

Design and Implementation of Three Axis Modern Trailer

#¹Shubham Khilari, #²Bhagyesh Khilare, #³Prashant Kadam, #⁴Laxaman Ghadge



¹shubhamkhilari2016@gmail.com

²bkhilare2737@gmail.com

³prashantkadam1311@gmail.com

⁴laxamanghadge9@gmail.com

#¹²³⁴Mechanical Engineering, SPPU, Pune, Maharashtra, India.

ABSTRACT

Trailer has lots of applications in today's world. In industrial and domestic considerations, tippers can pull a variety of products including gravel, grain, sand, fertilizer, heavy rocks, etc. By considering wide scope of the topic, it is necessary to do study and research on the topic of tipper mechanism in order to make it more economical and efficient. In existing system, tipper can unload only in one side by using pneumatic jack or conveyor mechanism. By this research it is easy for the driver to unload the trailer and also it reduces time and fuel consumption. For making tipper mechanism with such above conditions hydraulic jack mechanism can be used. Our project is mainly focused on above difficulty. 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. By this research it is easy for the driver to unload the trailer and it reduces the time.

Keywords: Research Paper, Technical Writing, Science, Engineering and Technology

ARTICLE INFO

Article History

Received: 26th May 2019

Received in revised form :
26th May 2019

Accepted: 29th May 2019

Published online :

30th May 2019

I. INTRODUCTION

A dumper is integral part of any construction work & hence role is important for completion of any constructional site. One of the problem is cited with in the time & energy for setting the huge dumper in proper direction to dump the material it in carrying & hence the need of the project work increase which is about 3 directional dumper which can dump the material in any direction 3-Directional dumper can be helpful for farmers for transfer material, site construction, garbage collector as well for dumping gravel, sand material etc. It also can reduce the power while it can dump in 3 directions. It also takes less time than traditional dumpers which can reduces the work & time. Truck, tipper, dump truck ,trolley, dumper trailer are used to transport bulk 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 dumper is needed which to take considerable time and effort to unloading bulk material. As everyone knows that tipper is mostly used for unloading loose material on construction site, mines and dump yards.

The conventional system available is to unloading the material on back side. As considering the mines space available is very small due to which unloading material on left or right side is not possible to take this as a problem Multisided dumper tilting is the need of less time. To overcome one side tilting of trolley, multisided tilting mechanism is come into focus.

II. LITERATURE REVIEW

A.S.Pal, A.G.Shahu, D.P.Mandaokar, R.I.Meshram, Ms. U.T.Dhanre, this paper concluded that the dumper is a vehicle use for carrying various materials from one place to another and dump to a specific place. A Dumper is a vehicle designed for carrying bulk material, often on building sites such gravels, sand, debris or rubbles. Dumper are different from tipper trucks by motion: a dumper is usually an open 4- wheeled vehicle, has its cabinet in front side of the load. A typical dump truck is equipped with an open-box bed, which is hinged at the rear and equipped with hydraulic pistons to lift the front, allowing the material in the trolley to be deposited ("dumped") on ground behind the truck at site of delivery.

Ganesh Shinde, Prachi Taweale, Laukik Raut, this paper concluded the 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 flow control valve which activates the ram of the hydraulic cylinder which lifting the trailer cabin in require side. Further changes and working limitations will put this work in the main league of use.

Sivasubramanian S Anandhu G K , Adarsh P , Joshua O , Logeshwaran K , this paper concluded that Design of multiside tipper tilting mechanism is done to help unloading loose material on three side of the tipper as per the availability of area. The design is safe for the maximum load of 16 MT which is rigid enough to transport bulk material from one site to another site. Design of hinge is the more important part for side tilting of the trolley. The benefits of 3D CAD and FEA packages can be taken for designing of three way dumper construction trucks. Three way tipper can undump materials in all three sides. To control the sides of tipping there needs to be required one more hudraulic cylinder apart from the main hydraulic cylinder. Also we require special types of hinge joints..

Iftikarahamad H. Patel, Tushar M. Mudhe, Prasad M. Sherkar, Nilesh N. Saykar, Dinesh S. Pendawale , this paper concluded that In industrial applications and domestic considerations, tippers can pull a variety of products including gravel, ,bulk material ,grain, sand, fertilizer, heavy rocks, etc. By considering wide scope of the topic, it is necessary to do study on the topic of tipper mechanism in order to make it most economical and efficient. In conventional system, tipper can unload only in one side by using hydraulic jack or conveyor mechanism. By this research, it is easy for the driver to unload the trailer in three sides and also it reduces time and fuel consumption.

III. PROBLEM STATEMENT

Design and fabrication of three axis rotational Trailer using Hydraulic System compared with conventional trailer system.

