

SOME ASPECTS OF ENERGY SAVING OF BURDEN MATERIAL IN THE BLAST FURNACE

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Purpose. To determine the possibility of self-stabilization effect for burden surface texture and gas flow in operating blast furnace under the proper conditions was experimentally proved for the first time, as well as the reasons of the effect disruption.

Methodology. The effect of dynamic heating possibilities which determine the self-stabilization effect for burden surface texture was used for increasing the effectiveness and energy saving of burden materials in the blast furnace.

Findings. The paper represents the experimental studies of the formation process of burden surface texture on blast furnace throat and its influence on radial distribution of gas flow. The studies were carried out in Tulachermet SC (Tula, Russia) blast furnaces equipped with bell-type charge equipment using radioisotope means of current control for burden surface texture (profile) and burden surface level, i.e. gamma locators for burden surface texture [1]. The same studies were carried out under the conditions of operating blast furnace SSAB iron and steel plant (Sweden) using unique Russian-Sweden-Ukrainian system for automated control of geometric and temperature parameters of burden material surface on the throat of the blast furnace, GEOTAPS system.

Furthermore, the possibility of efficiency improvement for control of radial distribution of burden and gas flow in case of deficiency of radioactive hazardous monitoring means of direct control for burden texture and surface was proven for the first time. Resulting from experimental studies the four ways of energy saving technology implementation were substantiated for control of blast furnace melting based on the information about burden surface texture and previously unknown regularities of surface layer formation of burden material on the throat of the operating blast furnace with bell-type charge equipment.

The main idea of the paper is represented by the developed concept for automated control of formation of control with prediction activity on radial distribution of burden material and gas flow using actual or predicted parameters of the materials' surface texture as an important intermediate factor of blast furnace process, which both describes the process and makes significant simultaneous influence on it.

Key words: furnace throat, radial distribution of burden, radial distribution of gas flow, radioisotope sensors, energy saving

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