

Design and Simulation of Box Transport Mechanism

¹Dr. G DIWAKAR, ²G.P.S. NARENDRA, ³G S V Gopal Prakeerthi, ⁴D Mahesh Naidu, ⁵G REVANTH

¹Mechanical (Associate Professor), K L. University, Vijayawada, India

²Mechanical(B-Tech), K L. University, Vijayawada, India

³Mechanical(B-Tech), K L. University, Vijayawada, India

⁴Mechanical(B-Tech), K L. University, Vijayawada, India

⁵Mechanical(B-Tech), K L. University, Vijayawada, India

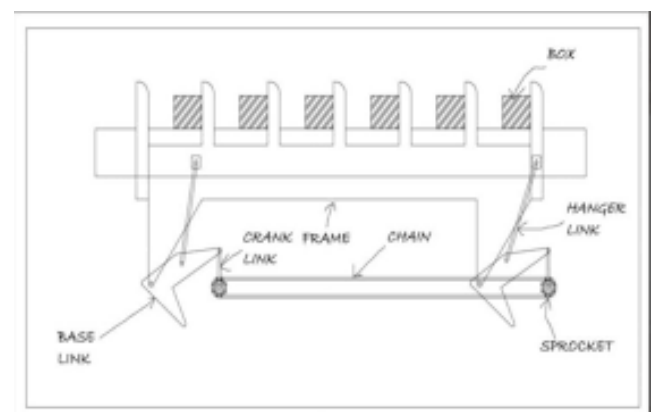
Abstract:- The main concept behind our project is replacement of treadmill mechanism for small scale industries which is fully functional, easy to use, highly accessible and easily maintainable. The answer for this is Box Transport Mechanism as it is a construction of links and joints it is easy to construct and to maintain. compared treadmill it is 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

There has been a serious demand for mechanisms for movement of packages in the industries right from the start. Though the continuous movement is important in the same field of assembly and packing etc. The objective of our paper is to produce a mechanism that delivers this result 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 Wood or metal 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 - 3kgs approximately and easy to construct and to maintain.

Keywords:- Box Transport Mechanism, Linkages, Linear Motion, DC Motors, Conveyer System, Single Slider Crank Mechanism, Fourbar Mechanism.

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 relates to improvements in transfer and conveyer belt devices, and it relates particularly to devices for transferring cardboard boxes and other items. It can be used by many small-scale industries and in-house industries where conveyor system is not accessible.



II. LITERATURE REVIEW

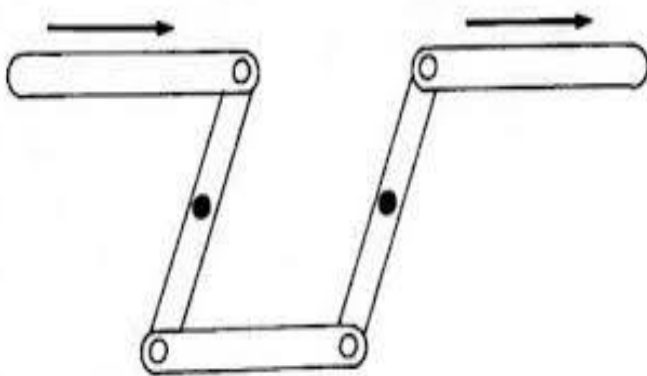
This paper's objective is for the effective utilization of CAD and motion analysis to construct a simple and easy to construct working model of an 8-bar link transfer mechanism.

III. LINKAGE MECHANISM

Linkage Mechanism is an assembly of joints and links connected to manage forces and movement to produce linear momentum. In a linkage mechanism starting momentum after the motor is achieved by structural connection of two or more levers together or a single triangular shaped plate. Linkages can be designed to change the direction of a force here circular motion is converted into linear motion. 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. The connections between links are providing ideal movement, pure rotation or sliding for example, and are called joints. A linkage modeled as a network of rigid links and ideal joints is called a kinematic chain.

