DESIGN AND FABRICATION OF HORIZONTAL RECIPROCATING SAND SIEVING MACHINE

A Thesis

by

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In partial fulfillment of the requirements for the award of the degree

of

Bachelor of Science in Mechanical Engineering

JANUARY 2024

ACKNOWLEDGEMENT

First of all, we are grateful to Allah, the almighty for giving us the courage and enthusiasm to complete the thesis work. The authors express their gratitude to "**Md. Minhaz Uddin**" for his constant & meticulous supervision, valuable suggestion and encouragement to carry out this work. For all this, the authors acknowledge their sincere gratitude to him. We are also grateful to all our thesis & project working team of SU for their help in construction of the project work and give their valuable knowledge and time for completing the experiment. Finally, we would like to thank everybody who supported us in any respect for the completion of the thesis.

ABSTRACT

The Horizontal Reciprocating Sand Sieving Machine is a mechanical device designed for efficient separation of sand particles through a reciprocating motion mechanism. The system is powered by a gear motor, providing controlled rotary motion, which is converted into a precise reverse-and-fowared motion through a crank and connecting rod arrangement. Electrical components, including a Switched Mode Power Supply (SMPS) and a switch, govern the power supply and control aspects of the machine. The sieving process involves the use of a sieving mechanism, and the collected sand particles that pass through the sieve are gathered in a designated Collecting Box. The machine's mobility is facilitated by wheels, while the overall structural integrity is maintained by a sturdy Frame/Base. This innovative design aims to streamline the sand sieving process, enhancing efficiency and usability in various applications such as construction and manufacturing. The Horizontal Reciprocating Sand Sieving Machine presents a reliable and adaptable solution for industries requiring precise sand separation. Its modular components and thoughtful design contribute to a robust and effective system for handling sand sieving operations.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

A sand sieving machine is designed to separate the particle according to their mesh size. In many industries for example the pharmaceutical, mining, food, etc. it is often desirable to communicate particulate matter. Sieves are used for sifting flour has very small holes. Depending upon the types of particles to be separated, sieves with different types of holes are used. Sieves are also used to separate stones from the stand. A number used to designate the size of a sieve, usually the approximate number of openings per inch. The size of openings between crosses wires of a testing sieve. The sand sieving machine is handily to construct and can be operated easily.

This fabricated with the help of parts like a handle, crank and slotted link mechanism, bearing, rail track, sieving box and a collecting box. The horizontal sieving machine is worked by eccentric pendulum mechanism. The rail track is attached to the base in which the collecting box moves in it. The collecting box is fixed with the shaft to move when the shaft is reciprocated. The sieving box is placed inside the collecting box, and the machine is started. When the collecting box moves in the reciprocating motion, the sieving process is performed. The various size of coal, coffee powder, sand are separated by eccentric pendulum operated two-level screening machine. The component which is greater in size they stay on the top layer of vibrating screen.

The little components fall on the second screen and lesser size of components obtained in the tray. Thus the different sizes of components are separated with the help of screens.stones from the stand. A number used to designate the size of a sieve, usually the approximate number of openings per inch. The size of openings between crosses wires of a testing sieve. The sand sieving machine is handily to construct and can be operated easily. This fabricated with the help of parts like a handle, crank and slotted link mechanism, bearing, rail track, sieving box and a collecting box. The horizontal sieving machine is worked by eccentric pendulum mechanism. The rail track is attached to the base in which the collecting box moves in it. The collecting box is fixed with the shaft to move when the shaft is reciprocated. The sieving box is placed inside the collecting box, and the machine is started. When the collecting box moves in the reciprocating motion, the sieving process is performed. The various size of coal, coffee powder, sand are separated by eccentric pendulum operated two-level screening machine. The component which is greater in size they stay on the top layer of vibrating screen. The little components fall on the second screen and lesser size of components obtained in the tray. Thus the different sizes of components are separated with the help of screens.

1.2 Objective

The objectives of this project are:

- To design and **Fabricate Of Horizontal Reciprocating Sand Sieving Machine.**
- To test the performance of the Horizontal Reciprocating Sand Sieving Machine.
- To develop interpersonal skills and to be familiar with the tools and process used in mechanical workshop.

