

ANALYSIS OF THE TECHNOLOGY OF STEEL ELABORATION *T 35 Mn 14* INTENDED FOR CASTING THE PIECES

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Abstract:

In this work it is made a critical analysis of the technology of elaboration of the alloy intended for the obtainment of *Driving spindle wheel*, respectively slightly allied steel *T35Mn14*.

There are presented the two types of charges used for the elaboration of steel, respectively the chemical compositions of the charges elaborated. With the help of these data there are made a series of correlations in order to emphasize the variation of the contents of the elements for the 14 bathes elaborated and studied.

Keywords:

slightly allied steel, casting pieces, metallic charge, chemical composition

1. INTRODUCTION

Steel *T 35 Mn 14* is part of the category of slightly allied steels. The slightly allied steel contain the main alloy element below 2% and the sum of all the alloy elements does not exceed 5%. The slightly allied steel s are part of the perilitic class [1,3].

The chemical composition of steel *T 35 Mn 14*, as per STAS 1773-76 is presented in table 1. The mechanical characteristics of steel *T 35 Mn 14* are presented in table 2.

Table 1. The chemical composition of steel *T 35 Mn 14* [STAS 1773-76].

Steel mark	Chemical composition, %					
	C	Mn	Si	P max.	S max.	Cr
T 35 Mn 14	0,33...0,38	1,30...1,50	0,30...0,50	0,035	0,035	0,50...0,70

Table 2. The mechanical characteristics of steel *T 35 Mn 14* [STAS 1773-76].

Steel mark	Mechanical characteristics				
	Flow limit, $R_{p0,2}$, N/mm ²	Traction resistance, R_m , N/mm ²	Extension at breakage, A, %	Swage at breakage Z, %	Hardness, HB
T 35 Mn 14	295	540...780	12	25	160

2. ANALYSIS OF THE CHARGES ELABORATED IN VIEW OF CASTING THE PIECE ANALYSED

The elaboration of the slightly allied steel *T 35 Mn 14*, out of which it is made the *Driving spindle wheel* is made in electric furnace of the type DSN-3, with basic casing, with a nominal capacity of 3000 kg.

For the elaboration of the batches intended for casting these pieces there have been used charges of the type [3]:

A). Type I:

- Scrap iron
- Proper waste, respectively lost heads, casting networks etc. charged from the steel cast pieces *T 35 Mn 14*
- Scrap cast iron

B). Type II:

- Scrap iron

- Proper waste, respectively lost heads, casting networks etc. charged from the steel cast pieces T 35 Mn 14
- For the alloy there are used:
- FeSi 66...50
- FeMn 75 or 79
- Gross electrodes
- CaF₂

In table 3 there are presented the chemical compositions and the casting temperatures for 14 charges elaborated made of steel T 35 Mn 14, out of which there have been cast the pieces studies, respectively *driving spindle wheel*.

Table 3. The chemical compositions for charges elaborated

No.	No. charge	Chemical composition, in %						Evacuation temperature, °C
		C	Mn	Si	P	S	Cr	
1	6423	0,35	1,33	0,59	0,069	0,028	0,68	1580
2	6424	0,31	1,5	0,32	0,055	0,033	0,51	1610
3	6425	0,36	1,3	0,3	0,059	0,035	0,52	1585
4	6427	0,36	1,5	0,59	0,061	0,034	0,74	1580
5	6428	0,33	1,32	0,38	0,045	0,035	0,5	1610
6	6430	0,36	1,44	0,23	0,045	0,029	0,63	1615
7	6435	0,3	1,6	0,27	0,068	0,035	0,7	1610
8	6438	0,34	1,3	0,49	0,054	0,036	0,69	1610
9	6439	0,35	1,46	0,4	0,045	0,034	0,7	1585
10	6441	0,32	1,29	0,42	0,059	0,035	0,62	1610
11	6442	0,35	1,37	0,28	0,056	0,03	0,63	1590
12	6455	0,34	1,17	0,53	0,03	0,037	0,37	1600
13	6456	0,34	1,5	0,38	0,033	0,035	0,55	1590
14	6459	0,33	1,25	0,41	0,04	0,033	0,52	1600

3. CONCLSIONS

With the help of the data presented in table 3, there have been made a series of correlations in order to emphasize the variation of the contents of the elements for the 14 bathes elaborated and studied.

