"Design And Fabrication Of Pedal Operated Grain Sieving Machine For Agriculture Used"

Prof.Anuj muley , Khushal Waghmare, priyasanghpal thool, Rajesh anparti, Rahul jane , Vijay barange ,Vivek Pullawar.

Department of Mechanical Engineering

Tulsiramji Gaikwad Patil College of Engineering And Technology Mohgaon, Nagpur

ABSTRACT

The aim is to separate different types grains and Dust depend upon their size to change different size of mesh". According to the current situation, in the agricultural side we have many former doesn't gets the value of their grains do to the presence of unnecessary small size of grains and waste particle. Stones and branch in the grains so some times the farmer gets his worth in such way to by verifying his produce thus the cost of transporting by near by market in very cheap rate trader buy grains from small farmers pay the same prize for different size grains there is no invectives to provide some mechanism which the farmer can separate his grains in two categories like the which we can see in the prize difference polish and which we can see the grains with large in size and the second one which we buy from the market with cheap rate. We have made the separation of sieving machine for different kind of grain for agricultural and household purpose. Vibrating table is fixed with the crank which moves the tray to vibrate it and act as aseparator with the help of wheel connected to the pulley. Thus try the Design and fabricating of Sieving Machine to help the industrial people and farmers on the global market. Advantage is to obtain the easy separation of things according to mesh.

Keywords:- *Crank Shaft, Belt Drive, Grains Sieving, Safe Working*

INTRODUCTION

A sieve or a riddle is mechanical vibrating element used for extrication the needed elements from unwanted material further it is used for charactering the element to the required size by the allocation of a sample. Using a pane such as a mesh or net. This project titled concentrates on providing descriptions of all the basic operation of the agricultural equipment. In the technical, education of Sieving plays a Major role in operations of various industries. Construction of work device under the constrains is achieved by the systematic The prime focus of the study of Sieving Machine integrates various skills and knowledge attainment and gives orientation towards application in practical life. It helps in intensifying the thinking and alternatives for potential applications. Sieving is a uncomplicated practice for sorting out the grains and particles of different size**.**

Sieving grains is a manual method for separation of husk and other impurities from the grains on the basis of there weight. Pedal power is the transfer of energy from a human source through the use of a foot pedal and crank system. This technology is most commonly used for transportation and has been used to propel bicycle for over a hundred years. Less commonly pedal power is used to power agricultural and hand tools even to generate electricity. Some applications include pedal powered laptops, pedal powered grinders and pedal powered water wells.

LITERATURE SURVEY

Reference[1] In this paper **Anbazhagan R., (2013)** Concluding the project up to now after research four different types of sieving machine was conceptualized to select the best considering every factor to make it more efficient, portable and easily operable. Then the required materials were selected by market study although the fabrication process was undoable due to condition occurred we continued the design process in Solid works and some preliminary calculations. This report also includes doing method of construction and research design flowchart and the Gantt chart. According to calculations and assumptions, this type of sieving machine will be efficient and easily operable, which can help society to learn new way of sieving sand. Reference

[2] In this paper **"Sanjay N.(2019)** This paper analyzes the design of a pedal operated water filtration system to be used by local dwellers. It works on the principle of compression and sudden release of a tube by creating negative pressure in the tube and this vacuum created draws water from the sump into the pump while rollers push the water through to the filter where adsorption takes place to purify the water. "Technology (IJERT), 01 January 2013. In this paper, design and construction of pedal operated water pump which is used in small irrigation and garden irrigation.

Reference[3] In this paper **Praveen R.,(2014)** The project can be comprehensive to continue separation of different sizes of nuts by involving series of mesh. Through this project one can get rid of manual separation which is time consuming. The project can be implemented all other types of separation of combination with the involvement of different types of mesh.

Reference[4] In this paper **Raja Kumar G ., (2014)** By observing above information we conclude that, we have design this product with the intention of replacing the existing sand filter with automated sand filter and pneumatic waste separator machine. In order to reduce the time.

Reference[5] In this paper **Altaf somani .,(2016)** The pedal operated pump can be constructed using local material and skill. A water system includes a Centrifugal pump operated by pedal power.

Reference[6] In this paper **Dilip bhaghat ., (2020)** Screening is a process using a screen mesh or sieve separation of solid particles of different size. On the basis of mechanism is user there are variety of machines use in screening sand. It can be vibratory are rotary motion.

