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Cam & Follower Operated Multi-Level Vibrating Screening Machine

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Abstract – *This paper include use of operated on cam as well as follower multi-level vibrating screening machine. Cam & follower is used to give reciprocating motion for screens. Generally in vibrating machine only one screen is used, but in this phenomenon more than two screens are used for improving the performance. it consist of prime mover that induces vibrations ,with the help of cam & follower by using the screen media particle is separated This system mostly useful for mining, food ,agriculture industries to separation of various size of material. The different type of product having large verities and hence required different grades of powder. This system basically designed for mechanical strength, and powder specimen. This system is also used for coal industries for dewatering of coal and sorting purpose.*

Key Words: screen, powder, vibrations, material, cam, grades.

1. INTRODUCTION

Different type of material in powder form or in solid form is separated by using multiple vibrating screening machine. In mining industry chemical companies food industries and construction firm is the screens to help separate and clean the item or metallurgical components. The work of few people can be done in a very less time by using screening machine

Screening machine is made up of solid material like mild steel having high strength. It has two opening sides for monitoring the gradually improving of the screen. Some vibrating screening machine having multilevel with two or more levels of screen placed.to separate different size of components. The screens are made up of the wire mesh and come in various grit size.

The various size of coal, coffee powder, sand are separated by using cam and follower operated multi-level vibrating screening machine. The component which is greater in size they stay on top layer of vibrating screen. The little of components fall on second screen and lesser size of components falls on third screen. Thus the different sizes of components are separated with the help of screens. There is of course a wide range of purpose for the multi-screening.the main purpose in mining industries there are different type of vibrating screens, but in this type inclined vibratory screens are used.

1.1 Vibrating Screens And There Type

1 Circular Vibrating Screen
2 Drum Type Screen
3 Rotary Vibrating Screen

1.1.1 Circular Vibrating Screen: Circular Vibrating Screen is a kind of screening equipment mostly used in the industries like mining, construction, building materials, water conservancy and hydropower, road, railway, chemical industry, and so on. Improve your product purity and avoided oversized material from your powders and liquids. Eliminate dust and fumes Enclosed screening means total containment. It's having lowers noise levels. A solid rubber suspension gives the machine a quiet operation.

1.1.2 Drum Type Screen: The drum screen is made up mainly by the motor, reducer, roller device, and rack, closures, expected out of the mouth. The drum unit is mounted on a rack aslope. Motor and the drum means is connected through a gear unit and via a coupling, drive roller means is rotated about its axis. When the material into the drum assembly, since the inclination and rotation of the drum assembly, so that the flip and scroll of the screen surface material. Selected materials discharged by the discharge port of the rear of the drum at the bottom, substandard materials are discharged through the discharge opening of the drum tail. As the material within the drum of

the flip, scroll, so that the block material can be ejected, to prevent the screen closed.

1.1.3 Rotary Vibrating Screen: Rotary vibrating screen is a kind of high efficiency sieving machine for screening any powder or particle material in many industries.

2 LITERATURE REVIEW

M. Majumder & P Ghosh 2015[1] described that finite element analysis of vibration screening techniques using EPS geo foam. The application of continuous geo foam filled barriers as vibration screening material. The numerical analysis is performed by using two-dimensional finite element method under dynamic condition considering vertically oscillated strip footing as a dynamic source. The present analysis considers the foundation bed as linearly elastic, isotropic, homogeneous and non homogeneous soil deposit. The vertical displacement amplitudes of ground vibrations are measured at different pick-up points along the ground surface to determine the amplitude reduction factor, which is considered as a measure of the screening efficiency. The present finite element analysis explores the usefulness of vibration screening technique using continuous geo foam. The effect of different parameters such a strength, width, depth, inclination, location, frequency of excitation and soil stiffness on the amplitude reduction factor (ARF) is analyzed critically.

Dr. Bhavesh Patel 2013[2] carried out a research on Design of Vibratory Screen used in Coal Mining Industry to Prevent Failure has done experiments on the design of the vibratory screen used in coal mining industry. As per the design of the existing vibratory screen, the life of the vibratory screen is more than eight month but it can be failed within half of its designed life two. In the first proposed design, to reduce the bending stresses within the limiting value the height is changed. Whereas in second proposed design, design is made safer by changing the support height.

