DESIGN AND FABRICATION OF MULTI AXIS MODERN PNEUMATIC TRUCK

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ABSTRACT :

This project work titled " DESIGN AND FABRICATION OF MULTI AXIS MODERN PNEUMATIC TRUCK" has been conceived having studied the various methods employed and difficulty in dumping materials.Conventional trailers unload materials only in one direction that is at the backside of the vehicle. This may cause the problems of blockage when the work area is limited. This Multidirectional dumper overcomes the problem of unloading the vehicle by using Pneumatic cylinder and worm gear arrangement through which the material can be unloaded in 180 degrees as per requirement. The three dumper is developed and tested for its movement in all possible angle (180 degrees) to unload the materials with the inclinations monitored and controlled.

Keywords :Valves, Pneumatic System, Trailer, Dumping Truck.

1. INTRODUCTION:

A trailer is a vehicle designed for carrying bulk material, repeatedly on building sites. Trailers are prestigious from dump trucks by configuration: a trailer is usually an open four-wheeled vehicle with the load skip in front of the driver, while a dump trolley has its cab in front of the load. The skip can tip to dump the load; this is where the name "trolley" comes from. A trailer is an integral part of any construction work and hence its role is important for completion of any constructional site. One of the problem are cited with trailer in the time and energy for setting the huge trailer in the proper direction to dump the material it in carrying and hence the need of the project work riser which is about 3 way dropping trailer which can dump the material in any direction except the rental one without moving the truck in any direction.

II. OBJECTIVES:

One of the problems is cited with dumper in the time & energy for operating the huge dumper in the proper direction to dump the material carrying in it hence the need of project work riser was is about Multidirectional dropping dumpers which dump the material in any direction with moving trolley in any direction. With rise of chances in technology, it is become essential to find a viable alternative to 3 way dumper system.

2.1. CONVENTIONAL DUMPING TRUCK:

The Traditional dumper unloads the material in only one direction generally in payloads of up to 10 tones and usually steer by articulating at the middle of the chassis (pivot steering). They have multi-cylinder diesel engines, some turbocharged, electric start and hydraulics for tipping and steering and are more expensive to make and operate. An A-frame known as a ROPS (Roll over Protection) frame may be fitted over the seat to protect the driver if the dumper rolls over. Some dumpers have FOPS. The Existing system available unloads the material on one direction only that is, on the back side. One of the problem are cited with the conventional dumper in the time and energy for setting the huge dumper in the proper direction to dump the material As considering the mines space available is very less especially in countries like India, major issues raises over here, the incompatibility of the site with the fully loaded dumper causes a lot of settling time for the trolley to get the material properly arranged and transported to reach its location.

2.2 BASIC IDEA FOR MULTI AXIS MODERN PNEUMATIC TRUCK:

This idea came after visiting various construction sites. The problem we observed there was that, the trailer only could unload the material (sand, gravel, dirt etc.) in only back side of the trailer. So if the construction site has narrow space and one wants to unload the material left or right side of the space then it is not possible. So for that there should be some mechanism so that the trailer can unload the material in all three possible directions and for that one can use three cylinder for three directions, But the controlling will be difficult and also the cost will be more. To overcome the above problems we can use one wormwheel gear pair arrangement to rotate the dumper of the trailer in all three possible directions (right, leftback) and one cylinder to lift the dumper for unloading truck.

2.3 PNEUMATIC CYLINDERS:

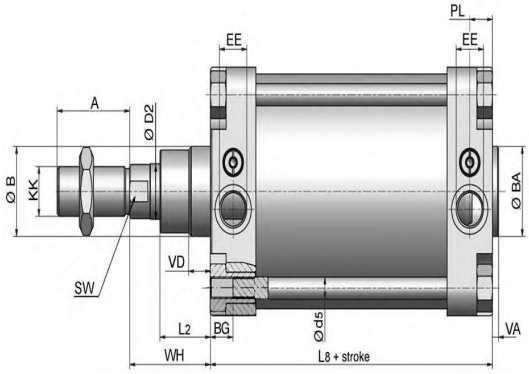
Pneumatic cylinder (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage.

Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement. Cylinders are the most important means of actuation in pneumatics. The cylinder transfers the energy that is stored in the compressed air into movement**.**

III. WORKING & PRINCIPLE OF PNEUMATIC CYLINDER:

Pneumatic cylinder sometimes known as aircylinders are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. Like hydraulic cylinders, something forces a piston to move in the desire direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage.

Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement. For example, in the mechanical puppets of the Disney Tiki Room, pneumatics are used to prevent fluid from dripping onto people below the puppets**.**



Pneumatic Three Axis Modern Trailer is nothing but one of the Lifting system in automobile at the time of emergency. In this Lifting system pneumatically operated one. Here the additional pneumatic cylinder and Control Valve is provided in the automobile itself. In this project, the Control Valve is used to activate/deactivate the Air input. The Valve is „ON‟ at the time of emergency; the compressed air goes to the pneumatic cylinder. Then the compressed air passes through the tube, and then pushes the pneumatic cylinder, so that the Lifting is applied at the time of Valve in “ON” positionThe speed of the pneumatic cylinder is varied by using flow control valve. This is the way of controlling Lifting speed of the Trailer at the time of emergency. In our project, we have to apply this Pneumatic Modern Trailer Mechanism in Load Lifting Vehicles. [3] discussed about a disclosure which is made regarding a gear blocking gear cover for the four wheeler vehicle where the protective cover has been with touch sensors and biometric sensors. Here in case of theft even if the car is started without a key the gear system is locked using biometric locks which can read the palm of the user to unlock the gear system thus protecting the vehicle against any form of theft. This device can be attached to any type of four wheeler vehicle.The Control Valve is fixed in near of the driving persons in the four wheeler. The air tank contains the compressed air already filled. The Valve was ON at the time of emergency, the Control Valve was activated. The compressed air flow is controlled by the valve is called “FLOW CONTROL VALVE”. This air flow is already set. Then the compressed air goes to the pneumatic cylinders. The pneumatic cylinders piston moves forward at the time of compressed air inlet to the cylinder. The pneumatic cylinders moves towards the Lifting arrangement.

3.1PNEUMATIC LOCKING SYSTEM:

When it is necessary to dump the trolley at rear side of the vehicle, the hinges are engaged automatically by pneumatic locking system pin at rear of the trolley and the trolley is made to lift by an actuator connected to trolley and chassis by a Universal joint. This results in the rotation of trolley about the rear hinge.

When it is required to dump the material at Left or right side of the vehicle, the hinges are engaged automatically by pneumatic locking system pin at respective side of the trolley and the trolley is made to lift by an actuator connected to trolley and chassis by a Universal joint. This results in the rotation of trolley about the left or right hinge as per requirement. Locking System Of Truck**.**

	Rear side Locking	**Left side Locking**	**Right side Locking**
Rear side Dump	Close	Open	Open
Left side Dump	Open	Close	Open
Right side Dump	Open	Open	Close

3.2ADVANTAGES AND APPLICATION ADVANTAGES:

It requires simple maintenance cares
Checking and cleaning are easy, because of the main parts are screwed.
Handling is easy, manual power not required Repairing is easy.

3.3 APPLICATION:

PACKING: Packing is that puts goods into boxes to protect them and to make them easier to carry while in transit. In this the required quantity of the material is loaded in trailer and can be unloaded at required direction.

MATERIAL LOADING: In this, any bulk and unit load can be loaded, transported and unloaded at required place and required direction.

DISPENSING: Dispensing is distributed or weighted out in carefully determined portions. In which material is distributed at any three directional places.

PALLETIZING: In this the material is filled in pallets and these pallets are carried or supported by trailer and transported to required place by using forklift.

MATERIAL DROPDOWN: the finished products on machine is dropdown by using pneumatic trailer.

IV.CONCLUSION:

The developed prototype exhibits the expected results. Further modifications and working limitations will put this work in the main league of use. This concept saves time & energy which leads to efficient working. This further line should be modeled using equations and an experimental agreement. The constructional work or the infrastructural work demands efficient and user friendly machinery which will lead to more and more use of three Axis Moder Pneumatic trailer.

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