



A Project Report on Sand Filter and Separator

For the fulfillment of the degree of Bachelor of Technology in
Mechanical Engineering

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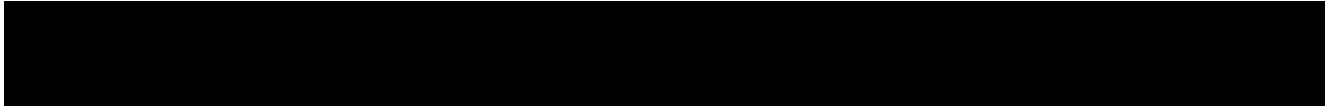
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The following thesis entitled “**SAND FILTER & SEPARATOR**” is hereby approved as a credible study of an engineering project carried out and presented in a manner satisfactory to warrant its acceptance as prerequisite to the degree for which it has necessarily endorse any conclusion or opinion there in, but approved thesis for the purpose for which it is submitted.

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are undergoing Bachelor of Technology in Mechanical Engineering and have carried out the dissertation **“SAND FILTER & SEPARTOR”** and prepared the report under my guidance and supervision. The dissertation is submitted as a partial fulfilment of the requirement for the award of Bachelor of Technology in Mechanical Engineering from SETGOI.

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DECLARATION

We declare that the thesis entitled “**SAND FILTER & SEPARATOR**” submitted to the Department of Mechanical Engineering, SETGOI, Durgapur in fulfilment of requirement for the award of B.Tech degree in Mechanical Engineering is an authentic work carried out by us during 2017-2018 under the supervision of Assistant Professor , ME Department, **Mr. Chanchal Pal & Mr. Kunal Dey** . To the best knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the reward of any other degree or diploma of the university or the institute of higher learning except where acknowledgement has been made in the text.

Date:

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Here we demonstrate the design & fabrication system. Sand is used in construction, manufacturing and many industries. Sand needs to be filtered and separated from unneeded particles, stones and other large particles before it is put to use. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a motorized shaft that is mounted horizontally using mounts. The shaft is connected to a filter frame with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best horizontal motion. Also we have a frame to hold the filter frame in place while ensuring proper horizontal motion at the same time. On switching on the motor using our motor controller circuit, the system allows to operate the motor. This allows us to operate the sand filter motion for appropriate sand filtering needs.



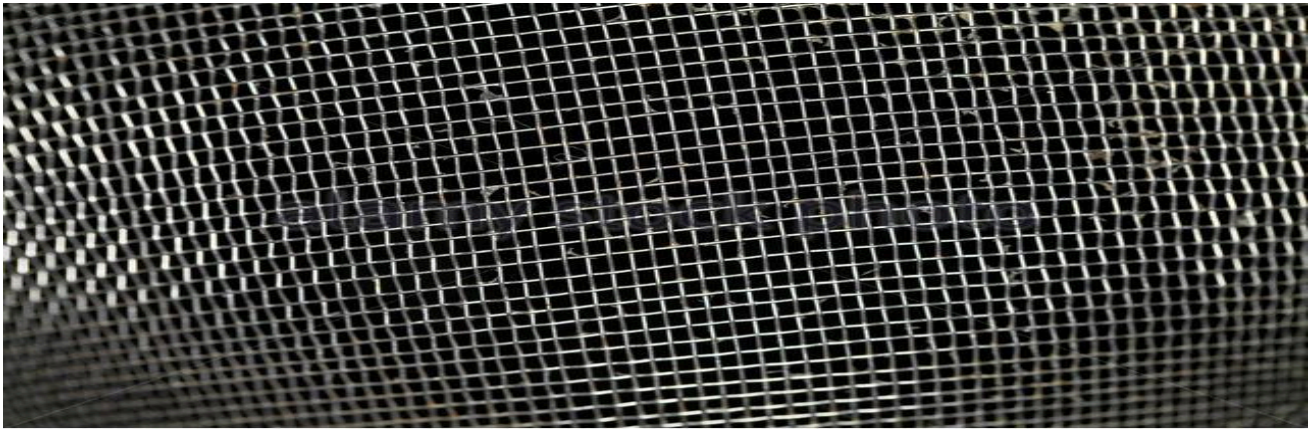
SIEVE ANALYSIS :-

A **sieve analysis** is a practice or procedure used to assess the [particle size distribution](#) (also called *gradation*) of a granular material by allowing the material to pass through a series of sieves of progressively smaller mesh size and weighing the amount of material that is stopped by each sieve as a fraction of the whole mass.

