ANNALS OF FACULTY ENGINEERING HUNEDOARA
- INTERNATIONAL JOURNAL OF ENGINEERING
Tome IX (Year 2011). Fascicule 3. (ISSN 1584 - 2673)

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RESEARCH ON DRUG SPECIFIC ELECTRODES TYPE EBT ELECTRIC ARC FURNACE

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ABSTRACT: Under current conditions in perspective, concern to reduce costs of raw materials and auxiliary materials, energy and fuel becomes a thing of prime importance. A detailed analysis of costs specific to each manufacturer to constitute a priority for the future existence of the steel products market. Obviously, significant reductions, it is a very important role in the modernization of equipment and technology investment. Leaving everything to the investment but would be a mistake as big as the lack of concern for finding financial resources for modernization of production flows in the performance of research for these flows.
KEYWORDS: Raw materials, auxiliary materials, electric arc furnace, technology investment

❖ INTRODUCTION

The continuous growth of specific power is installed, first, a constructive progress electric arc furnace. Operational and technological implications of the realization of this trend have been consistently beneficial (increased productivity, reduced specific consumption of electricity and specific consumption of electrodes).

In the literature [1-3] are devoted to three specific names for the fields of power transformers installed electric arc furnace (figure 1):

- ☐ High Power (HP), for P = 200-450 kVA/t,
- ☐ Ultra High Power (UHP) for P = 450-800 kVA/t,
- ☐ Super High Power (SHP) for P = 800-1200 kVA/t.

A disadvantage of increasing the specific power transformers installed electric arc furnace is represented by the increasing noise in the operation and especially the melting furnace. This disadvantage is removed by making an enclosure around the sound absorbing panels electric oven.

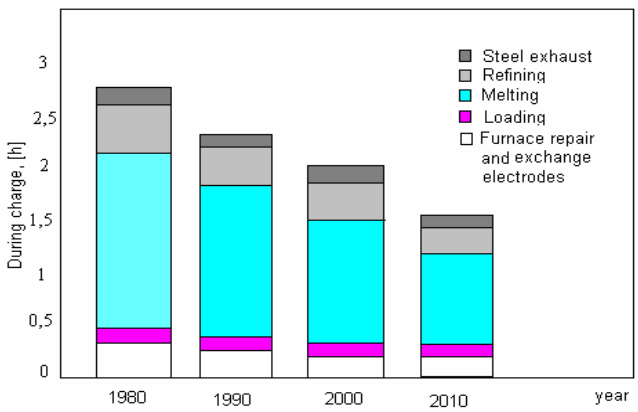

Figure 2. Manufacturing cycle time evolution of the electric furnace

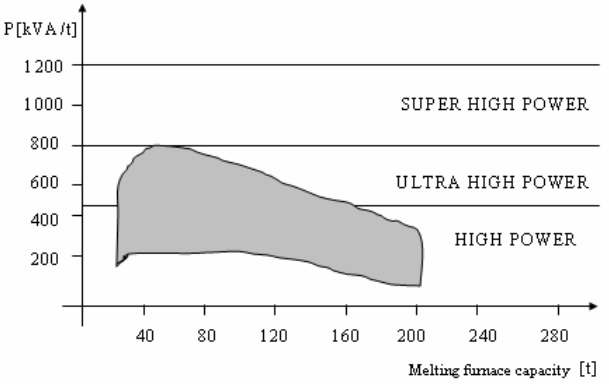

Figure.1. Areas of specific power transformer installed in the capacity of the oven

Constructive developments, technological and functional electric arc furnace to have the effect of improving efficiency (overall, but primarily qualitative) and productivity in the aggregate.

The most important developments and their impact on key operating parameters of electric furnaces [4] are presented in figure 2.

The role of traditional technology electric arc furnace (heating, melting and refining steel) has changed radically. A direct consequence of accumulated progress through the stages of the process flow of liquid steel production are scrap preheating, melting and refining outside the furnace stove.

❖ INDUSTRIAL EXPERIMENTS

The data come from an industrial steel mill type electric furnace equipped with a 100 ton capacity EBT. Data were processed in Excel spreadsheets and MATLAB programs to obtain a correlation between specific electrode consumption, kg/t steel (parameter dependent) and subsequent independent technological parameters: electrode diameter (mm), productivity (t/h) and oven capacity (t). Also, it was intended to further establish a correlation between increased consumption of electrodes (%) depending on the specific oxygen consumption (Nm^3/t steel).

Graphical and analytical correlations obtained are shown in Figure 3-9.

