

# Efficiency improvement of Jalal Abad Beneficiation Plant by Concentrate quality enhancement and Tailing Recovery

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## ABSTRACT

In recent years, due to advances in designing of various magnet assemblies, a wide range of magnetic materials with different properties can be concentrated. Jalal Abad iron ore beneficiation plant which is located in Iran, Kerman province, is currently producing iron ore concentrate with the capacity of 0.8 MTPY by having middle intensity magnetic separators (MIMS) with two stages of rougher and cleaner that finally leads to the production of an iron concentrate with the Fe grade of about 65%. In this plant, the rougher tailing directly goes to the thickener as the final tailing and cleaner tailing feeds to the ball mill for re-grinding. Since some portions of hematite particles with weak magnetic properties cannot be recovered from only these two stages of magnetic separation, the obtained tailing from this concentration plant has approximately an iron grade of 25 to 27%. Accordingly, laboratory processing tests were conducted on the obtained representative sample of the final tailing. Based on the experiment results performed on final tailing, a new magnetic drum separator with a specific magnetic assembly was designed that could finally lead to product with iron grade range of 58 to 60% with weight percentage of 8%. However, this product will be blended with the plant concentrate and, in this order, an increasing percent of 7% of the final product will be successfully achieved. Finally, it could be concluded that feeding of magnetite particles to the existing drum separators, due to their high magnetic field intensity, cannot efficiently lead to improvement of the grade of concentrate. Therefore, the laboratory magnetic separation tests were done on the final concentrate for evaluation of product upgrading probability. Consequently, by increasing another stage of cleaning and by decreasing the magnetic field intensity, the final product grade could be enhanced from of 65 to 67%.