

Tailings Valorization and Iron Recovery from Spiral Concentrators Circuit

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ABSTRACT

Mont Wright Mine is one of the most important assets of ArcelorMittal in the world, producing 26 million tons of concentrate per year (through spiral concentrators circuit) with iron grade higher than 66% Fe. On the other hand, 45 million tons of tailings are discarded every year with no additional treatment. Despite this, it is possible to observe a small quantity of iron oxides in the material, which presents a good potential to be recovered. Thinking in that, ArcelorMittal R&D Team started a study aiming to recover these iron oxides from Mont Wright final tailings and produce a final concentrate with more than 66% Fe and less than 4% SiO₂. Study showed an anomalous concentration of iron oxides in tailings fine fraction (<106µm) probably due to spirals intrinsic inefficiency. This material presents considerable Fe grade (23.55%), not so high SiO₂ (65.00%) and high liberation degree, which are excellent conditions to perform a concentration. Based on this information, some circuits of magnetic separation were evaluated being the best one composed by MIMS stage, WHIMS stage and a screening stage (to cut the fraction >75µm of WHIMS rougher concentrate) followed by a grinding stage (to grind this material to a P80 of 75µm and refeed it into WHIMS). Using this circuit was possible to produce a concentrate with 67.3% Fe and 3.87% SiO₂, with mass recovery of 30.2% and Fe recovery of 87.8%. Considering these results it will be possible to increase total production of asset in approximately 10%, reducing tailings generation in 6%. In this way, the present study showed that there is a great potential to generate value from the tailings produced at Mont Wright operation nowadays, which can be also applied in other operations based in the same type of concentration process.

Key words: Iron Ore, Tailings Recovery, Magnetic Separation, Spiral Concentrators