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EXPERIMENTAL STUDY OF PARAMETERS OF SOFTENING FOR AGGLOMERATE OF DIFFERENT FACTIONS

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There are executed experimental researches on determination of parameters of softening for agglomerate of different factions with the purpose of development of recommendations, sent to the improvement of work indexes of blast furnaces. Principal re-asons of unevenness of composition and quality of agglomerate on the height of sintered layer are educed.

Keywords: blast furnace, agglomerate, factious composition, sintered layer, softening

The questions of improvement of physical and chemical properties of iron-ore raw material occupy an important place at the decision of task of increase of technical and economical indexes of the blast furnace melting. At the choice of rational ways of perfection of process of smelting of cast-iron the special attention it is necessary to spare to the action of charge materials in a blast furnace, in particular, to the change of the aggregate state of agglomerate in the process of heating at different temperatures.

For intensification of process of the blast furnace melting a large value is had parameters of softening and melting of agglomerate. The state of agglomerate and its action in the low temperature zone of blast furnace suffices in detail in theory considered and experimentally studied in works [1-3]. In respect of changes of agglomerate in the high temperature zone of blast furnace, where the processes of its softening and melting are carried out, and then this process is studied in less degree. In the indicated zone of furnace the state of agglomerate is determined by both its physical and chemical properties and by the degree of renewal and temperature terms. The special actuality the study of the indicated questions acquires in the conditions of perfection of blast furnace process, sent to providing of even motion of furnace, improvement of technical and economical indexes of melting and receipt of high-quality cast-iron.

Every faction of agglomerate was exposed to breakage and subsequent division on faction on sieves measuring cells are -3.0...+1.0 mm, id est for further researches 1-3 mm the agglomerate of faction is used. As a repairer is applied hydrogen. The degree of renewal of samples was estimated on a size of losses of their mass at renewal. A research complex was executed on methods, described in work [4].

Results of research of mineralogenesis in agglomerate on the height of sintering layer [5] testify about the presence of heterogeneity, both on composition and to properties. Upper part of sintering layer from the briefness of stay of change materials at high temperatures and subsequent their chill by air, differs by subzero durability and maintenance of bucket of shallow faction. In the lever part of the sintered

layer an agglomerate, being long time at high temperatures, is exposed to milting, thus it durability increases considerably. Principal reason of unevenness of composition and quality of the sintered agglomerate on the height of layer the segregation of change materials serves as at loading on a sintering machine and unfavorable temperature-thermal regime of treatment on the height of sintering layer. Thus transformations does not have time in full to pass phase and, as a result, the microstructure of the got agglomerate is presented by the far of remaining grains of change materials, and in a copula component indevitriful glass flowed.

In works [6,7] it is suggested to reduce negative influence of segregation of change materials by diminishing of upper limit of largeness of ore and limestone. At the same time it will assist the deeper flowing of reactions of formation of agglomerate with the complete assimilation of lime that, in turn, will remove «white» inclusions of the unmastered lime, and also areas of crystallization of twocalcium silicate. For smoothing of the temperature-thermal regime surplus of warmth it is necessary to carry from the underbody of layer in its upper part by the increase of maintenance of carbon in the charge of upper part of sintering agglomerate and simultaneous application of the heated air on first third of length of sinter machine after ignition hearth. Application of the oblong hearth is also possible, that assists being of upper layer of sintering agglomerate during more great time in the area of influence of high temperatures, that allows the particles of agglomerate to co-operate in more complete volume and assists the increase of its durability

The presence of little quantity of new formations of magnetite in the upper areas of sintering agglomerate is explained by absence of deep transformations in change materials at the beginning of sintering process. The large pieces of ore (5-12 mm) do not have time to be melted, that contingently the shortage of warmth, and also subsequent sharp cooling. Reactions with participation a liquid phase (reactions of formation of glass, rarer than formation of calcium ferrites and silicates) have the limited development. As a rule, complete recrystallization of all components of change materials is impossible in such terms.

As far as the height of temperature in the sintering layer of agglomerate the degree of co-operation of change materials increases due to the sufficient quantity of warmth for melting of their particles and flowing of reaction of co-operation in a liquid phase. Near the fire bars of sintering machine change material is long time at a temperature about 1600 °C, as a result, an agglomerate strongly is fused, that assists the increase of strength descriptions of its upper layer, and also sharply to growth of quantity of glass, recrystallizated to the silicates of different composition.

On the studied material the unevenness of agglomeration process, conditioned by considerable heterogeneity of material and grain-size composition of change materials, is clearly visible. Diminishing of maintenance of upper layer in all mass of agglomerate possibly by the increase of height of sintering layer of charge to 500-600 mm. In this case the part of upper layer diminishes in the general volume of agglomerate, and it sintering gets better due to more complete use of the regenerated warmth.

Conclusion. It is set the results of the conducted researches, that the most subzero temperature of softening in all interval of degree of reduction is fixed for faction are -5 mm, and the highest - for faction -60…+40 mm. Principal reasons of uneven-

ness of composition and quality of the sintered agglomerate on the height of layer the segregation of change materials are serves as at their loading on a sinter mashine and different temperature-thermal regime on the height of sintering layer. The increase of durability of agglomerate is arrived by the increase of height of sintering layer of change materials to 500-600 mm. In this case, due to more complete use of the regenerated warmth, sintering gets better, and the part less durable, upper layer in all volume of agglomerate diminishes.

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