

Design & Fabrication of 90° conveyor system for material handing in Industries

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Abstract: *The primary aim of the project is to transfer the material by 90 degree conveyor system by applying the basic principle of material handling conveyor system. Our effort doesn't end with transfer the material by 90 degree. Behind this we have a great motive in fabricating are involved checker at a cheaper cost that cost all be easily affordable by a common manufacturer. Belt conveyor is the transportation of material from one location to another. As per the requirement of today's automotive world In the process or manufacturing industry, raw materials need to be transported from one manufacturing stage to another. Belt conveyor has high load carrying capacity, large length of conveying path, simple design, easy maintenance and high reliability of operation. Belt Conveyor system is also used in material transport in foundry shop like supply and distribution of molding sand, molds and removal of waste. This paper provides to design the conveyor system used for which includes belt speed, belt width, motor selection, belt specification, shaft diameter, pulley, with the help of standard model calculation.*

Keywords: *conveyor system; load carrying capacity;*

I. Introduction

The most common devices like gears and other circular components in the world of Engineering, offering an elegant solution to the problem of effective power transmission and any other revolutionary projects. Modern gear drives designs cost provides quick reliable services and high power intensities, which can be achieved only by raising the gears. So we made a brave step in manufacturing such a 90 degree conveyor system for material handling at a very low-cost that is early affordable and economical. Bulk material transportation requirements have continued to press the belt conveyor industry to carry higher tonnages some distances and more diverse routes. In ordered keep up, significant technology advances have been required in the field of system design, analysis and numerical simulation. The application of traditional components in non-traditional applications requiring horizontal curves and intermediate drives have changed and expanded belt conveyor possibilities. Example of complex conveying applications along with numerical tools require insuring reliability and availability will be reviewed. Throughout the world bulk materials handling operations perform a key function in a great number and variety of industries. While the nature of the handling tasks and scale of operations vary from one floor to another and, on the international scene, from one country to another according to the industrial and economic base, the relative costs of storing and transporting bulk materials are, in the majority of cases, quite significant. It is important, therefore, that handling systems be designed and operated with a view to achieving maximum efficiency and reliability. The system design tools and methods used to put components together into unique conveyance system designed to solve ever expanding bulk material handling needs. In industry for material handling many fixed conveyor belt is required. So the installation and maintenance charge of fixed conveyor belt is increased for solution of this problem, new creation is 90 degree conveyor system for material handling. This conveyor belt is use in place of fixed conveyor it uses in any place like industry, warehouses, food industry any ware easily. And the installation and maintenance charge is decreased place of number of fixed belt conveyor.

II. Literature Survey

A. w. Roberts and a. Harrison [1] has explained a review of design trends associated with long overland conveyors is presented indicating the influence of economic and technical considerations in the design methodology. Aspects of conveyor dynamics are discussed and research and development work concerned with specific subjects including belt drum friction, rolling resistance and bulk solid and conveyor belt interaction. A test rig for examining stability between bulk solids and conveyor belts during transportation is described.

Sunderesh S. Heragu and Banu Ekren [2] has explained Material handling systems consist of discrete or continuous resources to move entities from one location to another. They are more common in manufacturing systems compared to service systems. Material movement occurs everywhere in a factory or warehouse—before, during, and after processing. Apple (1977) notes that material handling can account for up to 80 percent of production activity. Although material movement does not add value in the manufacturing process, half of the company's operation costs are material handling costs (Meyers 1993).

Aniket A Jag taps teal [3] in the process or manufacturing industry, raw materials need to be transported from one manufacturing stage to another. Material handling equipment are designed such that they facilitate easy, cheap, fast and safe loading and unloading with least human interference. For instance, belt conveyor system can be employed for easy handling of materials beyond human capacity in terms of weight and height. This paper discusses the design calculations and considerations of belt conveyor system for biomass wood using 3 rolls idlers, in terms of size, length, capacity and speed, roller diameter, power and tension, idler spacing, type of drive unit, diameter, location and arrangement of pulley, angle and axis of rotation, control mode, intended application, product to be handled as well as its maximum loading capacity in order ensure fast, continuous and efficient movement of crushed biomass wood while avoiding fatalities during loading and unloading. The successful completion of this research work has generated design data for industrial uses in the development of an automated belt conveyor system which is fast, safe and efficient.

