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Design and Fabrication of 360^0 Rotating Belt Conveyor with Up Down Mechanism

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Abstract: ***Bulk material transportation requirements have continued to stress the belt conveyor industry to carry higher tonnages, larger distances and more diverse routes. In order to keep up these criteria significant technology advances have been incorporated in the field of the belt conveyor design, analysis and numerical simulation. The application of traditional components in non-traditional applications requiring horizontal curves and intermediate drives have changed and expanded belt conveyor possibilities. Examples of complex conveying applications along with the numerical tools required to insure reliability and availability will be reviewed. This work indicates the new developments in belt conveyor technology.***
The present work deals with the new trend in the field of belt conveyor system. A 360^0 rotating belt conveyor system has been designed for prototype operation and the details of the design, fabrication, modeling and economies of the rotating belt conveyor system is presented in this work.
Keywords: D.C Motor, U Clamps, Belts, Roller, Nuts, Bolts.

I. INTRODUCTION

A conveyor system is a part of mechanical handling equipment that moves materials from one location to another. Conveyors are especially useful in applications involving the transportation of heavy or bulky materials. Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging Material handling is an important sector of industry, which is consuming a considerable proportion of the total power supply. Belt conveyors are being employed to form the most important parts of material handling systems because of their high efficiency of transportation. It is significant to reduce the energy consumption or energy cost of material handling sector. This task mainly depends on the improvement of the energy efficiency of belt conveyors.
Now in industries only fixed type belt conveyors are available. But a prototype model of a 360^0 rotating belt conveyor belt with up-down mechanism is designed.

II. MODELLING AND ASSEMBLY OF 360^0 ROTATING CONVEYOR BELT WITH UP DOWN MECHANISM.

PTCreo formerly known as PRO/ENGINEER is a parametric integrates 3D CAD/CAM/CAE solution created by Parametric Technology Corporation (PTC). It is the world's leading CAD/CAM /CAE software, gives a broad range of integrated solutions to cover all aspects of product design and manufacturing. It was the first to market with parametric, feature-based, associative solid modeling software. The application runs on Microsoft windows platform, and provides solid modeling, assembly modeling and drafting, finite element analysis, direct and parametric modeling, NC and tooling functionality for mechanical engineers

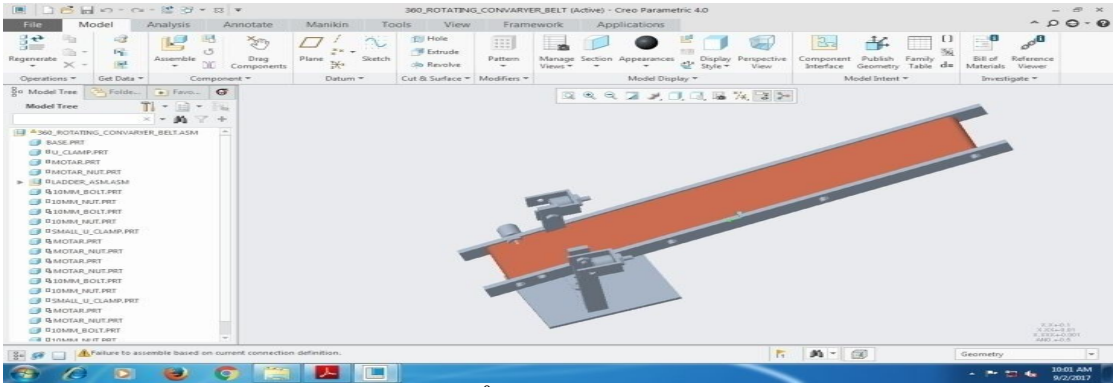

Fig: 2.1 Modeling and Assembly of 360^0 Rotating Conveyor Belt With Up Down Mechanism

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III. DESCRIPTION OF PROTOTYPE MODEL

Aluminum has lower density and higher thermal co-efficient. Hence aluminum material sticks are opted for the prototype construction. An embedded system is a system which is going to do a predefined specified task.

