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A Review Paper on screw Conveyor Blade & Bolt of Domestic Cattle Manure Monitor Making Machine

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A B S T R A C T

Screw conveyors are widely used in industry to transport materials over long distances. We improve the capacity of screw conveyor by incorporating the original and current design. (9TPH to 7.8TPH). They are a very imperial transportation tool for dry solids and deliver good performance. Design is generally based heavily on experience. For screw conveyors the overall performance depends upon the operating conditions ie the screw speed the inclination of the screw conveyors and the volumetric level of the bulk material in this review paper we improve the capacity of the blades of screw conveyor by using analysis and improve the tensile strength of the screw shaft. We change the materials for compare the design of blades for reducing the fracture facors in blades. The prediction of screw conveyors performance in terms of variations in practice velocities in terms of variations energy dissipations mass throughout and power consumption due to change in operating conditions.

Keywords: Screw conveyors; Vortex motion; Friction, screw blade.

1. Introduction

The domestic cattle manure monitor making machine is to use the available energy from the cattle dung. The machine produces cattle dung log in the form of long bar which is used as fuel for many purposes such as food preparation, heating boilers, brick chambers, etc. This saves the utilization of wood as a fuel. domestic cattle manure monitor making machine consists of hopper, screw conveyor, Gearbox, electric motor, coupling, drum and bearing. This machine uses Cattle Dung as raw material. The dry cattle dung is fed into the hopper, which is mounted on the top of the cylinder Drum, So that the cattle dung slides over the hopper and reaches the cylinder drum. The screw conveyor is fitted inside the drum to transport the cattle dung to the die side, compresses the dung and come out of the die as a cattle dung log. The screw extruder is driven by the electric motor which is coupled to the gearbox to reduce the speed from the motor.

It is a system that is used to convey material with the aid of the spiral component used in it. The basic requirement for the conveyor system is the type of conveyor, its length, the pitch of the screw and all the electrical equipment. The main application of the conveyor system is the transportation of food, concrete, fly ash, chemicals, etc. The two main designs of the screw conveyor system are the paddle and the belt design, which depend on the particular application for which they are used. The main drive in screw conveyors consists of a motor connected to a gearbox. The output of the gearbox is connected to the input of the screw conveyor via a coupling or other drive unit known as a chain and sprocket.

Conveyors are devices that can transport material or goods from one level to another without requiring any effort. The structure of the conveyors is usually based on a frame, a carrying or conveyor roller or a belt and the drive. Belt conveyors are used for transporting gravel, other aggregates, cement concrete and cement slurry in the construction industry and for transporting solid or semi-solid waste in raw water and wastewater treatment. In industry, they are mainly used as a substitute for coal, fly ash and the starting product to the final destination of the plant. There are different categories of conveyors that are used depending on the area and type of work, such as belt conveyors, roller conveyors, vibratory conveyors, bucket conveyors, etc.

1.1 HOPPER

The cattle dung is feed into the hopper. The cattle dung slides over the hopper by gravity into the drum. Hence the hopper is designed as conical shape.

1.2 DRUM

The drum is used to collect the cattle dung from the hopper. It is also used to store the cattle dung. The die is attached at the one end of the drum. The screw conveyor is placed inside the drum. It also acts as a support for the screw conveyor. The cattle dung extrudes from the drum should acquire a

cylindrical shape, So that the circular shaped die is placed at the one end of the drum. The cattle dung is made to pass through the die which is push by the screw conveyor hence it acquires the cylindrical shape. Bearing should be attached at the motor side of the drum. Bearing is used to reduce the friction and allow free rotation of screw conveyor.

1.3 SCREW CONVEYOR

The purpose of the screw Conveyor is to transfer and compress the Cattle Dung and also pushes the cattle dung to extrude it through the die. It consists of hollow cylindrical shaft consists of screw plates. The one end of the hollow shaft is coupled with the gearbox and the other end of the shaft is simply mounted at the end of the drum.

1.4. MOTOR AND GEAR BOX

The Capacitor Induction Motor is used as a main motor. The Motor Use a capacitor for the starting purpose. It has a cage rotor and a winding stator. The windings are placed at 90 degrees apart from one another. In this motor the single phase supply current is split into two phases so that the motor acts as a balanced two phase motor. For the capacitor Induction Motor the starting torque is high so it is preferred for Cattle dung log making machine. The motor is coupled with the gear box for the speed reduction purpose and also to maintain the constant torque.