Michael G. Kay [4] has explained Material handling (MH) involves “short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and a transportation agency.”¹ It can be used to create “time and place utility” through the handling, storage, and control of material, as distinct from manufacturing (i.e., fabrication and assembly operations), which creates “form utility” by changing the shape, form, and makeup of material. It is often said that MH only adds to the cost of a product, it does not add to the value of a product. Although MH does not provide a product with form utility, the time and place utility provided by MH can add real value to a product, i.e., the value of a product can increase after MH has taken place

N. Sivakumar et al [5] has been a serious demand for intermittent movement of packages in the industries right from the start. Though the continuous movement is more or less important in the same field the sporadic motion has become essential. The objective of our project is to produce a mechanism that delivers this stop and move motion using mechanical linkages. The advantage of our system over the conveyor system is that the system has a time delay between moving packages and this delay can be used to introduce any alterations in the package or move the package for any other purpose and likewise. While in conveyor system such actions cannot be performed unless programmed module is used to produce intermittent stopping of the belt which basically is costly. The prototype design requires electric motor, shafts and the frame of which the frame and platform on which the packages are moved is fabricated. All the links are being made of Aluminum which reduces the weight of the whole system including the head which has a direct contact with the boxes being moved. The system is expected to move as heavy packages as 2 to 3kgs approximately.

D.K. Nan aware et al [6] have explained a conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging industries. Many kinds of conveying systems are available, and are used according to the various needs of different industries. There are chain conveyors (floor and overhead) as well. Chain conveyors consist of enclosed tracks, I-Beam, towline, power & free, and hand pushed trolleys. Conveyor systems are used widespread across a range of industries due to the numerous benefits they provide. Conveyors are able to safely transport materials from one level to another, which when done by human labor would be strenuous and expensive.

III. Problem Statement

Throughout the world bulk materials handling operations perform a key function in a great number and variety of industries. While the nature of the handling tasks and scale of operations vary from one floor to another and according to the industrial and economic base, the relative costs of transporting bulk materials are, in the majority of cases, quite significant. It is important, therefore, that handling systems be designed and operated with a view to achieving maximum efficiency and reliability with flexible material handling. The aim of this project is to redesign existing conveyor system by designing the critical parts (pulley, belt, gear and Frame), to minimize the overall weight of the assembly and to save considerable amount of material.

IV. Objectives

- Now in industries only fixed type belt conveyor is available. But we will make the conveyor belt such that it can be rotate 90° and belt will be easy to turn at sharp corners with material.
- The handling systems be designed and operated with a view to achieving maximum efficiency and reliability.

V. Working Principle

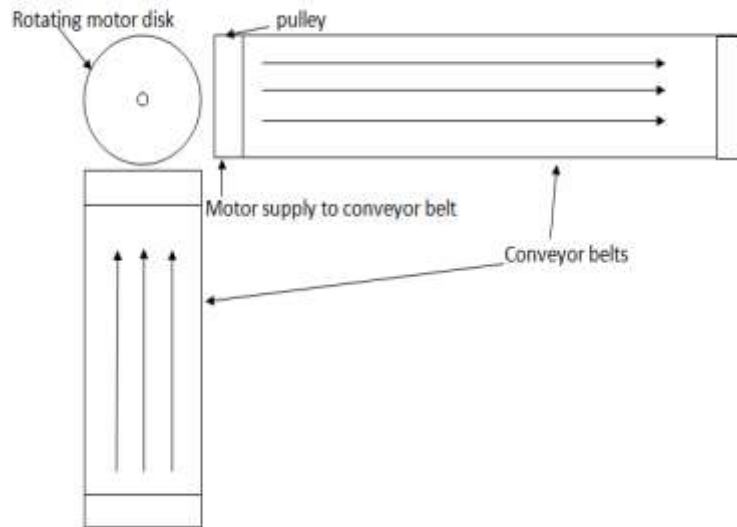


Fig.1 Block diagram

As the conveyor convey the material from start to end. In our project two conveyor belts are used. Perpendicular to each other & a rotating conveyor is installed in between them as shown in Fig. 1. First material flows through the one conveyor and then after it pass on the rotating conveyor then that conveyor rotates in 90 degree and pass on another conveyor.

