

Battery Operated Riddle Machine

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Abstract: A demonstration of design and fabrication of Battery Operated sand sieving system is done. As sand is used in construction, manufacturing and many industrial purposes, it needs to be filtered and separated from unneeded particles, stones and other large particles before put to use. This system puts forward a fully automated sand filtering and separator that automatically filters the sand poured on it. For this a motorized shaft is mounted horizontally on the mounts.

Keywords: Battery Operated

I. INTRODUCTION

A demonstration of design and fabrication of solar based sand sieving system is done. As sand is used in construction, manufacturing and many industrial purposes, it needs to be filtered and separated from unneeded particles, stones and other large particles before put to use. This system puts forward a fully automated sand filtering and separator that automatically filters the sand poured on it. For this a motorized shaft is mounted horizontally on the mounts. The shaft is connected to a filter frame with a mesh Sieving machine serves is to remove large grains with a small grain through a Riddle. Separation occurs when the sand is placed on top of a filter having holes size. The first sieving is done to get rid of the sand with a larger than standard withholding sand filter and the second sieving is done to get rid of the sand with a size too small means that the sand filter is ignored. A Riddle 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 or metal.

II. LITERATURE REVIEW

Got the information from internet that is related with this project. Such as

1. The history of Riddle machine
2. The type of sand and its size
3. Machinery process used

2.1 Design Concept

1. Sketch the new design of Riddle machine (consists of 4 designs). It base on customer needs
2. Evaluated the designs and come out with the new design (final concept)
3. Using the solid work software, make the isometric, orthographic and 3D Drawing

2.2 Fabrication

The process used in fabrication

- Welding: In this process, it uses to combine many part of material in the Riddle machine fabrication
- Drilling: To make a hole on the material
- Cutting: To cut the material

A. Introduction

Sand substance is one of the most important thing in industrial world. Now days the industry need the sand substand that are already been process known as sand product. As we know the sand substand are mixture with variety other compenent such as dirt and metal. As we know the way sand is been collected still used the conversional way such as sieving using hand or machine. And human energy is needed to run the process. So to make the process more efficient new technology is needed to help increase the productivity so the human power can be reduce and also can cut the cost of the process

B. History of Riddle Machine

The history of Riddle particles size analysis can be dated back to the earliest time even before the early man. It was used as a tool for separation, Riddle was invented in mount Tinantai an ancient place known for its beautiful land scape Riddle, which is early called fen shaii, wedu shaidi in Chinese is made up of remie as screen and bamboo as frame. Ancient native in tiantai crashed wheat in stone mortar, separated flour with Riddle, and then made ambrosia to worship heaven. To the memory of this great invention, a well was dunded and named as Preshai well. It is located in tiantai country. With the development of human civilization and technology, Riddle as a tool becomes more and more close to human life, with social progress and technological development, Riddle are more and more used in industries and the quality need is increasing. This has led to an increase in the filter cloth mill, which lies at the foot of mount Tinantai for instance, provides various standard sample Riddles for chemical engineering and fine chemical industries to make them contribute to the industrial development. Most of the materials in copper and stainless steel. Different types can be provided such as stainless steel screen and chromium electroplated flames. The mesh is from 5.600 and diameter are 20 and 25cm

III. THEORY OF SIVEING

The main use of sieving is in size analysis where a mesh of Riddle of decreasing aperture size is commonly used to obtain data in size distribution of samples. A sample is placed on coarsest Riddle. The nest of Riddles is vibrated so that particles on the Riddle are presented to apertures in the surface of the Riddle. Particles which are smaller than the aperture will pass through and fall into the lower Riddle, whilst particles which are larger than the aperture will be retained. In this way a vertical classification based on the size of particles relative to Riddle aperture is obtained. If one consider the process, a number of factors arises.

1. The passage of particle through the Riddle
2. the efficiency of the grading of sample (soil)
3. Mesh structures on the plate
4. Particles shape

Suspended large particles to pass through the pores of the Riddle plate will be retained on the top plate, these particles are called the bulky particles. Under the bulky particles, we have cobbles and silt particles which cover a large range and sizes, however, they are bulky in shape. The term bulky is confined to particles that are relatively large in all three dimension, as contrasted to platy particles in which one dimension is similar compared to the other two. The bulky shape has the following four subdivisions listed in descending order.

They are Angular, sub-angular, sub-round, round. That is how they pass through the Riddle mesh of different sizes. The Riddle plates are four in number and the angular particles will retains on top as overlap for the sub-angular that passes through the second plate called underflow, after which the sub-round, round, intermediate, subintermediate and fine particles.