A. The main basic components are

1) 12V Dc Motors
2) 12v 7.5Ams battery
3) Wheels
4) Conveyor Belt
5) Bearings
6) Switche
7) Aluminum strips

B. DC Motor Principle

A machine that converts DC Electrical power into mechanical power is known as a D.C. motor. This operation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction of this force is given by Fleming's left hand rule and magnitude is given by; F = BI .There is no constructional difference between a D.C. motor and a D.C. generator. The same D.C. machine can be run as a generator or motor.

Fig:3.1 D.C.Motor

C. Conveyor Belt

A conveyor belt is the carrying medium of a belt conveyor system. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium the conveyor belt that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport large volumes of resources and agricultural materials such as grain,salt,coal,ore and more.

Fig:3.2 Conveyor Belt

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IV. FABRICATION OF MODEL

In this experiment initially a base plate was arranged. For this base plate L-clamp arrangement was fixed. To this L clamp wheels are arranged which can be run by D.C motor. Wheels can be moved both forward and backward directions by means of Battery and D.C motor .If both the Positive terminals of Battery and Motor and at the same time Negative terminals of Battery and Motor are connected forward motion can be done. If the signs can be interchanged backward motion will be done.At the centre of the base plate 1cm radius hole is arranged. In this hole a U-clamp arrangement would be done. This U-clamp made by the Aluminum plate. For this U-clamp a conveyor belt is fixed. To turn the conveyor belt in 360 degrees rotation a vertical motor is arranged. The Up Down mechanism of conveyor belt would be done with the help of Power Screw Mechanism. This mechanism converts Rotary motion to linear motion.

V. WORKING OF MODEL

The equipment consists of a base plate supported with 4 wheels for mobile operation. This plate is fitted with a clamping arrangement over which a belt conveyor is arranged. The clamp can be rotated for 360^0 degrees movement. There is an arrangement for the conveyor belt to tilt up and down. All the movements of the equipment are controlled by the D.C motor.Eight motors are assembled for these operations. To turn the conveyor belt in 360 degrees rotation a vertical motor is arranged. All the equipments used in this assembly are run with the help of battery. In this assembly the components arranged can be handled with a hand held device.

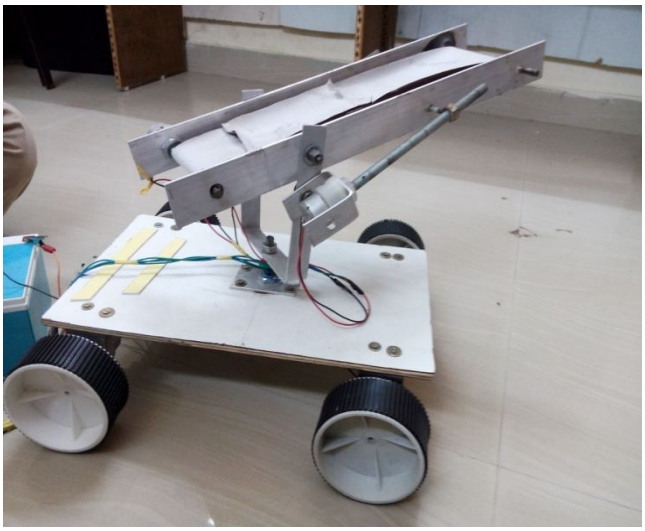

Fig: 3.3 Final assembly modelSpecifications

Table 1

S.NO	TYPE	Components	RPM
1	DC Motor	Wheel	100
2	DC Motor	Rotating	50
3	DC Motor	Rolling	60
4	DC Motor	Lifting	60

VI. CONCLUSIONS

Any machine must be inexpensive and easy to build if it is to be accepted by the society. This need is recognized and a "360° rotating conveyor belt with up-down mechanism" is designed for Prototype model. This machine will only contain parts that are readily available and in use regularly. This eliminates the need to order or import components just for conveying the product.
Thus a "360° rotating conveyor belt with up-down mechanism" is designed and prototype model is fabricated using D.C motors, batteries and remaining parts with in low cost.

