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Review On Wind Operated Sand Seivering Machine

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ABSTRACT

A sieve is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net. This project focuses in design, fabrication of the mechanical part of machine and the system of the wind operated sieve machine. To achieve this project objective, this sieve machine body structure and mechanical system needs to concern some other criteria such as strength, safety and ergonomic design. Depending on their size the individual particles either pass through the sieve mesh or retained on the sieve surface. There are different machines that are being used for sand sieving processes. In our project the process will takes place automatically. Thus, the time consumed during the whole process is reduced

1.INTRODUCTION

Today's world requires speed in each and every field. Hence rapidness and quick working is most important. Now a day for achieving rapidness, various machines and the equipment are being manufactured. In such a modern era of liberalization, small scale industries are contributing in a big way to the growth of our country. New machines and techniques are being developed continuously to manufacture various products at cheaper rates and high quality. This project focuses in design, fabrication of the mechanical part of machine and the system of the sieving machine. Sieving Machine mainly depends on converting rotary motion provided by wind mill. With the help of wind mill crank attached the Rotary Motion is converted into Reciprocating Motion with help of Connecting Rod. The horizontal

sieving machine is worked on the basis of crank and slider mechanism. The sieving box is placed inside the rail track and the machine is started. When the sieving box moves in the reciprocating motion the sieving process is performed. Sieving is an uncomplicated practice for sorting out the particles of different sizes. Generally, while preparing the concrete for construction purpose, the process of sieving is carried out manually. Sieving of sand is carried out using rectangular mesh which is inclined at certain angle. In the present sand sieving method, the sample is subjected to horizontal movement in accordance with the chosen method. This causes a relative motion between the particles and the sieve. Depending on their size the individual particles either pass through the sieve mesh or retained on the sieve surface. There are different machines that are being used for sand Sieving, but we demonstrate the design & fabrication of automatically driven sand sieving machine which have low cost and simple in operation. For small scale farming in rural areas the main aim of the cultivator is over domestic use. The harvest is usually a small bulk. Therefore, they are not taken in for refining in major refining factories. Here we generate an idea to solve the problem of filtering or refining the harvested crops mainly grains, cardamom etc. This project is a domestic sieving machine which can be used to separate or sieve or filter out dirt and unwanted particles from the harvested crops. The machine is compatible and requires only a limited amount of space. The machine can also sort out stones and other unwanted particles from purchased goods or stored crops.

The aim is to separate different types grains and Dust depend upon their size to change different size of mesh". According to the current situation, in the agricultural side we have many former doesn't get the value of their grains due to the presence of unnecessary small size of grains and waste particle. Stones and branch in the grains so sometimes the farmer gets his worth in such way to by verifying his produce thus the cost of transporting by nearby market in very cheap rate trader buy grains from small farmers pay the same prize for different size grains there is no invectives to provide some mechanism which the farmer can separate his grains in two categories like the which we can see in the prize difference polish and which we can see the grains with large in size and the second one which we buy from the market with cheap rate. We have made the separation of sieving machine for different kind of grain for agricultural and household purpose. Vibrating table is fixed with the crank which moves the tray to vibrate it and act as a separator with the help of wheel connected to the pulley. Thus try the Design and fabricating of Sieving Machine to help the industrial people and farmers on the global market. Advantage is to obtain the easy separation of things according to mesh**.**

1.1 Objective

- To design and fabricate rotator sand sieving machine which separates sand from mixture.
- To replace traditional method of using hand as it is time consuming.
- To learn sliding crank mechanism.

- To develop interpersonal skills and to be familiar with the tools and process used in mechanical workshop.

- To learn how to arrange time and budget.

1.3 Significance:

The project involves design of the mechanical part of machine using advance software like CAD and Solid works and the system using this mechanical part then fabrication is carried out based on selected design.

By changing the mesh size of this multi-purpose sieving machine, the machine can separate a product of selective particle size only.

1.4 Problem Statement:

A. Sieving of sand particles in construction, grain sorting in agriculture is done manually and human effort is required.

B. After careful review of literature, it was found that no specific solution to separate different sizes of grains are not available.

C. The Speed of Motor cannot be controlled so that can be set according to preference.

D. The waste which is not sorted in sieving remains in sieve after an operation it needs to manually cleaned and remove.

E. Now days people always prefer the most suitable way to cut their cost and time. Example in a construction where they have to finish the work before the due date. His might be a problem. Since we have waiting long waiting for the good to arrive

F. However, sometime in big company there are high tech machine that can do this work sieving any sub stand or mixture. But sometime in construction required a special sieve machine that are comfortable and easy to use.

