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Fabrication of three axis hydraulic modern trailer

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ABSTRACT

Trailer had lots of applications in today's world, in industrial and domestic uses. Trailer can transfer a variety of products including, rice, bricks, sand, fertilizer, wood, rocks, etc. By considering wide scope of the topic, it is necessary to study and in the topic of trailer mechanism in order to make it more economical and efficient. In existing system, trailer can unload one side only using hydraulic jack. In this paper we can apply three way unloading mechanism, it is easy to operator for unloading and also it decreases the time and fuel consumption. This paper has mainly focused current difficulties in unloading mechanism.

Keywords: Hydraulic Modern Trailer, Three Axes.

INTRODUCTION

Trailer system is widely used for material transportation in big construction projects. Due to its load carrying capacity and material handling facilities, trailers are being used as popular load carriers. In most cases where road width is not sufficient, trailers face the problems while unloading the material. It takes a lot of time to unload a single trolley as all material cannot be unloaded at same place. Hence additional time is required for turning of vehicle in highly congested area. Also in case of large trolleys, if all the material is unloaded at one place additional manpower is required to arrange the material properly which finally increases material handling cost. At the same time, the trailers unload the material backside i.e. in one axis only. Modern Three Axis Hydraulic Trailer incorporates the hydraulic cylinder. It is used to lift the load with help of hydraulic cylinder. The main purpose of this project is to unload the material in three directions instead of conventional trailer system in which the unloading is done in one direction. This system is very much useful in constructional sites having low turning space, to reduce the additional labour cost. It gives

the small fabrication of small model to have clear understanding of idea.

Material handling in building and civil works is one of the basic necessities. The material supply to construction is provided through trucks, trailer etc. In most cases where road size is not enough to unload the material in right place. It takes a lack of time to unload a material and material cannot be unloaded at same place and also we need to turn of vehicle in highly rushed area. In the trailer load is to be unloaded in one direction only. To avoid this type of problems and reduce manpower requirement we introduce our new invention of three way unloading mechanism. We are sure that our project three way unloading tipper vehicle will help us to unload in three directions easily without the help of any labor or any other mechanical support.

Trailer

A trailer is generally an unpowered vehicle pulled by a powered vehicle. Commonly, the term trailer refers to such vehicles used for transport of goods and materials. Sometimes recreational vehicles, travel trailers, or mobile homes with limited living facilities where people can camp or

stay have been referred to as trailers. In earlier days, many such vehicles were towable trailers.

Types of Trailers

Some trailers are made for personal (or small business) use with practically any powered vehicle having an appropriate hitch, but some trailers are part of large trucks called semi-trailer trucks for transportation of cargo.

Enclosed toy trailers and motorcycle trailers can be towed by commonly accessible pickup truck or van, which generally require no special permit beyond a regular driver's license. Specialized trailers like open-air motorcycle trailers, bicycle trailers are much smaller, accessible to small automobiles, as are some simple trailers, pulled by a drawbar and riding on a single set of axles. Other trailers, such as utility trailers and travel trailers or campers come in single and multiple axle varieties, to allow for varying sizes of two vehicles.

LITERATURE REVIEW

[1] AhmadO.Moaaz et al, made a study and concluded that heavy duty vehicle plays a more important role in highway transportation. The major focus in the truck manufacturing industries is design of truck chassis with more payload capacity and possible less weight. An important aspect of chassis" design and analysis is the stress distribution and fatigue life of prediction process. Fatigue is one of the most important 13 parameters to consider when designing truck components. The components are typically subjected to dynamic loads when in service. In this paper, an effort is made to review the investigations that have been made on the different fatigue analysis techniques of heavy duty truck frames. A number of analytical and numerical techniques are available for the fatigue analysis of the heavy duty truck frames has been reported in literature.

[2] DeepeshGarg et al, done a study on Construction and mining segment in India has picked up pace in recent years. Due to this, equipment's such as tippers, excavators and loaders are in great demand. Function of tipper trucks is to combine the two tasks of dumping and haulage. Truck Body Floor which is used for this purpose has been designed in a conventional way

since its inception. Normal conventional method of floor construction is a sandwich floor with layers of steel floor on top and bottom and a layer of wood in between. Scope of this paper is to optimize the design of conventional truck body floor design considering heavy & impact loading in mines which damages the floor. Thus this demands the need of heavy duty impact resistance floor which replaces the normal conventional sandwich construction. Hence new concept of single layer heavy duty floor has been embarked upon with high strength material which will be able to resist severe impact loads and also results in weight reduction with various other advantages.

[3] Ganesh Shinde et al, prepared aModern 3 ways dropping dumper" has been conceived by observing the difficulty in unloading the materials. The survey in this regards in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. This paper has mainly focused on above difficulty. Hence a prototype of suitable arrangement has been designed. The vehicles can be unloaded from the trailer in three axes without application of any impact force. The Direction control valves which activate the ram of the hydraulic cylinder which lifting the trailer cabin in require side. 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.

