

TECHNICAL – ECONOMICAL ANALYSIS FOR THE QUALITY OF THE STEEL ELABORATED IN THE EAF

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Abstract

The paper present the main methods of technical-economical analysis of the quality of the steel elaborated in the EAF. Both the analysis methods for products (A) and the ones for companies (B) are presented in comparison.

There are mainly presented and analyzed a specific analysis models.

1. INTRODUCTION

The steel - making in the EAF is a very complex process. Thus, the quality of the steels elaborated in the EAF is a very important parameter. From this point of view, there is the need of analyzing the electric steels' quality in various methods, including by technical-economical ones.

The technical - economical analysis of the electric steels' quality can be processed both for the product (electric steel) and for the company (electric steelworks).

2. TECHNICAL – ECONOMICAL ANALYSIS METHODS FOR QUALITY OF THE ELECTRIC STEELS

For the technical - economical analysis for the electric steels' quality, one can use 2 methods:

- A. Methods of the analysis for the product's quality (MAPQ);
- B. Methods of the analysis for the company's (MACQ).

The main elements specific to the 2 categories of analysis methods, including mathematical models, will be presented:

- MWAQPC - The model of weighted average quality per product coefficient (specific to the analysis method A);
- MEAQPC - The model of equivalent average quality per product coefficient (specific to the analysis method A);
- MGQC - The model of generalized quality coefficient (specific to the analysis method B);
- MSQPW - The model of superior quality products weight (specific to the analysis method B).

The scheme of correlations between the technical – economical analysis methods and the mathematical models used in order to apply these methods to the analysis of the steel elaborated in the EAF is presented in figure no.1.

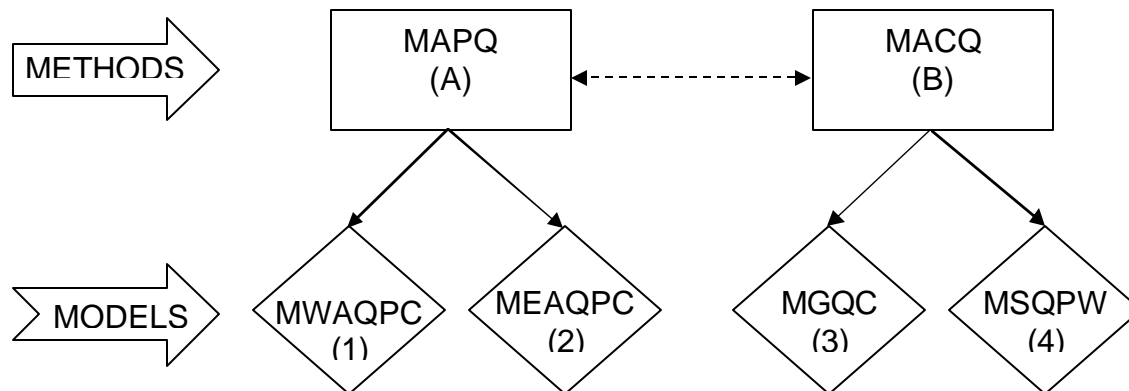


Fig.1. Correlations between the technical – economical analysis methods (A&B) and the mathematical models used to quantify the quality of the steel elaboration in the EAF

(1) - MWAQPC – is the model of weighted average quality per product coefficient ($\bar{C}_{p,ci}$).

This model of analysis for the steel elaborated in the EAF is based on relationship (1):

$$\bar{C}_{p,ci} = \frac{\sum_{i=1}^n M_{pi} \cdot Q_{ci}}{\sum_{i=1}^n M_{pi}} \quad (1)$$

Where:

M_{pi} – is the quantity (mass) of the “i” category steel elaborated in the EAF (t/year);

Q_{ci} – is the quality class of the “i” category of steel elaborated in EAF.

In order to quantify the quality class of the category of steel elaborated in the EAF the quantitative model briefly presented in figure no. 2 is indicated.