IV. PUSH-PULL LINKAGE

The box moving mechanism has a simple mechanism and is operated with a crank and links arrangement. Here the electric motor rotary motion is converted into the To and Fro motion or linear motion of the link. the output link moves in the same direction as the input link. Technically classed as an eight-bar linkage, it can be rotated through 360° without changing its function. The rotary motion is converted into linear motion by the crank and mechanical linkages arrangement.



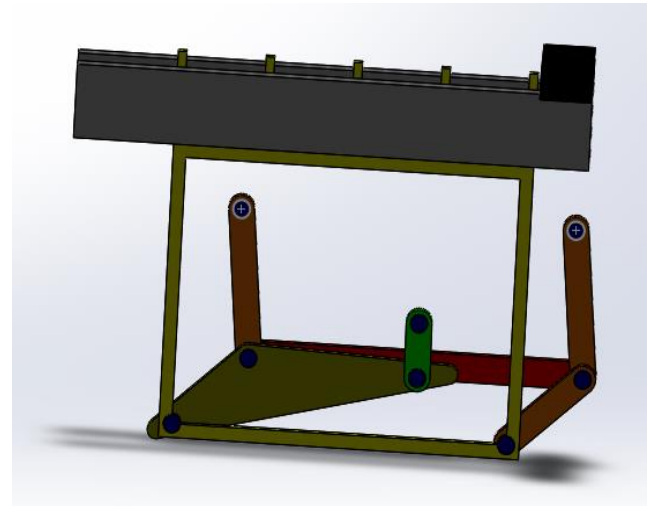
V. PARTS

- Metal connecting links
- Metal Frame
- Metal Crank
- DC motor
- Power source
- Bearings
- Bolts

VI. PROCEDURE

1. Make a rough sketch using calculations
2. Draw the model sketch in any CAD software like solid works
3. Find the optimal dimensions for making of the CAD model.

4. Now Prepare the parts like connecting link, crank shaft, frame, links separately in CAD
5. Import those parts into assembly and assemble those parts
6. After completion of assembly go to motion study and give appropriate motions to the parts and see how the motion is those parts
7. If we have got desired motion, then go to animation and see how our box transport mechanism is working



VII. APPLICATIONS

- It can be used to replace thread mill mechanism in industries.
- Transferring the boxes from one place to another in the sections of assembly lines and packing lines etc in the industry.
- Heavy tools and parts can easily be transport to one workstation to another workstation.
- Creating an unsophisticated and simple balance line in the assembly line.
- Wildly used in box folding or forming machine to the operator of a semi-automatic box wrapping machine
- Real life home applications Sewing machine etc.
- Agricultural applications seed sowing machines
- Heavy applications container liftings

VIII. FUTURE SCOPE

- It will ramp up the speed of production when used in small scale industries
- Dynamic analysis is one of the very important Phase in design the systems.
- Before building a prototype, a CAD based design and simulation of working model gives a better understand regarding the rigidity of system parameter.
- There is a much to the scope in development of an accurate mathematical model and simulation for the kinematics, dynamics, and motion analysis of the machine for the precise application.
- Further advancements and modifications can be done as per the requirements as well as scale of the use.

IX. CONCLUSION

The box shifting mechanism plays a major role in many small scale industries, the process of moving products from one place to another was to be maintained by conveyors only by using our project we have another a another kinetic mechanism which can be constructed and maintained easily and with less money.

REFERENCES

- [1]. Theory of Machines, S.S. Rattan, Tata McGraw Hill Publishers, 3rd Edition, 2013.
- [2]. Kinematics and dynamics of machinery, R.L Norton, Tata McGraw Hill Publishers, 1st Edition, 2009.
- [3]. <http://www.mekanizmalar.com/transport01.html>
- [4]. <http://projectseminars.org/report-box-transport-mechanism-project-report-in-pdf>
- [5]. [http://en.wikipedia.org/wiki/Crank_\(mechanism\)](http://en.wikipedia.org/wiki/Crank_(mechanism))