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Background of a Converter Gas Usage for Iron Ore Raw Materials Reduction

Converter steel production is one of the main ways in global steel production. The share of converter steel accounts for about 70% of the total steel production.

From the standpoint of energy converter production is the largest source of metallurgical secondary energy resource - converter gas. Converter gas has the contents to 90% and high temperature of 1600-1800 °C.

In this work it is offered to use converter gas as a reducer of iron ore raw materials. Restoration of metallized pellet was considered. Time of restoration was determined by Makkevan's formula.

A number of aspects related to the use of converter gas for iron ore recovery were analyzed:

1. The use of metallized materials in converting smelting.
2. Possibility to reduce or eliminate the carbon emissions into the atmosphere with non-combustible converter gas.
3. Possibility to reduce the amount of converter gas recovery.

The analysis of background indicates the possibility of working out the effective system for technological converter gas usage, including obtaining pre-reduced iron ore with its following use in the converter, eliminating carbon oxide emissions to the atmosphere together with non-combustible gas and decreasing amount of converter gas during reduction in 1.1-1.8.

Two options for placement of reactor on flue tract converter are offered: with the use high-temperature gas (before gas cleaning) and the cooled gas (after gas cleaning). Placing of reactor on high-temperature gas allows using reduction potential of the gas and simultaneously disposing its physical heat. With the use of 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 metallized product, gas must be used during several converter blowing. Converter blowing forms a recovery cycle. In this case the process of recovery is synchronized with steel smelting. It is also established that the use of high-temperature gas is 2-3 times as efficient compared to using cooled gas. In this case the use of gas as a reducing agent, both before and after gas treatment is advisable. Recovery with converter gas is not worse than other well-known technologies for direct reduction of iron ore.

Thus, the use of converter gas for iron ore recovery provides a metallized iron ore and give opportunity to use it instead of iron, which will reduce the cost of steel.