1.3 Organization of the Book

- **Chapter 1: Introduction.** This chapter is all about background study, motivation, Objectives and thesis book organization.
- **Chapter 2: Literature Review-** Here briefly describe about previous book review and Summary of this chapter.
- **Chapter 3: Structure-** This chapter is discussed about block diagram, circuit diagram, components of list . Here we describe our hole instrument details.
- **Chapter 4 : Hardware Analysis -** This chapter is discussed about our project hardware and Software . Here we describe our hole instrument details.

- **Chapter 5: Design And Methodology–** Here briefly discuss about project methodology, working principle and our system overview.

- **Chapter 6: Result and Discussion–** Here briefly discuss about project discussion, result analysis, advantages, application and our system overview.

- **Chapter 7: Conclusion** – This chapter is all about our thesis future recommendation and this project conclusion.

CHAPTER 2
LITURATURE REVIEW

2.1 Introduction

This chapter mainly reviews literature, reviews of various types of work and highlights the importance of Fabrication of **Fabrication of Horizontal Reciprocating Sand Sieving Machine** in such situations.

2.2 Literature review

A. Design and Fabrication of Domestic Sieving Machine

Alan Biju, Alwin Thomas, Akash J Kalarickal, Jeswin Jose, Rittin Abraham Kurien,Con ventional practices like winnowing require highly expertise hand movements consideri ng 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 t ime and energy. This project proposes a domestic sieving machine which can easily re move 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 scre ened properly for various stages in construction, i.e. size of sand for construction work i s slightly coarse whereas that used for plaster work is fine These processes are carried o ut manually. Sieving of sand is carried out using rectangular mesh which is inclined at c ertain angle. This causes a relative motion between the particles and the sieve. Dependi ng on their size the individual particles either pass through the sieve mesh or retained o n 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 de veloped to tackle the problems of high labor, expense associated with manual sifting, ti me 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 posi tion during manual sifting, low productivity, and the hygienically unsafe nature of man ual 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 siev e was intended to replace conventional sieves that had several disadvantages, including unstable speed, inefficient time in processing large amounts of sand, and relatively high er 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 variatio ns 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 acco rding 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 H olub, 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 auto matic shakers for soil samples. For this approach to calculating total sieving energy, usi ng oscillation frequency, vibration amplitude, and time was proposed. Retisol, Phaeoze m, and Chernozem topsoil samples from agricultural and native ecosystems were analy zed using a sieving test, in which 50-kg soil samples were divided into 500–700 g subs amples and sieved with a constant oscillation frequency (50 Hz), but with varying vibra tional 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. Base d on results of the dry sieving test, we have proposed the indicators of mechanical stabi lity 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 e nergy, and modified the soil friability index (F4), that characterizes the rate of change i n 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, whe re 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 re manufacturing 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. The effects of shredding settings and sieving were studied, showing a strong correlation between machine parameters and FLD, wher eas the offcut size was found to have no effect on FLD.

H. Intelligent optimal sieving method for FACTS device control in multi-machine systems

Qiang Lu, Wencong Wang, Chen Shen, Shengwei Mei, Masuo Goto, Akihiko Yokoyam a A multi-target oriented optimal control strategy for FACTS devices installed in multi-machine power systems is presented in this paper, which is named the intelligent optim al sieving control (IOSC) method. This new method divides the FACTS device output r egion into several parts and selects one typical value from each part, which is called out put candidate. Then, an intelligent optimal sieve is constructed, which predicts the impa cts of each output candidate on a power system and sieves out an optimal output from a ll of the candidates. The artificial neural network technologies and fuzzy methods are a pplied to build the intelligent sieve. Finally, the real control signal of FACTS devices is calculated according to the selected optimal output through inverse system method. Si mulation has been done on a three-machine power system and the results show that the proposed IOSC controller can effectively attenuate system oscillations and enhance the power system transient stability.

2.3 Summary

From the literature discussed above, we gained a lot of knowledge and we inspired to do this project. We were able to do it with everyone tireless work.

CHAPTER 3
METHODOLOGY

3.1 Block Diagram

In this diagram we will show by block the individual parts.