VI. Component of the System

- Conveyor belt
- Pulley
- DC motors
- Shaft
- Bevel gears
- Rotating plate

A. Conveyor belt

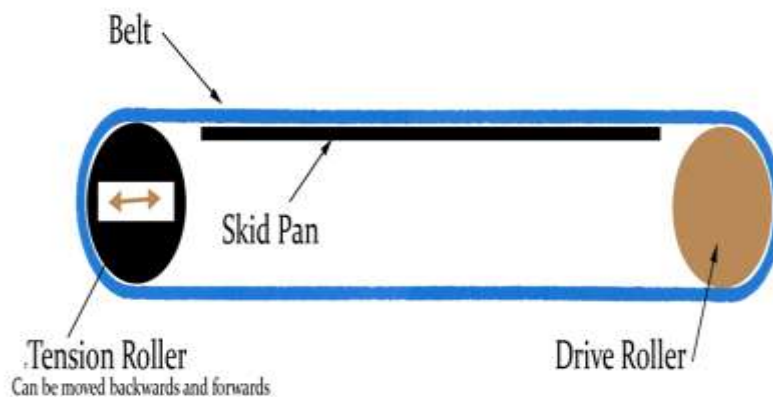


Fig. 2 conveyor belt

B. Pulley



Fig. 3 Pulley

C. DC motors

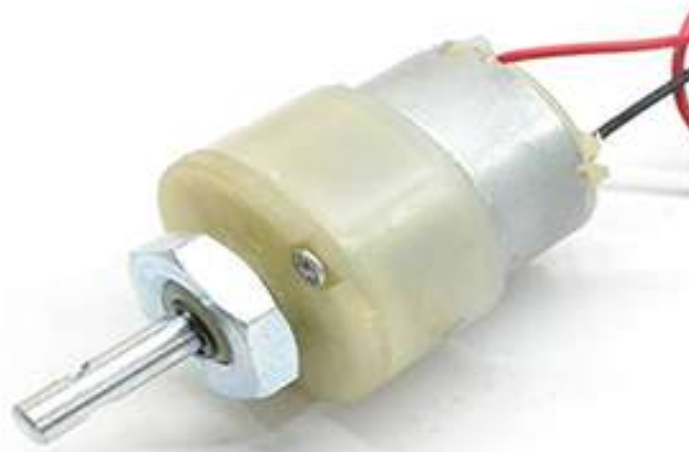


Fig. 3 DC motor

D. Shaft



Fig. 4 bevel gear

VII. Cad Model

F. Rotating conveyor.

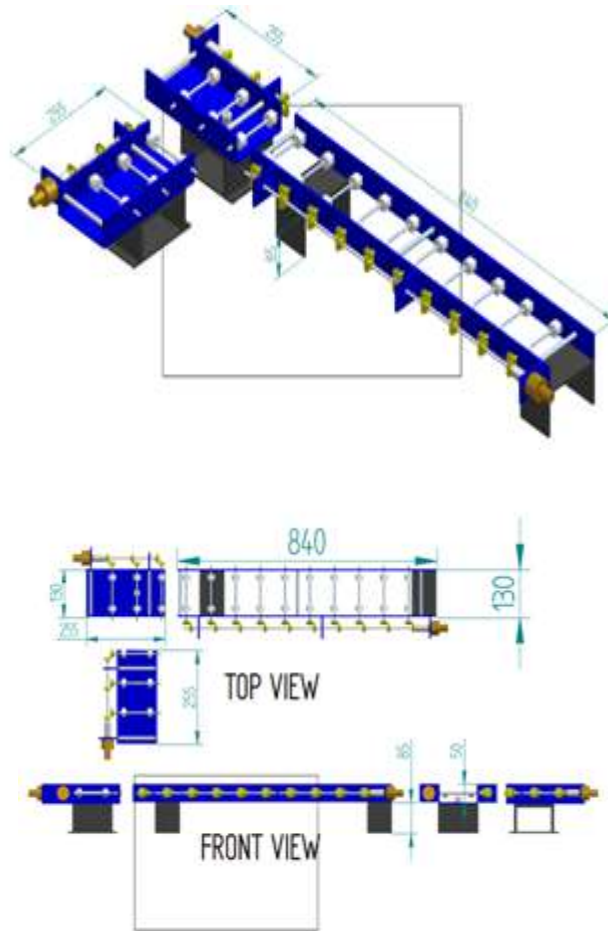


Fig. 6 Different view

VIII. Advantages

The 90 degree conveyor system for material handling has all abundant and outstanding advantage of this equipment in any material handling industry with minimum knowledge about the operation of equipment is very limited time.

- Low manufacturing cost of the equipment.
- Easy to handle.
- Less weight.
- Compact in size.
- Cost of checking the error is less.
- All kinds of material can the handled.
- Even a lay man can work in it.

IX. Limitation

- Accumulation ifficult.
- Continuous or periodic monitoring of belt is necessary.
- Heat affects the material of belt.

X. Applications

- Can be applied in gear manufacturing unit.
- Used in automobile industry
- Used in airport.
- Also used in stone crushing industry.
- Used in both small scale industries as well as the large scale industries

- Outcome can be utilized properly to a great extent in mechanical field as well as the automobile field.
- Also used in Warehouses
- In coal industry
- Food and packaging industry.

XI. Conclusion

We design & fabricate the 90 degree conveyor belt system. The transport of the material in 90 degree is made easier & atomized in small scale industries. We fabricate the conveyor for the capacity of 1 kg. This conveyor belt is used in place of fixed conveyor it uses in any place like industry, warehouses, food industry any ware easily. And the installation and maintenance charge is decreased in place of number of fixed belt conveyor. So in all matter it is the better than fixed conveyor belt.

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