

# Review on Design and Fabrication of Multi-Sieve Sand Sieving Machine

Himanshu Meshram<sup>1</sup>, Nihal Bawankar<sup>2</sup>, Yash Nikhar<sup>3</sup>, Danish Khan<sup>4</sup>, Labhesh Petkar<sup>5</sup>,  
Dr. M. Shakebuddin<sup>6</sup>

<sup>1,2,3,4,5</sup> Student of Anjuman College of Engineering & Technology, Nagpur, India

<sup>6</sup>Professor, Dept. of Mechanical Engineering, Anjuman College of Engineering & Technology, Nagpur, India

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**Abstract** - Sand is the basic requirement at the construction site. Different grading of sand has different work functions. It is being tedious work to sieve the sand of a particular grade for the particular work. Evolving into the machine and mechanism where things are getting automatic and manual work is transforming into machine work, even today the sieving of sand is done by using the mesh sieving technique. This technique operates manually, where the mesh of the desired size is kept at an inclination with the ground and the sand is poured onto it and a labor sweep that sand onto that mesh. This process is time-consuming and hence to sieve the fine grade of sand, more time will be required. To overcome this problem, we are designing and developing a multi-plate sieving machine that will help to sieve the sand of various grades by changing the sieve plates accordingly.

**Key Words:** Sand Sieving, Sieve, Multi-Sieve, Motor Operated, Sand, Vibrations, Old Hand Operated Technique.

## 1. INTRODUCTION

Sand is the basic entity used majorly at the construction site. Different size of sand has a different usage, particularly at the construction site. Plastering requires the fine grading of sand (0.07mm- 0.25mm) whereas flooring requires a lesser grading size of sand (0.25-5mm). As per the requirement at the site, the sand has to be sieved off. Depending on the work, a particular grade of sand is sieved. Mainly the sand sieving machine having a single sieving plate is being used which is not possible to operate at the construction site where the requirement of grading sand changes depending upon the work function. To date, even though there are few machines that can sieve the sand but hardly they are being used at the construction site. Today also the major part of sand sieving is done by the old technique or manually. Manually sand sieving technique requires more amount of time to sieve the fine grade of sand. This will increase the labour workload and hence the labour cost at the construction site. This machine can be used for various industries and various operations such as road divider making operation, resin industry, Powder and tiles industry, Marble powder industry, etc.

## 2. LITERATURE REVIEW

Author	Swapnil Bhote
Paper Title	Design and Fabrication of multi-purpose sieving machine [1]
Mechanism	Sliding mechanism; Pulley belt mechanism
Motion	Sliding motion, back and forth motion
Construction	The sieve plate is clamped or attached with the help of a metal plate with the mainframe. main sieve frame is attached to the one end of the shaft and the other end is attached to the pulley belt mechanism which is further attached to the main shaft of the motor
Mode of operation	Motor operated
Limitation	1) Only one sieve can be used at a time 2) Have limited usage as the machine is not designed for all purpose of sieving.
Take aways	1) Design on how to clamp sieve with the frame 2) Calculations

Author	Sohan Hapsenkar
Paper Title	Design And Fabrication Of Industrial Sand Screening Machine For Green Sand [2]
Mechanism	Belt and pulley mechanism
Motion	Rotary motion
Construction	Hollow cylindrical shaped tube round with the mesh on its surface. And that cylinder rotates and the sand is sieved. Hollow cylinder is attached with the belt and pulley mechanism which is further attached to the shaft of the motor
Mode of operation	Motor operated
Limitation	1) Only one sieve can be used at a time 2) Can not be easily transported

Author	Mr. Avadhunt Tigadikar
Paper Title	Design And Fabrication Of Semi Automated Solar Powered Sand Sieving Machine [3]
Mechanism	Gear mechanism
Motion	Sliding motion, back and forth motion
Construction	Sieve plate is mounted on a sieve frame. The sieve frame is mounted with the rollers at its lower surface. One end of the shaft is attached to the sieve frame and another is attached to the motor which is operated with the solar power.
Mode operation of	Solar powered
Limitation	<ol style="list-style-type: none"> <li>1) In monsoon and winter days, battery will not be charged and hence affect the work load.</li> <li>2) Only one sieve can be used at a time</li> <li>3) Have limited usage as the machine is not designed for all purpose of sieving.</li> </ol>

