

Design & Fabrication Of Three Directional (270 Degree) Rotating Trolley

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ABSTRACT

There are new three way rotating trolley has been conceived by observing the problems in unloading the materials. So that, The survey in this relates in several automobile garages which revealed the facts that mostly some difficult methods were adopted for unloading the materials from the trailer. This paper has mainly focused on above problems. Therefore, In this a model of suitable arrangement has been designed. The vehicles can be unloaded from the trailer in three axes without application of any impact force. The DCV which accelerates the ram of the hydraulic cylinder which lifting the trailer cabin in require side. Further working and modifications limitations will put this work in the main league of use. In this concept saves time & energy which leads to work efficient..

Keywords: Design Optimization of Worm Gear drive, Pneumatic Cylinder, Worm & Worm Gear.

INTRODUCTION

In daily uses the transport of material from one place to another so many methods are adopted in such application. The pneumatically operated tricon trolley will over come the previous problem of rotation of the trolley. The main problem in the existing trolleys is that the material is dump towards back side only this requires more man power to scatter the material drained. Such type of difficulties are over come, if we use a tricon trolley which can rotate axially and enables to deliver the material towards all sides.

PROBLEM STATEMENT

1. The pneumatic power takes more time and air pressure to drive the trolley operation for heavy job.
2. Pneumatic has the limitation of weight lifting, for very heavy weights the trolley cannot be used.
3. As the pneumatic cylinders are not very large, a pneumatic system cannot drive loads that are too heavy.

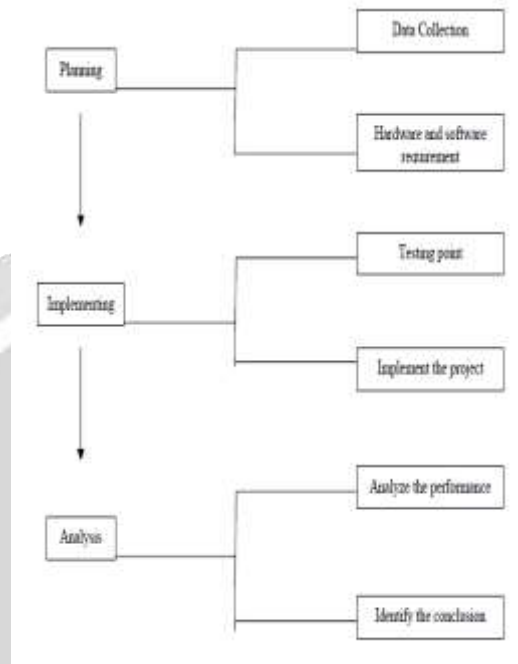
Objectives of Project

The basic objectives of this project work for carrying the waste material from the public residential area to remote place where the waste material is dropped.

1. To reduce labour cost.
2. To minimize the overall operation and production cycle time.
3. It is having more power than electric power and has less cost than the hydraulic power systems.

4. The trolley so developed having the technique three side dumping which enable to deliver the material towards all sides i.e. back side, left side and right side.

METHODOLOGY:

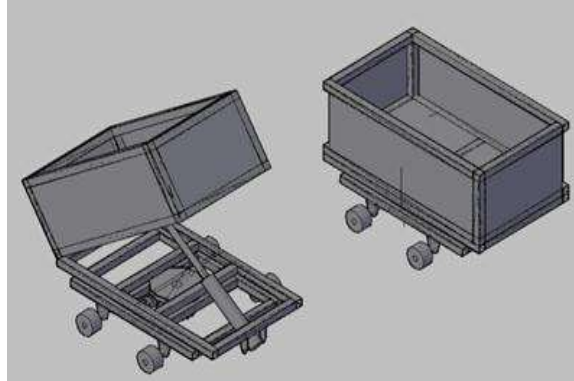


SYSTEM MODELING

Constructional Details:

Process sheet implementation details:

1. Then it was cut into pieces as per the required dimension.
2. All these angle pieces were joined together to form top side frame of the basic structure.
3. Another MS angle with same dimension 35mm x 3mm was taken.
4. It is cut into pieces to form a leg pieces.
5. Fabricate the legs with the rectangle from one by one to form the stand structure.
6. To develop the rack and pinion gear arrangement.
7. Initially, the spur gear is developed with a metal plate, this plate is drilled centrally.
8. This is then converted into a teeth gear box with the help of milling machine.



COMPONENTS

(a) Double acting cylinder:

In a double acting cylinder, air pressure is applied alternately to the relative surface of the piston, producing a propelling force and a retracting force. As the effective area of the piston is small, the thrust produced during retraction is relatively weak. The impenetrable tubes of double acting cylinders are usually made of steel. The working surfaces are also polished and coated with chromium to reduce friction.



(b) Rack And Pinion

A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called “the pinion” engages teeth on a linear “gear” bar called “the rack”; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion.

e.g. in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and forces a train up a steep slope.



(c)Ball Bearing

A ball bearing is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit



WORKING

It is mainly based on rotation of tipper trolley and divided in two parts Rotation and Dumping. For rotation of tipper, we used worm and gear mechanism. Worm is directly coupled with electric motor which is at horizontal position. On the lower side of dumper, the spur gears are meshed with worm wheel and the axis of rotation of spur gear is vertical, which is directly attached to tipper trolley. The power supply is provided to the electric motor by using DPDT switch to complete the circuit of battery and motor. As a motor start rotating the worm is also rotated at same speed (i.e. 30 rpm) and spur gear which is connected to worm wheel. The vertical shaft which is connected directly to the centre of tipper trolley, when worm complete its 1 rotation then 1 teeth of worm gear moves forward. Spur gear which having 40 teeth on its profile. When 10 teeth of spur gear are moved forward then trolley gets rotated by 90° from its initial position in 20 second. The rotating direction of trolley is changed or reversed by DPDT switch. When the trolley completes its required angle then material is dumped with the help of pneumatic cylinder. The compressed air is supplied by air compressor to cylinder. The air flow direction is controlled by solenoid valve. On the cylinder two forces are provided one on upper side & other on one side. For the upper movement of trolley air is supplied through the lower port and for downward movement of trolley air is released from the same port.

ADVANTAGES:

1. The very important advantage using the pneumatic operated trolleys is that, it is having less cost than the hydraulic power systems.
2. The trolley so developed having three side dumping which enable to deliver the material towards all sides i.e. back side, left side and right side.
3. All the components are readily available in the market.
4. Simple in Construction.
5. Maintenance Cost of the system is less as Compare to Hydraulic System.

DISADVANTAGES:

1. The pneumatic power is take more time than the hydraulic system for operation.
2. Pneumatic power is not preferred for handling heavy load.

APPLICATIONS:

Normally such types of trolleys are used for carrying the waste material from the public residential area to remote place, where the waste material is dropped. Such dumpers of Municipal Corporation collecting the waste of daily activities.

1. The material may become poisonous due to the bacteria and viruses and may avoid the trolleys are used.
2. In industrial environment, where the chemical industries carry the poisonous material which is dangerous to handle for the operators.

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