

- mm

Effects of Nucleation on Solidification and Structure of Ductile Iron

- A. Babakhani Lecturer, Dept. of Materials and Metallurgy, Faculty of Eng.
Ferdowsi University of Mashhad
- S. M. R. Yusof Sani Lecturer, Dept. of Materials and Metallurgy, Faculty of Eng.
Ferdowsi University of Mashhad
- M. H. Golmakani M. Sc., Student, Isfahan University of Technology

Abstract

Among the most important parameters involved in solidification and structure of the cast ductile iron are: the composition, melt temperature, cooling rate, kind and amount of inoculant, and the nucleation procedure. The effect of graphite nodules per unit area on the mechanical properties of the ductile iron has been the subject of intensive research in recent years. In this paper, the effect of nucleation on the percentage of graphite nodules and the structure of cast material has been investigated. In addition, various methods of nucleation has been investigated. The effect of the inoculant size distribution on the microstructure and hardness of ductile iron with respect to thickness of cast material has been studied. It was shown that, it is even possible to produce ductile iron with nodular graphite in sections as thin as 2-3 mm.

Key words: Ductile Iron, Nucleation, Spheroidal, Graphite, Impact Strength, Mesh

(-)

%

% (FeSiMg)

[5]

°c

CO₂

[]

[6]

-Y

(/ % %)

() ()

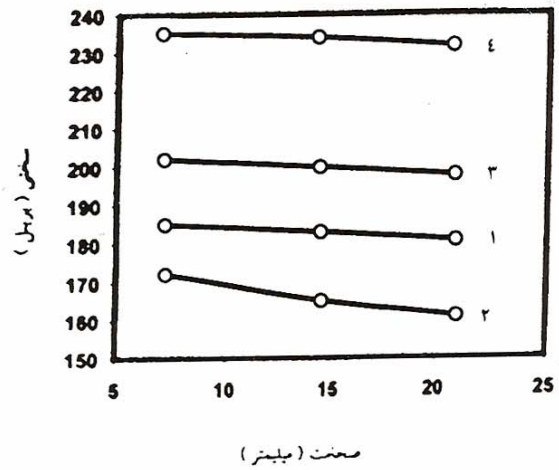
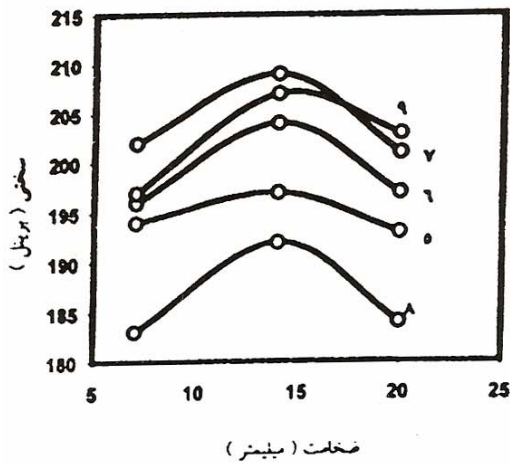
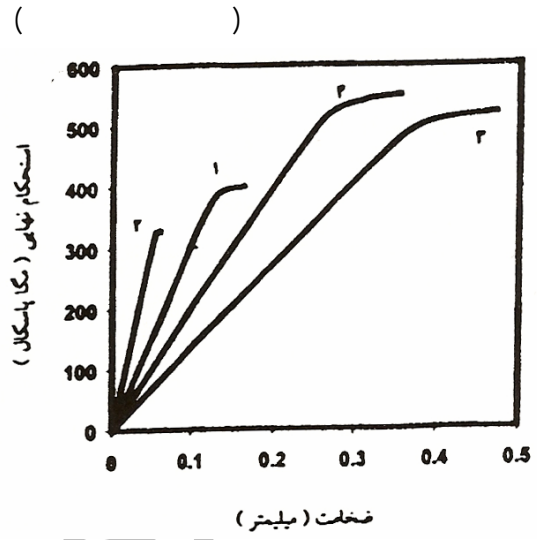
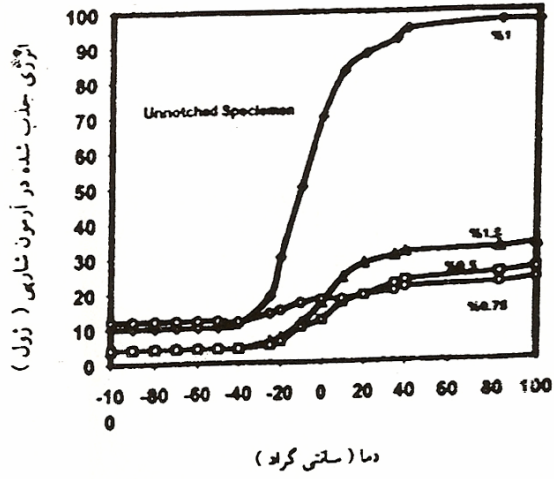
-Y

	(kg)	(g)	(g)

() ()

[7]

(.)