G. Traditional method gives low efficiency as it is operated manually but the automated sand sieving machine have higher efficiency

H. Traditional method requires more labour.

I. Traditional method is more time consumed during the process of preparing the concrete.

J. The cost of highly sophisticated machine is very high which is not affordable for small scale foundries and low-level contractors

2. Literature Review

A. Design and Fabrication of Domestic Sieving Machine

Alan Biju, Alwin Thomas, Akash J Kalarickal, Jeswin Jose, Rittin Abraham Kurien,

Conventional practices like winnowing require highly expertise hand movements considering gravity, aerodynamics and centrifugal force. This is the major difficulty observed in the winnowing process. Nowadays people always prefer the most suitable way to save time and energy. This project proposes a domestic sieving machine which can easily remove unwanted particles from the grains, nuts and other pulses automatically.

B. Automatically Driven Sand Sieving Machine

P.R. Gajbhiye ,RupeshKhode PratikSukhadeve ,VickyChaple

Construction of buildings requires sand as an important ingredient Sand is used at different stages in construction right from the foundation to the finishing work i.e. plaster. This sand is needs to be screened properly for various stages in construction, i.e. size of sand for construction work is slightly coarse whereas that used for plaster work is fine These processes are carried out manually. Sieving of sand is carried out using rectangular mesh which is inclined at certain angle. This causes a relative motion between the particles and the sieve. Depending on their size the individual particles either pass through the sieve mesh or retained on the sieve surface

C. Development of NCAM Reciprocating Cassava Mash Shifter

Abiodun L.O., Oladipo N.O and Bamidele B.L.

The NCAM cassava mash sifter was developed to tackle the problems of high labor, expense associated with manual sifting, time wastage, the tedious mature of the operation, injury to the hand or palm as one rubs against the raffia sieve continuously, back ache, caused by prolonged sitting in one position during manual sifting, low productivity, and the hygienically unsafe nature of manual sifting as products are exposed to germs.

D. Stacked Siever for Natural Sand Processing

W.D. Handoko, N. Widiastuti, G.S. Budi, K. Karelius, S. Pratapa

This stacked sand sieve was intended to replace conventional sieves that had several disadvantages, including unstable speed, inefficient time in processing large amounts of sand, and relatively higher costs incurred. This stacked sieve exhibited the following characters: 1) composed of two sieves, 2) can be assembled easily to change the size of the sieve, 3) had 3 variations of the sieve slope, and 4) used a gasoline motor to pro- duce a sift speed of 25.2 cm/s and 36.4 cm/s. The sieve slopes were manually adjusted by positioning the sieves according to the available slots on the device.

E. *Energy-based Indicators of Soil Structure by Automatic Dry Sieving*

Dmitry Fomin, Maria Timofeeva, Olga Ovchinnikova, Ilya Valdes-Korovkin, Andrey Holub, Anna Yudina

Numerous methodological approaches and fractionation procedures contribute to the continuation of discussions about soil aggregate formation. This study aims to justify the dry sieving procedure and suggest an optimal sieving regime for automatic shakers for soil samples.For this approach to calculating total sieving energy, using oscillation frequency, vibration amplitude, and time was proposed. Retisol, Phaeozem, and Chernozem topsoil samples from agricultural and native ecosystems were analyzed using a sieving test, in which 50-kg soil samples were divided into 500–700 g subsamples and sieved with a constant oscillation frequency (50 Hz), but with varying vibrational amplitudes (0–2.5 mm), for sieving times that ranged from 1 to 5 min. We found that the optimal sieving regime is characterized by total sieving energy of 1850 J kg− 1, reached during 2 min of sieving with a 50 Hz frequency and a 2.5 mm amplitude. Based on results of the dry sieving test, we have proposed the indicators of mechanical stability of soil structure: index of soil structure stability (SS) which characterize the degree of change in the soil aggregates size during sieving with minimal and optimal sieving energy, and modified the soil friability index (F4), that characterizes the rate of change in the soil aggregates size under mechanical load by dry sieving.

The proposed formula of total sieving energy calculation allows comparing results between soil studies. Our meta-analysis showed that most (26 of 34) studies used insufficient sieving energy, where the aggregate size distribution did not reach the equilibrium state. A detailed protocol for soil dry sieving analysis is provided.