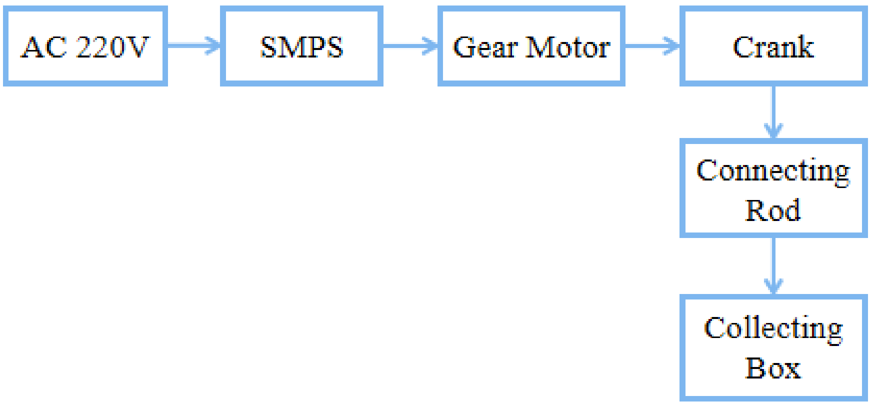

Figure 3.1: Block Diagram

3.2 Circuit Design

The schematic diagram here is representing the electrical circuit and the components of our System. Here we connect equipment with he smart wire connection.

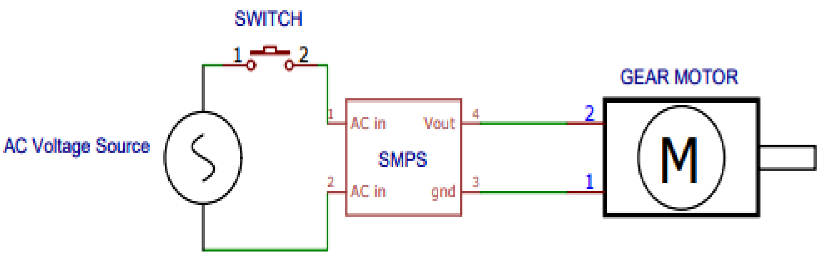

Figure 3.2: Schematic Diagram

3.3 Components List

Hardware

1. Gear Motor
2. Battery
3. Switch
4. Crank
5. Wheel
6. Connecting Rod
7. Collecting Box
8. Frame Base

3.4 Gear Motor

A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. A 12v DC motor is small and inexpensive, yet powerful enough to be used for many applications.

Specification:

- Voltage: 12V DC
- Gear ratio: 1/31
- No-load speed: 200 RPM
- Rated Speed: 140 RPM
- Rated torque: 10 kg.cm
- Rated current: 2.5 Amp
- Length of Motor(including spindle): 106 mm/4.17″
- Diameter: 37 mm/1.45″
- Shaft length: 21 mm/0.82″
- Shaft diameter: 6 mm/0.24″

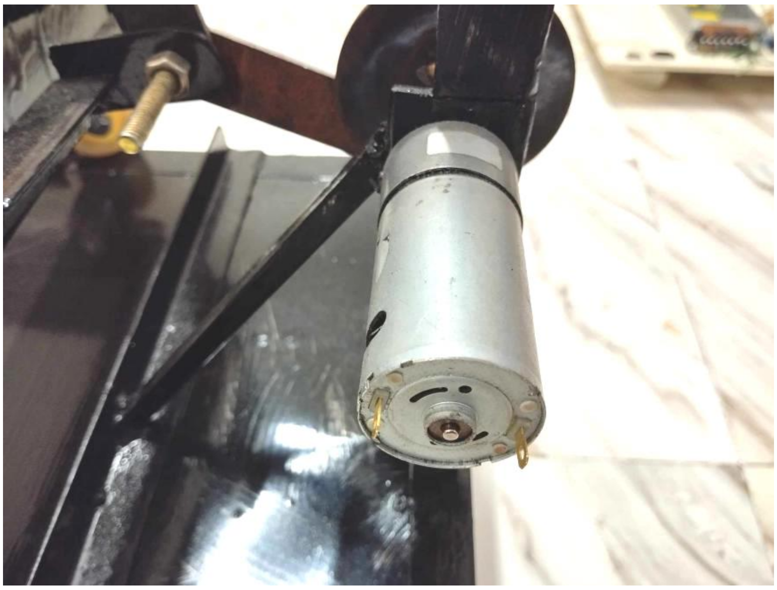

Figure 3.3: Gear Motor

3.5 Switch Mode Power Supply (SMPS)

A switched-mode power supply (switching-mode power supply, switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. A hypothetical ideal switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time (also known as duty cycles). In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This higher power conversion efficiency is an important advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight.

