Design And Fabrication of Smart Sieveing Machine

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Abstract- The paper describes the basic model and operation of a smart multifunctional sieving machine. The sieving machine is a multi-layer sieving machine that can be used for a variety of tasks such as sieving sand, eliminating stone from grains, and so on. The size and number of sieves may be adjusted depending on the need. This article covers the idea of the Design and Fabrication of a Multi-purpose Sieving Machine, which was primarily completed for manufacturing-based enterprises. Because of technological innovation, every work in today's world has become faster and faster, and every industry aspires to retain a high production rate while preserving the quality and standard of the product at a low average cost. We created a conceptual idea of a machine that can conduct several tasks concurrently and quickly. In this machine, we drive to the main shaft with a motor that is directly connected to the slider-crank mechanism; the slider-crank mechanism is employed in the sieving operation. With the assistance of a wiper motor, the table is fastened with a crank that rotates the tray to vibrate it and function as a separator. Consequently, the purpose of designing and manufacturing the Sieving Machine is to assist industrialists and farmers on the global market. The benefit is the ability to easily separate objects based on mesh, as well as cost savings linked with power use, an improvement in productivity rate, and the production of less space, among other things. We have further automated this sieving process and can operate the machine via the blynk interface.

Keywords: Sieving, slider crank mechanism, blynk, multi-purpose, multi-layer, technology, productivity.

INTRODUCTION

A smart sieving machine is a network-based collaboration of technology and services to improve quality and productivity. A smart sieving machine allows the entire machine to be automated, providing simplicity and convenience to routine industry processes by decreasing human inference. A sieve is a device used to separate desired materials from undesired material or to characterize a sample's particle size distribution, generally using a woven screen such as a mesh or net. This project focuses on the design, construction, and integration of the mechanical element of the machine with IOT. Horizontal sieving machines are designed to filter particles based on mesh size at various levels. Because of its tiny openings, a little sieve is used to sift flour. Sieves with various sorts of holes are employed depending on the particles to be sorted. Huge sieves are used to separate the stones from the stand. A metallic plate or sheet, or another similar device, having regularly spaced perforations of consistent sizes set in an appropriate frame or holder, is used in size separation. The fine coarse particle is divided or broken up by grinding against one other and via screen apertures, eliminating undesirable particles. In its natural state, building sand comprises organic debris, stones, and gravels of all shapes and sizes. When we need sand of a precise specification for building work, we have no choice but to sift it. We may utilize this equipment to speed up the procedure and adjust it to the type of sand and site circumstances. We can also decrease human intervention by automating.

TYPES OF SIEVING MACHINE

ROTARY SAND SCREENING MACHINE

The sieving will be done by rotating the cylindrical section of the machine in this case. They can be operated by hand or by electricity. The gearbox for the mechanical machine is coupled to the shaft of the cylinder, which is powered by the needed capacity motor. In the event of a power outage, a handle is given at the other end to run them. The handle will be supplied to the shaft of the drum for spinning in the manually operated machine. Sand should be put into the hopper, and the sieved sand should be gathered

beneath or in front of the cylinder. In certain areas, the cylindrical drum is also referred to as a trommel drum, and the apparatus is referred to as a trommel drum screening machine.

VIBRATORY SCREENING MACHINE

The vibration of the machine's screening table is used to sieve in this kind. These machines, unlike the rotary kind, are merely powered. Sand is poured over the vibrating table in a linear vibratory screening machine, and the sieved sand is collected in the sloppy tray at the bottom, which divides it in different directions.

SAND SCREENING CUM WASHING MACHINE

After screening the sand, washing will take place in the second layer at the same time to remove the silt, grime, and undesired compounds from the sieved sand. When the sand received from the supplier has to be washed, this equipment saves energy and labour expenses. Alternatively, you would need to build a separate sand washing machine to complete this operation.

