

## PREPARATION OF STORED FERRUGINOUS SLURRIES FOR UTILIZATION IN AGGLOMERATION

*Yana Ponomaryova*

*Donetsk National Technical University, Donetsk, Ukraine*

Manufacture of metallurgical products is accompanied by formation of a significant amount of ferruginous waste products (a dust, slurries, slags). A compound of by-products of the metallurgical plant is following: slags - 57-63 %; mineral waste products (rafractories, entrance materials) - 4-6 %; metal scrap - 15-17 %; a dust, slurry, an oxide scale - 9-13 %; others - 2-4 %.

More than 70 million tones slurries are saved at Ukrainian metallurgical plants because of insufficient extent of utilization of ferruginous by-products. Only 25 million tones slurries are suitable for usage in metallurgy. Other part is mixed with non-ferruginous wastes. Metallurgical slurries are stored in congested holding ladnoons. Free capacities are not located near plants. And the organization of storing far from the plants will result in significant economic expenses and a decline of environment conditions.

Metallurgical slurries feature is high content of iron. Sintering slurries contain 30-43 % of iron; blast-furnace slurries contain 22-48 % of iron; steel-melting slurries contain 50-68 % of iron. Besides, slurries contain a significant amount of non-ferrous metals. For example, resources of zinc in stored metallurgical slurries are estimated in 66000 tones. Cost of this mass of zinc is approximately 260 mln.grn.

One of the main routes of ferruginous slurries' utilization is their additive in a sintering charge. But use unprepared slurries in charge influences negatively on sinter quality and sintering machines' productivity.

Slurries utilization in metallurgy is complicated because of the contents of non-ferrous metals, in particular zinc. For agglomeration zinc content in by-products has no special value. But use such sinter in the blast furnace causes its lining destruction, decline of productivity, increase of a fuel rate. Pyrometallurgical processes of extraction of zinc are used for preparation zincontaining metallurgical slurries. We recommend processing of zincontaining materials by fluidic slags of steel-melting manufacture. This way allows using heat energy of steel-melting slags, to sublimate non-ferrous metals and to receive a ferruginous product for a blast-furnace production. The enriched dust (50-60 % Zn) is sent on nonferrous metallurgy plants.

Maintenance of homogeneity charge on coarseness, a chemical compound, humidity at use stored slurries is a problem. Strong flocs are formed in charge at use stored slurries. These flocs are not destroyed during preparation of sintering charge, are sintered badly, and they are the centers of destruction of a sinter. Thus, the necessary condition of increase of extent of ferruginous by-products utilization in sinter process is careful slurries distribution in initial charge. For utilization stored slurries these condition is provided in the way of destroying large pieces of slurries and their blending with other ingredients of a sintering charge.

The base demands for organization of homogenization sinter charge and development of the corresponding unit are:

- coarseness flocs of slurries should be no more than 10 mm after destroying;
- not bucked pieces of the foreign materials up to 200×200 mm should be passed by a size through the preparatory equipment;
- careful blending and loosening charge materials;
- continuum of work of the unit with its greatest possible productivity;
- free passage of materials through the unit at its shut-down.

On faculty of Rawtermical processes and law-wastes technologies of Donetsk National Technical University the design of the chain rotary desintegrating-blending machine for homogenization multicomponent agglomeration charge is developed. Advantages of its design are: high extent of homogeneity of the processed sintering charge; reliability of tools; continuum of operation; an opportunity of plugging of the chain rotary desintegrating-blending machine in existing circuit of preparation of sintering charge.

The opportunity of the chain rotary desintegrating-blending machine use for preparation of the charge containing stored ferruginous slurries was fixed at its testings on sinter plants of Dneprovsk integrated iron-and-steel works "Dzerjiskogo" and Mariupol integrated iron-and-steel works "Ilyicha". Quality of sinter charge after processing was monitored during explorations of chain rotary desintegrating-blending machine work. Pieces and flocs of slurries were absent in the processed sinter charge. It was homogeneous and loosened.

Thus, addition preparation charge circuit of sinter plants by the chain rotary desintegrating-blending machine will allow increasing the efficiency of use ferruginous by-products in sinter charge, including stored slurries, without breaking technology of an agglomeration and decrease of sinter quality.