

Dry Concentration of Low Grade Magnetic Iron Ores

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Abstract

Australia is presently enjoying the fruits of a booming iron ore market. Expectations are that market strength will be supported in the short to medium term by increasing feedstock demands from steel mills, as world economies rebuild post Covid 19. However, as cost and environmental pressures increase the longer-term market outlook will be dominated by product quality. The “flight to quality” will place increasing demands on direct shipping ore miners as they compete to maintain their standing in the iron ore marketplace. China will progressively disengage from its dependence on Australian imports, leaving miners under increasing pressure to boost product quality and diversify outlets globally. Australia has vast deposits of low-grade magnetite ores located mainly in remote and arid regions of the continent. This paper outlines how future product quality demands can be met by dry processing of magnetite ores to produce premium concentrate grades for either blending or direct sale. The dry concentration process is environmentally risk free and involves the pairing of Vertical Roller Milling (a mature technology widely used in the cement industry) and Planar Magnetic Separation, which has been developed to the threshold of commercialization by the private Australian company Cyclomag P/L. Three laboratory prototype planar magnetic separators with field strengths of 1,800 gauss, 6,000 gauss and 15,500 gauss have been built and tested on a wide range of magnetite ore types over the past three years. In each case, pellet grade concentrate was produced from one roughing and one cleaning operation. Vertical roller milling tests on a typically hard ore successfully liberated magnetite with significant savings over wet media milling. A key advantage of dry processing is that it is adaptable to stepwise modular development, which facilitates start-up capital investment and generates early revenue streams to cope with unpredictable market volatility.

Key words – dry magnetic separation, roller milling, marketplace, product quality, risk reduction