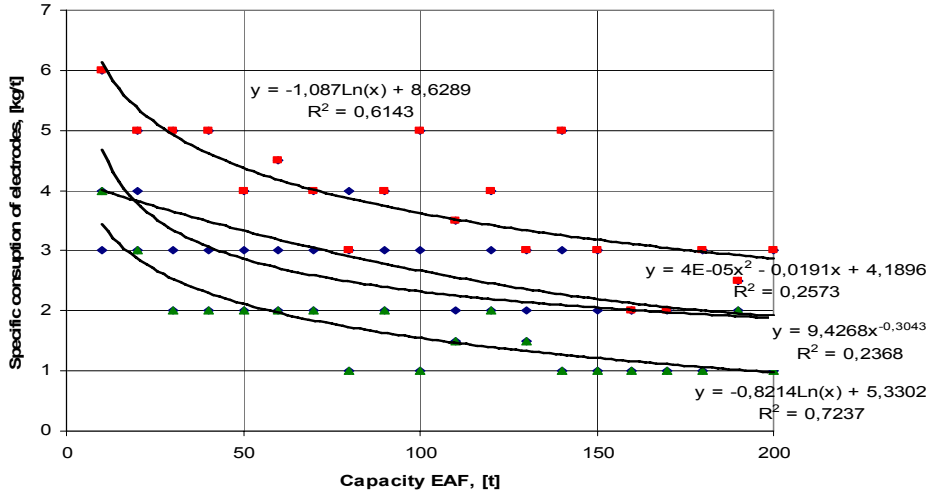

Figure 3. Specific consumption of electrodes vs. Capacity EAF

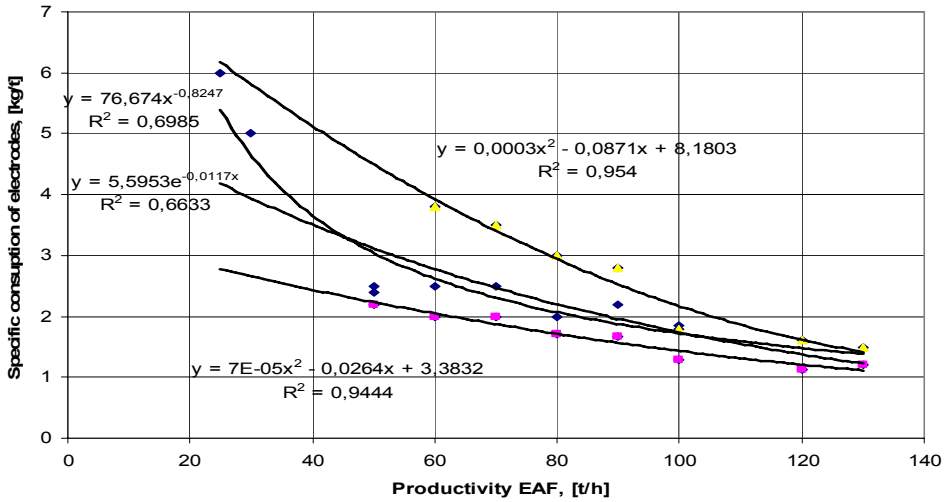

Figure 4. Specific consumption of electrodes vs. Productivity EAF

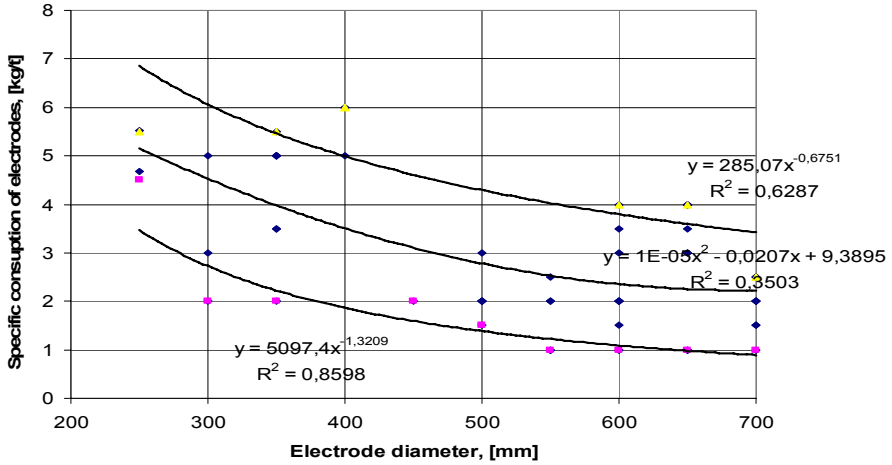

Figure 5. Specific consumption of electrodes vs. Electrode diameter

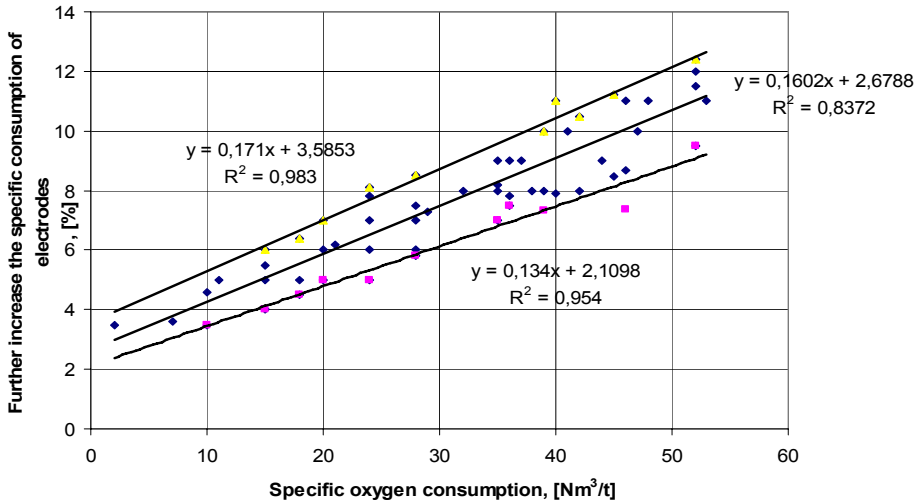