Figure 3.4: SMPS

Switching regulators are used as replacements for linear regulators when higher efficiency, smaller size or lighter weight are required. They are, however, more complicated; their switching currents can cause electrical noise problems if not carefully suppressed, and simple designs may have a poor power factor. Switched-mode power supplies are classified according to the type of input and output voltages. The four major categories are:

- AC to DC
- DC to DC
- DC to AC
- AC to AC

A basic isolated AC to DC switched-mode power supply consists of:

- Input rectifier and filter
- Inverter consisting of switching devices such as MOSFETs
- Transformer
- Output rectifier and filter
- Feedback and control circuit

The input DC supply from a rectifier or battery is fed to the inverter where it is turned on and off at high frequencies of between 20 KHz and 200 KHz by the switching MOSFET or power transistors. The high-frequency voltage pulses from the inverter are fed to the transformer primary winding, and the secondary AC output is rectified and smoothed to produce the required DC voltages. A feedback circuit monitors the output voltage and instructs the control circuit to adjust the duty cycle to maintain the output at the desired level.

Basic working concept of an SMPS

A switching regulator does the regulation in the SMPS. A series switching element turns the current supply to a smoothing capacitor on and off. The voltage on the capacitor controls the time the series element is turned. The continuous switching of the capacitor maintains the voltage at the required level.

Design basics

AC power first passes through fuses and a line filter. Then it is rectified by a full-wave bridge rectifier. The rectified voltage is next applied to the power factor correction (PFC) pre-regulator followed by the downstream DC-DC converter(s). Most computers and small appliances use the International Electrotechnical Commission (IEC) style input connector. As for output connectors and pin outs, except for some industries, such as PC and compact PCI, in general, they are not standardized and are left up to the manufacturer.

There are different circuit configurations known as topologies, each having unique characteristics, advantages and modes of operation, which determines how the input power is transferred to the output. Most of the commonly used topologies such as flyback, push-pull, half bridge and full bridge, consist of a transformer to provide isolation, voltage scaling, and multiple output voltages. The non-isolated configurations do not have a transformer and the power conversion is provided by the inductive energy transfer.

Advantages of switched-mode power supplies:

- Higher efficiency of 68% to 90%
- Regulated and reliable outputs regardless of variations in input supply voltage
- Small size and lighter
- Flexible technology

- High power density
- Disadvantages:
- Generates electromagnetic interference
- Complex circuit design
- Expensive compared to linear supplies

Switched-mode power supplies are used to power a wide variety of equipment such as computers, sensitive electronics, battery-operated devices and other equipment requiring high efficiency. Linear voltage IC regulators have been the basis of power supply designs for many years as they are very good at supplying a continuous fixed voltage output. Linear voltage regulators are generally much more efficient and easier to use than equivalent voltage regulator circuits made from discrete components such a zener diode and a resistor, or transistors and even op-amps.The most popular linear and fixed output voltage regulator types are by far the 78… positive output voltage series, and the 79… negative output voltage series.

These two types of complementary voltage regulators produce a precise and stable voltage output ranging from about 5 volts up to about 24 volts for use in many electronic circuits.There is a wide range of these three-terminal fixed voltage regulators available each with its own built-in voltage regulation and current limiting circuits. This allows us to create a whole host of different power supply rails and outputs, either single or dual supply, suitable for most electronic circuits and applications. There are even variable voltage linear regulators available as well providing an output voltage which is continually variable from just above zero to a few volts below its maximum voltage output.

