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DESIGN AND FABRICATION OF HORIZONTAL SIEVING MACHINE

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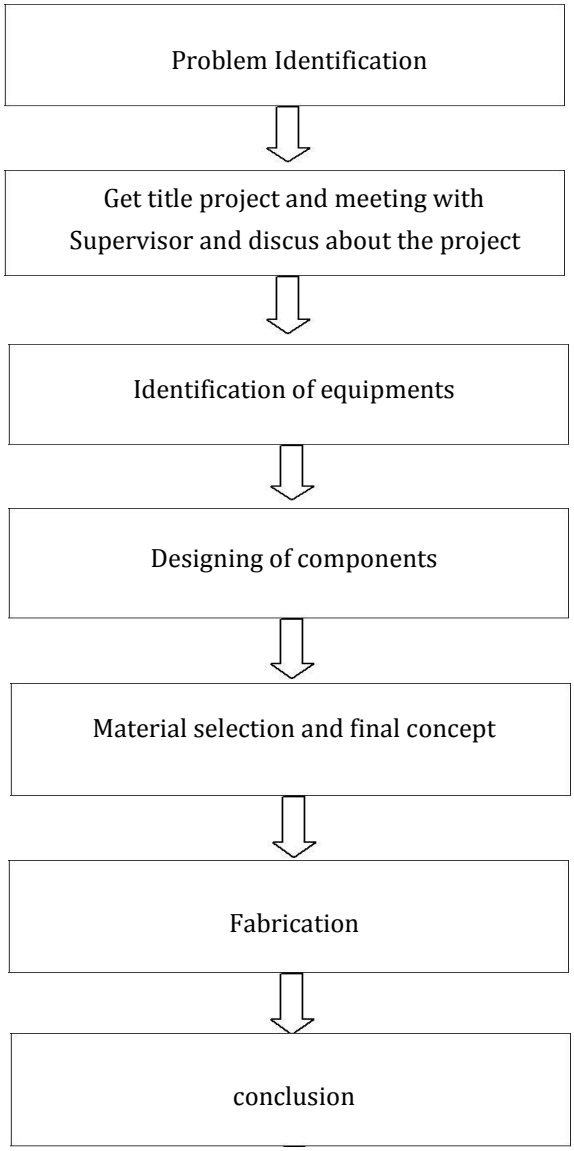
Abstract - *A sieve is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a mesh or net. This project focuses in design, fabrication of the mechanical part of machine and the system of the sieve machine. To achieve this project objective, this sieve machine body structure and mechanical system needs to concern some other criteria such as strength, safety and ergonomic design.*

Key Words: Sieve machine, Characterizing, Design, Fabrication, Ergonomic design.

1.INTRODUCTION

Horizontal sieving machine is a machine designed to separate the particle according to their mesh size different levels.in many industry for example the pharmaceutical, it is often desirable to communite particulate matter. A small sieve such as used for sifting flour has very small holes. Depending upon the types of particles to be seperated, sieves with differeft tyoes of holes are used.sieve are also used to separate stones from stand. A metallic plate or sheet, or other similar device, with regularly spaced apertures of uniform sizes,mounted in a suitable frame or holder, for use in seperating material according to size. A number used to designate the size oa a sieve, usually the approximate number of openings per inch. The normal size of openings usually between cross wires of a testing sieve.

2.METHODOLOGY



3.PROBLEM IDENTIFICATION

The problem of size of sand in the market available. Need to spend more money if we want the sand in specific size or category it will increase the budget and time to wait the supplier preparing the goods. Now days people always prefer the most suitable way to cut their cost and time.

4.DESIGN CONCEPT

The design of sieve machine must have based on much aspect actually. The design consideration must be done carefully so that the design can be fabricate easily and the system functioning. Then the material used in each design influence the selection thing because absolutely we need a lightweight material suitable with product size. The design is separated into three phases, firstly choose as many proposed design can be produce then choose 4 designs and try to improve it functionality and the last one is a new design with detail thing including dimension by using Solid Work software. Beside that the cost to design and fabricate must reasonable mustn't exceeded the budget given try to reduce waste .

The criteria that must be considered in designing the sieve machine are:

Durability: sieve machine must be durable when rotate and vibrate. 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.

