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ASPECTS OF INFLUENCE ON THE VALUE OF COAL BLEND BURSTING PRESSURE AND METALLURGICAL PROPERTIES OF COKE. MESSAGE 2. PREDICTION OF BURSTING PRESSURE OF COAL BLENDS AND ITS INFLUENCE ON THE PHYSICAL AND MECHANICAL PROPERTIES OF COKE

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The article is devoted to the causes of complications in the implementation and application of special methods of preparing raw materials for coking (technology of coking rammed blend, technology of coking dry blend and technology of coking thermally prepared blend). On the one hand, the use of advanced technologies and technological methods makes it possible to achieve high quality coke, while increasing the share of low-baking coal in coal blends, thereby reducing their cost. On the other hand, there is the problem of increased bursting pressure of thermally treated and rammed blends. Therefore, the issue of optimising the component composition, predicting, monitoring and controlling the bursting pressure, taking into account the properties of coal blends, is of great importance. The aim of the research is to assess the possibility of predicting the bursting pressure of coal blends taking into account their technological properties and petrographic characteristics, as well as to study the effect of bursting pressure on the metallurgical properties of coke. Standardised methods were used to study the technological properties of coal and coal blends (technical analysis, petrographic analysis). The qualitative characteristics of coke were studied using physical, mechanical and thermochemical methods for the study of standardised indicators: crushability (M_{25}), abrasion (M_{10}), reactivity (CRI), and post-reaction strength (CSR). The statistical analysis of the results and the development of mathematical dependencies were performed using the licensed computer program Microsoft Excel.

The possibility of predicting the bursting pressure of coal blends with regard to the yield of volatile substances in the blend, vitrinite content, and grinding is shown. The proposed regression equations are characterised by high correlation coefficients (0.89 and 0.9). Their use will make it possible to optimise the composition of coal blends, control the bursting pressure during regrinding, and reduce the number of experimental measurements in a particular coke production. The mechanism of influence of the bursting pressure on the strength characteristics of coke was confirmed. Thus, an increase in the bursting pressure leads to an increase in the amount of liquid products, deepening their interaction with softened coal grains, which improves the sinterability and coking properties of the blend and, as a result, increases the mechanical strength of coke. It has been established that with an increase in the bursting pressure by 1 kPa, an increase in the mechanical strength of coke in terms of crushability M_{25} by about 2.6 % and a decrease in the abrasion of coke M_{10} by 1 % can be expected.

Keywords: coal blend, bursting pressure, petrographic characteristics, volatile substance yield, forecasting, coke quality.

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