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SHAPING OF THE MICROSTRUCTURE IN NEAR-EUTECTIC Fe-C-V ALLOYS

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Abstract
The study presents the results of microstructural examinations of the volume solidifying Fe-C-V alloys containing carbon in the range of 1.45÷2.23% and vanadium in the range of 7.33÷15.08%. Attention was focussed on near-eutectic alloys. The Fe-C-V eutectic crystallising in these alloys is composed of ferrite and vanadium carbides of VC_{1-x} type, and as such is included in the group of fibrous eutectics.
During research, the experimental eutectic lines were plotted for Fe-C-V alloys, and a formula enabling calculation of the eutectic saturation ratio of these alloys was proposed.

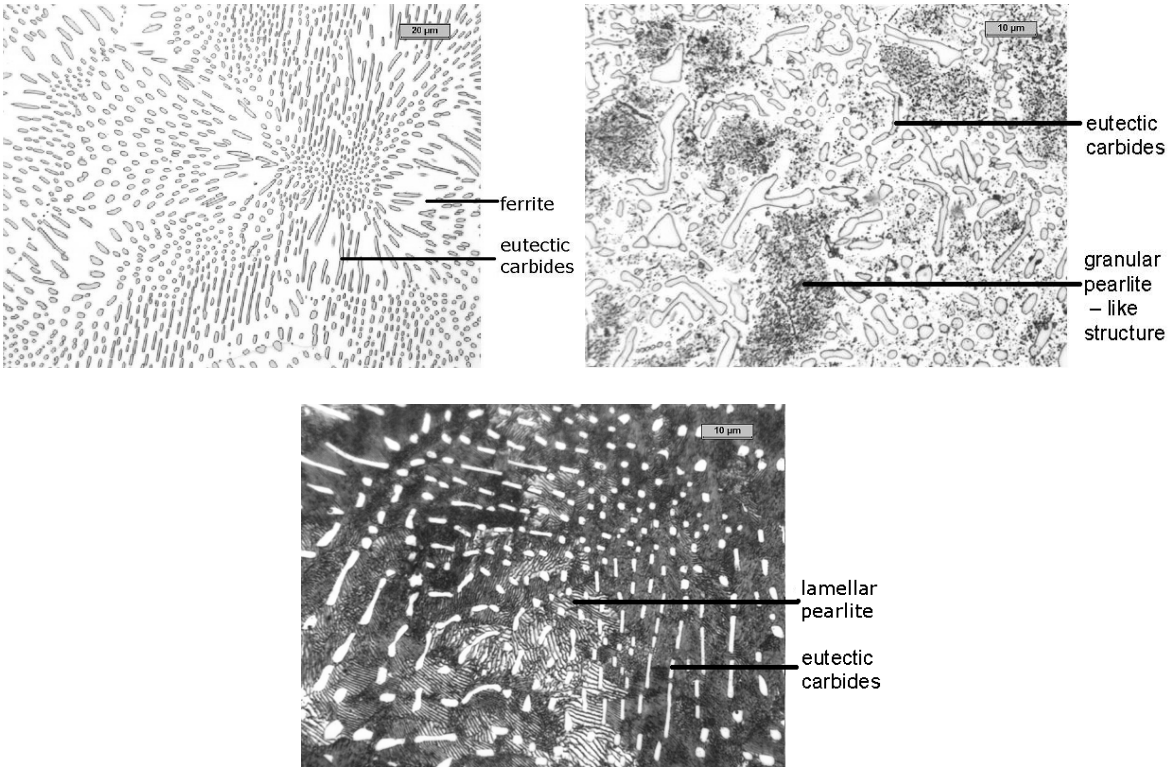
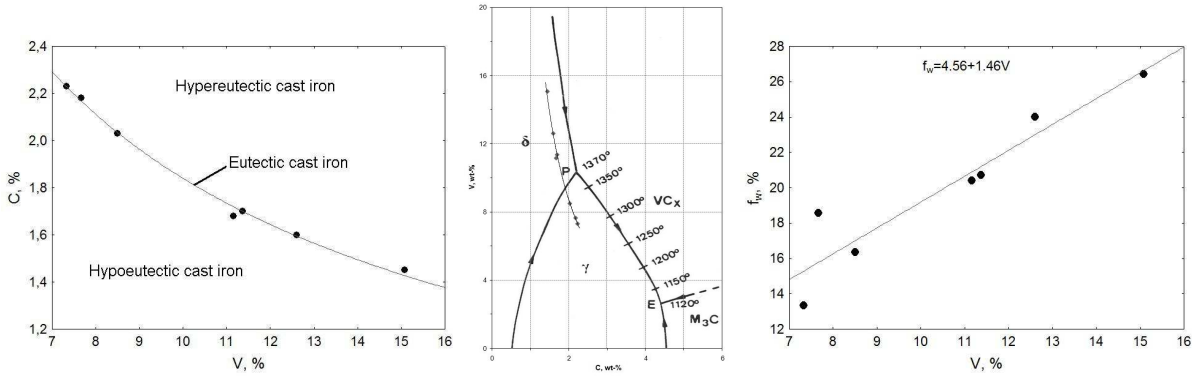


Fig. 2. Microstructure of near-eutectic Fe-C-V alloy

Table 1. Chemical composition and percent content of structural constituents in Fe-C-V alloys

Melt No.	Chemical composition		Matrix constituent content			f_w [%]	C/V	S_c
	C [%]	V [%]	f_f [%]	$f_{p.z.}$ [%]	$f_{p.p.}$ [%]			
1	1.45	15.08	73.59	-	-	26.41	0.10	1.02
2	1.60	12.60	76.00	-	-	24.00	0.13	1.00
3	1.70	11.37	-	79.3	-	20.70	0.15	1.00
4	1.68	11.16	-	79.6	-	20.40	0.15	0.98
5	2.03	8.50	-	-	81.42	16.35	0.24	1.00
6	2.18	7.67	-	-	83.65	18.58	0.28	1.01
7	2.23	7.33	-	-	86.68	13.32	0.30	1.00

f_f – ferrite content in cast iron
$f_{p.z.}$ – granular pearlite content in cast iron
$f_{p.p.}$ – lamellar pearlite content in cast iron
f_w – eutectic carbides content in cast iron



a) b) c)

Fig. 3. The run of eutectic line in Fe-C-V alloys (a) and (b) projection of eutectic line (equation 1) against the background of Fe-C-V system described in [6]. Effect of vanadium content on the content of eutectic carbides (f_w) in near-eutectic alloys (c)

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