PROBLEM DEFINATION

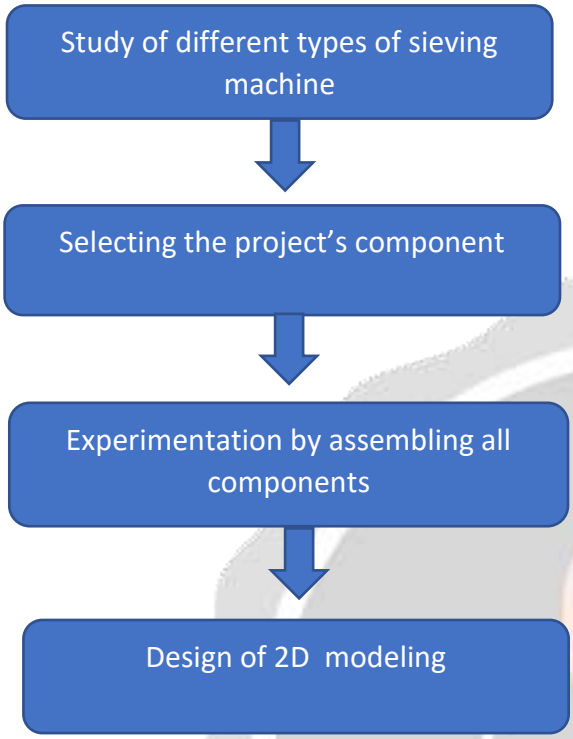
The problem of size grain in the market available with different prices but the former who produce these grains. He/she will not get the reasonable prize of his produce. The ancient time sieving is done by hands by use of soap /sieve.

The sieving by hand need lot of time to extract grains and the grains size can not be separated by this traditional way. After researching on it in rural area and some of in format, we found hand there are many project available that can extract sand ,grain by the use of electricity.

These machine uses motor as it is save time and increase rate of production. Duo to the high production rate and electric power it cost is increase so in the rural area and formers can not effort.

The expensive product to get quality of product. Instead of that by buying these expensive and heavy model product they choose to suitable way

Methodology



A)Shaft:- The shaft is connected to the wheel by means of pulley. If wheel start rotating one revolution the shaft also rotates. Also the shaft is the support to the base or frame of the machine.

B)Crank shaft :- The crank shaft is the main component of the machine it is connected to the wheel and sieve (mesh) of the machine. The one revolution of wheel is equal to the one sliding of crank shaft. If wheel rotates shaft start to slide forward and backward with the help of crank.

Fig. crank shaft connected with the wheel

C) Wheel and pulley:- The handle is connected to the wheel so that if we apply force on handle it takes rotation and transfer motion to the shaft. The shaft is connected to the pulley and pulley transfer the motion by means of belt drive to the another pulley and it gives motion to the another sieve.

D)Belt drive:- The belt is used to transmit power from one pulley to another pulley by means of external applied force. The belt is made up of either rubber or leather.

E) The base :- The base is the supporting member of the machine it help us sudden impacts from sieve which is connected with the crank shaft at the time of separation of grains. It can also handle the vibration which comes from the machine when it is in working process.

I. Fig. support base

Design Calculation

Diameter of pedal crank = 180 mm = 0.18 m Cycling speed with experiment in rpm, N = 75 rpm Weight of person, m = 5 kg

The number of teeth on larger sprocket and smaller sprocket are 44 and 15.The velocity ratio of chain drive is calculated by the following equation.,

VR = $\frac{N1}{N2} + \frac{T1}{T2}$

Where N1 = Diameter of greater sprocket, N2= Diameter of smaller sprocket,

T1 = No of teeth on Bigger sprocket ,

T2= No of teeth on smaller sprocket , Velocity Ratio by using data below,

Number of teeth on larger sprocket T1=44

Number of teeth on smaller sprocket T2=15

$VR = \frac{15}{44}$ =0.34

Velocity of pedal crank ,

Velocity of pedal crank is calculated by following equation,

$$V = \frac{\pi DN}{60}$$

Where D is diameter of pedal crank, m is mass, N speed of rotation

BY using the details below

Diameter of pedal crank =0.18 m

Speed of rotation = 75 rpm

$$V = \frac{\pi DN}{60} = \frac{3.14*0.18*75}{60} = 0.70 M/S$$

Power transmitted of simple chain

Power rating is calculated by the following

Equation

P1 =F . V

F =M . G

P1 , power rating in watts, f is the force , by human N,. g = acceleration of gravity, n-m,

By using details below ‘

Weight of grains is 5kg

Acceleration due to gravity , =9.81 n/m2

Velocity ratio = 0.34 m/s

F =m.g = 5*9.81 =49.09 N

P1 = f.v = 49.09* 0.70 =33.34 KW

From the power rating value ,chain number and speed of smaller sprocket ,N2. Can be chosen so chain no. 08 B and 100 rpm for smaller sprocket are chosen .

