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Seperation of Material by Using Conveyor Belt System

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ABSTRACT— In the process or manufacturing industry, raw materials and products 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 limestone 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 limestone while avoiding halt or 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.

Keyword: Belt Conveyor system, Idler, Loading, Material handling equipment, Unloading.

I. INTRODUCTION

During the project design stage for the transport of raw materials or finished products, the choice of the method must favor the most cost-effective solution for the volume of material moved the plant and its maintenance; its flexibility for adaptation and its ability to carry a variety of loads and even be overloaded at times. The belt conveyor, increasingly used in the last 10 years, is a method of conveying that satisfies the above selection criteria. Compared with other systems it is in fact the most economic, especially when one considers its adaptability to the most diverse and the most difficult conditions.

Conveyor systems are one of the commonly used devices for the transportation of parts from one workplace to another and for horizontal transport in manufacturing systems. In today's world it is difficult to get manpower, besides transportation by means of truck or railways is also not economical in some applications. In such places wireless control of the conveyor controller plays an important role that is to reduce the manual work and save funds for the enterprise. Conveyors join processes together, deliver and take away goods automatically and on cue. They can store goods until the next person or machine wants them, sort out goods or merge them intelligently and can facilitate a number of functions that add value to products, such as packing and weighing

II. LITERATURE SURVEY

Conveyors are durable and reliable components used in automated distribution and warehousing, as well as manufacturing and production facilities. In combination with computer-controlled pallet handling equipment this allows for more efficient retail, wholesale, and manufacturing distribution. 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 storages pace and with less labor expense .Rubber conveyor belts are commonly used to convey items with irregular bottom surfaces, small items that would fall in between rollers (e.g. a sushi conveyor bar), or bags of product that would sag between rollers. Belt conveyors are generally fairly similar in construction consisting of a metal frame with

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rollers at either end of a flat metal bed. The belt is looped around each of the rollers and when one of the roller sis powered (by an electrical motor) the belting slides across the solid metal frame bed, moving the product. In heavy use applications the beds which the belting is pulled over are replaced with rollers. The rollers allow weight to be conveyed as they reduce the amount of friction generated from the heavier loading on the belting [3].Belt conveyors can now be manufactured with curved sections which use tapered rollers and curved belting to convey products around a corner. These conveyor systems are commonly used in postal sorting offices and airport baggage handling systems. A sandwich belt conveyor uses two conveyor belts, face-to-face, to firmly contain the item being carried, making steep incline and even vertical-lift runs achievable. Belt conveyors are the most commonly used powered conveyors because they are the most versatile and the least expensive.[citation needed] Product is conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. These conveyors should use only the highest quality premium belting products, which reduces belt stretch and results in less maintenance for tension adjustments. Belt conveyors can be used to transport product in a straight line or through changes in elevation or direction. In certain applications they can also be used for static accumulation or cartons[5].

