Fabrication of Semi Automatic Feeding Mechanism for Small Scale Poultry Farm

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Abstract - The main aim of this work is to build an efficient way of feed handling machine in a poultry farm with a low cost which is the screw conveyor. A screw conveyor is a mechanism that uses a rotating helical screw blade usually within a tube, to move liquid or granular materials. They are used in many bulk handling industries. Screw conveyors in modern industry are often used horizontally or at a slight incline as an efficient way to move semi-solid materials, including food waste, wood chips, aggregates, cereal grains, animal feed, boiler ash, meat and bone meal, municipal solid waste, and many others. There are many readily available screw conveyors in the market. But these are for large material handling purposes and they are not suitable for small scale industries. Also the cost of the machines is more and hence they are not affordable by the small scale industries and small workshops. Hence this project serves as an efficient way of material handling machine which is of low cost. The components that are made used in this project are easily available in the market and hence the cost of the machine is less.

Keywords – Screw Conveyor, Testing, Poultry Farm, Feeding Mechanism.

I. INTRODUCTION

The screw conveyor is one of the oldest and most versatile conveyors in use today. The original idea was conceived by Archimedes more than twenty century ago. The Archimedes screw was used to remove water from the holds of ships. A continuous helix is mounted on a pipe in a stationary trough. The face of the helix pushes the materials along the bottom and sides [2]. The material is sheared from the space between the bottom of the screw and the trough and tumbled along. The rotation action of the screw also lifts the material in the direction of rotation. Each rotation of the screw advances the material one pitch length in a continuous shearing and tumbling motion. It follows that materials that readily tumble and shear are ideally suited for conveying in a screw conveyor. As well as moving materials, screw conveyors can be adapted to do a certain amount of processing to the material being conveyed. Screw conveyors can perform the following operations.

- Cooling and heating,
- Mixing,
- De-watering,
- Compaction or aeration,
- Particle size reduction (breaking lumps).

The significant lagging factor of screw conveyors are that they are not self cleaning and the material is discharged intermittently rather than continuously.

II. COMPONENTS AND DESCRIPTION

The major components employed in the fabrication of the screw conveyors are as follows.

- Frame,
- Hopper,
- Belt drive,
- Motor,
- Bearing,
- Helix screw.

A. Frame

This is made of mild steel material. The whole parts are mounted on this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearings properly while assembling. Provisions are made to cover the bearings with grease.

B. Hopper

![Fig 1 Hopper](image)

A square frustum at the top and bottom respectively, with each side inclined at 45° to the horizontal is welded on a 100mm high square box placed to one end of the circumference of the threshing drum cover. The hopper was also incorporated with a feed cover regulating slide which is adjustable through a bolt. The hopper was
made up of mild steel plate with trapezoidal shape to serve as outlet for the material. It was designed such that materials to be grated fall on the auger with gravity.

C. Belt Drive

A belt is a loop of flexible material used to mechanically link two or more rotating shafts, most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys and the shafts need not be parallel. In a two pulley system, the belt can either drive the pulleys normally in one direction (the same if on parallel shafts) or the belt may be crossed, so that the direction of the driven shaft is reversed (the opposite direction to the driver if on parallel shafts). As a source of motion, a conveyor belt is one application where the belt is adapted to continuously carry a load between two points. A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium—the conveyor belt—that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as grain, salt, coal, ore, sand, overburden and more.

D. Motor

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming’s left hand rule. When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

E. Helix Screw

Helix Screw, also called Helical piles, are a steel screw-in piling and ground anchoring system used for building deep foundations. Helix screws are manufactured using varying sizes of tubular hollow sections for the pile or anchors shaft. The pile shaft transfers a structure's load into the pile. Helical steel plates are welded to the pile shaft in accordance with the intended ground conditions. Helices can be press-formed to a specified pitch or simply consist of flat plates welded at a specified pitch to the pile's shaft. The number of helices, their diameters and position on the pile shaft as well as steel plate thickness are all determined by a combination of:

1. The combined structure design load requirement
2. The geotechnical parameters
3. Environmental corrosion parameters
4. The minimum design life of the structure being supported or restrained.

III. WORKING PRINCIPLE

The working principle of the screw conveyor is that the materials are transported by the rotation of the helical screws which moves the material in the forward direction in tube from the feed point (hopper) to the discharge point (outlet). The materials to be
transmitted are fed through the hopper. This feeding can be done manually or may be automated whereas the automated feeding requires some special attachments. However in our project, we prefer manual feeding. The motor is switched on such that the power from the motor is transmitted to the screw conveyor through the belt drive. This consists of a number of helix blades which is used for transmitting. As the blades or the helix screw rotates, the material is advanced by one pitch length such that the material cones out of the outlet. Usually the liquid particles and the granules are used in this type of screw conveyors. The size of the screw conveyor depends upon the application in which it is to be used.

IV. DESIGN METHODOLOGY

Elements/Pro offers a range of tools to enable the generation of a complete digital representation of the product being designed. In addition to the general geometry tools there is also the ability to generate geometry of other integrated design disciplines such as industrial and standard pipe work and complete wiring definitions. Tools are also available to support collaborative development. A number of concept design tools that provide up-front Industrial Design concepts can then be used in the downstream process of engineering the product. These range from conceptual Industrial design sketches, reverse engineering with point cloud data and comprehensive free-form surface tools. We created 3D model of this project by using CREO software. The models are shown below.

A. Assembly

An assembly line is a manufacturing process (most of the time called a progressive assembly) in which parts are added as the semi-finished assembly moves from work station to work station where the parts are added in sequence until the final assembly is produced. By mechanically moving the parts to the assembly work and moving the semi-finished assembly from work station to work station, a finished product can be assembled much faster and
with much less labour than by having workers carry parts to a stationary piece for assembly.

VII. CONCLUSIONS

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.. The “fabrication of screw conveyor” system is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities. Thus we have developed a “screw conveyor” which helps to achieve low cost material handling system. The liquids and semi solid granules can be transmitted with the help of this screw conveyor. By using more techniques, they can be modified and developed according to the applications.

REFERENCES