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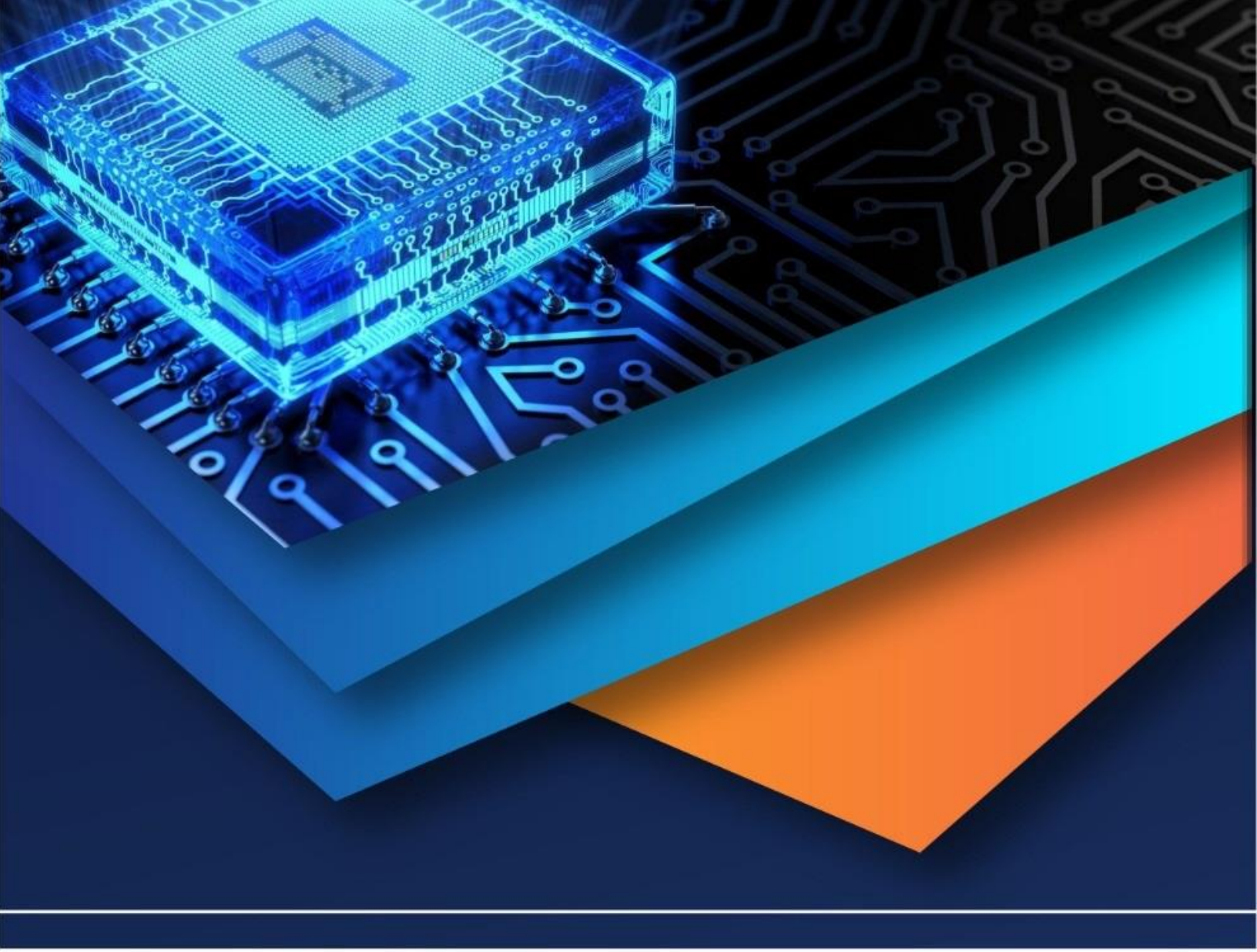

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