F. Quality attributes of parboiled rice prepared with a parboiling process using a rotating sieve system

Naruebodee Srisang, Thatchapol Chungcharoen

The aim of this study is to apply a rotating sieve system to the parboiling process for parboiled rice production. The parboiling time and rotation speed were the main production factors affecting the quality attributes of the parboiled rice, including the degree of starch gelatinization (DG), fissure percentage, head rice yield (HRY), white belly, and color. The results showed that the parboiling process with a rotating sieve can decrease the parboiling time required to provide an even quality of parboiled rice. The parboiling time for an even quality of parboiled rice was 5 min at rotation speeds of 10 and 15 rpm, while the parboiling time at a rotation speed of 5 rpm was 10 min. These times were shorter than that with a fixed sieve (15 min). Moreover, the parboiling process using a rotating sieve system provided better qualities of parboiled rice than that using the fixed sieve system, including higher DG and HRY and lower fissure and whiteness percentages. Additionally, the values of DG and HRY were increased with increasing parboiling time. In contrast, the fissure and whiteness percentages of the parboiled rice decreased. However, the quality of the parboiled rice was not dependent on the rotation speed.

G. Shredding and sieving thermoplastic composite scrap: Method development and analyses of the fibre length distributions

Guillaume A. Vincent, Thomas A. de Bruijn, Sebastiaan Wijskamp, Mohammed Iqbal Abdul Rasheed, Martin van Drongelen , Remko Akkerman

Recycling of thermoplastic composites has attracted considerable attention in the recent years. Several recycling solutions include shredding scrap to centimetre-sized flakes to retain long fibres, followed by a remanufacturing step that prevents fibre breakage. Determining the exact fibre length distribution (FLD) for these routes is crucial, as it is of importance for the processibility of the material as well as the mechanical performance of the recycled parts. In this paper, novel analysis methods are introduced to calculate FLDs based on photographs of flakes. The reliability of the method and of the sampling was found to be high. The relation between flake size and FLD was studied, showing that offcut layup barely influences the FLD in comparison to flake size.

2.1Ancient Grain Sieving:

Sieving began in Ancient Egypt as a way to grade grain harvests. The process involved using simple mesh strainers to separate the needed elements from unwanted material.

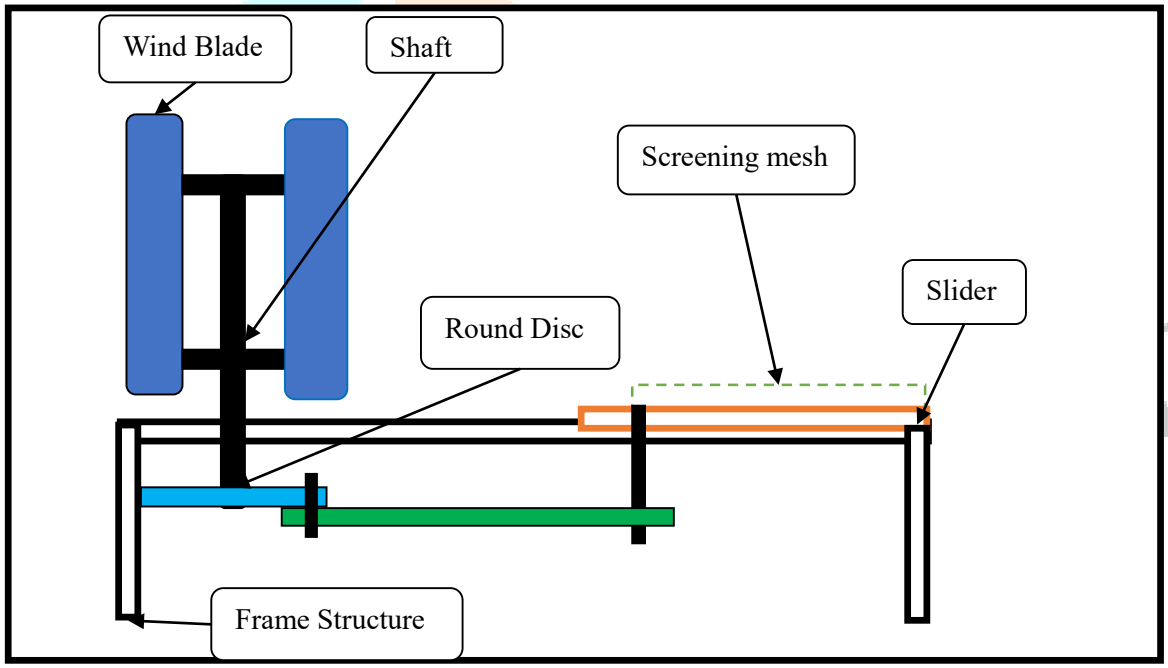
The earliest sieves were made of woven materials, but even then, punched plate sieves (made with holes) were used. These sieves are depicted in early Egyptian drawings.

