

Overcoming the phosphorous issue at the Agbaja iron ore project in Nigeria

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ABSTRACT

The Agbaja Iron Ore project in Kogi State Nigeria is a unique sedimentary hosted channel iron geothite deposit. The sedimentary ore allows for a simple beneficiation circuit resulting in a low-cost concentrate feed for pre-reduction and smelting to produce steel billets. However, the ore contains high levels of phosphorous (1.0 – 2.0%) which need to be reduced for the crude steel to be suitable for steel billet production.

Previous work focused on generating an iron ore concentrate using magnetic separation and bioleaching techniques to improve the iron grade and reduce the phosphorous levels. This product would then be suitable for sale to steel manufacturers on the open market. However, the novel bioleaching method is unproven at commercial scale with limited markets available for the final product, namely due to the high transport costs associated with getting the product to the customer. The ability to produce a crude steel product which can feed the local Nigerian steel mills, significantly improves the economics for the Agbaja project and reduces the reliance of the local steel manufactures, who currently import 100% scrap metal to satisfy their requirements.

Recent pilot scale testwork at Mintek investigated methods of producing such a crude steel low in phosphorus. Four main phases of testing were completed, namely, Ore Beneficiation, Pre-Reduction, Smelting and Refining testwork. These tests have successfully demonstrated that a steel product, low in phosphorus suitable for local steel mills, can be produced from the Agbaja ore. The results of these phases of testing and the interpretation and development into a flowsheet suitable for the Agbaja ore are discussed.

Keywords

phosphorus, pilot testing, steel mills