

**DESIGNING PROTOTYPE PORTABLE
PARTICLE SIZE SEPARATOR FOR PURE
ILMENITE SEPARATION**

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by

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Abstract

Designing prototype portable particle size separator for pure ilmenite (FeTiO_3) particle size separation is giving a good phenomenon to further know about particle size distribution and their elementary analysis. Ilmenite has magnetic property that can be feasible to separate the ilmenite due to percentage of Fe^{2+} percentage on each particle. Separator design has several adjustments for best performance and concentration was analyzed to know success of this research. Sri Lanka has huge beach sands deposit including high amount of ilmenite which are spread over eastern costal of Sri Lanka specially pulmoddai and there is a plant which does ilmeinte separation ,the product of separation export as bulk without any valuation but foreign countries are using ilmenite for nono technology, abrasive purpose and synthetic process, those technologies based on particle size of ilmenite there for perfect analysis of particles based on elementary distribution gives value addition process of ilmenite. When Ilmenite grade is low separator can upgrade the ilmenite also, therefore portable particle size separator can feasible for particle size analysis of ilmenite.

Particle size separator outlook is rectangular box shape and in front side of the design has all processing apparatus which are primary coil, secondary coil, feed hopper, conveyor belt, chutes, splitter and switches but inside of this instrument has designed with all circuits, transformer and gear system with motor and bridge circuit. Each apparatus was fixed with systematically for proper separation, after designing Ilmenite was fed through feed hopper and conveyor belt toward the separation point where primary and secondary coils are fixed. Due selective magnetic flux, particle size separation was occurred and concentrate and tailing were dropped into separate bins through chutes. Selective flux rate was changed by current regulator for each deferent particle size distribution output because each ilmenite particle has different amount of Fe^{2+} which concern by selective magnetic flux density to capture the particles. In low current passage, flux density is low therefor particle size distribution has lot of large grains with low ilmenite grade but when increase the flux density particle size distribution has low amount of large grain and medium size grains with high amount of small particles and distribution can be contained high amount of titanium ion. This separator has high efficiency but recovery is low, to increase the recovery rate feasible magnetic coils are needed.