9760 Recycling of Waste Oxides in Steelmaking Furnaces

Benefits

- Eliminates the need to land-fill an estimated three million tons of waste oxides each year which could save up to $120 million annually.
- Provides savings of up to $180 million and 15 trillion Btu annually by recycling waste oxides.

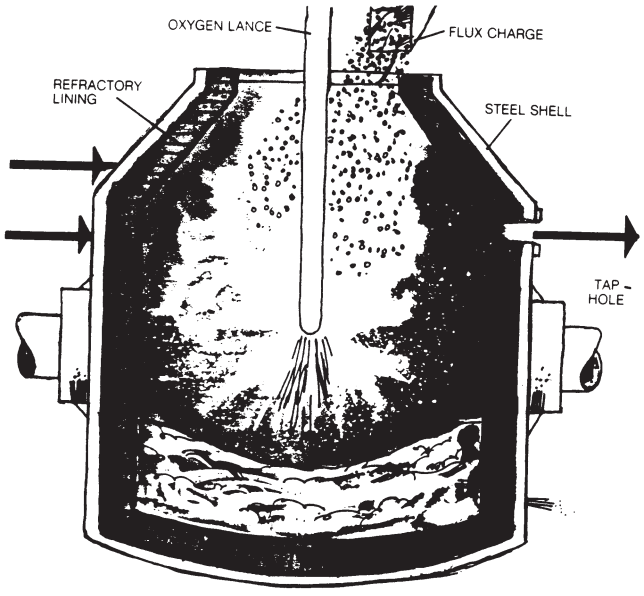
Applications

The technology has the potential for application to the 100 million tons/year of liquid steel produced. Successful development and application of the operating practices to utilize these waste oxides, due to the large benefits, could be adopted by all steel producers.

Development of an operating practice which will permit the recycling of waste oxide agglomerates in the steelmaking vessel

The U.S. Department of Energy is collaborating with the North American steel industry to develop an effective operating practice for recycling of waste oxide agglomerates in the steelmaking furnace. The successful development of this operating practice and its application to the production of liquid steel would result in improved energy efficiency and reduced steel product costs.

The application of the concept to high tonnage steel production operations requires many challenges to be overcome. Slopping, caused by the violent evolution of gas during steelmaking, interferes with the recycling of waste oxide agglomerates directly into the steelmaking process. The project will examine the mechanism of slopping induced by the addition of waste oxide agglomerates into the steelmaking vessel, develop operating practices which will permit the addition of these agglomerates while avoiding slopping, and perform industrial trials based on the results of this research.



Cross-section of a basic oxygen furnace.

Project Description

Goals: To develop an operating practice which will permit the recycling of waste oxide agglomerates in the steelmaking vessel, and to determining the mechanism of zinc oxide formation along with identification of factors that control its size distribution.

The project will have four major areas of investigation:
1) experimental work on gas generation; 2) slag foaming; 3) plant trials to develop operating practice; and 4) zinc partition studies.

Progress and Milestones

- Literature survey on slag foaming and gas generation has been completed.
- The experimental equipment for gas evolution has been built, tested, and experimental work is complete. Data gathered indicates very fast reaction rates.
- Recommendations to avoid slopping in steelmaking were presented to the industry.
- The Final Project Report was completed, January 2001.

Total Project Cost/Duration

$366,000/32 months.

Research Organization

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Industry Participants

Bethlehem Steel Corporation
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The Timken Company
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