

Fabrication of Semi_Automated Box Transport Mechanism

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ABSTRACT

The main concept behind our project is replacement of treadmill mechanism for small scale industries which is fully functional, easy to use, highly accessible and easily maintainable. The answer for this is Box Transport Mechanism as it is a construction of links and joints it is easy to construct and to maintain. compared to treadmill it is cheap and efficient. The results from this project can be used by many small-scale industries and in-house industries where conveyor system is not accessible.

This invention relates to improvements in transfer and conveying devices, and it relates particularly to devices for transferring set-up cardboard boxes from a box folding or forming machine to the operator of a semi-automatic box wrapping machine. Many manufacturers who wrap or cover cardboard boxes for packaging candies, cakes, and other confections, cosmetics and other articles require this setup. These set-up boxes are transferred by means of a conveyor to an operator, who picks up the boxes and places and centers them on wrappers with which the boxes are to be covered.

The boxes and wrappers are then conveyed to a box wrapping machine where the wrapper is folded around and glued to the box. Usually, the operation of the wrapping machine is controlled by means of a switch actuated by the box forming machine so that their operating speeds are related to each other

Keywords: Box Transport Mechanism, Linkages, Linear Motion, DC Motors, Conveyor System, Single Slider Crank Mechanism, Fourbar Mechanism , battery , DC motor controller.

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I. INTRODUCTION

The box transport mechanism has a simple mechanism, as it operated with a crank and links arrangement. As by the electric motor rotary motion is converted into the to and fro motion of the linkages, the linear motion

is obtained by conversion of rotary motion by the use of cranks and mechanical linkages. If we take the fact that same work can be done by thread mill of other mechanisms which are used in large scale industries and factories but small scale industries will not be able to afford them so this box transport mechanism comes

in handy. In the case of thread mill mechanism as it always in continues in motion so when a human involvement is introduced to it sometimes causes time delays which causes an effect on production process this problem can be solved by using box transport mechanism. So, a basic module of moving packages is designed using CAD/CAM with a time delay which can be used to do alterations if required in the package or move the package or production line. This invention

II. LITERATURE REVIEW

According to Xiangwei Liu, et al, maintenance of conveyor is very important and for that it is important to introduce the framework of decision making based on operational conditions [1].

Rubber textile and steel cord conveyor belts are types of conveyors are used in industries. For analysis of conveyor belt type, impact height, and impactor type are considered. For pyramidic impactor height should be less than 1.4m, for spherical impactor, impact height is above 2.2m[2].

Jaroslav Homišin, et al, present effective value of vibration (RMS) and CREST factor for analysis of vibrations in conveyors. Because of the continuous use of conveyors, it is important to consider vibrations while designing the conveyors to avoid failure due to vibrations [3].

According to Abhijit Gaikwad, conveyors are important for fast production and to reduce the human effort for material handling. Variable Frequency Drives (VFD) is useful for controlling of the system of a conveyor. VFD can be used to control the reducing and controlling of motor operating speed [4].

S.H. Masood gave the importance of conveyors in food industries and presents a current technique used in industries to reduce the time of production. Conveyors in food industries are highly automated and non-toxic. [5].

Marcin Barburski has studied nine different materials for their mechanical characteristics at different stages. Also examine their sustainability by treating them

with different processes like impregnation and Vulcanization. Fabric rubber conveyors are designed to carry material having a temperature from -250C to +600C. Generally, a material having non-linear mechanical behavior are used for the production conveyors [6].

Gabriel Fedorko examines how the inner belt of conveyor behaves by providing constant velocity tensile load. Also provide the data of relaxation phenomenon after load. And all these readings are help full. In prediction of failure in the inner structure of the conveyor belt. [7].

By using FEA analysis A. Samanta has studied the vibration and tension induce in the conveyor belt. For this they treat the conveyor belt like the folded plate and found that many vibrations got reduced due to V-shape of the belt. Also, they established the relation between vibration and tension with the inclination angle. When the crank angle increases the frequency parameter for the folded plate decreased [8].

H. Chen et al analyze the dynamic contact characteristics between the conveyor belt and idling roller. The study of rolling resistance was taken at different temperature and its was recorded. Also, Characteristics of dynamic contact has been studied between roller and conveyor belt. Rubber matrix is tested for the sinusoidal compression displacement test for six different the temperature between -200C and 400C. They conclude that the resistance initially with an increase in temperature and then starts to increase with increasing temperature. [9].

III. MECHANISM USED

LINKAGE MECHANISM:- A linkage is a mechanism formed by connecting two or more levers together. Linkages can be designed to change the direction of a force or make two or more objects move at the same .time. Many different fasteners are used to connect linkages together yet allow them to move freely such as pins, end-threaded bolts with nuts, and loosely fitted rivets. There are two general classes of

linkages: simple planar linkages and more complex specialized linkages; both are capable of performing tasks such as describing straight lines or curves and executing motions at differing speeds. The names of the linkage mechanisms given here are widely but not universally accepted in all textbooks and references.

