



A PROJECT REPORT [10ME85]

ON

DESIGN AND PERFORMANCE ANALYSIS OF SOLAR POWERED TROMMEL SCREEN

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Bachelor of Engineering
(Mechanical Engineering)

Of

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ABSTRACT

Solar power is the conversion of sunlight into electricity, either directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaics convert light into an electric current using the photovoltaic effect.

The main aim of this study is to design and analyse the performance of a solar powered trommel screen that can segregate particles by size like compost soil, sand, coal etc., a system that is relatively cheap, portable, and depends only on renewable solar energy.

The project is motivated from the advantages of trommel screen over vibrating screens and reduction of time, labour cost and increase efficiency for segregating the components. The project goal is to efficiently produce trommel screen that can run using solar power.

Experiments were carried out to evaluate the performance of a trommel screen for compost cleaning to increase product quality. Theoretical analysis was conducted for optimizing sieve speed and sieve inclination angle. The machine performance was studied as a function of change in material feed rate, screen opening size and compost moisture content. Performance evaluation of the trommel screen was carried out in terms of machine productivity, separating efficiency, compost losses, cleaning efficiency, required power, energy requirements and criterion cost.

The experimental results reveal that the performance of the trommel screen during compost cleaning was in the optimum region under the following observations:

Operate the trommel screen at a sieve speed of 25 rpm (1.18 m/min). The slope angle of the cylindrical sieve on the horizontal plane (sieve inclination angle) should be lower than 15 degrees. The screen opening size should be of about 10 mm. Clean compost at a moisture content of about 25-30 %. Operate the trommel screen at an average feed rate of 4 Kg/min.

From the experiments that were carried out the segregation of the particles were smooth and reliable. With optimum time and optimum feed the segregated particles can be replaced by the old conventional methods. And by the use of solar or green energy and by trial and error basis the best suitable optimum conditions has been adopted for the design and performance analysis of the solar powered trommel screen.