

AGRICULTURAL SAND SIEVING MACHINE

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Abstract - Generally sand filtering or separating is a huge task for the construction workers due to the inappropriate grain size of the sand. So a Sand Sieving Machine can be much useful for the sand filtering irrespective of the grain sizes. Nowadays in industries, constructions, agriculture fields Sand Sieving Machine plays a vital role to make the task easier and efficient. The proposed work is to fabricate for the construction purpose. In this project we are focusing on the use of the filter mesh, crank, connecting rod along with the proper usage of battery. In this project we are also using a mechanism by which the machine works like linear motion of the mesh, rotary motion of the crank etc.

Keywords - Grain size, Filter mesh, Crank, Connecting rod, Battery.

I. INTRODUCTION

Sand is a loose particle of hard broken rock. It is also a naturally occurring granular material composed of finely divided rock and mineral particles. The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non - tropical coastal settings is silica (silicon dioxide or SiO_2), usually in the form of quartz.

It comprises of grains from disintegrated rock. The grains size ranges between 0.06 mm to 2mm in size and varies in shades of brown and orange colour.

Sand provides bulk strength and other particles to construction materials and for casting (mould making) such as asphalt and concrete.

The main uses of sand include:

Concrete sand which is often a principle component of concrete.

Moulding sand, also known as foundry sand is moistened and or oiled and hence shaped into moulds for sand casting.

It is the principle component in glass making.

Brick manufacturing sand plants use sand as an additive and with a mixture of clay and other material for manufacturing of brick.

Since sand comes in different sizes and grades, a sand sieving machine was conceptualized for design to sieve sand for user's requirement and then transport them to a desired location.

The problem statement suggest that the sieved sand be produced to user's specification (of suitable fine grade) and then produce them in large quantity without stopping the machine economically and effectively, these are the main objectives of the project and this poses a challenge in the design.

Sieving technique adopted involves gravity separation process. Sand sieving machine consists of electric motor, transfer belt, hopper, rotating sieve (rotating drum) and mass conveyor.

In this process a rotating drum with suitable microns of sieve is tilted to an angle such that when

rough sand is fed into it through a hopper during operation, sieving takes place due to agitation of the rotating sieve and the unwanted sand slides down by gravity through the outlet of the rotating sieve. The fine sand is then transported to a collection point which could be a construction site for concrete production or for storage purpose. This method of operation enhances high production output and reduction of downtime for stoppage. The scope of the project includes the fabricating the machine parts using engineering methods like welding, drilling, cutting etc.

II. METHODOLOGY

Sieving is a physical mechanism of particle removal, where a particle is denied access through a pore or a passageway that is smaller than the particle itself. The fine mesh strainer, also known as sieve, is a device for separating wanted elements from the unwanted material or for characterizing the particle size distribution of a sample, typically using a woven sieve such as a mesh or net or metal.

In this process, the rotary motion produced by the DC motor is transmitted to the shaft fitted with sieve net using belt drive. Shaft is fitted to framework with the help of bearing. The homogeneous mixture of sand and pebbles are fed from the slider which falls on the sieve net fixed on the rotating shaft. Then due to relative motion between particles and rotating sieve, the particles smaller are passed through the net and remaining particles fall on the other side.

III. RESULT

The following figure shows the total fabrication of the agricultural sand sieving machine that separates the unwanted particles from the sand.



IV. CONCLUSION

Concluding the project up to now after research four different types of sieving machine was conceptualized to select the best considering every factor to make it more efficient, portable and easily operable. Then the required materials were selected by market study although the fabrication process was undoable due to condition occurred we continued the design process in Solid works and some preliminary calculations. This report also includes to do method of construction and research design flowchart and the Gantt chart.

According to calculations and assumptions, this type of sieving machine will be efficient and easily operable, which can help society to learn new way of sieving sand

REFERENCES

- [1] P. S. Krishna, P. Pradeep, B. Bivek, and P. S. Bim, "Mathematical modeling, simulation and analysis of rice grain movement for design and fabrication of low-cost winnowing machine," *J. Mech. Eng. Res.*, vol. 9, no. 1, pp. 1–14, Jan. 2017, doi: 10.5897/jmer2016.0403.
- [2] MOHD EFFI B MOHJEE, "DESIGN AND FABRICATE SIEVE MACHINE," 2008.
- [3] "Traditional method of sand sieving." [Online]. Available: https://www.ekshiksha.org.in/chapter/77/images_of_Separation_of_substances_VI/8.png. [Accessed: 10-Mar-2020].
- [4] "Hand operated rotating siever." [Online]. Available:

- <https://dccb75d8gej24.cloudfront.net/images/products/03/030711400/B234C322-16C8-480C-9062-6D1F5BD922ED-large.jpg>. [Accessed: 11-Mar-2020].
- [5] “Motor operated sieve.” [Online]. Available: <https://encrypted-tbn0.gstatic.com/images?q=tbn%3AAAd9GcSmQUAkNMwLUnH7XptSKEsUCV2oBXHzspQPEaoBlbXIJf9iiTuJ>. [Accessed: 11-Mar-2020].
- [6] “Hand operated siever.” [Online]. Available: <https://shop.r10s.jp/minatodenk/cabinet/00640999/img55537538.jpg>. [Accessed: 11-Mar-2020].
- [7] “Rotatory garden sieve.” [Online]. Available: https://cdn.manomano.com/bmc-rotary-garden-soil-sieve-L-3178967-7022744_2.jpg. [Accessed: 11-Mar-2020].
- [8] “Hand operated sieve with net, hooper, slider and collector.” [Online]. Available: https://shop.r10s.jp/minatodenk/cabinet/00467453/sc-1_120525-01.jpg. [Accessed: 11-Mar-2020].
- [9] S. K. Subramaniam, Siti Huziamah Binti, Yusmarinta Yusop, and A. Hamidon, “Machine efficiency and man power utilization on production lines.” [Online].