Linkages can be classified according to their primary functions:
 Function generation: the relative motion between the links connected to the frame
 Path generation: the path of a tracer point
 Motion generation: the motion of the coupler link

1. PUSH-PULL LINKAGE:- Push-pull linkage, can make the objects or force move in the same direction; the output link moves in the same direction as the input link. Technically classed as a four-bar linkage, it can be rotated through 360° without changing its function.

Functions of four basic planar linkage mechanisms

2. PARALLEL-MOTION LINKAGE:- Parallel-motion linkage, can make objects or forces move in the same direction, but at a set distance apart. The moving and fixed pivots on the opposing links in the parallelogram must be equidistant for this linkage to work correctly. Technically classed as a four-bar linkage, this linkage can also be rotated through 360° without changing its function. Pantographs that obtain power for electric trains from overhead cables are based on parallel-motion linkage. Drawing pantographs that permit original drawings to be manually copied without tracing or photocopying are also adaptations of this linkage; in its simplest form it can also keep tool trays in a horizontal position when the toolbox covers are opened.

3.WORKING PRINCIPLE

This Box Transport Mechanism Project task utilizes system for moving stuffed merchandise one by one among which some action can be conveyed like examination, shutting, naming and so forth among the travel and will move the products one by one by the bar linkages.

The principle of box moving is to change circulatory motion or cycling motion of the DC motor into translator motion with the help of levers and linkages through metal connecting rods.

Application:

- Can use this mechanism in medical production fields.
- It also can be used in bottle filling process.
- Can use this mechanism in cool drinks production.

4.WIPER MOTOR

A wiper generally consists of a metal arm, pivoting at one end and with a long rubber blade attached to the other. The arm is powered by a motor, often an electric motor, although pneumatic power is also used in some vehicles. The blade is swung back and forth over the glass, pushing water or other precipitation from its surface. The speed is normally adjustable, with several continuous speeds and often one or more "intermittent" settings. Most automobiles use two synchronized radial type arms, while many commercial vehicles use one or more pantograph arms.



4.1 BATTERY

It supplies electric current to operate lighting system and accessories system. It is often call the part of the electrical system. The battery stores energy in a chemical form. The chemical reaction takes place inside the battery when any electric consuming devices like lights, horns, et., is connected to the battery, which produces a flow of current.



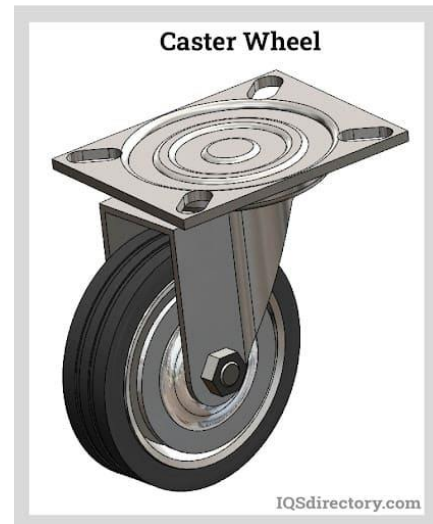
4.2 NUTS AND BOLTS

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten two or more parts together. The two partners are kept together by a combination of their threads' friction (with slight elastic deformation), a slight stretching of the bolt, and compression of the parts to be held together.

In applications where vibration or rotation may work a nut loose, various locking mechanisms may be employed: lock washers, jam nuts, specialist adhesive thread-locking fluid such as Loctite, safety pins (split pins) or lock wire in conjunction with castellated nuts, nylon inserts (Nylon), or slightly oval-shaped threads. The distinction between a bolt and a screw is unclear and commonly misunderstood. There are several practical differences, but most have some degree of overlap between bolts and screws

5. WHEELS

caster is a non-powered wheel that is designed to be fitted to the bottom of a bigger object and used to move it. Caster wheels are used in shopping carts, office chairs, medical beds, and material handling equipment.



Caster wheel variations vary greatly based on the application requirements and are widely employed in a wide range of applications. It is a wonderful mobility enabler, with properties such as strength, corrosion resistance, water resistance, and weather resistance. The applications of caster wheels necessitate precise sizing based on the terrain on which they will be used and the weight they are expected to carry. Heavy items need casters with thicker wheels, some larger objects might need multiple wheels to evenly distribute weight.

IV. FINAL PRODUCT



V. CONCLUSION

The box transport mechanism plays a major role in industries. The process of transporting products from

one place to another was to be maintained by conveyor only. So we just successfully altered this with a box transport mechanism using the kinematic links and motor. We had just implemented our basic mechanical knowledge and designing skills for design and fabricating this project successfully.

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