PROJECTS UNDERWAY AT THE MAGNITOGORSK METALLURGICAL COMBINE

MODERNIZATION OF THE CHARGING SYSTEM OF THE LIME KILNS

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The startup of the oxygen converter shop at the MMC required a boost in the production of lime from the kilns at the combine, as well as a significant improvement in the quality of the lime. Prior to the beginning of operation of the shop, calcination losses of the 0-40 mm fraction in rotary kilns Nos. 1 and 2 averaged 8.95% and fluctuated within the range 0.2-21.8% per hour.

One of the measures implemented to improve the quality of the lime was stabilization of the amount of limestone charged into the kiln. Previously, kiln productivity had been determined by the size of the charge, and charge size was determined by a weigh hopper operated with defective monitoring equipment. This charging system, based on the principle of volume feed, made it impossible to monitor the quantity of limestone charged per hour (particularly when there were fluctuations in its granulometric composition) and quickly change charge rate when one or more parameters of the calcination process deviated from the norms. In addition, frequent problems with the operation of the electromagnetic coils of the vibrating feeder of the hopper and lengthy repairs to the metal structures of the feeder made it impossible to monitor the charging process. During these periods, limestone was charged into the kiln directly — through the chute of a screw feeder.

The installation of automated continuous limestone feeders made it possible to accurately weigh the charge materials and closely regulate the charge process, while the use of microprocessor controller "Remikont—130" has enabled operators to account for limestone consumption on their shift, previous shifts, or over a period of days. An analysis of the current data made it possible to devise a calcination regime that eliminates the previous stoppages of the kiln for heating, which increased fuel consumption. Thus, while maintaining the previous monthly average rating for the quality of lime of the 5-40 mm fraction, the combine succeeded in stabilizing calcination losses (7-11%) and decreasing gas consumption per shift from 284.9 to 243.3 m³/ton lime. Thus, the size of the reduction increased from 35 to 70%.

USE OF STAUROLITE TO FILL THE CHANNEL OF LADLE NOZZLES

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The use of slide gates also makes it necessary to use powdered materials to fill the channel of the ladle nozzle in order to prevent the formation of a skull of metal when the heat is tapped into the ladle. The powder should flow freely out of the channel and allow the gate to open without the use of oxygen. In order to meet these requirements, the material should be characterized by good fluidity and friability when heated; it should be of one fraction, have isometric grains, be inert in relation to liquid steel, and not contain a large amount of grains finer than 0.063 mm. Grains of that fineness cause the material to consolidate and sinter.

When slide gates were introduced at the MMC, the nozzles were filled with a mixture of graphite and a powder consisting either of magnesite or chromite and magnesite. However, nearly all (90%) of the heats had to be "opened" with oxygen.

To optimize the composition of the filling material, tests were conducted of powdered chromite, pulverized coke breeze, electrocorundum, quartzite, graphite, cast-iron chips mixed with coke breeze, quartz sand, powdered fireclay, staurolite and rutile concentrates, and top dust (Table 1). The best results were obtained with the use of staurolite. Increased erosion of the well brick by iron-bearing oxides was seen when top dust was used.

The use of staurolite is most effective when it is necessary to replace the supply of this material on a slide gate that is not in use in the given heat. The use of staurolite is also more efficient when the following conditions are met: the nozzle channel and seat are filled completely; the seat has been properly cleaned after the last heat; any encrusted slag or "roofs" above the seat are removed; the material is preheated, especially in the winter.