



# FABRICATION OF A SOLAR BASED SAND SIEVING MACHINE

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## ABSTRACT

A demonstration of design and fabrication of solar based sand sieving system is done. As sand is used in construction, manufacturing and many industrial purposes, it needs to be filtered and separated from unneeded particles, stones and other large particles before put to use. This system puts forward a fully automated sand filtering and separator that automatically filters the sand poured on it. For this a motorized shaft is mounted horizontally on the mounts. The shaft is connected to a filter frame with a mesh below and enclosed frame on sides which operates the motor when switched on.

**Keywords:** Sand Siever, Solar Energy;

## 1. INTRODUCTION

Sieving machine serves is to remove large grains with a small grain through a sieve. Separation occurs when the sand is placed on top of a filter having holes size. The first sieving is done to get rid of the sand with a larger than standard withholding sand filter and the second sieving is done to get rid of the sand with a size too small means that the sand filter is ignored. 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 or metal.

### 1.1 Types of Sand Sievers

➤ **Simple hand sand siever:**

For the purposes of foundry sand, a simple siever is used.



Fig.1.1. Simple Hand Sand Siever

➤ **Sieving Mechanism by Vibrating System:**

The concept of vibration shaker takes the concept of gravity, where the material will tend to go down when there is an empty place. A little material will be easier to reach the lower point of large material because the large material will form a larger gap can be easily introduced by small material.



Fig.1.2. Vibrating Sand Siever

➤ **Sieving by Rotary Siever:**

This machine combines the principles of rotary machine and sieving machine. The rotary motion generated by a crank system that converts rotary motion to translational movement or a back and forth.



Fig.1.3. Rotary Sieving Machine

Micro and Nano-technologies have enhanced the opt-electricity conversion efficiency of silicon solar PV cells. A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect. Solar cells can also be applied to other electronics devices to make it self-power sustainable in the sun. There are solar cell phone chargers, solar bike light and solar camping lanterns that people can adopt for daily use.

## 2. Experimentation

### 2.1.Components Used:

#### ➤ Photovoltaic panel:

The batteries of cell phones, PDAs, laptops, mp3 players, and more can be charged by solar battery chargers. A solar cell, or photovoltaic cell is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect, which is a physical and chemical phenomenon. It is a form of photoelectric cell, defined as a device whose electrical characteristics, such as current, voltage, or resistance, vary when exposed to light. In a solar panel battery, the solar cell is the smallest constituent unit of a device having the function of photoelectric conversion. That maintains them joined to the cores of the atoms, promoting them to a superior energetic state called conduction band in which they can move easily through the semiconductor.



Fig.2.1. Photovoltaic Panel

#### ➤ Gear box:

The transmission box which is also known as the gear box is the second element of the power

train in an automobile. It is used to change the speed and torque of vehicle according to variety of road and load condition. Transmission box change the engine speed into torque when climbing hills and when the vehicle required. . Provide the torque needed to move the vehicle under a variety of road and load conditions.

- i. It does this by changing the gear ratio between the engine crankshaft and vehicle drive wheels.
- ii. Be shifted into reverse so the vehicle can move backward.
- iii. Be shifted into neutral for starting the engine.



Fig.2.2. Gear Box

#### ➤ DC Motor:



Fig.2.3. DC Motor

The DC motor find in modern industrial applications operates very similarly to the simple DC motor. When voltage is applied to the motor, current begins to flow through the field coil from the negative terminal to the positive terminal. This sets up a strong magnetic field in the field winding. Current also begins to flow through the brushes into a commutated segment and then through an armature coil.

The current continues to flow through the coil back to the brush that is attached to other end of the coil and returns to the DC power source. The current flowing in the armature coil sets up a strong magnetic field in the armature. The switching action is timed so that the armature will not lock up magnetically with the field. Instead the magnetic fields tend to build on each

other and provide additional torque to keep the motor shaft rotating. When the voltage is de-energized to the motor, the magnetic fields in the armature and the field winding will quickly diminish and the armature shaft's speed will begin to drop to zero. If voltage is applied to the motor again, the magnetic fields will strengthen and the armature will begin to rotate again.

**2.2.Working Principle**

➤ **H-Bridge:**

An H bridge is an electronic circuit that enables a voltage to be applied across a load in either direction. These circuits are often used in robotics and other applications to allow DC motors to run forwards and backwards. H bridges are available as integrated circuits, or can be built from discrete components.

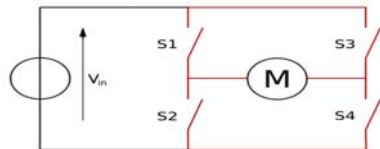


Fig.2.4. H-Bridge Circuit

The term H Bridge is derived from the typical graphical representation of such a circuit. An H bridge is built with four switches. When the switches S1 and S4 are closed a positive voltage will be applied across the motor. By opening S1 and S4 switches and closing S2 and S3 switches, this voltage is reversed, allowing reverse operation of the motor. Using the nomenclature above, the switches S1 and S2 should never be closed at the same time, as this would cause a short circuit on the input voltage source. The same applies to the switches S3 and S4. This condition is known as shoot-through.

**3. Methodology**

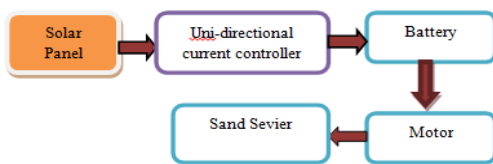


Fig.3.1 Block Diagram

➤ **Sand Sieving Mesh:**

A sand sieve mesh has been designed by using clamps and a square block which is welded, and fixed to the clamps that hold the thin sheet of mesh rigidly. The standard dimensions of the mesh are 300\*50\*2 mm.



Fig.3.2. Sand Sieving Mesh

➤ **DC Motor and Gear Arrangement:**

This is an arrangement of gear box used in the sieving machine. When the motor is switched on the power is transmitted to the shaft where in turn rotates the ring gear that is attached to the shaft. While the ring gear rotates the pinion gear starts rotating with same rpm.



Fig.3.3. Gear and Motor Arrangement

➤ **Sliding Wheel Arrangement:**

Due to the movement of rotation of shaft, to and fro motion is attained. These have rollers as support to the mesh.it is linked up with sliding wheel arrangement i.e., rollers.



Fig.3.4. Sliding Wheel Arrangement

➤ **Battery:**

A 12v battery is used to store the electrical energy which is used to power the motor.



Fig.3.5. Battery

➤ **Solar Based Sand Siever:**

Sand siever has been fabricated and the sieving action has been attained using the motor actuation.



Fig.3.6. Solar Based Sand Siever

**4. Conclusion**

The solar traveller is easily accessible, safe and practical with limited maintenance requirements because of few mechanical parts. It is ideal not only for the experienced cyclists but also for those non athletes, the elderly and individuals with health problems. This is the best source to replace the fuel which is exhausting day by day and becoming more costly.

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