	(kg)	(g)		(g)
۵	۱/۲	۲۴	۱۲	۱۲
۶	۱/۲	۲۴	۳۰	۱۲
۷	۱/۲	۲۴	۵۰	۱۲
۸	۱/۲	۲۴	۸۰	۱۲
۹	۱/۲	۲۴	۱۰۰	۱۲

() ()

شماره	درصد	کد
نمونه	جوانه‌زا	ش

ضخامت مقطع (میلیمتر)

۲۰

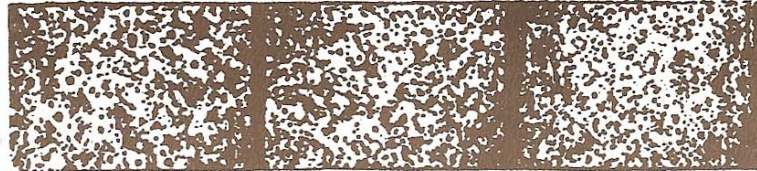
۱۲

۷

۵

۱

۱۲



۶

۱

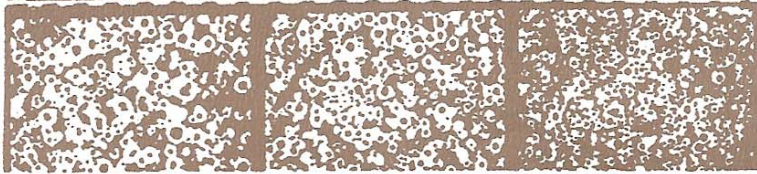
۳۰



۷

۱

۵۰



۸

۱

۸۰



۹

۱

۱۰۰



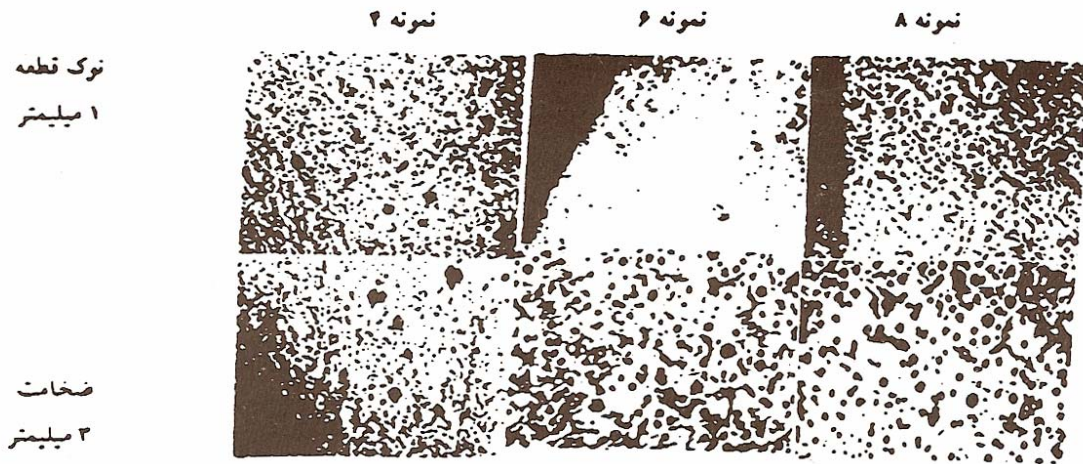
(.)

()

()

()

(.)



	(MPa)	(MPa)		(J)	(HB)
۱	۳۴۵	۳۸۹	۲/۲	۲۰	۱۸۳
۲	۲۸۵	۳۲۷	۰/۹	۲۱	۱۶۵
۳	۴۳۲	۴۵۱	۷/۲	۸۰	۲۰۵
۴	۴۹۶	۵۱۳	۵/۴	۲۷	۲۳۲

(/)

()

" () ()

[4] davis, J. R. "ASM Specialty Handbook, Cast Irons, PP 54-70 (1996). " []

[5] ASM Handbook, Vol. 15, Casting, PP 647-666 (1988). "

[6] Goodrich, G.M. and Jones, D.P., "Factors Affecting Ductile Iron Nodule Count: A Literature Review", AFS Transactions Vol. 101, PP 1031-1037, (1993). " []

[7] Emerson, P.J. and simmons,W. "Final Report on the Evaluation of The Graphite Form in Ferritic Ductile Iron by Ultrasonic and Sonic Testing, and of the Effect of Grapnite Form on Mechanical Properties", AFS Transaction Vol. 84, PP 109-128, (1976). " []

Archive of SID