[4] Hemant A. Gaikwad et al, invented "Design of Multiside Tipper Tilting Mechanism" Truck, tipper, dump truck are used to transport loose material from one place to another place at construction site in mines or in dump yards to accomplish the actual site requirement. If one can understand the ground condition and availability of space in mines and on construction site, it is very tough task to unload loose material at appropriate place, adjustment of truck is needed which take considerable time and effort to unload loose material. As everyone knows that tipper is mostly used for unloading loose material on construction site, mines and dump yards. The Existing system available is to unload material on back side. As considering the mines space availability very less due to which unloading material on left or right side is not possible, to take this as a problem multi

side tipper tilting is the need of time. To overcome one side tilting of trolley, multiside tilting mechanism is come into focus. This will help to reduce the efforts to unload loose material one side of tipper. Propose work is on placing three hydraulic cylinders each on front side, right side and left side of trolley to unload loose material on back side, left side and right side of trolley respectively. Some design modification is needed in existing system to work on multisided tipper tilting mechanism.

[5] N.Nagendra Kumar et al, made a survey and found that the truck industry is a significant lifeline of the country's economic activity. About 90 per cent of vehicles are owned and operated by individual operators. A large majority of the truck cabs, truck bodies and trailers are constructed by units in semi-organized / unorganized sectors spread over the country. There is considerable scope to improve the design of their products. Every extra pound of vehicle weight increases manufacturing cost, lower fuel efficiency and reduces vehicle payload capacity. With this concept of reducing weight and stress reduction the optimized model of tipper dump body is modeled and analyzed. By conducting the Finite Element Analysis on the three Models the optimized parameters, optimized Model-IV is developed and analyzed. For the Model-IV (optimized) stress analysis is carried out and the results are presented.

[6] Sanjaykumar A. Borikar et al, invented "Development, Testing and Monitoring of the Movement of Three Directional Tipper

Mechanism" Conventional tipper mechanism an unload materials only at the backside of the tipper using hydraulically operated boom which may cause the problems of road blockage in the limited space area. The prototype model of three direction movement tipper overcomes the problem of unloading the vehicle on side way by using BOOM (D.C. Motor operated). By using Boom the material can be unloaded in all three directions as per requirement. The prototype is developed and tested for its movement in all three possible direction to unload the materials in the tipper trolley and monitor the inclinations for its gradualism (linearity). The results of inclination of the tipper in all three directions are obtained with respect to time period with material and without material as 22.80° and 23.24° for 100 seconds of operation.

PROBLEM IDENTIFICATION

In usually unload materials from vehicle is consider as the various hydraulic cylinder act to powered operation to tipper backside in one direction. That conditions blockage problem in work area is limited. To overcome can be used as pneumatic cylinder as multi directional dumper. Our review is focus as several gears in automobile and exposed the fact some complicated method adopted in trailer. The trailer has been loaded one direction. It is difficult to handle. From our research we can decided to rectified that problem by design and analysis of suitable operation condition.

DESIGN OF TRAILER MECHANISM

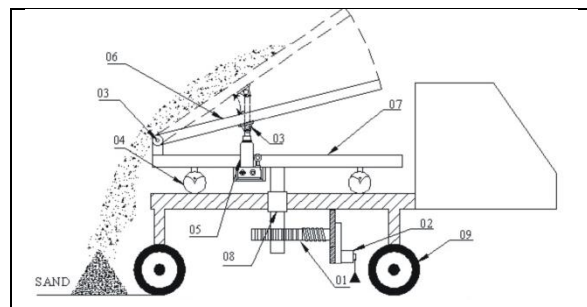


Fig .1 Fabrication of three axis hydraulic modern trailer

1. Worm gear arrangement
2. DC Motor
3. Hinge
4. 360 Rotatable wheel
5. Hydraulic jack
6. Lifting plate
7. Rotating plate
8. Bearing
9. Wheel

WORKING OF HYDRAULIC TRAILER

Hydraulic system is the heart of the trailer mechanism for lifting or unloading the materials. It consist of hydraulic trailer, control valve, reservoir, filter, pumps. The reservoir contain the hydraulic oil and filter is provided to clean the dust in the hydraulic fluid. Pump is used to pump the oil to the control valve when the valve is operated. The two way direction control valve is connected to the hydraulic trailer, which moves the piston forward and backward. Hydraulic cylinder is fixed

between the chassis and trailer, piston is connected to the trailer which is movable and trailer is fixed to the chassis. When the direction control valve is operated forward, the oil from the reservoir is pumped to trailer.

Through DCV, it extend the piston and lift the trailer to the corresponding side which ever we required. The lever is operated to the backward, oil from the trailer is pull back to the reservoir and piston comes back to its original position.

CONCLUSION

The developed prototype model exhibits the expected results. Further modifications and working limitations will put this work in the main league for use. This concept saves energy& time 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 way unloading trailer.

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