LITERATURE SURVEY

1. Dilip Bhagat, ETAL1 wrote this work (2020) Screening is the separation of solid particles of varying sizes using a screen mesh or sieve. A number of machines are utilized in screening sand based on this mechanism for the user. It might be either vibratory or rotational motion.
2. Praveen R, and ETAL2 are the authors of this publication (2014). The idea may be expanded to include a series of mesh to continue the separation of different sizes of nuts. This project eliminates the need for time-consuming manual separation. With the inclusion of other forms of mesh, the project may be extended to additional sorts of separation of combination.
3. In this study, Dr. Anil Baliram, ETAL3, discusses (May 2021). This project may be used to implement all sorts of separation of combinations with various types of mesh. It was discovered that there is no unique way to separate different grain sizes. The primary results are that it improves grain quality, reduces human effort, and saves time and money.
4. Ganjar kurnia ETAL4 is used in this work (2019). A sand sieving machine powered by a crank, power transmission with chain, mixed sand input using the open tub, sand sieve using centrifuge idea, separating sand and stone with a sieve, and utilizing the sand container is the concept that has been carried out.

Electrical working

The operation of this sieving machine is quite simple; the board that controls the entire sieving process is the Nodemcu (esp8266) board; when we provide an input signal to the blynk server, the blynk server determines whether or not the board is connected to the personal hotspot. If the board is linked to a hotspot, the user's input signal is delivered via the blink server from the smartphone to the esp8266 device. Eventually, the board is linked, and we may provide any input, such as ON/OFF. Once the board is attached, it transforms the user's input into digital output, which can be acquired by connecting the jumper wires to Nodemcu's digital pin. The digital output D4 of the Nodemcu is coupled to a relay module input pin. The relay is activated by receiving the input signal from the Nodemcu, and the relay module has three signals: COM, NO, and NC, to which the positive terminal of the motor is connected. The relay's NO port and the motor's ground is connected to the ground of the 12-volt adaptor. The positive terminal of the 12-volt adapter is connected to the relay module's com port. The relay's job in this case is to operate as an electrical switch. Later the electrical switch is connected to NO and COM ports of the relay output so that the sieve can be operated manually or either by using the smartphone.

Mechanical working

The Sieving Machine's operation is based primarily on translating the rotational motion produced by the wiper motor into a sliding motion or slider-crank mechanism. The slider-crank mechanism moves the mesh linked to the frame back and forth. When it moves or slides, the particles and other foreign particles of the requisite size are separated based on the mesh size. This technique can be repeated as many times as there are various particle sizes. A motor/drive receives an electric source. The particles to be sorted are first placed in a sieve. And sieve sizes are set in accordance with our specifications. Once the motor begins to turn on, the shaft rotates (main shaft). The driving pulley, which is connected to the main shaft, spins around its axis as well. The crank is linked to a driven pulley and a sieve bracket. The sieve bracket has four supports. The crank revolves in tandem with the driving pulley. By spinning the crank linked to the

sieve bracket, the sieve bracket gains sliding motion (TWO and FRO motion). Small/thin particles pass through the sieve due to its continuous sliding, whereas large/thick particles remain above the sieve. Hence Finally, we have the desired outcome.

CONCLUSION

A motorized multifunctional sieving machine with a low cost and simple design is created. This computer lowers human work; thus, we don't require numerous people to filter/sieve at the same time. Furthermore, the machine is portable since it can be readily disassembled and reassembled.

With the involvement of various forms of mesh, the project may execute all other sorts of separation or combination. This project is powered by a motor-driven rotating motion that is coupled to a crank and crankshaft, which provides a sliding motion to the mesh. Different types and sizes of grains can be separated as a result of the mesh's back-and-forth action. And hence, in real-time, this project provides a straightforward approach to separate different sizes of grains, sand, and any other mixture based on mesh size. We have developed this to the blynk interface, through which one may manage the operation of the machine using the phone and even acquire the live work status.

We conclude that our automated sieving machine may be utilized in a variety of disciplines, such as the food industry or construction, and it can be operated manually or mechanically to decrease human participation in these domains.

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