Figure 6. Further increase the consumptions of electrodes vs. Specific oxygen consumption

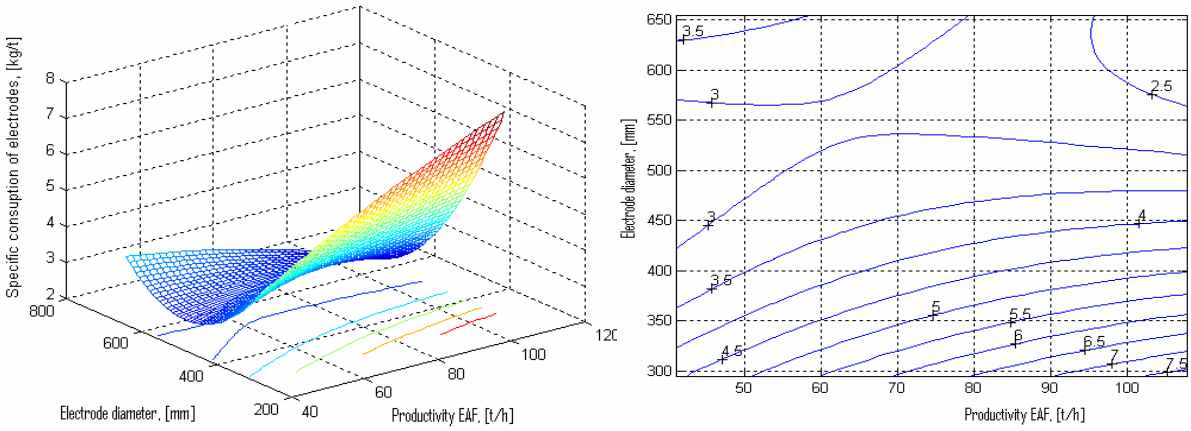

Figure 7. Specific consumption of electrodes vs. Electrode diameter & Productivity EAF

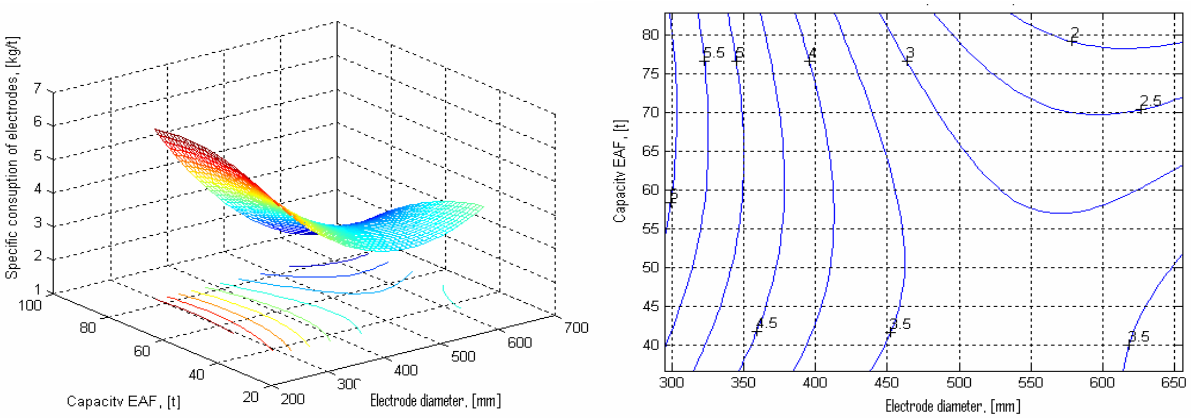

Figure 8. Specific consumption of electrodes vs. Electrode diameter & Capacity EAF