The primary purpose was to prepare foodstuffs by separating particles of different sizes

Parts used in the project

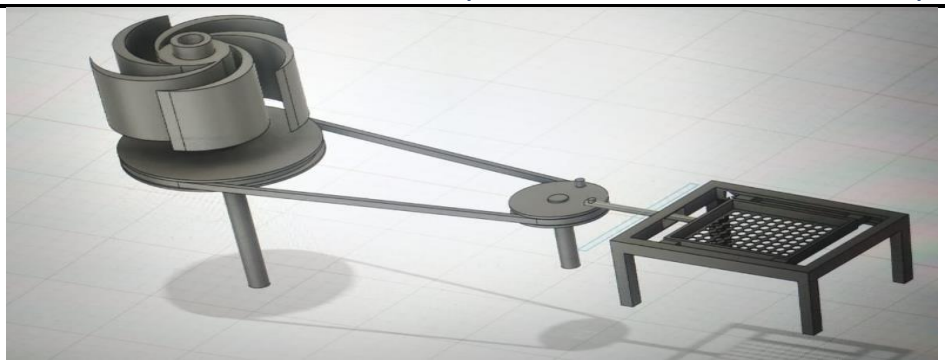
Wind blade 4 no's
Bearing 2 no's
Nut & Bolts
Shaft
Screening mesh
Slider 2 Nos
Frame Structure
Round Disc

3.1 Diagram of the project



3.2 Working of the project

The wind operated sieving machine is very easy to construct and can be operated easily. It is very economic among this kind of machines. This project is fabricated with the help of parts like a wind mill, crank and slider link mechanism, bearing, sieving box. The horizontal sieving machine is worked on the basis of crank and slider mechanism. Here crank is attached to the sieve box the power is given by wind mill through crank arrangement. The rail bracket is made in which the sieving box moves in it. The sieving box fixed with the connecting rod in order to move when the wheel is rotated by means of crank attached to the wind mill. The sieving box is placed inside the slider bracket and the machine is started. When the sieving box moves in the reciprocating motion the sieving process is performed for various operations by changing the inner sieve for different applications.



3.3 Product development process

A product development has to go through the following concepts of product engineering which are given as under.

1. Product functions
2. Product specifications
3. Conceptual design
4. Ergonomics and aesthetics
5. Standards

Detailed design

1. Prototype development
2. Testing
3. Simulation
4. Design for manufacture
5. Design for assembly
6. Drafting

Advantages

1) Simple in construction.

2) Nowadays, separation of different sizes of solid material is a need of hours; this project can be used for the separation of different sizes of solid only by changing mesh of required size.

3) Compact in size and required less space.

4) Less in weight.

5) Here different types of materials can be separated which depends on the mesh size used.

6) Low in cost and does not required electricity.

DISADVANTAGES

1) Initial costing is high
2) For the finer sand repeated screening process is required which is tedious.
3) Refining more amounts of will consume time.

3.4 Cost estimation of the project

Raw material cost:-It includes the material in the form of the Material supplied by the "Steel authority of India limited" and 'Indian aluminum co.,' as the round bars, angles, square rods, plates along with the strip material form. We have to search for the suitable available material as per the requirement of designed safe values. We have searched the material as follows:-Hence the cost of the raw material is as follows:-

Sr. No.	**Name of the Part**	**Cost**
1	Wind blade 4 no's	800
2	Bearing 2 no's	1200
3	Nut & Bolts	100
4	Shaft	500
5	Screening mesh	100
6	Slider 2 Nos	1000
7	Frame Structure	2000
8	Round Disc	200
Total		5900/-

Future Scope

The project can be made for higher capacities by increasing the dimension and improving the design aspects. The machine can be operated using solar energy also which is economically useful. The fabrication of a multipurpose sieving machine opens up possibilities for various industries such as agriculture, pharmaceuticals, and construction. Its future scope lies in refining its design for greater efficiency, automation, and adaptability to different materials and particle sizes. Additionally, integrating smart technologies for real-time monitoring and data analysis could enhance its functionality and performance. As industries evolve, so will the demands placed on sieving machines, driving innovation and expanding their applications

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 doing 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.

The mechanical sand sieve is an important tool in construction and foundry projects for filtering and separating sand particles. The efficiency of the machine, ease of use, and low cost makes it an attractive option for sand separation across many different industries. The machine can scale up for bigger projects

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