The size distribution is often of critical importance to the way the material performs in use. A sieve analysis can be performed on any type of non-organic or organic granular materials including sands, crushed rock, clays, granite, feldspars, coal, soil, a wide range of manufactured powders, grain and seeds, down to a minimum size depending on the exact method. Being such a simple technique of particle sizing, it is probably the most common .

A gradation test is performed on a sample of [aggregate](#) in a laboratory. A typical sieve analysis involves a nested column of [sieves](#) with wire mesh cloth (screen). See the separate [Mesh \(scale\)](#) page for details of sieve sizing .The size of the each hole is 2.36mm .





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A representative weighed sample is poured into the top sieve which has the largest screen openings. Each lower sieve in the column has smaller openings than the one above. At the base is a round pan, called the receiver.

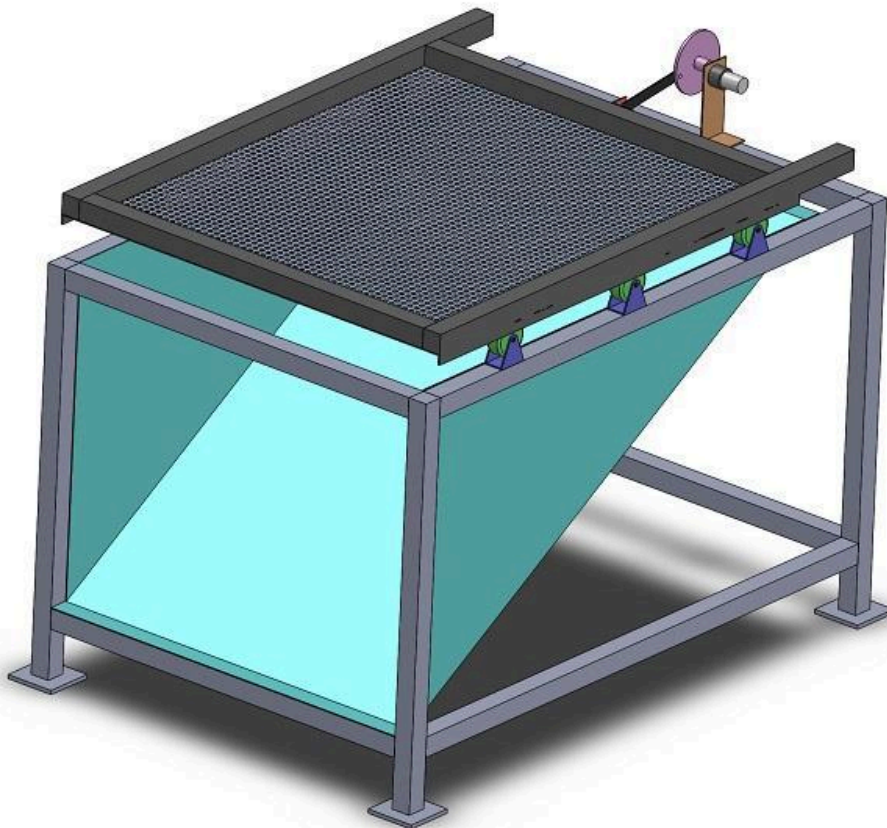
The column is typically placed in a mechanical shaker. The shaker shakes the column, usually for some fixed amount of time. After the shaking is complete the material on each sieve is weighed. The weight of the sample of each sieve is then divided by the total weight to give a percentage retained on each sieve. The size of the average particle on each sieve is then analysed to get a cut-off point or specific size range, which is then captured on a screen.

The results of this test are used to describe the properties of the aggregate and to see if it is appropriate for various civil engineering purposes such as selecting the appropriate aggregate for concrete mixes and asphalt mixes as well as sizing of water production well screens.



Sand filter & Separator Mechanism :-

Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a motorized shaft that is mounted horizontally using mounts. The shaft is connected to a filter frame with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best horizontal motion



. Also we have a frame to hold the filter frame in place while ensuring proper horizontal motion at the same time. On switching on the motor using our motor controller circuit, the system allows to operate the motor. Then the gear motor will start to rotating and the filter or net or tray which is mounted on the up of the robot , start moving horizontally .

Abstract :- Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. and other large particles before it is put to use. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a motorized shaft that is mounted horizontally using stepped pulley .The shaft is connected to a filter frame with mesh below and this frame enclosed on the sides. We use a rod connected from the shaft to the filter frame in a way such as to achieve the rotary motion to reciprocating motion. We will use this reciprocating motion to vibrate a separator. The separator is vibrated then sand falls down with proper size of separator and we will gate the different sizes of sand in separate compartments of frame .