Most d.c. power supplies comprise of a large and heavy step-down mains transformer, diode rectification, either full-wave or half-wave, a filter circuit to remove any ripple content from the rectified d.c. producing a suitably smooth d.c. voltage, and some form of voltage regulator or stabiliser circuit, either linear or switching to ensure the correct regulation of the power supplies output voltage under varying load conditions. Then a typical d.c. power supply would look something like this:

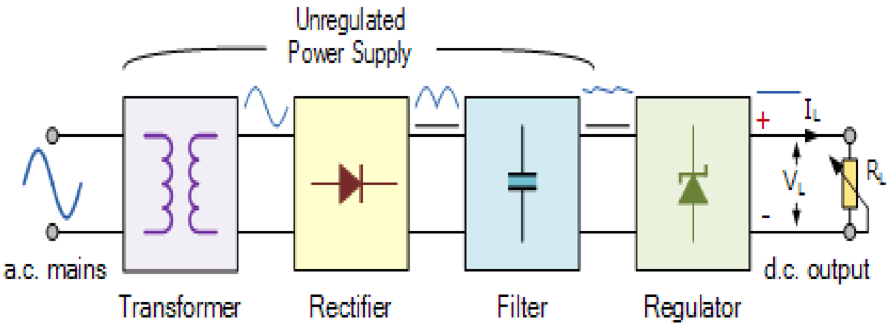

Figure 3.5: DC Power supply way

These typical power supply designs contain a large mains transformer (which also provides isolation between the input and output) and a dissipative series regulator circuit. The regulator circuit could consist of a single zener diode or a three-terminal linear series regulator to produce the required output voltage. The advantage of a linear regulator is that the power supply circuit only needs an input capacitor, output capacitor and some feedback resistors to set the output voltage.

3.6 Crank

A **crankshaft** is a mechanical component used in a piston engine to convert the reciprocating motion into rotational motion. The crankshaft is a rotating shaft containing one or more crankpins,[1] that are driven by the pistons via the connecting rods.[2] The crank pins are also called rod bearing journals, and they rotate within the "big end" of the connecting rods. Most modern crankshafts are located in the engine block. They are made from steel or cast iron, using either a forging, casting or machining process.

Figure 3.6: Crank

The crankshaft located within the engine block, held in place via main bearings which allow the crankshaft to rotate within the block.[3] The up-down motion of each piston is transferred to the crankshaft via connecting rods.[4] A flywheel is often attached to one end of the crankshaft, in order to smooth en the power delivery and reduce vibration.[5]

3.7 Wheel

A **wheel** is a circular component that is intended to rotate on an axle bearing. The wheel is one of the key components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel, and flywheel.

Figure 3.7: Wheel

Common examples can be found in transport applications. A wheel reduces friction by facilitating motion by rolling together with the use of axles. In order for wheels to rotate, a moment needs to be applied to the wheel about its axis, either by way of gravity or by the application of another external force or torque. Using the wheel, Sumerians invented a device that spins clay as a potter shapes it into the desired object.

3.8 Collecting Box

A **sieve**, **fine mesh strainer**, or **sift**, is a device for separating wanted elements from unwanted material or for controlling the particle size distribution of a sample, using a screen such as a woven mesh or net or perforated sheet material.

Figure 3.8: Collecting Box (8 Mesh)

Figure 3.9: Collecting Box (6 Mesh)

Figure 3.10: Collecting Box (3 Mesh)

The word sift derives from sieve. In cooking, a **sifter** is used to separate and break up clumps in dry ingredients such as flour, as well as to aerate and combine them. A **strainer** (see Colander), meanwhile, is a form of sieve used to separate suspended solids from a liquid by filtration. Some industrial strainers available are simplex basket strainers, duplex basket strainers, T-strainers and Y-strainers. Simple basket strainers are used to protect valuable or sensitive equipment in systems that are meant to be shut down temporarily. Some commonly used strainers are bell mouth strainers, foot valve strainers,[2] basket strainers. Most processing industries (mainly pharmaceutical, coatings and liquid food industries) will opt for a self-cleaning strainer instead of a basket strainer or a simplex strainer due to limitations of simple filtration systems.

3.9 Frame Base

Frames are an artificial intelligence data structure used to divide knowledge into substructures by representing "stereotyped situations". They were proposed by Marvin Minsky in his 1974 article "A Framework for Representing Knowledge". Frames are the primary data structure used in artificial intelligence frame languages; they are stored as ontologies of sets.

Frames are also an extensive part of knowledge representation and reasoning schemes. They were originally derived from semantic networks and are therefore part of structure-based knowledge representations. According to Russell and Norvig's Artificial Intelligence: A Modern Approach, structural representations assemble "[...]facts about particular objects and event types and arrange the types into a large taxonomic hierarchy analogous to a biological taxonomy".

