Ultrasonic Treatment of Iron Ore Fines

Ultrasonic treatment of pulps containing iron ore fines can assist in the removal of impurities to improve iron grade. This treatment can be used to remove ultrafine material from lower grade ores and to clean the surfaces of gangue particles to increase floatability during reverse flotation processes.

Improving iron ore grade

Ultrasonic treatment of hematitic/goethitic iron ore fines can initiate and intensify particle cleaning and mineral disintegration. Soft minerals with lower iron contents and high gangue contents, such as kaolinite, dolomite and ochreous goethite, disintegrate much faster than valuable minerals like magnetite or hematite.

Ultrasonic treatment has been found improve the grade of hematitic/goethitic iron ore fines by moving relatively low grade soft material from the coarse to the ultrafine size fractions (CS6-CS7).

Our results

Tests to date have shown an increase in iron grade up to ~2% Fe with a reduction in alumina content of 30-40% for the ores evaluated. On average, the ores used in these studies had relatively low silica (2.5-3.5%) and alumina (1-3%) contents. Based on these results, it is very likely that for ores with lower iron grade and/or higher alumina and silica contents, ultrasonic treatment could provide even higher iron grade improvements.

Applications

Ultrasonic treatment can be applied to iron ore prior to:

- Hydrocyclone desliming
- Magnetic separation
- Flotation

CSIRO can conduct laboratory studies on the effectiveness of ultrasonic treatment as a precursor to hydrocyclone desliming, magnetic separation and reverse flotation for different ores, and identify the optimum conditions for simultaneously increasing recovery and grade.

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