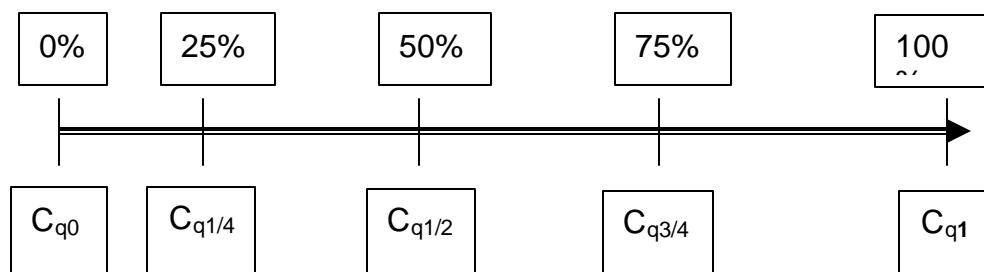


Fig. 2. The quantitative model for indicating the quality class of the category of steel elaboration in the EAF

Where:

- C_{q0} – is zero quality class (non quality, or zero quality);
- $C_{q1/4}$ – is quarter quality class (semi median);
- $C_{q1/2}$ – is half quality class (median);
- $C_{q3/4}$ – is three quarters quality class;
- C_{q1} – is complete quality class (maximum quality).

Relationship (2) may be also used:

$$\bar{C}_{p,ci} = \frac{\sum_{i=1}^n w_i \cdot Q_{ci}}{100} \quad (2)$$

Where:

W_i – is the weight of the “i” category of the steel in the total production (%).

According to this technical – economical analysis model for the quality of the steel elaborated in the EAF (MWAQPC – the model of weighted average quality per product coefficient), a superior qualitative situation is characterized by relationship (3):

$$\bar{C}_{p,ci} \rightarrow 1 \quad (3)$$

Another important ratio for the technical – economical analysis of the quality of the steel elaborated in the EAF is the degree of increase of the quality of production (D_{iqi}) which is given by relationship (4):

$$D_{iqi} = 100 - I_{qci} \quad (4)$$

Where:

I_{qci} – is the average quality per product coefficient (electric steel elaborated in the EAF) calculated according to relationship (5):

$$I_{qci} = (C_{ci0} / C_{ci1}) \cdot 100 \quad (5)$$

The correlation between the index of the average quality per product coefficient and the quality level of the steel elaborated in the EAF is presented in figure no. 3.

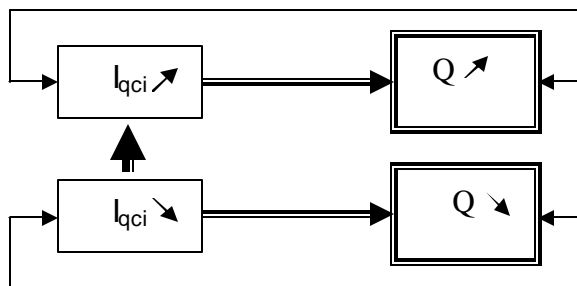


Fig. 3. The correlation between the index of the average quality per product coefficient and the quality of the steel elaborated in the EAF

REFERENCE

1. Ioana, A. - Optimizarea performantelor functionale si tehnologice ale cuptorului cu arc electric cu preîncalzirea încărcaturii si insuflare de pulberi pentru elaborarea otelurilor de înalta calitate, Teza de Doctorat, Universitatea "Politehnica" din Bucuresti, 1998.
2. Ioana, A., Ionescu, E., Sandu, I.F., Nicolae, A. – Conducerea optima a cuptoarelor cu arc electric, Ed. Fair Partners, ISBN 973-8470-04-8, Bucuresti, 2002.
3. Cohen, E. – Analyse financiere, Ed. Ec., Paris, 1994.
4. Rappaport, A. – Creating Shareholder Value 1997, e – book.
5. Nicolae, A., Nicolae, Maria, Ioana, A. s.a – Dezvoltare durabila in siderurgie prin valorificarea materialelor secundare, Ed. Printech, ISBN 973-718-002-X, Bucuresti, 2004.