DESIGN AND MANUFACTURING OF SCREW CONVEYOR

¹M.Yadhagiri , ²Garipelli Kranthi Kumar , ³Dr. I. Satyanarayana(Ph.D)

Dept.Of Mechanical Engineering, Sri Indu Institute of Engineering & Technology Sheriguda (Vill), Ibrahimpatnam (Mandal), Ranga Reddy (Dist), Hyderabad Telangana, India. Email: yadu.mech@gmail.com

Abstract

A Screw Conveyor consists of two or more, with a continuous loop of material - the conveyor Screw - that rotates about them. One or both of the pulleys are powered, moving the Screw and the material on the Screw forward. The powered pulley is called the drive pulley while the un powered pulley is called the idler. There are two main industrial classes of Screw conveyors; Those in general such as those moving boxes along inside a factory and such as those used to transport industrial and agricultural materials, such as grain, coal, ores, etc. generally in outdoor locations. Generally companies providing general material handling type Screw conveyors do not provide the conveyors for bulk material handling.

The consists of one or more layers of material they can be made out of. Many Screws in general material handling have two layers. An under layer of material to provide linear strength and shape called a carcass and an over layer called the cover. The carcass is often a cotton or plastic web or mesh. The cover is often various rubber or plastic compounds specified by use of the Screw. Screw Conveyor Systems

Conveyors are used as components in automated distribution and warehousing. In combination with computer controlled pallet handling equipment this allows for more efficient. It is considered a labor saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with less labor expense.

Rubber Conveyor Screws are commonly used to convey items with irregular bottom surfaces, small items that would fall in between rollers (e.g. a conveyor bar), or bags of product that would sag between rollers. Screw conveyors are generally fairly similar in construction consisting of a metal frame with rollers at either end of a flat metal bed. The Screw is looped around each of the rollers and when one of the rollers is powered (by an) the Screwing slides across the solid metal frame bed, moving the product.

INTRODUCTION TO SCREW CONVEYOR

A screw conveyor or auger conveyor is a mechanism that uses a rotating helical screw blade, called a "*flighting*", 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. The first type of screw conveyor was the Archimedean screw, used since ancient times to pump irrigation water.

Screw conveyors move materials either horizontally on an incline or vertical. They are used to feed, distribute, collect or mix and can be equipped to either hest or cool while performing this transfer with the proper cover and gasketing, they are easily made dust or weather tight and rodent proof.

Gravity, as well as the friction between the bulk material and the trough walls, works against the material's rotation as effected by the screw. If there is a high filling level and the friction on the wall is low, the material will only rotate perpendicularly to the screw axis at the beginning of the screw, meaning that the screw will function as a simple cylinder and the material will not be conveyed. Because of this, centrifugal force must be used to generate wall friction so as to be able to convey material vertically (this, in turn, requires high screw speeds).

A system's delivery volume depends on the screw's speed, the inner and outer diameters, the degree of inclination, the level of filling, and the friction between the material and the screw. The maximum delivery volume is achieved when the friction on the conveyor screw is low relative to the friction on the trough wall. If liquids are being conveyed, the delivery rate decreases and the level of wear increases, as the chambers are no longer completely separated from each other and backflow occurs as a result.

In general, screw conveyors are made up of the following elements: The screw conveyor trough, which can feature a trough cover (depending on the specific design) The conveyor

screw, consisting of helical flighting, the screw shaft with a drive shaft, end bearing shaft, and seals. A drive unit, consisting of a shaft coupling or a chain drive, The drive mechanism itself The bearing for the screw shaft, A feed spout and a discharge spout.

WORKING PRINCIPLE OF SCREW CONVEYORS:



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- 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, <u>cereal grains</u>, animal feed, boiler ash, meat and bone meal, <u>municipal</u> <u>solid waste</u>, and many others.
- The first type of screw conveyor was the <u>Archimedean screw</u>, used since ancient times to pump irrigation water.
- They usually consist of a trough or tube containing either a spiral blade coiled around a shaft, driven at one end and held at the other, or a "shaftless spiral", driven at one end and free at the other.
- > The rate of volume transfer is proportional to the rotation rate of the shaft. In industrial control applications the device is often used as a *variable rate feeder* by

varying the rotation rate of the shaft to deliver a measured rate or quantity of material into a process.

- Screw conveyors can be operated with the flow of material inclined upward. When space allows, this is a very economical method of elevating and conveying. As the angle of inclination increases, the allowable capacity of a given unit rapidly decreases.
- > The rotating part of the conveyor is sometimes called simply an *auger*.
- Screw conveyors were used as low height lift pump to irrigate the lands. It comprises of an inclined rotating casing with an internal helical screw thread, called flight. When such a casing is rotated with its lower end submerged in water, the water entrained in the pockets, formed by the pitches, is raised.
- The performance of such screws is limited by the angle of inclination of the casing. A modified version of such screws have been tried with a rotating shaft having helical screw thread moving inside a stationery casing for lifting fluids like sewage sludge.
- But due to various limitations the process achieved limited success in the field of transportation of liquid. However when a rotating screw shaft in a stationery casing is used to convey solids, it has commendable success.



Floor mill industry was probably the first to employ horizontal screw conveyor to convey corn and flour. These screws were made by fitted wood blades to a central shaft rotating inside a cylindrical casing. Even now such screw conveyors enjoy popularity in agro based industries, handling grains and flours, because of low friction, negligible cohesive strength of the material.