IV. METHODOLOGY

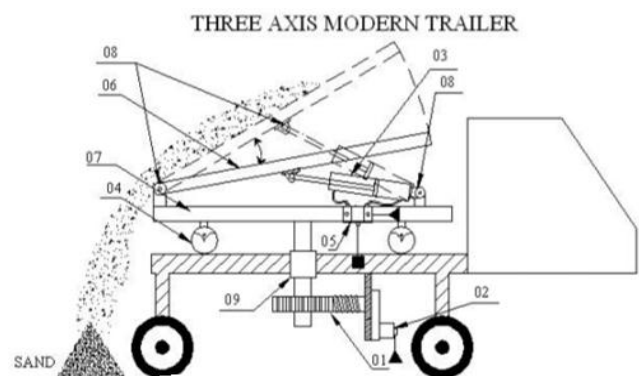
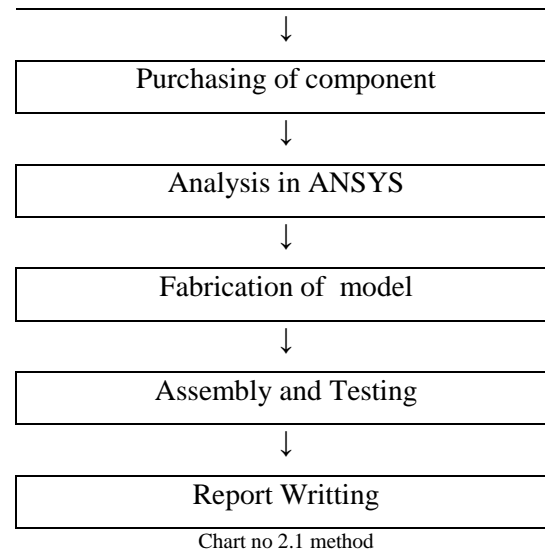
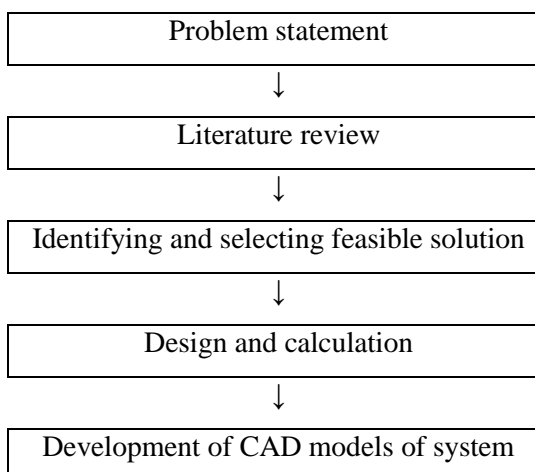


Fig4.1 - Schematic diagram of Modern Three Axis

Hydraulic Trailer

1. Wiper motor
2. Motor
3. Cylinder
4. Reservoir
5. Control valve
6. Lifting body
7. Rotating body
8. Hinged support
9. Bearing

Objective:

- Study and analyze the axial movement of trailer.
- Design and calculation of system. Development of the prototype having 3-axis movement.
- Compare actual project model to the conventional trailer system.

V. SCOPE OF THE PROJECT

The very first version of a dump truck used to haul and dump material was nothing more than a simple dump body style cart drawn by horses. It would have consisted of a two-wheeled cart hinged to the axle with the center of gravity, when loaded, just behind the axle. The loaded front body was hooked, and when unlatched, would dump. These carts were used in open mines and pulled by horses along a railway track. After 1900, a four-wheeled horse-drawn flatbed wagon with a rectangular body lifted with a hand hoist in the front was employed. In the book, 500 Years of

Earthmoving, Heinz-Herbert Cohrs cites that before the first dump trucks appeared, excavated materials were being removed and hauled by locomotives and trolleys known as box tip wagons, dump bodies, and scoop tippers.

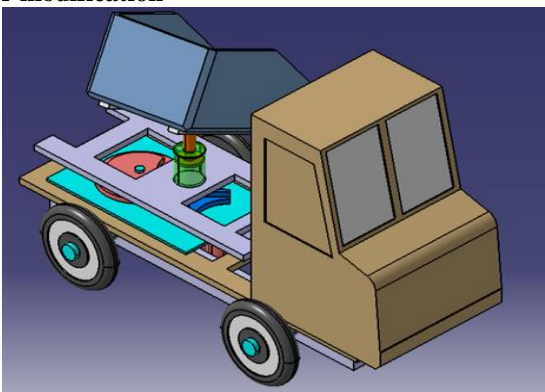
VI. ACTUAL CONCEPT OF PROJECT

A side dump truck (SDT) consists of a 3-axle tractor pulling a semi-trailer. It has hydraulic rams which tilted the dump body on its side, spilling the material to either the left or right side of the trailer. The key advantages of the side dump are that it allows rapid dumping and can carry more weight in the western United States. In addition, it is almost upset (tipping over) while dumping, unlike the semi end dumps which are prone to tipping over. It is, however, highly likely that side dump trailer will tip over if dumping is stopped prematurely. Also, when dumping loose materials or sized stone, the side dump can become stuck if the pile becomes wide enough to cover too much of the trailer's wheels

Before modification



After modification



VII. CONCLUSION

The development of the project can be used to the various applications in effective manner. The developed Prototype model exhibits the expected results. Further changes and working limitations will put this work in the main league of use. This concept tells about saves time & energy which leads to efficient working. This further line should be model using equations and an experimental

validation. The constructional work or the infrastructural work increase demands efficient and user friendly machinery which will lead to more and most use of in three way dropping dumper.

VIII. REFERENCES

- 1)Prof. R.S. Ambade, Shubham D. Navghare, Bhushan S. Kamatkar , “Universal Modern Trailer”, International Journal of Engineering Technology Science and Research, ISSN 2394 – 3386,Volume 5, Issue 3 ,March 2018,PP 881-888.
- 2)Mr. Abhimanyu D. Deshmukh, Mr. VivekR.Patil Mr.Vivek S. Chavan3Mr.Mahesh M. Kadam Mr. Dipak M. Bhosale , “3-Way Hydraulic Dumping Trolley” International Journal for Scientific Research and Development”,Vol . ,Issue 12, ISSN:2321-0613, 2017,PP 917-920.
- 3)P. Shashidar, P. Laxminagaprasad, U. Anil Kumar, “Design and fabrication of modern three way dumping trolley mechanism”, International Journal Of Advance Technology In Engineering And Science ,Vol .No.4,Issue No.11, 2016,PP 27-34.