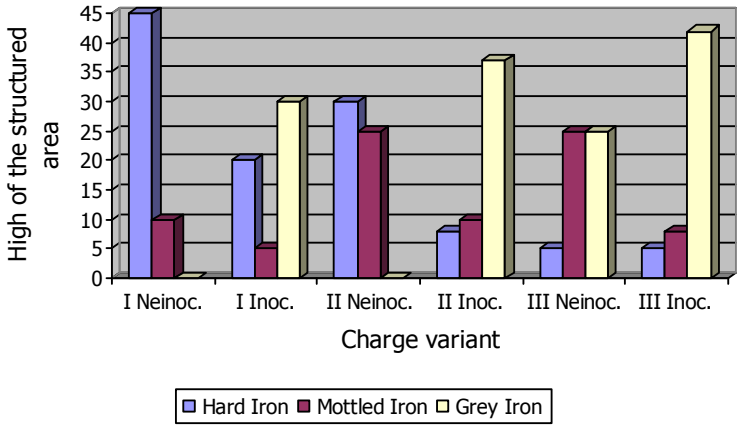

Figure 1. The whitening tendency of the hypoeutectic grey iron. The height of the structural areas, in [mm].

* The grey iron resulted from a charge that contains furnace pig iron, increases its pipe volume through modification, and the are obtained from synthetic pig iron reduces its pipe volume [4].
* Further in the study regarding the metallographic aspect of the matrix of the grey irons studied, the more significant whitening tendency of the unmodified grey iron obtained from the first variant of charge has been highlighted and the less significant, of the modified grey iron obtained from the third variant of charge.
* The modification of the grey irons, obtained from the three variants of charge does determine a reduction of the whitening tendency.
* In spite of all predictions, the presence of the synthetic pig iron in the charge does not increase the whitening tendency of the grey irons produced.
* Regarding the components of the matrix, it is observed that the grey iron charges, unmodified and modified, resulted from charges that contain pig irons *blast furnace, synthetic) present, in concentration, small separations of ferrite (2%) in a matrix that is mainly pearlitic (98%).
* On the other hand, in grey iron, modified and unmodified, obtained from offals of grey irons and steel scrap, together, with a matrix, that is entirely pearlite (100%) are emphasized the minor leaks of ledeburite and cementite .

As a final conclisions, we may say that the influence of the metallic charge on the grey irons, produced in electric induction furnace is highlighted by the graphite separations (shape, size and distribution), by the components of the matrix and also, by the technological properties already studied.

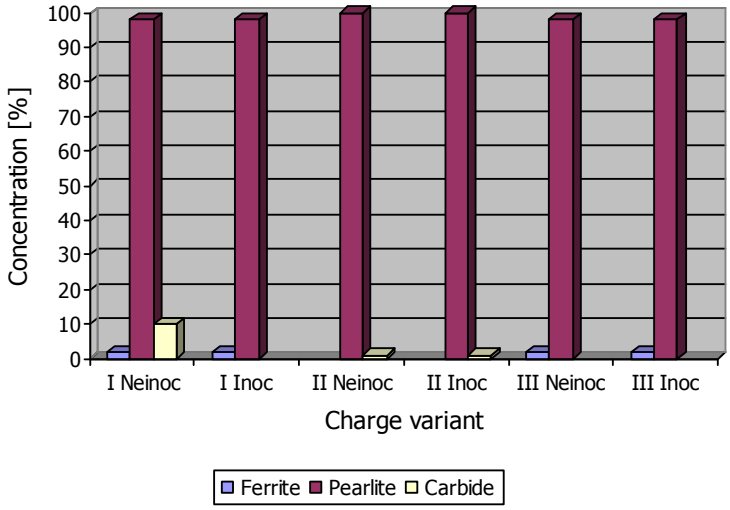

Figure 2. The concentration of the components of the matrix, in hypoeutectic grey irons.

4. References

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