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Design and Fabrication of Box Transport System Using Geneva Mechanism

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Abstract— This project aims to construct a box transport mechanism that delivers stop and move motion with the help of Geneva mechanism. The advantage of the system over the traditional conveyor system is that the system features a time delay between moving packages and this delay are often wont to introduce any alterations within the package or move the package for any other purpose and likewise. whereas in conveyor system such actions can't be performed unless programmed module is employed to provide intermittent stopping of the belt that primarily is expensive. The epitome style needs motor, Geneva wheel, Mechanical linkages and a wood frame wherever the setup is mounted.

Keywords— Design and Fabrication, Mechanism model, Packaging, Geneva mechanism, Box transport system.

I. INTRODUCTION

The demand for sporadic motion in the field of automation has been from a long time. Stop and movement of consignment in the flow line causes the time delay which can be utilised for any alterations in packages like loading, unloading or to carry out any required operations. This project deals with Integration of Geneva conveyor system with loading or packing mechanism which will give one stop solution to transportation of manufactured product and packaging in production industry. This system can be designed as per the requirements, be it is a small-scale industry, medium scale or large-scale industry.

II. LITERATURE REVIEW

- **Mr. Ankur Prajapati *et al***, Reviewed in their paper about the basics of Geneva mechanism, application of Geneva mechanism and different design criteria for Geneva Wheel.
- **Mr. M.V. Ingalekar *et al*** discussed the ways of determination of angular velocity, acceleration of Geneva wheel, determination of the transport time of the object to cover the entire conveyor and preparation of model on CATIA. Also, they proposed use of this concept in production line where many workers are used for the material handling purpose it also reduces the cost and threshing time requirement of a greater number of workers will be completely eliminated as only two workers can carry out the complete operation.
- **Mr.Abhijit Gaikwad *et al*** presented latest development of an automated belt conveyor system which is efficient and safe. It is aimed to reduce human effort and at the same time increase the productivity & accuracy levels that cannot be achieved with manual operations.
- **Mr. Vijay M. Patil *et al*** presented case study on work done by different researchers for the development of conveyor system for industrial purpose and the expert system approach to conveyor selection.

III. OBJECTIVES& METHODOLOGY

A) OBJECTIVES

1. To Develop an Automated Box transport System which is safe, Efficient and gives Intermittent motion.
2. To Design and Develop Integrated Box Transporting and box loading/packaging System.
3. To design the geometric model of the Box transport system using Commercial Software package like Solid Edge or CATIA.
4. To fabricate the model to given dimension using Suitable Machining processes.
5. To lower the initial and operational cost in Automation process.

B) METHODOLOGY

This project has numerous totally different style ways to complete our product whereas meeting the objectives. this suggests we'll got to implement and compare our totally different style to insure the most effective product supported our set of objectives. These ways have modified as we have a tendency to progressed through our project, and {there we have a tendency tore there have been} some foretold ways that we expand upon within the style section. the essential style for Geneva operated roller belt conveyor is to possess motor on the fix stand, then motor shaft is inserted within the centre hole of drive wheel. Drive wheel is in mesh with driven wheel i.e. Geneva wheel, that is mounted on the roller shaft & belt is wound around all the rollers. after we provide electrical current to the dc motor by victimization adapter, then motor shaft starts rotating that additional transmits the spinning motion to rollers by victimization Geneva wheel. the primary call is choosing bill of materials for is style path. this can facilitate verify the final word product affordability. we

have a tendency to should decide whether or not to use A battery or adapter to run the motor. For low repairs we have a tendency to used adapter rather than battery. A lot of economical nevertheless high-priced style would be to possess battery rather than adapter that helps in carrying conveyor where we would like. There square measure sure to be numerous different obstacles and style technique to be enforced because the project progresses and can be determined and recorded as they occur.

IV. DESIGN AND FABRICATION

A) COMPUER AIDED MODELLING

CAD modeling is employed by several designers to make elaborate processed models of objects.. CAD stands for computer-aided design. In this project we use AUTODESK FUSION 360 {computer aided three-dimensional interactive application} software for preparation of 3D solid Model.

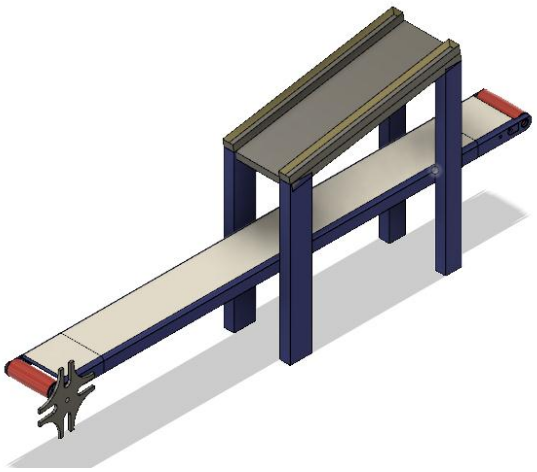
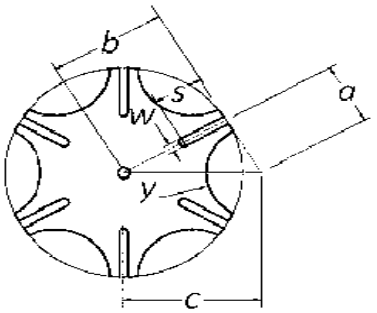


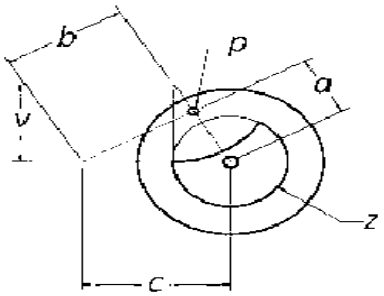
Fig. 1 Complete Assembled Model

B) DESIGN PARAMETERS OF GENEVA MECHANISM



Geneva Driven

Fig. 2: Geneva



Geneva Drive

Fig.3: Pin wheel

a= drive crank radius
s= slot Centre length
= $(a+b)-c$
n= driven slot quantity
w= slot width = $p+t$
p= drive pin diameter
y= stop arc radius = $a-p(1.5)$
y= allowed clearance
z= stop disc radius = $y-t$
c= Centre distance
$=a \sin(180/n)$
p= clearance arc = bza
b= Geneva wheel radius
$= (c2-a2)^{1/2}$

C) MATERIAL SPECIFICATION

The fabrication was completed using suitable materials, mechanism and manufacturing processes

TABLE I
MARETIAL SPECIFICATION

Sl. No	Component	Material	Characteristics
1	Stand	Wood	Ease of Machinability High Strength
2	Belt	Rubber belt	High tensile Strength
3	Roller	CPVC	Light weight
4	Geneva Wheel	ABS	3D Printed
5	Motor	DC Motor	Torque: 7-30 Kg Cm 10 RPM

V.CONCLUSIONS AND SCOPE FOR FUTURE

A) CONCLUSIONS

1. A Comprehensive study was done based on available models of automated transport lines in industry.
2. The geometric model of the proposed "Box transport system" was created by using AUTODESK FUSION 360.The fabrication was completed using suitable materials, mechanism and manufacturing processes.
3. Trial test suggest that the model works according to the need.
4. This automated system makes the transport process efficient convenient and fast.

B) SCOPE FOR FUTURE

1. Different mechanisms can be used to exhibit different functionalities
2. The system can be optimized by analyzing the multibody dynamics

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