Blast Furnace Encyclopedia Article

Blast Furnace

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Blast Furnace

Furnaces have been used in the metal-smelting process for thousands of years. The walls of a furnace trap heat to achieve a temperature great enough to melt metal. For millennia, people melted metal simply by building huge fires in furnaces of various types and letting the natural build up of heat occur. However, in more recent history, metallurgists have developed various techniques to make the furnaces cleaner, hotter, and more efficient.

The blast furnace is one of the greatest improvements to the smelting process. By allowing blasts of air into the furnace, greater heat can be produced. The individual credited with the invention of the blast furnace is Abraham Darby. Although blast furnaces had already existed for a long time, Darby introduced coke as fuel for the furnace. Coke is made from coal heated between 9,000°C (16,232°F) and 11,500°C (20,732°F). It burns slower and hotter than coal, with little or no flame. Darby's process made it possible to produce iron more efficiently.

Blast furnaces were further improved in the 1850s by the simultaneous invention of the pneumatic conversion process by William Kelly and Henry Bessemer. This process directed the blasts of air into the molten metal, either overhead or directly into the metal through holes in the bottom of the kettle. It allowed for the efficient elimination of carbonic impurities from the iron, making steel production possible.

In 1856 brothers Charles William Siemens and Ernst Werner von Siemens invented their regenerative metal-processing chamber, which trapped escaping heat and returned it to the furnace. Improvements were made by Pierre-Emile Martin as well.

A newer generation of blast furnace employs the basic oxygen method, which produces supersonic blasts of oxygen. An automated blast-furnace system was introduced in 1997. Developed in Austria, the furnace is regulated by computers and specific computer models. These models control each phase of the operation of the blast furnace for optimal output.