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 project on the topic of trailer mechanism in order to make it more economical and efficient. In existing system, trailer can unload one side only by using hydraulic jack. By this project we can apply three way unloading mechanism, it is easy for the driver to unload the trailer and also it decreases time and fuel consumption. This paper has mainly focused current difficulty in unloading mechanism.

Key words: Hydraulic Modern Trailer, Three Axes

I. INTRODUCTION

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 only 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.

II. BASIC CONCEPT

The thought we got, when we visited to an agricultural farms. There we found that a trailer was unloaded the dung fertilizer its back side only. One thing that was find difficult to unloading the fertilizer in other sides (include left and right) trailer. It consumed lot of time to complete the process.

III. LITERATURE REVIEW

Deepesh Garg, Dr. R S Bindu “Design Optimization of Truck Body Floor for Heavy Loading” IOSR Journal of Engineering (IOSRJEN) ISSN: 2250-3021 Volume 2, Issue 8 (August 2012).[7] 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.

Ahmad O. Moazou, Nouby M. Ghazaly, “The Fatigue Analysis of Heavy Duty Truck Frames” American Journal of Engineering Research (AJER), e-ISSN: 2320-0847 p-ISSN: 2320-0936 Volume-3, Issue-10, pp-01-06(2014).[1] 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 pay load 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.

Ganesh Shinde, Prachi Tawele, Laukik Rau “Design and Development of 3-Way Dropping Dumper” ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 9, September 2014.[13] Modern 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.

Hemant A. Gaikwad, Nilesh P. Awate 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 on 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. Multiside 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 multiside tipper tilting mechanism.

Sanjaykumar A. Borikar, Hemant V. Karkade, Pramod G. Pokley 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 foe 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.

N.Nagendra Kumar, B.Jithendra, Malaga Anil Kumar “Optimization of Weight and Stress Reduction of Dump for Automotive Vehicles” International Journal of Engineering Research & Technology (IJERT) Vol.2 Issue 10, October – 2013 ISSN: 2278-0181 [6] 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 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.

IV. METHODOLOGY

![Methodology Diagram](image1)

![Fabrication Diagram](image2)

V. DESIGN OF TRAILER MECHANISM
VI. 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.

VII. CONCLUSION

The developed prototype model exhibits the expected results. Next 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.

REFERENCES