4.1.Designing Calculation

DESIGN OF POWER:

Weight = 2.5 kg

Crank radius = 55mm

Connecting rod =310mm

Work = Force x Distance

= 2.5 x 9.81 x 55 x 2

= 2697.75 N-mm

= 2.6 N-mm

Speed=30 rpm

1rev=1stroke=2L=110mm

30x110=3300mm/min

=3.3m/min Velocity,

v=0.055m/s Power,

p=Force x Velocity

p =2.5 x 9.8 x 0.055 = 1.34W

Design Of Power By Dynamics Principle:

Acceleration = m w r (sinθ+sin2θ/n)

=2.5 x 2 Π N/60 x 0.0.55

=0.431m/s^2

Force= Mass x Acceleration

= 2.5 x 0.431

= 1.07N

Power= Velocity x Force

= 0.055 x 1.07

P=0.058W

DESIGN OF DEEP GROVE BALL BEARING:

Diameter of the shaft =15 mm

Speed of the shaft = 30 rpm

Radial load, Fr=3000 N

Thrust load, Fa = 1000 N

Life of the bearing expected, Lh = 500 hrs.

Since,

Fa / Fr<0.7, a single row deep groove ball bearing may be suitable.

For the given diameter of the shaft= 15 mm

From PSG.DDB. pg.no 4.13

Select SKF6202 bearing.

Static load rating,co=3350N

Dynamic load rating , c=6100N

Fa/co =1000/3350 =0.29

From PSG.DDB.pg.no 4.4,

Corresponding to Fa/Co =0.29

e = 0.27 (by Interpolation)

Since Fa/Cr =1000 /3000 =0.33 > e

From PSG.DDB.pg.no 4.4,

The radial load factor X =0.56, Y = 1 (by Interpolation)

From PSG.DDB.pg.no 4.2

The service factor is selected as 1.5

Equivalent load,

P =(X Fr + Y Fa) S = (0.56 x3000 + 1 x1000)1.5

P = 4020 N

From PSG.DDB.pg.no 4.6,

Corresponding to 30 rpm and 500 hrs

Loading ratio, C/P = 1.24

C = 1.24 x 4020=4984.8 N

Since the dynamic load of the SKF6202 bearing is more than the required dynamic load capacity, the selected bearing is suitable.

The calculated dynamic load < standard dynamic load

4984.8N<6100N

So the **"Design is safe".**

5.WORKING PRINCIPLE

The Horizontal sieving machine is very easy to construct and can be operated easily. It is very economic among this kind of machines. This project is fabricated with the help of parts like a handle, crank and slotted link mechanism, bearing, rail track, sieving box and a collecting box. The horizontal sieving machine is worked on the basis of crank and slotted mechanism. The rail track is attached at the base in which the collecting box moves in it. The collecting box is fixed with the crank shaft in order to move when the crank shaft is reciprocated. The sieving box is placed inside the collecting box and the machine is started. When the collecting box moves in the reciprocating motion the sieving process is performed.

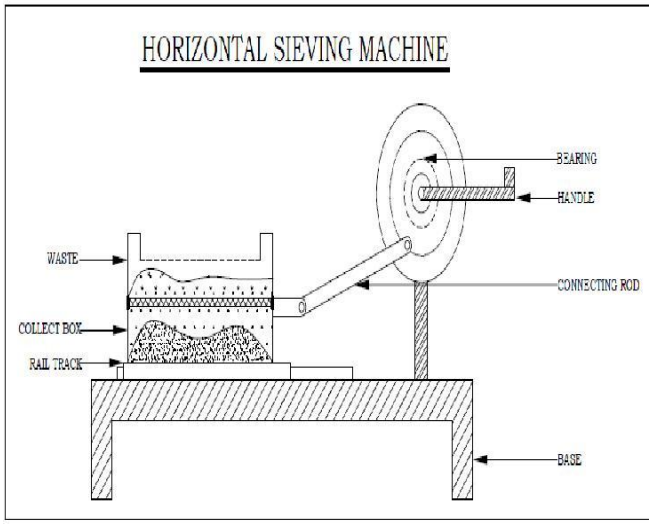


Fig:1 Horizontal Sieving Machine

6.CONCLUSIONS

In this research study, the mild steel failure problem encountered by loads were successfully addressed by applying the Taguchi Method. A Taguchi orthogonal array, the signal-to-noise (S/N) ratio and analysis of variance (AVOVA) were used for the optimization of welding parameters. The optimum levels obtained are A3B3C3. It is found that welding speed has major influence on tensile strength of welded joints.

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BIOGRAPHIES

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