III. METHODOLOGY

The DC motor was run at the 6Volt power supply and the belt in the conveyor started rotating. The program was set to regulate the speed of belt rotation and the speed was regulated to keep moving it slow at 70-80 rpm so that the product in the belt pass slowly and sensed in the color sensor accurately. The green products bin and the red product bin is placed respectively on the left side and right side of the divider separator. The flow chart of working procedure of the system is shown in following Flow chart of methodology process When the Green colored product is placed on the conveyor, the belt drags it with its rotating movement to the Color sensor. The green Color of the product is sensed by the sensor and according to the program, the divider with servo motor make an alignment way to pass the product to the desired green products bin. Normally the servo divider separator is kept 90 degrees at neutral position whereas that servo motor can rotate 180 degrees. So there remains a chance of rotating the divider 90 degrees on both left and right side. When the product is detected green on the color sensor, the divider automatically rotates 60 degrees right from the neutral position. At the time when the green product leaves the color sensor and come close in the range of divider, the divider automatically rotates 35 degrees to the left which drive the green product to the Green product bin with a little slide force. On the verge of red product passing, the divider makes alignment way to pass the product to the desired red product bin. When the product is detected red on the color sensor, the divider automatically rotates 60 degrees left from the neutral position. At the time when the red product leaves the color sensor and come close in the range of divider, the divider automatically rotates 35 degrees to the right which drive the red product to the red product bin with a little slide force. Every time after the divider separator rotates 35 degrees to drive the product with slide force to the pre-determined bin, it returns to its neutral position so that it prepares for the next product to separate. In this system of product separating, there is an advantage of safely and efficiently passing of soft and fragile product and separating them without any rejectable trace or spot. Here, the mechanism of the separating system to drive the product with small slide force is very much efficient to separate product safely rather than a thrust force mechanism system. In thrust force mechanism system, products are separated with thrust force to the destined places and this force of this system may cause harm of creating reject able trace or spot on the soft and fragile products like cakes, sweets, butter foods etc. But in this system of slide force mechanism, the failure of soft and fragile product separating is drastically reduced and safely separation is ensured.

IV. OUTPUT

A conveyor system is a fast and efficient mechanical handling apparatus for automatically transporting loads and materials within an area. This system minimizes human error, lowers workplace risks and reduces labor costs — among other benefits. They are useful in helping to move bulky or heavy items from one point to another. A conveyor system may use a belt, wheels, rollers, or a chain to transport objects.

Typically, conveyor systems consist of a belt stretched across two or more pulleys. The belt forms a closed loop around the pulleys so it can continually rotate. One pulley, known as the drive pulley, drives or tows the belt, moving items from one location to another.The most common conveyor system designs use a rotor to power the drive pulley and belt. The belt remains attached to the rotor through the friction between the two surfaces. For the belt to move effectively, both the

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drive pulley and idler must run in the same direction, either clockwise or counterclockwise.While conventional conveyor systems such as moving walkways and grocery store conveyors are straight, sometimes, the unit needs to turn to deliver the items to the proper location. For the turns, there are unique cone-shaped wheels or rotors which allow the belt to follow a bend or twist without getting tangled.

Fig. conveyor belt system

V. CONCLUSION AND FUTURE SCOPE

The problems were found in different conveyer system was improper alignment of idlers, belt running off at tail pulley, excessive wear on bottom of belt and corrosion in the frame. We implement the strategy of preventive maintenance as the first step of our project, by this maintenance future maintenance cost is saved. Regular maintenance and proper lubrication can keep maintain alignment of idlers. Adjust loading material to properly center the load helps in reducing belt running off at tail pulley. Greasing and painting can reduce corrosion in frames and drum. Use of dual scrap system, brush system and rubber scrapper helps in effective running of the conveyor belt. By following these methods the tendency to breakdown maintenance reduces and gradually the yearly maintenance cost suppresses thereby profiting the companies

This type of conveyor belt can be used to carry food products because it is easy to clean. Spacing between plastic segments are adjustable for applications where fluid should be either drained or retained as it is carried on the conveyor. The segments' plastic composition also makes this conveyor belt useful for metal detection.

Curved belt conveyors are often used in bag handling systems to change items' conveying direction.

These systems can cross over with cleated belt conveyors to transport products to different elevations while keeping them from falling off the line. Aside from transferring objects between floors, these conveyor belts are also suitable for boosting gravity flow systems.

Belt conveyors are used in transporting containers for Lilling, capping, sealing, labeling, pasting, visual inspection, etc., in the production of injectables, liquid orals, ointments, and jellies.

In the strip and blister packings of tablets and capsules. strips are conveyed on a moving belt. During this process, the strips are packed in the cartons.

Belt conveyors are used in the manufacture of lozenges. It is a continuous process of candy base cookies. When a mass of sugar base is on the conveyor the water is removed. At the end of the belt, the candy base is mixed, tempered, formed, roped, melted, acidulants, and flavors are added. cooled and sized.

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