Figure 3.11: Frame Base

The frame contains information on how to use the frame, what to expect next, and what to do when these expectations are not met. Some information in the frame is generally unchanged while other information, stored in "terminals", usually change. Terminals can be considered as variables. Top-level frames carry information, that is always true about the problem in hand, however, terminals do not have to be true. Their value might change with the new information encountered. Different frames may share the same terminals. A frame's terminals are already filled with default values, which is based on how the human mind works. For example, when a person is told "a boy kicks a ball", most people will visualize a particular ball (such as a familiar soccer ball) rather than imagining some abstract ball with no attributes.

3.10 Capacitor

When there is a potential difference across the conductors (e.g., when a capacitor is attached across a battery), an electric field develops across the dielectric, causing positive charge (+Q) to collect on one plate and negative charge (-Q) to collect on the other plate. If a battery has been attached to a capacitor for a sufficient amount of time, no current can flow through the capacitor. However, if an accelerating or alternating voltage is applied across the leads of the capacitor, a displacement current can flow.

Figure 3.12: Capacitor

3.11 Resistor

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the sometime, act to lower voltage levels within circuits. Resistors may have fixed resistances or variable resistances, such as those founding thermostats, visitors, trimmers, photo resistors, hamsters and potentiometer s. The current through a resistor is in direct proportion to the voltage across the resistor's terminals. This relationship is represented by Ohm's law.

Figure 3.13: Resistor

3.12 Methodology

- Creating an idea for **Horizontal Reciprocating Sand Sieving Machine**. And drawing and listed of components/materials to know which components/materials need to construct it.
- Collecting the all components/materials for construct the system.
- Finally, we constructed this system & checked it finally that working very well.

3.13 Complete Project Prototype Image

Figure 3.14: Complete Project Picture

3.14 Working Principle

The Horizontal sand 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 handle, crank and slotted link mechanism, bearing, rail track, sieving box and a collecting box. The horizontal sieving machine is worked on the basis of crank and slotted mechanism. The rail track is attached at the base in which the collecting box moves in it. The collecting box is fixed with the crank shaft in order to move when the crank shaft is reciprocated. The sieving box is placed inside the collecting box and the machine is started. When the collecting box moves in the reciprocating motion the sieving process is performed.

3.15 Cost Analysis

Table 1: Cost of Components with Price

Sl. no	Particulars	Specification	Qty.	Unit Price (Taka)	Total Price (Taka)
1	SMPS		1	680	680
2	Crank		1	260	260
3	Gear Motor	12V	1	1090	1090
4	Wheel		4	100	400
5	Bearing		8	40	320
6	Collecting Box		1	460	460
7	Frame Base		1	4050	4050
8	Others		1	1850	1850
				Total	**9110/=**

