

DESIGN AND FABRICATION OF SUGARCANE LIFTER

Lt. Dr. M. Kalil Rahiman¹, K. Moorthi², R. Prakash³, M. Sanjaikumar⁴

¹Assistant Professor(Si.G), Dept of Mechanical Engineering, Bannari Amman Institute of Technology, Tamilnadu, India

^{2,3,4}Student, Dept of Mechanical Engineering, Bannari Amman Institute of Technology, Tamilnadu, India

Abstract: The Indian sugar industry positions eleventh in size out of 200 sugar-creating nations; and constant progression is fundamental to guarantee that this industry stays aggressive. This project is about innovative idea used in sugarcane lifting process. Normally the sugarcanes are loaded in the trucks manually and by heavy machines, in order to simplify that we have designed a pulley and belt drive arrangement with arms for lifting the sugarcane to top of the trucks. Another important factor is this lifter is designed to accommodate different heights of trucks.

Keywords: sugarcane, pulley and rope, adjustable heights, reduced effort.

Problem Statement

The sugar factories work in the season of October to march, during season lot of sugarcane is collected and stored in an open place. Loading of whole sugarcane to the trolley has become a very difficult task due to dust coming out of it and it creating a lot of health hazards to human beings. As it is injurious to health and too much time consuming, labours are unable to work in that environment, sometimes they avoid to do work. Hence a mechanical system must be developed for the loading of sugarcane.

Introduction

Overview

Sugar from sugarcane is an item which impacts on numerous economies including India. The sugar business in India faces numerous difficulties, which should be tended to so as to stay aggressive. Benefit in the global sugar industry has been stressed by expanding farming information costs, with one of the principle factors being transport costs. This part represents around 20 – 25 % of the complete expense of sugarcane generation in India, which likens to Rs. 750 million for each annum. Sugarcane in Indian is for the most part developed in the provincial locales of Maharashtra and Uttar Pradesh which had a yearly creation increment from 500 000 tons in 1950 to 21 million tons in 2000. This demonstrates sugarcane generation has quickly expanded. The vehicles vary concerning their administration, plan and abilities. The Indian sugar industry is expansive and positions eleventh among the 200 sugar creating nations on the planet which are overseen by 6 organizations. The sugarcane exchange framework contains sugarcane being Moved and stacked, trans-stacked and off-stacked, which adds up to more than 25 % of the all-out creation cost of sugarcane, henceforth little upgrades can have critical financial advantages. One such way of simplifying the loading process is done through the height adjustable sugarcane lifter. This eliminates the large manpower and time required for loading the sugarcane in trucks. This project works under the principle of conveyor mechanism. This conveyor is powered by a prime mover which in turn moves the belt with fixed arm upon which the sugarcane is loaded.

Components Description

1.2.1 MS Pipe

1.2.2 Pulley

1.2.3 Belt Conveyor

1.2.4 Bearing

1.2.5 DC Motor

1.2.6 Battery

1.2.1 MS Pipe

The Different Diameters Pipe is used in this project. The MS Hollow Pipes are used. In this project the pipes are used to column. In two sides the pipe is fixed in vertical direction. The various diameters pipe is used to adjust the height of the lift. The small diameter pipe is to inside another diameter pipe.

1.2.2 Pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave. A pulley may have a groove or grooves between flanges around its circumference to locate the cable or belt. The drive element of a pulley system can be a rope, cable, belt, or chain.

1.2.3 Belt Conveyer

V belts (also style V-belts, v belts, or, less commonly, wedge rope) solved the slippage and alignment problem. It is now the basic belt for power transmission. They provide the best combination of traction, speed of movement, load of the bearings, and long service life. They are generally endless, and their general cross-section shape is trapezoidal (hence the name "V"). The "V" shape of the belt tracks in a mating groove in the pulley (or sheave), with the result that the belt cannot slip off. The belt also tends to wedge into the groove as the load increases—the greater the load, the greater the wedging action—improving torque transmission and making the V-belt an effective solution, needing less width and tension than flat belts. V-belts trump flat belts with their small centre distances and high reduction ratios. The preferred centre distance is larger than the largest pulley diameter, but less than three times the sum of both pulleys. Optimal speed range is 1,000– 7,000 ft/min (300–2,130 m/min). V-belts need larger pulleys for their thicker cross-section than flat belts.

