

## **Studies of Iron Ore Raw Materials Reduction Process by Waste Gas from Steelmaking Converters**

Analysis of the preconditions of using converter gas for reduction of iron ore materials provides an opportunity to develop an effective system of technological use of converter gas. It allows to receive pre-reduced iron ore raw materials with its subsequent use for converter melting and to eliminate CO emissions with nonflammable converter gas to the atmosphere.

Reduction iron ore raw materials in the converter shop with use of converter gas CO as a reducing agent gives possibility for obtaining pre-reduced product with minimal power inputs at a cost less than the scrap value.

Iron ore raw materials reduced with help of converter gas can find a wide application in metallurgical production. The use reduced iron ore materials in the steelmaking process as metalized additives to the charging material with the replacement of the usual metallic charge components - cast iron and scrap is of a great interest.

The tasks of this work are:

1. Working out the placing scheme of a reducing reactor on a converter flue tract.
2. Assessment of converter gas reduction ability as well as the elaboration the main provisions of iron ore raw materials reduction technology by a converter gas.

This work allowed us to determine the nature and duration of the process, the expected output of pre-reduced product, the degree of converter gas CO usage, and the preferable reduction temperature intervals in different variants of gas use.

Two options for placement of the reactor on the flue tract converter are offered: with the use of the high-temperature gas (before gas cleaning) and the cooled gas (after gas cleaning). Placing of the reactor on high-temperature gas allows you to use reduction potential of the gas and simultaneously dispose its physical heat. With the use of the cooled gas its heating before feeding it into the reactor is done by partial burning of gas.

As a result of evaluation the gas reconstructive ability it became clear that in order to obtain a highly metalized product, gas must be used during several converter blowings. Converter blowings form a reduction cycle. In this case the process of reduction is synchronized with the steel smelting. It is also established that the use of high-temperature gas is 2-3 times as efficient compared to using of the cooled gas. In this case the use of gas as a reducing agent, both before and after gas treatment is advisable. Reduction with converter gas is not worse than other well-known technologies for direct reduction of iron ore.