CHAPTER 4
DESIGN ANALYSIS

4.1 2D Model View

2D Image of our system-

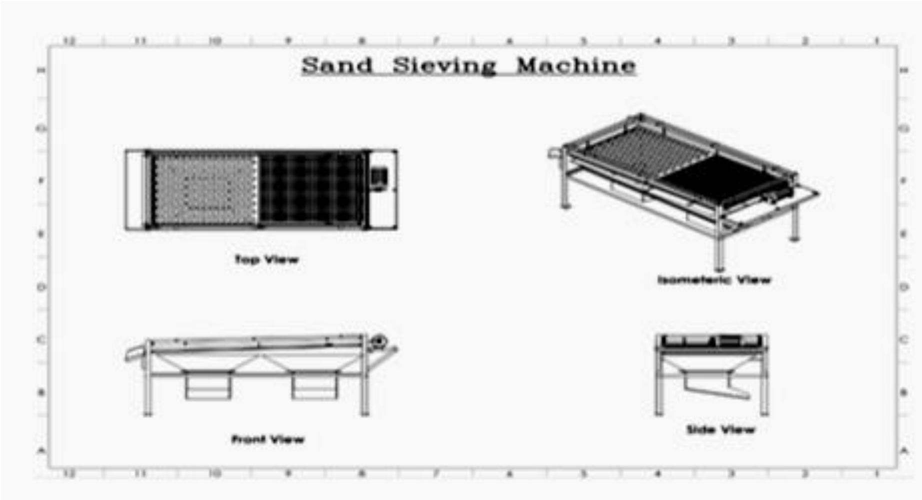

Figure 4.1: 2D Image

4.2 3D Model View

3d Image of our system-

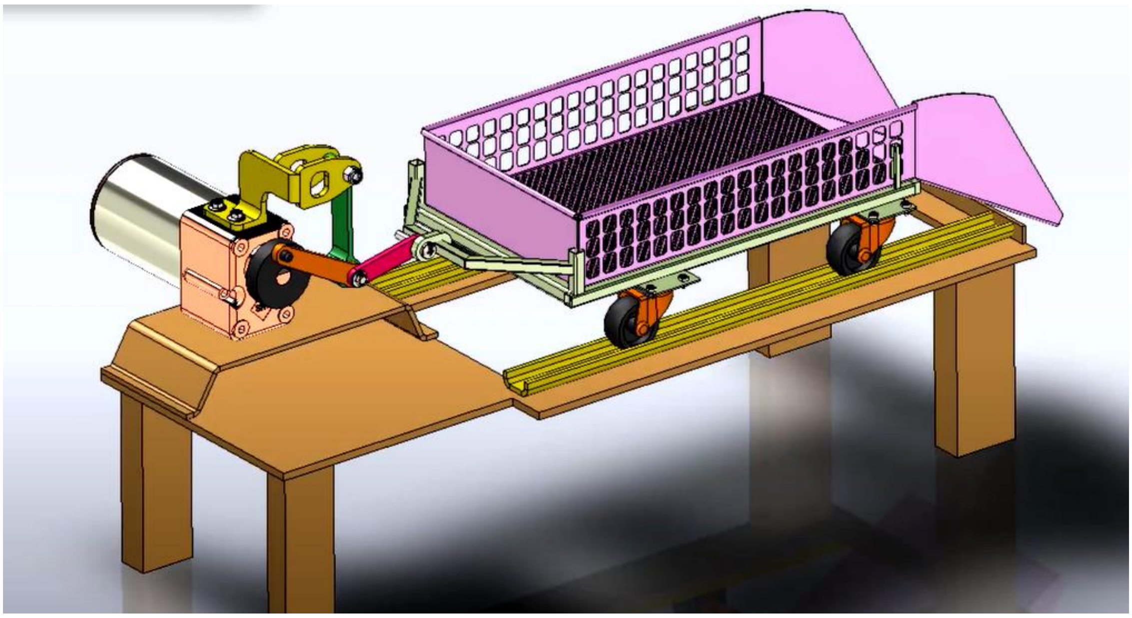

Figure 4.2: 3D Image

4.3 Materials Dimension, Weight & Thickness of All Parts

Sl. no	Particulars	Dimension	Weight	Thickness
1	SMPS	(L= 4, W=3, H=1) inch	112gm	1 cm
2	Crank	(L= 8, W=5, H=4) inch	4 kg	5 cm
3	Gear Motor	(L= 4, W=3, H=5) inch	300gm	3.4 mm
4	Wheel	(L= 3, W=2, H=1) inch	200gm	3 cm
6	Collecting Box	1.5 feet	500gm	20 cm
7	Frame Base	1.3 feet	12kg	30 cm

CHAPTER 5
RESULT AND CALCULATION

5.1 Result

Now, it's time to talk about the results. We have written our commands using the Arduino IDE and the following things can happen:

- Finally, we have completed our project successfully & check our project its run accurately according to our objective.
- At first, we start our system.
- When this project is run then it will sand sieving machine start the working Process.

■ Data Table (8 Mesh For Sand):

SL. No.	Input Sand CFT	Output Sand CFT	Wastage Sand	Time (Minutes)
1	0.3	0.299	0.001	20
2	0.4	0.298	0.002	22
3	0.3	0.299	0.001	18
Total =	**1**	**0.996**	**0.004**	**60**

■ Data Table (6 Mesh For Sylhet Sand):

SL. No.	Input Sand CFT	Output Sand CFT	Wastage Sand	Time (Minutes)
1	0.3	0.398	0.002	15
2	0.4	0.397	0.003	20
3	0.3	0.398	0.002	15
Total =	**1**	**0.993**	**0.007**	**50**

■ Data Table (3 Mesh For Concrete):

SL. No.	Input Sand CFT	Output Sand CFT	Wastage Sand	Time (Minutes)
1	0.5	0.497	0.003	10
2	0.6	0.596	0.004	15
3	0.5	0.498	0.002	10
Total =	**1.5**	**1.491**	**0.009**	**35**

■ Calculation:

Motor Capacity = 3 Watt

Use 50 HZ, 220 Volt

Power = W/T = 3/1 Watt/H

= 0.003 Unit

1 Unit Rate for industrial = 7.5 taka

Cost = 0.003* 7.5 taka

= 0.00225 Taka

Cost Per CFT = 0.0225 Taka

If we do the work analog man power cost generally per cft = 2.66 taka

Benefit = 2.66 - 0.0225 = 2.637 Taka Per CFT.