For high-power requirements, two or more V-belts can be joined side-by-side in an arrangement called a multi-V, running on matching multi-groove sheaves. This is known as a multiple-V-belt drive (or sometimes a "classical V-belt drive"). V-belts may be homogeneously rubber or polymer throughout, or there may be fibres embedded in the rubber or polymer for strength and reinforcement. The fibres may be of textile materials such as cotton, polyamide (such as Nylon) or polyester or, for greatest strength, of steel or aramid (such as Twaron or Kevlar). When an endless belt does not fit the need, jointed and link V-belts may be employed. Most models offer the same power and speed ratings as equivalently-sized endless belts and do not require special pulleys to operate. A link v-belt is a number of polyurethane/polyester composite links held together, either by themselves, such as Fener Drives' Power Twist, or by metal studs, such as Gates' Nu-T-Link. These provide easy installation and superior environmental resistance compared to rubber belts and are length adjustable by disassembling and removing links when needed.



Belt Conveyer

That bear on the moving parts. Most course encourage the ideal movement by limiting rubbing. Course are grouped extensively as per the kind of activity, the movements permitted, or to the bearings of the heaps (powers) connected to the parts. Revolving course hold pivoting parts, for example, shafts or axles inside mechanical frameworks, and exchange hub and outspread burdens from the wellspring of the heap to the structure supporting it. The least complex type of bearing, the plain bearing, comprises of a pole turning in a gap. Grease is regularly used to lessen grating. In the metal roller and roller bearing, to forestall sliding grating, moving components, for example, rollers or balls with a roundabout cross-area are situated between the races or diaries of the bearing get together. A wide assortment of bearing structures exists to enable the requests of the application to be accurately met for most extreme proficiency, dependability, toughness and execution. The expression "bearing" is gotten from the action word "to hold up under" a heading being a machine component that enables one section to shoulder (i.e., to help) another. The most straightforward course are bearing

surfaces, cut or framed into a section, with changing degrees of command over the structure, size, unpleasantness and area of the surface. Different orientation are isolated gadgets introduced into a machine or machine part. The most complex direction for the most requesting applications are exact gadgets; their assembling requires the absolute most noteworthy guidelines of current innovation.

1.2.4 DC Motor

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion. Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

1.2.4 Bearing

1.2.3 Belt Conveyer

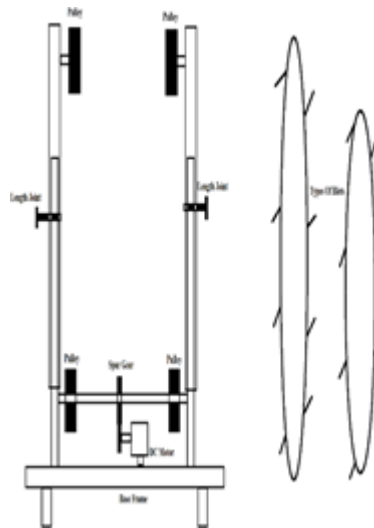
A course is a machine component that obliges relative movement to just the ideal movement, and lessens contact between moving parts. The plan of the bearing may, for instance, accommodate free direct development of the moving part or with the expectation of complimentary revolution around a fixed pivot; or, it might keep a movement by controlling the vectors of ordinary powers