According Indian standard (IS : 2403 - 1991)

Pitch , p = 12.7 mm

Torsional force :

Maximum tensile tress of mild steel

Steel = (Ŧ) = 525/1.73 =300 mpa

Diameter of shaft (D) = 1cm =0.01 m

$$Ŧ = \frac{\pi}{16} * 300 * (0.01)3$$

$$Ŧ = (589.04 * 10) - 3$$

Length of chain drive,

Diameter of greater sprocket = 18cm

Diameter of smaller sprocket = 6.5cm

Length of chain = $\frac{\pi}{2}(d1 + d2) + 2x + \frac{(d1-d2)2}{4x}$

$= \frac{\pi}{2}(18+ 6.5)+2x +\frac{(18-6.5)2}{4x}$

=73.54 cm

Cleaning efficiency

$\eta \quad \frac{weight\ of\ pure\ grains}{weight\ of\ unwanted + weight\ of\ pure\ grain}*100$

$\eta = \frac{G\theta}{G\theta+Pg}*100$

$\eta = \frac{4.80}{0.20+4.80}*100$

η = 96 %

Man power efficiency

For the manpower cost to

The work, One hour labour cost of worker = 50rs

Working 8 hour a day for 1 month it will take amount ,

= 50rs*8*30

Man power efficiency =12000rs

FIG. SIEVING MACHINE

WORKING PRINCIPLE

The working of the vibrating table mainly depends on converting reciprocating motion provide by manually wheel crank provide with connecting rod by attached to the wheel and crank as it rotates the shaft connected to the movable framing portion does back and forth motion as such the mesh emotionally involved to it when moves or slides separate the grains of required size based on the size of mesh. This process can be used for as many numbers of different types of grains . The choice of a particular method depends primarily on the dispersion status, i.e. on the degree of fineness of the sample. The size of the grain size allocation is defined through the quantity of mass. The analyses done on the sieve are to differentiate the grains size and the size fraction which are used to establish the grain size fractions. Broad particle size spectrums are analysed quickly and reliably. Optimal sieving time and amplitude or the speed the setting for the sieving time and optimal amplitude or speed depends upon the person who is operating it Machines are available with grades of by changing the mesh size of this multi-purpose sieving machine, the machine can separate a product of selective particle size only.

DESIGN CONCEPT

The design of domestic sieve machines must have based on many aspects actually. The design consideration must be done carefully so that the design can be fabricated easily and the system functioning. Then the material used in each design influences the selection, because absolutely we need a lightweight material suitable with product size. The design is separated into three phases, firstly choose as many proposed designs can be produced then choose 4 designs and try to improve its functionality and at last one is finalized and designed with detail including dimension by using Solid Work software. CAD drawings are beside that the cost to design and fabricate must reasonably mustn't exceed the budget given to try to reduce waste. The criteria that must be considered in designing the sieve machine are: Durability: Domestic sieve machine must be durable, Material: The material that will be used must be suitable to fabricate the Sieve machine and easy to get, Cost: It depends on material and manufacturing processes. It should reduce the cost to the minimum.

APPLICATIONS

1) Substance industry: resin, pigment, industrial medicine, cosmetic, coatings Foodstuff industry: sugar powder, starch, salt, rice.
2) Environment: assistant detergent, active carbon.
3) Coatings: Powder coatings, pigment paints, etc.
4) Metals: Metal powders, zinc powder, copper powder, coal powder, alloys, etc.

Agricultural:-sorting of fruits grain.

ADVANTAGES

1) Simple in construction.
2) Nowadays, separation of different sizes of solid material is a need of hours; this project can be used for the separation of different sizes of solid only by changing mesh of required size.
3) Compact in size and required less space.
4) Less in weight.
5) Here different types of materials can be separated which depends on the mesh size used.
6) Low in cost and does not required electricity.

DISADVANTAGES

1) Time consuming as compared to the electric operated machine.
2) Required more man power two or more.

CONCLUSION

Vibration table is plays on important role in today's mechanical field. Companies where mass manufacture ofnuts is done different sixes of nuts can be separated without difficulty. The project can be comprehensive to continue separation of different sizes of nuts involving series of mesh. through this project one can separation method of hand use separation . The project can be implemented all other types of separation of combination with the involvement of different types ofmesh. This project is run by manually powered rotary motion wheel which connected to crank and crank shaft . the rotary motion pedal operated wheel is used to provide sliding motion to the mesh as result of back and forth motion of mesh different types & sizes grains can be separated. Thus this project in real time is providing easy way of separation of different sizes grains any other mixture depending on mesh size. The farmer can separate his grains in two categories which can gives him a better deals in the market for two different types and size grains.

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