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Design and Fabrication of Three Axis Rotating Trailer Using Pneumatic System

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Abstract – This project work "design and fabrication of Three axis rotating trailer using pneumatic system" has been conceived having studied the trouble in emptying the materials. Our review in the respect in a few automobile garages, reveals the fact that generally some troublesome strategies were embraced in emptying the materials from the trailer. The trailer will empty the material just in one direction only. It is hard to empty the materials in small compact roads and small streets. All the three sides are effectively to unload the trailer in our task are rectified. Automobile engine drive is coupled to the compressor engine, the compressed air its stores when running the vehicle. the pneumatic cylinder are is used to activate this compressed air, whenactivate the valve. Spur gear is used for rotating the trailer in three directions & easy for unloading the materials in small compact streets and roads.

***Keywords*:** Design , fabrication, automobile garages, Automobile engine etc.

INTRODUCTION: Trailer measure has wide applications in areas like farming, development and garbage transportation, etc. Conventional trailer has restriction of instrument which don't permits it to dump the material at rear side only. It is highly inconvenience for vehicles to reposition as shown by dumping side in narrow lanes and limited spaces. This inconvenience is overcomed by different sides trailer system by using single actuator. The trailer exhausts the material only one way. This difficulty is overcomed by new strategy segment as the multidirectional trailer. This instrument is a way to reduce the actual time to settle the trailer.

The material is unloaded in three ways band accordingly can be firmly communicated as "Three way trailer." The major outcome of three way directional trailer has defeated space necessity which frequently bring about road blocking. Hence we have inversion in the currentmechanism giving the unloading in three directions. This mechanism prevents road blocking, lessen time and increment efficiency at low cost. As considering the minesspace accessible is extremely less.

Accordingly it is simple for the driver to dump the trailer and further more it decreases time and fuel utilization. For making tipper system with such above conditions pneumatic system can be utilized. The compressed air is going to the pneumatic chamber through the because of which dumping material on left or right side is not possible to expect to take this as an issue, Multisidedtipper tilting is the need of time. To beat one side shifting of trolley, multisided shifting mechanism is come intofocus. This will help to dump free material one side of tipper. Presently dropping unloader has been brought about by noticing the trouble in emptying the materials. Dropping trailer can dump just in one side by utilizing pneumatic mechanism.

By this project, essentially we focused on above trouble direction control valve and flow control valve. The direction control valve is utilized to control the flow direction of the pneumatic cylinder in both the way and flow control valve is utilized to control the flow of fluids towards chamber.

LITERATURE REVIEW:

A. Ajithkumar, P. Dhivya, D. Surendar, R. Srinivas- describes that their projects works on the Principles of pneumatic mechanism along with micro controllers then efficiency of dumping trailers will increase. The three direction of unloading and material can be done and useful for shipping industry. They have chosen this project for decreasing the man power and time. The combination of pneumatics and microcontrollers can be seen in their project.

Dr. Sushila Rani says that the dumping is a important roleof bulky load for carrying construction loads & the materials unloading the particular site of proper direction. Unloading the material is difficult and assigned position in dump of the materials. To overcome these problems some modified designs are easy to dump the materials & pneumatic cylinder are along with a chain sprocket mechanism .In this dumper it has been designed by using the finite element based the ANSYS software. The static

structural analysis can maximum equivalent to stress, shear stress ,elastic stress and total the deformation of the pneumatic dumper.

S. Durai1, R. Vignesh, R. Vignesh, S. Vignesh, P. Vignesh they described that the tipper has lot of applications in today's world about industrial and domesticconsiderations. Tippers can pull a variety of products including sand, grain, fertilizer, etc. The old model tipper has been conceived by observing the difficulty in unloading the materials. The modern trailer will unload thematerial in three directions. It is difficult to unload the materials directly at elevated place (such as top floor of a building) from the ground and also in small compact street. In their project these are rectified to unload the materials.

Rabhakaran. G says that in the modern three axis tipper which works in all axis like a truck is used for transporting loose material such as dirt, or gravel, sand for construction and the dump truck another name is UK dumper/tipper truck. An open-box bed is equipped in typical dump truck, which is joined at the rear and hydraulic pistons equipped to lift the front, the bed to be deposited in the allowing the material the delivery of the truck site behind on the ground. Off-road construction plant only in the UK and Australia to the term applies, andthe road vehicle is called as tip truck (AU), tipper lorry (UK), a tipper. x,y,z.

