

Pilot Testing Comparison of VRM Milling with AG and Ball Milling, each in Combination with Magnetic Separation, for Grange Resources' Southdown Magnetite Ore

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Loesche's Vertical Roller Mill (VRM) has achieved superior pilot plant comminution outcomes on hard Southdown Magnetite ore (Grange Resources, WA) compared to a conventional AG, magnetic separation and ball milling pilot circuit. VRMs utilise hydrostatic breakage to emulate HPGR power efficiency and can also achieve selective liberation. For magnetite ores, the dry VRM classifier oversize ("grit", $-3\text{ mm}+75\ \mu\text{m}$) is extracted continuously then magnetically separated. Magnetic grit is returned the VRM and non-magnetic grit is rejected to tailings. The novel Loesche VRM pilot plant rejected 31 to 41% of feed mass as coarse non-mag grits while recovering between 95 and 97% of the magnetite to the $85\ \mu\text{m}$ P_{80} product. VRM piloting was 33 to 36% more energy efficient than AG/Mag/Ball pilot milling, and achieved superior upgrading of the P_{80} $85\ \mu\text{m}$ product. This paper will compare the flowsheets, outcomes, modelling and scale up difficulties and the industrial benefits of each method.