Objectives :-

1. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it.
2. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it.
3. To reduce the human efforts , so we make this automatic .
4. We use a rod connected from the shaft to the filter frame in a way such as to achieve the rotary motion to reciprocating motion. We will use this reciprocating motion to vibrate a separator .



SHAFT :-

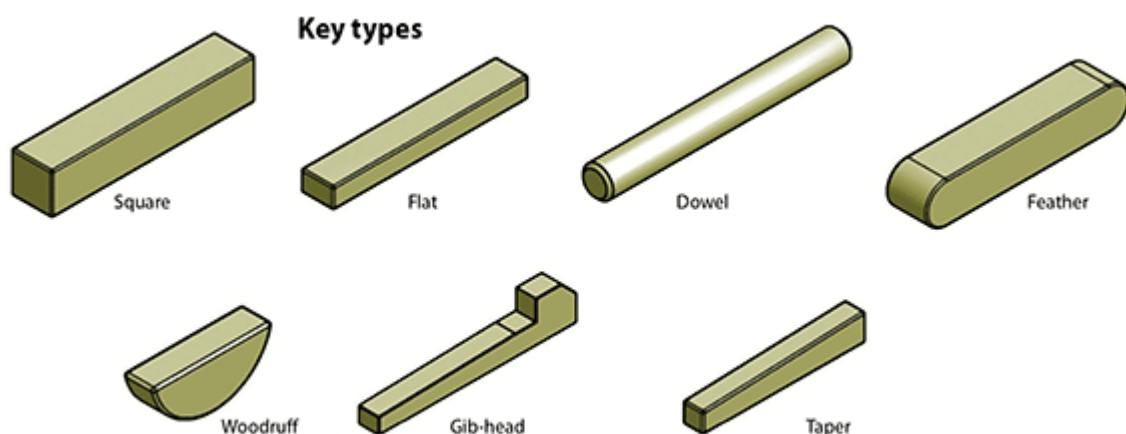
A **shaft** is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. The various members such as pulleys and gears are mounted on it.

They are mainly classified into two types.

- Transmission shafts are used to transmit power between the source and the machine absorbing power; e.g. counter shafts and line shafts.
- Machine shafts are the integral part of the machine itself; e.g. crankshaft.

The material used for ordinary shafts is mild steel. When high strength is required, an alloy steel such as nickel, nickel-chromium or chromium-vanadium steel is used.

Shafts are generally formed by hot rolling and finished to size by cold drawing or turning and grinding.



GEAR MOTOR :-

A **gear motor** is a specific type of electrical motor that is designed to produce high torque while maintaining a low horsepower, or low speed, motor output. Gear motors can be found in many different applications, and are probably used in many devices in your home.

Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs and even electric alarm clocks. Common commercial applications of a gear motor include hospital beds, Commercial jacks, cranes and many other applications that are too many to list.

Gear motors are commonly used in commercial applications where a piece of equipment needs to be able to exert a high amount of force in order to move a very heavy object. Examples of these types of equipment would include a crane or lift Jack . If you've ever seen a crane in action, you've seen a great example of how a gear motor works. As you have probably noticed, a crane can be used to lift and move very heavy objects. The electric motor used in most cranes is a type of gear motor that uses the basic principles of speed reduction to increase torque or force.



Gear motor 12v ,DC , 6mm , 200 rpm



WHEELS :-

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 labour in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel.



Common examples are found in transport applications. A wheel greatly 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 contraption that spins clay as a potter shapes it into the desired object.



SUPPORTING FRAME :-

we demonstrate the design & fabrication system.

Sand is used in construction, manufacturing and many industries. Sand needs to be filtered and separated from unneeded particles, stones and other large particles before it is put to use. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a motorized shaft that is mounted horizontally using mounts. The shaft is connected to a filter frame with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best horizontal motion. Also we have a frame to hold the filter frame in place while ensuring proper horizontal motion at the same time. It is made by wood.



POWER ADAPTOR :-

An AC adapter, AC/DC adapter, or AC/DC converter is a type of external power supply, often enclosed in a case similar to an AC plug. Other common names include plug pack, plug-in adapter, adapter block, domestic mains adapter, line power adapter, wall wart, power brick, and power adapter. Adapters for battery-powered equipment may be described as chargers or rechargers (see also battery charger). AC adapters are used with electrical devices that require power but do not contain internal components to derive the required voltage and power from mains power. The internal circuitry of an external power supply is very similar to the design that would be used for a built-in or internal supply.