Zhao Yue-min 2009 [3] et al carried out a research on Dynamic design theory and application of large vibrating screen.Dynamic characteristic of the vibrating screen was researched and dynamic simulation method of large screening machines was explored. They used finite element method (FEM) to analyze dynamic characteristic of large vibrating screen with hyper static net-beam structure. Multi natural frequency, natural modes of vibration and dynamic response of the vibrating screen were calculated. The finite element method is an important method and necessary process in the dynamic design process of vibrating screen. Using FEM to analyze structural characteristic can help the designers realize dynamic characteristic of vibrating screen and make dynamic modification of the structure.

Song Yan 2009 [4] et al carried out a research on Dynamic analysis of a chaotic vibrating screen. The precisely screening process of coal is an effective way to improve the quality and structure of coal production and to increase economic efficiency and social energy saving benefit. At present, the key problem of restraining the precisely screening process of moist raw coal is the small size of particles, big specific surface area, and binding aperture caused by water. It is difficult for ordinary vibrating screen to complete this screening task. Existing wets screening machines make it difficult to use fine-coal dry screening to screen the wet raw coal. In this paper, we intend to develop a new type of multi-degree-of-freedom chaotic vibrating screen

4 DESIGN AND CALCULATION

1) SELECTION OF MOTOR

Single phase ac motor power = 0.5hp=375 watt speed= 0-1440 rpm (variable)
Motor torque
P = 2 Π N T /60
T = (60 x 375) /(2 Π x 1440)
T = 2.4867 N-m

Calculations are based on the top speed of the motor.

Diameter of motor pulley = 60 mm

Diameter of output shaft pulley = 120 mm

Reduction ratio = 2

Speed of Input shaft pulley = 1440/2 =720rpm

3) SHAFT DESIGN. (ASME CODE)
Since in connected machinery forces on most of the shafts are not constant, it is necessary to make proper allowance for reduce the baneful effects of load fluctuations.
According to ASME code allowable values of shear stress may be calculated from various relations.
For commercial steel shaft,
Actual shear stress τ_{act} = 41N/mm2

$$\tau_{act} = \frac{16 \times T}{\Pi \times d^3}$$

$$41 = \frac{16 \times 36449.1}{\Pi \times d^3}$$

d=12.948mm
d=13mm
Assume d= 20mm.
Ref: - PSG Design data book

2) BALL BEARING DESIGN.
While considering of mounting of ball bearing. As shaft diameter is 20 mm to it &selected a pedestal ball bearing having shaft outer dia-20mm ball bearing to support the shaft of 20mm.

3) DESIGN OF RADIAL CAM WITH FOLLOWER

Least radius of cam 20 mm
Ascent lift 20 mm
N1= speed of motor shaft=1440 rpm
N2=speed of shaft pulley=720 rpm
D1=diameter of motor pulley=60mm
D2=diameter of shaft pulley=120 mm

$$\frac{N1}{N2}=\frac{d2}{d1} \qquad \frac{1440}{N2}=\frac{120}{60}$$

N2= 720

Speed of cam 720 rpm

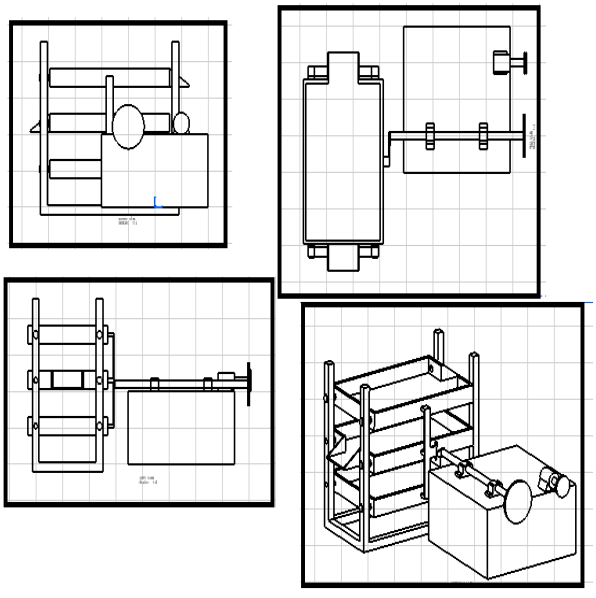

Fig -1: Name of the figure

3. CONCLUSIONS

By using this machine we can separate the grits of different types as well as size in less time & cost

Machine uses a single vibrator is changed is changed for all sizes of powders produced; which saves the machine cost

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