The shape of an individual particle is conveniently expressed in two of the sphericity which is independent of the particles size for a spherical particles of diameter $DP = 1$; for a non-spherical practical, the spherical is defined by the relation

$$Os = 6yp \dots\dots\dots(1)$$

DPsp

Where DP = equivalent diameter or nominal diameter of particle

Sp = Surface area of one particle

YP = Size of one particle

To get the percentage retained on any Riddle plate after the passage of the underflow, it is gotten by dividing the soil retained by the total soil weight and multiply it by 100%.

$$\text{Percentage retained} = \text{Weight of soil retains} \times 100\% \text{ Total soil weight}$$

IV. DEFINITION OF RIDDLE

Riddle is an implement consisting of a wire or plastic net attached to a ring.

Riddles are used for separating a finite range of particles sizes, dependent on the nature of the method used.

Riddle analysis may be carried out using a nest of Riddles, each lower Riddle being of smaller aperture size. Generally, Riddle series are arranged so that the ratio of aperture sizes on consecutive Riddles is 2, 2½ or 2¼ according to the

closeness of sieving which is required.

The Riddles can either be mounted on a vibrator which should be designed to give a degree of vertical movement in addition to the horizontal vibration, or may be hand shaker.

The classification of particle into sizes is effected by retaining high range of sizes while allowing the passage of low ranges through the Riddle opening to the other side.

Those particles that are retained at the surface of the Riddle are larger than the Riddle openings and therefore called the oversize or tail. While the undersize or fines are smaller than the Riddle opening. From this analysis, it is then implies that the sole function of a Riddle is to separate any material feed into two fractions undersize and oversize. Industrial screens are constructed with metal bar woven wire, silk cloth, punched or perforated metal plates. Every Riddle (screen) is characterized by the dimensions of the opening. The opening is correlated in mesh which is the number of openings per linear inch from the centre of any wire to a point one inch apart. The Riddle ranges from 150 meshes (0.104mm) to 10mesh (1.651mm) size. However, the actual openings are smaller than the corresponding mesh numbers due to the thickness of the wires. The Riddle size opening called aperture is the minimum clear space between the edges of the opening in the Riddle surface. The mesh size and the opening area are related to the size of the opening and the diameter of the wire.

$$A = O^2 - OM \\ [O + D]^2$$

Where A = Opening Area

O = Size of Opening

M = Mesh

D = Diameter of wire

V. GRIZZLY RIDDLES

They are most suitable for coarse fractions containing few fines. Grizzly Riddles have the sampling of design and construction and it cheap to maintain. It consists of grid of two parallel bars separated by spacers containing the Riddle surfaces with the Riddle openings. The bars are spaced to a predetermined distance of 50mm to 200mm. The entire arrangement is tilted to a given angle to the horizontal. The feed is introduced at the upper part of the grid. As the feed particles roll downward the slope the undersize pass through the opening while at the other end of the grid is the discharge of oversize. There are two forms of Grizzly Riddle –stationary and vibrating Riddles. The stationary grizzlies are self-operated on introduction of feed. It requires no power and thus making it the cheapest to maintain. But provides low efficiency of separation and scarcely applied in process industries. Vibrating Riddles are distinguished by mounting a set of bars on eccentrics which allows for to and fro movements. The vibrating grizzlies are mostly desirable due to its relative high efficiency.

VI. REVOLVING RIDDLE

This type of Riddle was once widely used. It is being widely replaced by vibrational Riddles (screen). They consist of cylindrical frame surrounded by wire cloth or protected plate open at both ends and inclined at a slight angle. The materials to be screened are delivered at the upper end and the oversize is discharged at the cover end. The desired product falls through the wire cloth openings. The screen revolves at a relatively low speed of 15 to 20 rpm/mm. The capacity is not greater and efficiency is relatively low machine. Using the electrical motor it vibrate as it mechanism It has many different size layer so the sand comes in variety size. We just need to choose the size. The magnet also is installed in this machine to remove the any metal substand. Because metal can cause corrosion.

VIII. CONCLUSION

In size separation operation, Riddle is mainly used. Other size separation equipment's includes cyclone separator, electrostatic, precipitator, settling chambers, bowl centrifuge etc. The Riddle equipment consists of a set of Riddles. The size of the solid particles should be uniform throughout the Riddle plate. For practice, a high degree of separation is achieved in Riddle equipment than any other equipment, and as sensitive to the soil particles. The occurrence of blinding which depends on the usage of the equipment without can be avoided by cleaning the Riddle equipment after usage.

The quantity of solid particle used, at the initial stage of the experiment is not the same with the one gotten at the end point of the process because of a larger particles causes blinding of the mesh.

Also, the quantity of solid particle that can pass through the Riddle mesh depends on the condition of the Riddle mesh at a particular time. At the commencement of the use of the newly clear mesh the head lost is low and the passage is always rapid. But as blinding occurs the head lost it low and the passage of the particle is ultimate reduced.

In the analysis of material for construction, materials that resist corrosion are preferred to be used. In the analysis, stainless and mild steel should not be used because of their corroding factors.

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