❖ When 5x3 Screen use two manpower sand saving 320Cft (8hours).

In this time same screen Sand Saving Maching Saving=1500cft(8 hours).

Electricity consumption = Motor power 2kw **x** 8hours=16 unite

It one unit price 6 Taka than 16 unite.

Cost = (6 **x** 16) Taka

= 96 Taka

320 cft sand saving 2 person than one person 160 cft

1 cft " " " " sand saving

160 cft sand sieving 01 person

So, 1 cft sand sieving 1/160

Then 1600 sand sieving 1x1600/160 =10 person

10person cost 10x500

=5000 Tk

When we use sand sieving then cost

3 person = 3x500 =1500 Tk

16 unite Electicity cost =96

Others = 100 Tk

Total = 1700 Tk

Benefit = 5000-1700 Tk = 3300 Tk

5.2 Advantage

There are many advantages of our project because of its accuracy. Some of the advantages are pointed out below:

- Easy disposes off unnecessary object.
- Simple construction and easy to used
- Automatic as well as fast filtering.
- It is compact size and less weight.

- The machine is easy to operate and anyone with a little knowledge also can operate it.

5.3 Application

The project has a major application in the

- It can be used for Construction Industry.
- It can be used in Civil Engineering Projects.
- It can be use Agriculture.
- Environmental Remediation.
- Small-Scale Construction Sites.

5.4 Limitation

It is a demo project so we found some limitation. In future we will work for reduce this kind of limitation. These limitations are –

- It is a demo project so it has some error.
- Our project may delay in work.

5.5 Discussion

- Certainly! Let's discuss some aspects related to the Horizontal Reciprocating Sand Sieving Machine project: What is the primary purpose of your sand sieving machine? Is it for construction, landscaping, or another application? Understanding the intended use will help you tailor the design and specifications to meet specific requirements.
- How have you planned the design to ensure efficiency in sieving? Consider factors such as the size of the sieving frame, the mesh size of the sieve, and the amplitude and frequency of the reciprocating motion. Considerations like portability and the availability of electrical power at the working site can influence the choice of power source.
- Discuss the need for mobility and whether the machine will be stationary or require movement during operation. Discuss how you plan to optimize the machine's performance based on initial testing results. Addressing environmental concerns can be important, especially if the machine will be used in sensitive areas.

5.6 Conclusion

- In conclusion, the Horizontal Reciprocating Sand Sieving Machine is a versatile and practical tool with applications across various industries. Its primary function of separating particles based on size makes it invaluable in contexts ranging from construction and civil engineering to agriculture and environmental remediation.
- The machine's ability to efficiently sieve sand and other materials contributes to the quality and success of diverse projects. Key considerations in the design and implementation of the project include the selection of appropriate materials, the integration of safety features, and the optimization of the sieving process for specific applications.
- Mobility, ease of use, and maintenance considerations also play crucial roles in the machine's overall effectiveness and user-friendliness. As the Horizontal Reciprocating Sand Sieving Machine is implemented in different fields, rigorous testing and ongoing optimization will be essential to ensure its reliability and performance.
- Additionally, environmental impact and cost-effectiveness should be taken into account to align the project with sustainability goals and budget constraints. Ultimately, the successful development and application of the Horizontal Reciprocating Sand Sieving Machine depend on careful planning, attention to detail, and a thorough understanding of the specific requirements of the target industries or activities.

5.7 Future Scope

The model can be improved by making some changes in the program and components. Some suggestions are given below-

- **Automation and Integration:** Explore the possibility of automating the sieving process further by incorporating sensors and controls.
- **Smart Technology:** Integrate smart technologies, such as Internet of Things (IoT) devices, to monitor and control the sieving machine remotely.

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