2. Problem Definition:

- At the various loading condition, the screw conveyor blade of domestic cattle manure monitor making machine gets bend at regular interval as well as bolt is break which is attached in screw conveyor & shaft. The breakdown of the bolt is mainly occurs when cattle dunk obstacles in screw conveyor blade, when it is hard or dry or when there is a stone or hard substance in manure while working and more torque is required.
- The screw conveyor blade also gets deformed during the working due to colloidal of cattle manure during filling.
- The other parts of domestic cattle manure monitor making machine easily available and convenient to repair or replace , but if there is any failure in the blade of screw conveyor & failure of bolt of the machine than it is very time consuming process for assembly.

3. Aims and Objectives

Aim: Modeling and analysis of screw conveyor blade & bolt of domestic cattle manure monitor making machine.

Objectives:

- To study the existing design of domestic cattle manure monitor making machine and analyze it.
- Modeling and analysis of screw conveyor blade & bolt.
- Validate the solution by FEM analysis using CAE software.
- To increase the productivity rate of cattle dung logs at minimum runtime of machine.

4. Literature Survey

Bepariya Keyur et al 2018 performed investigation on new machine rather than old machine for material handling purpose. The main purpose of the author in the present study is to utilize the land and it space in such a way that it can full fill the all requirement of the manufacturing process in which the material such as soaps biscuits wafer scan be transfer from manufacturing area to storage area at higher level with efficient out by using the screw conveyor as a material handling system.

Panchal Prit et al 2017 investigated about the present scenario of the industries and its drainage system such that it is the major problem which cause the pollution and leads to bad impact on biological life and this leads to the enhancement of the global warming. Author also explained the drawbacks of drainage pipe as it sometimes result as loss of human life. To overcome all the related problem author investigated the automated system using screw conveyor which can clean the waste named as “Automatic waste Cleaning System by screw conveyor” and also constructed the prototype of the present suggested system.

Amudha.K 2017 represented the experimental analysis of the screw conveyor and performed a review on the performance of the screw conveyor under various operating conditions. In the investigation the author found that with different flow rates and federate there was no change in mass flow of the material. It was also observed the nodule output about 8.6 kg/rotation. In the study screw feeder operation took place for 150meter depth with mass loss of 14% due wash away of finer particles. It was concluded that the design was validated in trials in sea for higher depth about 6000 meter depth.

Lanrewaju T. O. et al 2017 performed experimental analysis on the screw conveyor for grains with inclination of 0°, 30° and 45° respectively. In the experimental analysis he found that for maize the average capacity of the screw conveyor was 407.05, 282.4 and 263.1 kg h-1 in case of gari the capacity

of the screw conveyor was 460.0, 365.3, 310.0 kg h-1 and in case of sorghum the average capacity of the screw conveyor was, 450.2, 350.5, 263.0 kg h-1.With al, the output author concluded that screw conveyor with inclination provided 99.95% efficiency in case of handling the granules.

Michael Rackl 2016 investigated the design parameters of the screw conveyor mass flow and driving torque for three grades of wood chips and two blends of wood chips. As a result it was found that one of the chip grade recoded high torque rate ie twice of the another and one get jammed. The result concluded that the blending of the wood chips can reduce the jamming to desirable rate.

Marianna Tomašková 2014 explained the complete working of the screw conveyor and the various design of the system which are utilized across the world for getting the best efficiency in material handling purpose. In the research paper also discussed about the various risks and drawbacks associated with use of screw conveyor for material handling purpose.

Jigar N. Patel 2013 represented the modification of the Auger in order to attain same output with small size and less power consumption. In the investigation author proposed the screw conveyor without shaft for conveying the cement with capacity of 2t/h. As a result it was found that screw conveyor are capable of conveying the material in inclination but its capacity decrease with increase in inclination angle

5. Conclusion

Research on auger performance in agricultural material extraction and transportation has mostly concentrated on free-flowing, fibrous, and agricultural grains (corn, wheat, oats, etc.). For both inclined and horizontal conveying, performance parameters including screw speed, conveying angle, and conveying diameter were examined. According to the aforementioned study, the primary issue with all of the explanations is the way a moving material flows and how much energy is used at various speeds as well as pitch and diameter ratios. It is very challenging to analyse the material particle flow pattern as it moves from the inlet to the outlet. For more research, a thorough grasp of the material particles' flow pattern inside the screw helix is necessary. Thus, the finite element method (FEM) can be used to predict the screw conveyor's performance based on the aforementioned study.

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