

# Efficiency improvement of iron beneficiation plant by special fine particle magnetic separator

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## ABSTRACT

Dry magnetic separators have been used to upgrade and beneficiate a wide variety of minerals such as hematite and magnetite materials. In recent years, advances in dry magnetic separators have remarkably improved their performance. However, fine particle separation is one of the main areas which still remain a potential field for further research and development activities. In this paper, a new design of fine particle magnetic drum separators is introduced which could be successfully applied for separation of fine particles, i.e., less than 3mm. In other words, one of the major challenges in iron ore processing plants has been attributed to promoting the grade and recovery of minerals fine particle sizes. The new design of a high efficiency magnetic drum separator is developed in order to handle feeding materials with fine particle sizes. In this novel type of magnetic drum separator, both the drum shell as well as magnetic yoke will rotate in opposite directions. Finally, it could be observed from the results that if the feeding material size is  $K_{80}=1298\mu\text{m}$ , then by applying the drum shell speed in addition to magnetic yoke speed at 42.5 rpm and 100rpm, respectively, and finally by providing the maximum intensity of magnetic field at  $\theta= 30^\circ$ , the feed grade can be increased from 50.87% to 65.67% in concentrate box. Furthermore, the grade in the middle box could be improved to 60.45% and also the tailing grade could reach 26.23%, while the total achieved recovery for both concentrate and middle box was 81.89 %.