- A screw conveyor consists essentially of a shaft mounted screw rotating in a trough and a drive unit for running the shaft. The material is moved forward along the axis of the trough by the thrust of screw thread or flight. The trough is usually of the U-shape.
- A helical blade is attached to a drive shaft which is coupled to a drive unit. The shaft is supported by two end bearings and intermediate bearings. The U-shaped trough has a cover plate with an opening for loading the conveyor.
- A discharge opening is provided at the bottom of the trough. The loading and discharging points can be located anywhere along the trough. More than one feed hopper and discharge hopper may be fitted according to the necessity.



The principle of material movement along the trough is similar to the sliding motion of a nut along a rotating screw when the nut is not allowed to rotate. The weight of the material and the friction of the material against the wall prevent the load from rotating with the screw.

CONSTRUCTION OF SCREW CONVEYOR :



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Conveyor Screw:

Compact, manufactured straight and accurate in helicoid, sectional, ribbon and special designs to meet your requirements

BRated Components:

Selected to meet the performance required. Precisely worked to insure a longer lasting, truer running unit. Jig-Drilled Couplings: Assures easy shaft alignment and assembly. Available with "Redi-Change" clamping key for quick disassembly of conveyor screw. Tem-U-Lac Self-Locking Coupling Bolts: Guards against system damage and costly down-time caused by coupling bolts or nuts working loose.



Hangers and Bearings:

Various styles and bearing materials selected to meet your needs.



Trough Ends:

Several bearing and seal styles are available to match your needs



Troughs, Covers, Clamps and Shrouds:

Ruggedly constructed standard "U" and other styles of troughs including tubular. Covers, clamps and shrouds available for all applications.



Nu-Weld® Flange:

Continuously welded steel flange holds trough in alignment.

G Discharge Spouts: All types available...located where you need them...with hand, electric, hydraulic or pneumatic powered gates.



Supporting Feet and Saddles:

Align and fasten the trough to the floor or existing structure.

The screw conveyor's wide range of available configurations, components, and construction materials makes the equipment suitable for transferring even the most challenging dry bulk materials.

A screw conveyor consists of a screw mounted in an enclosed U-shaped trough (or tubular housing). The screw can have one or several sections, and each section consists of flighting mounted on a pipe. At one end, the screw is connected to a rotating drive shaft, and the opposite end is connected to an end shaft.

The screw is supported by bearings at the trough ends. If the screw conveyor is long enough to require more support, hanger bearings can be suspended from the top of the trough to support the screw at points between the screw sections.

Selecting a screw conveyor to handle your challenging material is really a matter of choosing the right combination of components and construction materials. While you'll need to work closely with your conveyor supplier's engineering department for technical advice during this process, here are some basics for making the right choices for handling your tough material I n a screw conveyor.

TYPES OF SCREW FLIGHT:

The screw of the conveyor may be right hand or left hand, the right hand type being the usual design. The threads of the screw may be single, double or triple. The flight of the screws may be made in either of the two ways: (1). As Helicoids

(2). As Sectional flight

Helicoids Flight:

They are formed from a flat bar or strip into a continues helix. The threads are thinner at the outer edge and thicker at the

inner



edge.

Sectional flights:

Sectional flights are formed from a flat disc and the thickness of the thread is uniform throughout. A continuous helix is made by joining a number of sectional flights together on a piece of pipe and butt welded them. Various styles of screw flights are in use, depending on the service required.



Some of the typical configurations are:

1. Short pitch or continuous flight:

If the conveyor is required to handle dry granular or powdered materials that do not pack, this style of flight may be selected. It is of regular construction and recommended for inclined conveyors having a slope of 20 or more, including vertical conveyors. This style is extensively used as feeder screw.

2. Ribbon flight:

If the conveyor is to handle lumpy, clinging, sticky, gummy or viscous substances, this type flight may be selected. It consists of continuous helical flight formed from steel bar and secured to the pipe by supporting lugs.



3. Cut flight:

In this type of flight screws have notches cut in the periphery of the flight. These notches supplement the conveying with moderate mixing action. They are recommended for conveyors required to handle light, fine, granular or flaky materials.



4. Cut and folded flights:

This type of flight is characterized by notches as in cut flight, together with folded segments. This type of flight creates agitation and aeration resulting in better mixing. This type of flight is used to handle light or medium weight materials having fine, granular or flaky materials. Some screw conveyors have cut flight with paddles mounted at regular intervals. The paddles counteract the flow of material past the flight resulting in greater agitation and mixing.

Sometimes screws are made of stainless steel to suit special requirements, like the sanitation requirements for handling food, drugs and other hygienic materials.

Advantages

Ability to handle varying flow rates, consistencies dry solids contents, free water, temperatures without problems from a single fixed speed. Totally enclosed – no visual or odour contact from inlet to outlet. Safe transport – lids fully bolted along length. High fill rates – low power, low speeds = low wear and balanced transportation. , No spillage of materials during transport – no carry over. No ragging or blockage possible. Low operator intervention. Can convey directly into the side of a secondary or vertical conveyor.Wide range of sizes and designs available.Multiple outlets possible.Highly flexible design- many support + operational facilities possible.

Conclusion:

The design and manufacturing of screw conveyor, basic application of which is to transport, Limestone for some distance in horizontal direction. This project gives detailed information about the various factor that should be taken into account before designing and selecting different components, which form a part of screw conveyor.

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