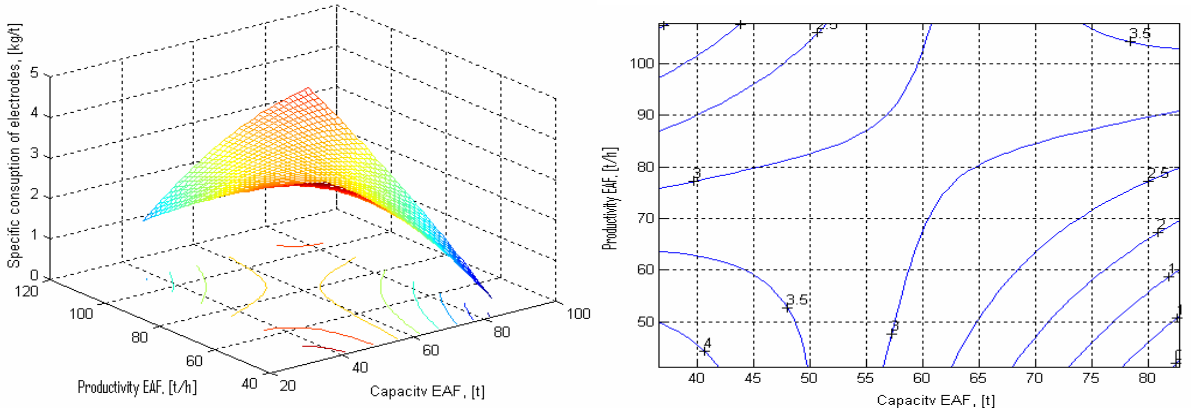

Figure 9. Specific consumption of electrodes

❖ RESULTS. DISCUSSION

By analyzing the charts presented in fig.3-5 shows that the range for the specific consumption of electrodes in the capacity of the furnace, furnace productivity and electrode diameter, are bounded graphical representative, both top and bottom of the technological field, the curves expressed by mathematical relations, with a high confidence level.

The diagram in fig.4 shows that an increase in productivity leads to a narrowing of the range of variation of specific consumption of electrodes, effect as a result of a higher utilization of electricity in the oven (or heat) on the one hand, and on the other hand the use of intense flame burners, as well as post-combustion process.

Equations representing the dependence of the specific consumption of electrodes depending on the parameters analyzed were representative in terms of graphics and falls in the range of variation. For each variation and correlation is presented in analytical form.

From fig. 6 shows that an increase in specific consumption of oxygen for the intensification of metallurgical causes a further increase in electrode consumption (expressed in% increase), which is determined by a further oxidation of the electrode (side area) in following an oxidizing atmosphere in the workspace of the furnace.

Knowing the dependencies expressed analytically, especially graphics allow verification/election of independent parameters, so as to obtain values for specific electrode consumption as low in terms of technology (1-3 kg/t steel).

Regarding the results of data processing in MATLAB program (fig. 7-9), they allow us to determine precisely the limits of variation independent parameters, so we employed the use of electrodes in an area required (a desirable -3 kg/t steel, shaded areas).

In most cases the type of electric arc furnace EBT, the specific consumption of electrodes are below 3 kg/t steel, much lower than in furnaces that work/have worked under the ENP (normal electrical power), where this consumption is included was between 6-12 kg/t. steel.

❖ CONCLUSIONS

The analysis of the research the following conclusions:

- Increasing the furnace productivity (due to advanced training load, metal intensification, increased use of electricity) leads to a significant reduction in specific consumption of electrodes;
- interdependence between the specific consumption of electrodes and show that their diameter is desirable to work with electrode diameter at the upper limit values for that capacity, which will lead to specific content consumption within 1-3 kg/t;
- modern furnaces are equipped with electrodes of diameter 600 - 700mm, minimum specific consumption of electrodes that record the capacity of 150-200 tons;
- need to increase capacity and productivity and to reduce the diameter of the electrode ovens specific consumption of electrodes;
- provide independent values for the parameters located in the shaded areas can provide specific electrode consumption in limits.

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