Motion	Rotary Motion
Construction	Hollow cylindrical shaped tube round with the mesh on its surface. And that cylinder rotates and the sand is sieved. Hollow cylinder is attached with the belt and pulley mechanism which is further attached to the shaft of the motor
Mode operation of	Motor operated
Limitation	<ol style="list-style-type: none"> <li>1) Only one sieve can be used at a time</li> <li>2) Can not be easily transported</li> </ol>
Take aways	Application of sieving machine in various industries

Author	Swapnil Bandgar
Paper Title	Review On Multi Level Sand Screening Machine And Analysis Of Vibration Mechanism [4]
Mechanism	Belt drive
Motion	Vibratory
Construction	Two sieve are joint in V - Shaped with each other and at inclination with horizontal namely screen1 and screen2. Both the ends of sieve are coupled with the main shaft which is connected with the belt drive mechanism.
Mode operation of	Motor Operated
Limitation	<ol style="list-style-type: none"> <li>1) No proper waste separation is mentioned</li> </ol>
Take aways	<ol style="list-style-type: none"> <li>1) Use of Multiple sieve to reduce the time to sieve the sand</li> </ol>

Author	Oladeji Ogunwole
Paper Title	Design Construction And Testing Of Dry Sand Sieveing Machine [6]
Mechanism	Reciprocating mechanism along with the vibration
Motion	Vibratory motion
Construction	Hopper is mounted at the top of the frame. Sieves are attached to the main frame. There are 4 slots for the different size of mesh. An extruder is there at the bottom of the frame
Mode operation of	Motor Operated
Limitation	<ol style="list-style-type: none"> <li>1) No proper segregation technique for the removal of meshed sand and leftover sand</li> </ol>
Take aways	<ol style="list-style-type: none"> <li>1) Concept of multiple use of mesh plates</li> </ol>

Author	Zahid Hasan
Paper Title	Design And Development Of Automatic Sieving Machine For Granular/Powder Materials [5]
Mechanism	Belt and pulley mechanism

Author	Prasenjeet Mahure
Paper Title	Review On Multipurpose Sieving Machine [7]
Mechanism	Slider crank mechanism
Motion	Sliding motion ; reciprocating motion
Construction	Sieve plate is mounted on a sieve frame. The sieve frame is mounted with the rollers at its lower surface. One end of the shaft is attached to the sieve frame and another is attached to the motor.
Mode operation of	Hand operated
Limitation	<ol style="list-style-type: none"> <li>1) Only one sieve can be used at a</li> </ol>

	<p>time</p> <p>2) No proper waste separation is mentioned</p> <p>3) Have limited usage as the machine is not designed for all purpose of sieving.</p>
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Author	Aldo Boy A. Atienza
Paper Title	Design And Fabrication Of Inclinable Trommel Sand Sieve Machine [8]
Mechanism	Pulley and belt mechanism
Motion	Rotary motion
Construction	Hollow cylindrical shaped tube round with the mesh on its surface. And that cylinder rotates and the sand is sieved. Hollow cylinder is attached with the belt and pulley mechanism which is further attached to the shaft of the motor
Mode of operation	Motor operated
Limitation	1) Can not be easily transported
Take aways	1) To use different size of sieves 2) Concept of sieved sand collection

Author	Daniel Minnow
Paper Title	Design And Construction Of Gari Sieving Machine [9]
Mechanism	Belt and pulley mechanism
Motion	Rotary motion
Construction	Hollow cylindrical shaped tube round with the mesh on its surface. And that cylinder rotates and the sand is sieved. Hollow cylinder is attached with the belt and pulley mechanism which is further attached to the shaft of the motor
Mode of operation	Motor operated
Limitation	1) No proper detailing about the leftover sand 2) Sand pouring way is not cleared 3) Single sieve can be used 4) Limited usage

