Sorting Pilbara Manganese Ores – Do your homework and understand the mineralogy

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ABSTRACT

Manganese ores at the Woodie Woodie operation are understood to be fairly coarsely liberated up to 75 mm in particle size. With increasing iron levels present in recently mined ores, it was necessary to develop a simple method of separating iron minerals from manganese minerals. Unfortunately, finding a separation method is a challenge as nearly every physical property used in the mineral separation of iron and manganese is the same.

A few different methods of separation were explored. The first using electromagnetics as it was discovered that manganese particles can be detected through electromagnetic induction, whereas the gangue minerals of iron and silica cannot. Another ore sorting technique was based on exploiting the colour difference, manganese being black and the iron ore being red.

Several full-scale equipment tests indicated reasonable success and a pilot scale plant was developed and built to trial the effectiveness of sorting various Woodie Woodie lump ores employing electromagnetic separation and Near Infra-Red (Colour / NIR).

Best efforts were employed to overcome numerous feed preparation issues but ultimately the complex manganese mineralogy proved that no ore sorting technique was economically viable for Woodie Woodie ores. This paper discusses the testing and pilot plant program and provides practical tips and points out pitfalls that may be encountered when applying ore sorting technology to complex mineral deposits.