Every DC motor has six basic parts -- axle, rotor (armature), stator, commutator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator. The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets. The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating. So since most small DC motors are of a three-pole design, One pole is fully energized at a time (but two others are "partially" energized). As each brush transitions from one commutator contact to the next, one coil's field will rapidly collapse, as the next coil's field will rapidly charge up (this occurs within a few microsecond). There's presumably no better method to perceive how a normal DC engine is assembled, than by simply opening one up. Sadly, this is repetitive work, just as requiring the demolition of a flawlessly decent engine. The utilization of an iron center armature (as in the Mabuchi, above) is very normal, and has various preferences. For one thing, the iron center gives a solid, inflexible help for the windings - an especially critical thought for high-torque engines. The center likewise directs heat far from the rotor windings, enabling the engine to be driven more enthusiastically than might some way or another be the situation. Iron center development is likewise moderately modest contrasted and other development types.

1.2.6 Battery

An electric battery is a gadget comprising of at least one electrochemical cells with outside associations gave to control electrical gadgets, for example, spotlights, cell phones, and electric vehicles. At the point when a battery is providing electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal checked negative is the wellspring of electrons that will move through an outer electric circuit to the positive terminal. At the point when a battery is associated with an outer electric burden, a redox response changes over high- vitality reactants to bring down vitality items, and the free- vitality distinction is conveyed to the outside circuit as electrical vitality. Generally the expression "battery" explicitly alluded to a gadget made out of numerous cells, anyway the use has advanced to incorporate gadgets made out of a solitary cell.

2.2 Design 2D



2.4 Working

Here we are fabricating the sugarcane lifting machine. Here the different diameter pipes are used to accommodate various height of trucks.

Here the collecting plate and chain drives are rotating continuously by the motor. The collecting plate is coupled between the two chain drives for collect the sugarcane materials from the bottom place. Here only a single person is enough to load the sugarcane in the equipment. Then the collected sugarcane is lifted to the top of the truck another person on the truck collect the sugarcane. Our project is having wheels for movable application. In addition to that this project can be adjusted to various height depends on the truck size. It is an advantage that it could handle trucks of different loading height.

Conclusion

Thinking about all the structure parameters, constant computations, wellbeing standards, cost productivity, material life time and work accessibility, it tends to be presumed that the Mechanism that is proposed is the most fitting for conduction and transportation of sugarcane. The sugar plant is limited by an impediment of using an excavator for 10 hrs. Every day; from now on the utilization of this component which can be created at an onetime venture can serve the plant when required, dispensing with the costs. The system is adaptable as far as movement because of the nearness of a driving instrument which makes it to gather the sugarcane covering the entire plant region over which it is spread. By changing the extent of the beds, the measure of sugarcane that can be gathered can likewise be expanded correspondingly. The complete number of connections present in the system is extensively less making the upkeep cost of the instrument lesser. By this, above recommended continuous application will be ideal to suit the organization prerequisites and keeps human works from risky condition.

Reference

1. Manohar R. P. J. (1997). Industrial utilization of sugar and its co-products. New Delhi, India: ISPC Publishers and distributors.
2. Anonymous. 2010. Crop growing manual of sugarcane. Netafim ACS, Israel. [http:// www.sugarcane.crops.com](http://www.sugarcane.crops.com).
3. Burrows, G. Shlomowitz, R. (1992). The lag in the mechanization of the sugarcane harvest: Some comparative perspectives. *Agric. History*, 66(3), 61-75.

Biographies



Lt. Dr. Kalil rahiman presently working as professor, Mechanical Engineering Department, Bannari Amman Institute of Technology.



MOORTHY K received diploma in mechanical engineering from RAMCO Polytechnic College and currently pursuing BE Mechanical Engineering at Bannari Amman Institute of Technology.



PRAKASH R received diploma in mechanical engineering from Government Polytechnic College at 2016 and currently pursuing BE Mechanical Engineering at Bannari Amman Institute of Technology.



Sanjaikumar M received diploma in mechanical engineering from MIT Polytechnic College at 2015 and currently pursuing BE Mechanical Engineering at Bannari Amman Institute of Technology.