External power supplies are used both with equipment with no other source of power and with battery-powered equipment, where the supply, when plugged in, can sometimes charge the battery in addition to powering the equipment.

Use of an external power supply allows portability of equipment powered either by mains or battery without the added bulk of internal power components, and makes it unnecessary to produce equipment for use only with a specified power source; the same device can be powered from 120 VAC or 230 VAC mains, vehicle or aircraft battery by using a different adapter. Another advantage of these designs can be increased safety; as the hazardous 120 or 240 volt mains power is transformed to a lower safer voltage at the wall outlet, and the appliance which is handled by the user is powered by this lower voltage.

Block Diagram & parts:

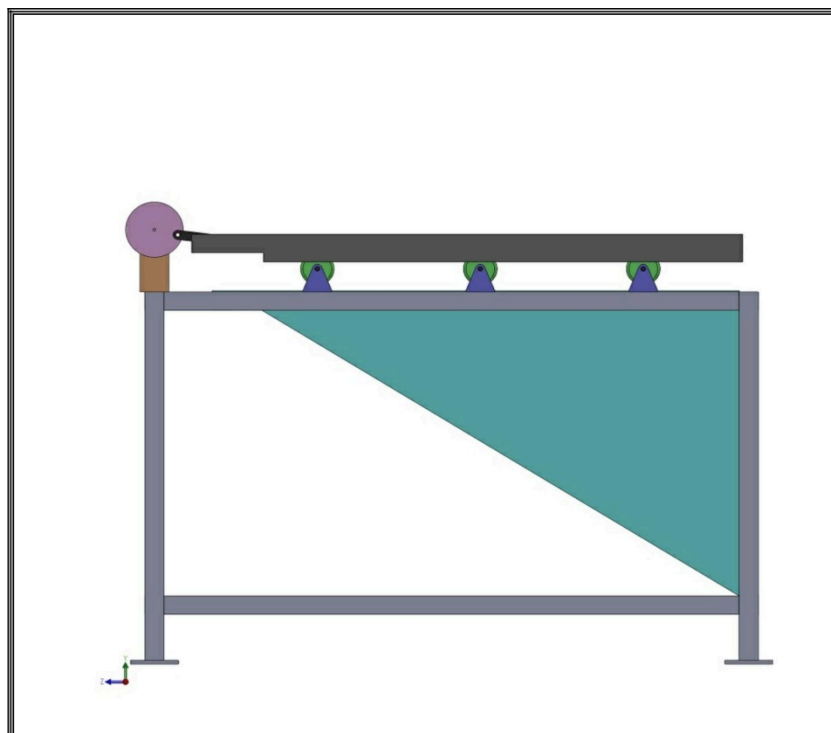


FIG. 13 A and B

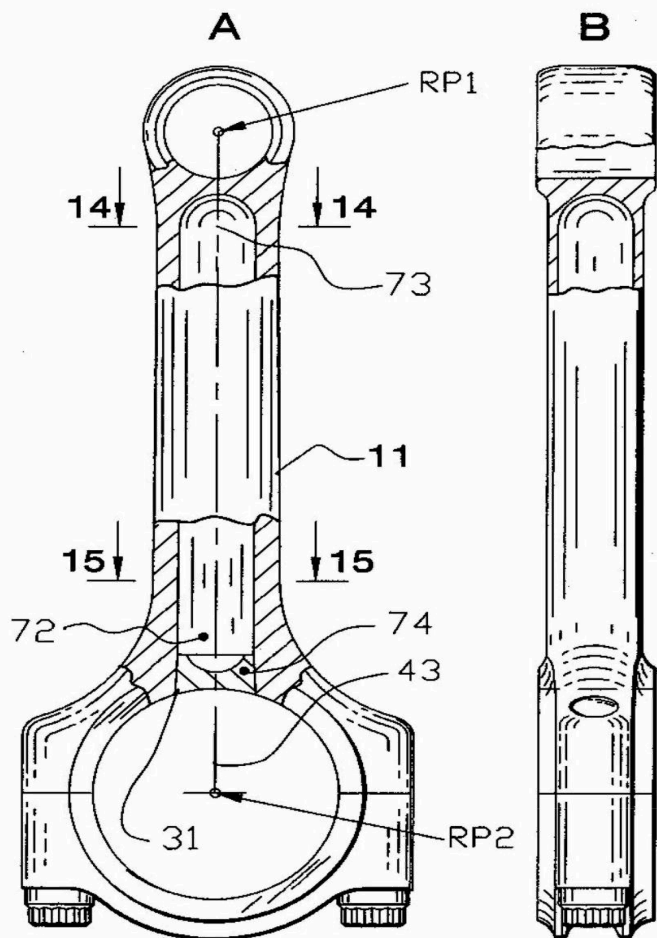


FIG. 14

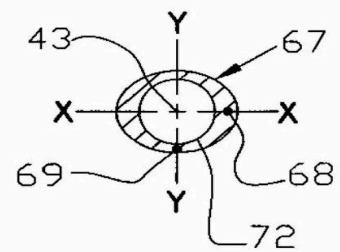
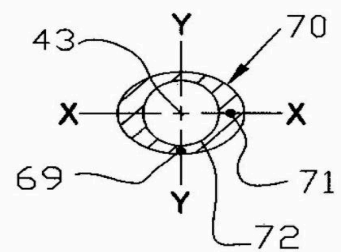
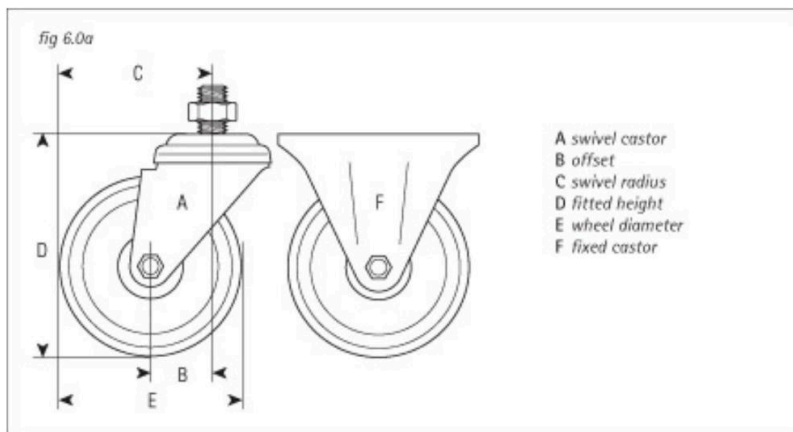


FIG. 15



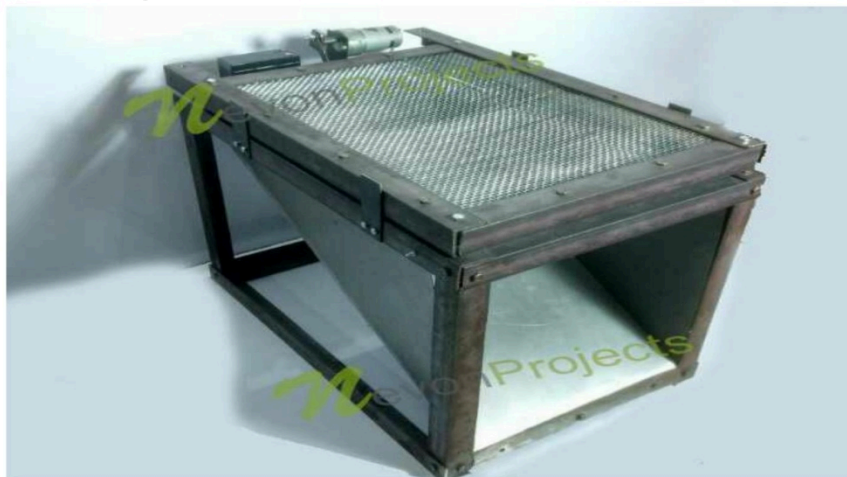


Advantages & Uses:

Automatic and filter and separator has been used in many industries construction companies also widely used in manufacturing companies. It has many advantages too like

1. Automatic Filterings one edsless manual efforts.
2. Fast Filterings save a lot of time is wel.
3. Easy to dispose off unneeded objects

Project image:



Reference:

Books

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Conclusion

Though this project had some limitations regarding the strength and built of the structure , it can be considered a small step forward as far as sand filtration is concerned.

During the test run of the project we realized that it won't be a bad to reduce human efforts and to maximise the mechanical input. This project will be a great success if it can be commercialised to suit the needs and demand. Though the initial manufacturing cost is a bit high but it can be minimal.

As far as the commercial success of the project is concerned , if the production cost is lowered and the and is fully automated. Its acceptance will be unimaginable.

Presently there is no product in the market for its competition.