Author	V. Chandramohan
Paper Title	Design And Fabrication Of Automated Sand Filter And Waste Separator Machine [10]
Mechanism	Gear drive
Motion	Reciprocating mechanism
Construction	Sieve plate is mounted on a sieve frame. The sieve frame is mounted with the rollers at its lower surface. One end of the shaft is attached to the sieve frame and another is attached to the motor.
Mode of operation	Motor operated
Limitation	1) Limited use 2) Single size of sand can be meshed at a time
Take aways	1) Waste separation technique
Author	Eyere Emagbetere
Paper Title	Design, Construction And Performance Evaluation Of A Horizontal Sand Sieving Machine And Heating Machine [11]
Mechanism	Reciprocating mechanism
Motion	Reciprocating motion
Construction	Hopper is mounted at the top of the frame. Sieve plate is mounted on a sieve frame. The sieve frame is mounted with the rollers at its lower surface. One end of the shaft is attached to the sieve frame and another is attached to the motor.
Mode of operation	Motor operated
Limitation	1) Single sieve is used therefore one size of sand can be sieved
Take aways	1) Design of Hopper 2) Calculations

Author	Nofriady Handra
Paper Title	Automated Sand Sieving Machine With Three Sieves [12]
Mechanism	Belt and pulley mechanism
Motion	Rotary motion
Construction	Hollow cylindrical shaped tube round with the mesh on its surface. And that cylinder rotates and the sand is sieved. Hollow cylinder is attached with the belt and pulley mechanism which is further attached to the shaft of the

	motor
Mode of operation	Motor operated
Limitation	1) One sieve can be used at a time 2) Not portable

Author	Pradeep Kumar Krishnan
Paper Title	Design And Development Of An Electronic Sieving For Sand Separation Using Node MCU System [13]
Mechanism	Slider crank mechanism
Motion	Reciprocating mechanism
Construction	Sieve plate is mounted on a sieve frame. The sieve frame is mounted with the rollers at its lower surface. One end of the shaft is attached to the sieve frame and another is attached to the motor.
Mode of operation	Motor operated
Limitation	1) Single grade of sand can be sieved at a time 2) As the electronic system is inbuilt, maintenance increases
Takeaways	1) Concept of how to disburse the meshed sand and leftover sand stones

### 3. LITERATURE GAP

After going through several research and solutions provided for sand sieving techniques by various authors, there is a handful of machines that can be used or are being used at the construction site. After having various conceptual ideas of sand sieving machines, if we look at the ground reality, the majority of sand sieving is done manually with a hand-operated technique. There are various drawbacks considering the use of a single sand sieving plate at a construction site, as the major drawback of it is, that it requires a longer period of time to sieve the fine grade of sand, which therefore increases the labor workload and simultaneously the labor cost and hence affect the working factors. To address this problem at the worksite, we are designing a machine that can sieve the sand of multiple grades and the sieves can be changed according to the use, which can be easy to operate and can be easily portable from one site to another.

### 4. PROPOSED IDEA FOR DEVELOPMENT OF MULTIPURPOSE SAND SIEVING MACHINE HAVING MULTIPLE SIEVEING PLATES

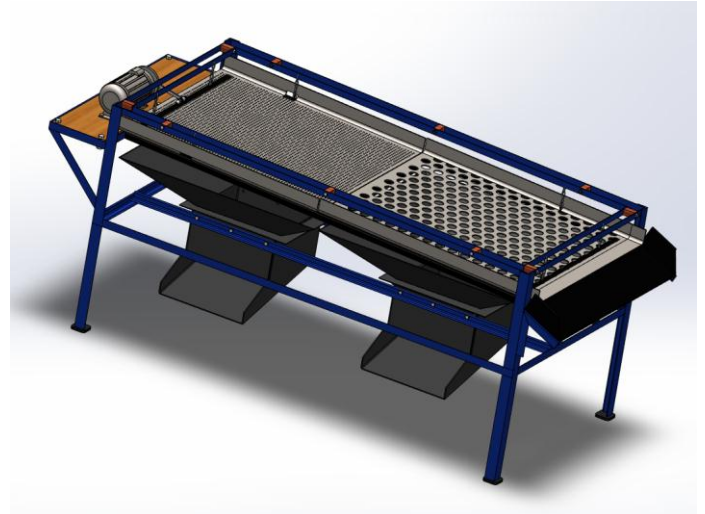


Figure 1 : Multi-Sieve Sand Sieving Machine

### 4. CONCLUSION

After going through various research papers and review papers, we are designing and developing a multipurpose sand sieving machine having multiple sieving plates. This machine can be easily portable from one site to another. At a time two sizes of sand or other elements can be sieved off. Due to having a simple mechanism this machine can be used by anyone on the site. This will increase the productivity at the construction site and reduce the labour work and hence increase the profitability.

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