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A STUDY OF SOFTENING INTERVAL FOR REDUCED IRON-ORE MATERIALS OF DIFFERENT FRACTION IN THE TERMS OF BLAST FURNACE

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There are studied causes of nonuniform of composition and qualitative indicators of iron-ore materials at their sintering on a sinter machine. There are presented the results of research for different factions softering degree of the recovered iron-ore materials, allowing to forecast their action in the conditions of blast furnace, with the purpose of improvement of indicators of its work.

Keywords: blast furnace, iron-ore material, renewal, faction, softering degree

One of ways of intensification of the domain melting is increase of gas-penetrability of low part of pole iron-ore materials in a furnace which can be attained by the improvement of physical and chemical properties of liquid phase, i. e. by the increase of mobility of slag at once after its melting. Composition of slag, and, thus, its chemical activity, temperature of melting, viscidity and other properties largely determine quality of cast-iron intensity of melting process and equality of run of blast furnace. Taking into account the regulative role of slag in a high furnace, its composition follows to choose, oriented on the temperature of crystallization and viscidity at temperatures, near to crystallization.

At the productive terms of OAJ «Metallurgical combine «Zaporozhstal′» there are executed tests of iron-ore raw material by mass 5.7 kg of every faction. Then tests added to the successive crushing and dispersion on bolts with a size cells 3.0 mm and a 1.0 mm and at next researches used the agglomerate of faction a 1.0-3.0 mm. Further renewal of samples of iron-ore materials was carried out with the use of hydrogen. Research in relation of measure of softening of samples of the reduced agglomerate it was executed the study on a stand for determination of quality of these materials,

From the results of researches follows, that for iron-ore materials of the considered factions during the increase of measure of their renewal to 60-70 % there is a decline of temperature of beginning of softening influence, and process of renewal to 92 % accompanied by the increase of temperature of beginning of softening influence, however on the absolute value of its value below than for the unreduced materials.

It is set that the most subzero temperature of beginning and completion of softening for the investigational interval of proceeding in iron-ore materials is characterize the agglomerate of faction –5.0 mm. The greatest value of the this temperature is fixed for the agglomerate of faction -60.0 +40,0 mm.

Main reasons of uneven composition and quality of the sintered agglomerate on the height of its layer consist in the segregation of iron-ore materials during their loading on a sintering machine and presence of the unfavorable temperature-heat mode of sintering after the height of layer.

The difference of temperature-heat treatment on the height of layer of material is accompanied by the presence of unevenness of its properties. By virtue of that the temperature of sintering of iron-ore materials rises gradually, as far as passing of area of burning from above downstream on the height of layer, the head layer of such materials does not get a warmth in a quantity which is sufficient for the complete passing of process of sintering. In this connection in iron-ore material of head layer, because of short duration of its stay in the area of action of high temperature (to 1400 °C) and next snap-chilling by cold air, does not have time in full to be completed phase transformations and, as a result, remaining grains of charge prevail in the microstructure of the got agglomerate, and a bundle is presented by blasted glass. Agglomerate which appears has subzeroed enough descriptions of durability.

For achievement of alignment of the temperature-heat mode of sintering on the height of layer of iron-ore materials it is suggested to carry the surplus quantity of warmth from its low in heat part, increasing content of carbon in iron-ore materials of head part of layer, that sintering, with the simultaneous use of the heated air on first third of length of sintering machine. Also possible is application of the oblong ignition hearth, when head part of layer which sintering, more long time will be in the area of action of high temperature which will allow to provide more complete cooperation for agglomerate parts and to promote durability of material.