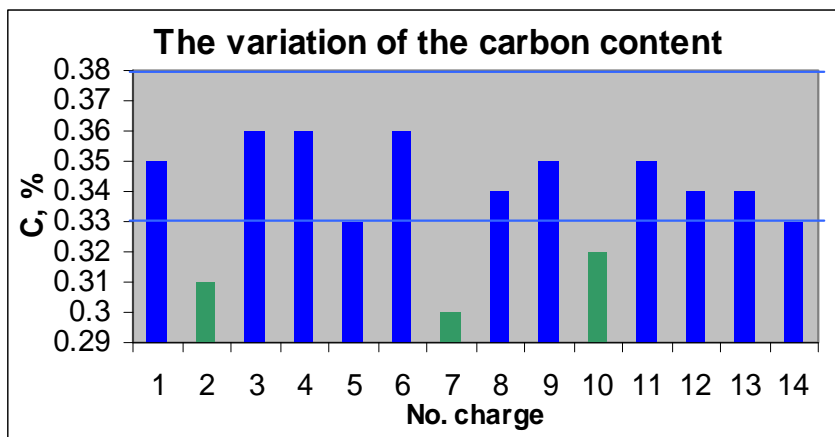


Figure 1. The histogram of the variation of the carbon content of the charges elaborated

Thus, in figure 1 it is presented the variation of the carbon content for the charges elaborated. From the analysis of this histogram there can be noticed that only three charges (6424, 6435, 6441) have a carbon content below the limit provided in the STAS, the other three charges having a carbon content lower than 0,33%.

Similarly, there are executed, with the help of the program EXCEL, the histograms for the contents of manganese and chrome. They are presented in fig. 2, 3.

It results the following:

- ✚ the manganese content, for the charge nr.6430, exceeds the value provided in STAS, and charges 6455 and 6459 have a manganese content below the limit allowed;
- ✚ the chrome content is lower for charge 6456 only.

In figure 4 there is presented the histogram of the casting temperatures registered. There can be noticed that the casting temperatures are contained in the interval 1585-1615 °C. Most of the values are registered in the interval 1605-1615°C.

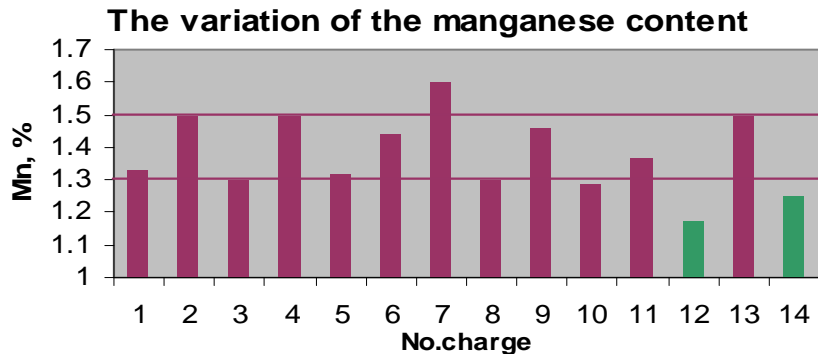


Figure 2. The histogram of the variation of the manganese content of the charges elaborated.

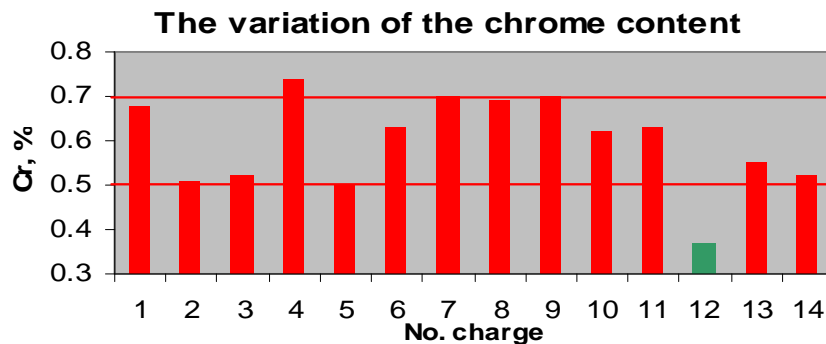


Figure 3. The histogram of the variation of the chrome content of the charges elaborated

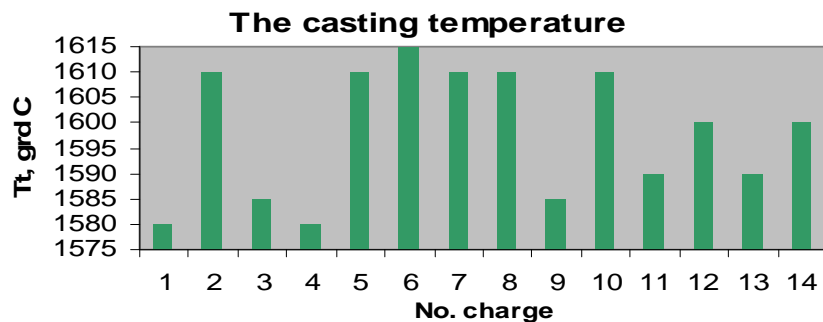


Figure 4. The histogram of the variation of the casting temperatures of the charges elaborated

In general, the elaboration of steel $T35Mn14$, intended for casting the studied piece within a metallurgical enterprise does not raise particular problems, but there must be made a critical control of the process of elaboration of the alloy in view of obtaining quality castings.

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