Deore Vinod, Endait Sunit, Prajapati Mahesh, Attarde Bhushan says that 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 thatmostly some difficult methods were adopted for unloadingthe 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.

M. Shanmugam, G R. Arunkumar, K. Ganesh, V. Gopalakrishnan, M. Hariharan reveals that in today's world Trailer had many uses in industrial and internal purpose. Trailer used to transfer stone, sand, agriculture products etc. Trailer can unload the material in one direction in current system. By this project we can unload the material in 3 directions and it used to decrease the timeand unload the material in small areas. That project mostlyfocused current problems for unload the material.

Shinde Akshaykumar, Shinde Akshay, Kadam Aniket, Dhanavi Nilesh, Pawar Prashant, Mr. Patil S.P describes that their project "Design and Fabrication of Three way dumping trailer" has been considered havingthe trailer will empty the material just one single way. It is hard to empty the materials in little conservative roads andlittle streets. In their project it is easy to unload the material in 3 directions .And vehicles can be dumped fromthe trailer in three ways without utilization of any Impact power. By squeezing the Direction control valve actuated.

Dharmala Venkata Padmaja, Yalagada Aravind Kumar, Kallepalli Rambabu, Pradhan Hemanta Kumar,

says that the objective of their paper is to assess the trouble in unloading the materials .The loading and unloading of material using trailer is just in one direction only. Also, loading and unloading of material, in little reduced roads and little streets, is finished with high trouble. And three possible direction are loading and unloading the materials. The a control possible in three ways by enacting the course control valve. Compressed air is utilized in controlling the valve. The trailer cabin is lifted, by utilizing the ram of the pneumatic chamber as lifter. The Compressor engine is combined with automobile engine, so that, when vehicle is running, compressed air is stored. Pneumatic cylinder is activatedby utilizing the compressed air, when the valve is activated.

Vinamra Agnihotri, Shoaib Rabbani, Shankaran Pillai,Vivek Patel, Sarvanan V reveals that their project name is three axis modern trailer and having study of methods employed and difficulty in dumping materials. The normal trailer are unloading the materials in only one direction may problem of blockage and work area is limited. They used a gear arrangement for all possible three direction.

Tapobrat Pani, Shubham Warate, Ritesh Chandrakar, Vaibhav Adulkar, Akshay Pawnarkar, Lecturer G. D. Gosavi describes that nowadays, many areas are used in hydraulic system. Hydraulic cylinder needs to be change periodically because it get wear as hydraulic have some disadvantages such as the seal. The price is too high the hydraulic system. So, they are pneumatic replaced it.

Advantages from this system so we can use it to obtain the mechanical. Two gears, D.C. Motor and mechanical linkages, it consists of three pneumatic cylinders. The cylinders are used to give movement to the arms and to give rotary movement of 360 degrees are used the gears. Agriculture sector it can be used and purpose for industrial where low tonnage capacity work is require.

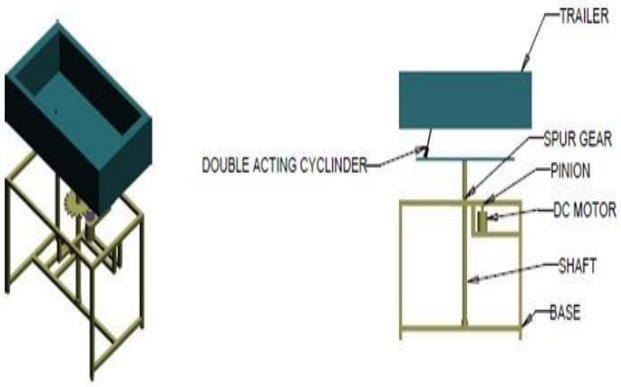
Shinde , D says that the normally conventional trailer are unloading the materials are only one direction is difficulty the unloading materials. And the loading the materials is very difficulty in normally trailer. This paper has mainly focused on above difficulty. Hence a prototype of suitable arrangement has been designed. The vehicles can be unloaded from the trailer in three axes with application of any impact force. This concept saves time &energy which leads to efficient working.

A. Vijay prajapati, 1,2,3,4 UG Assistant Professor saysthat the trailer has lots of applications in today's world.

COMPONENT SPECIFICATIONS

Compressor:

Motor power = 5.5KW/7.5HP



ISOMETRIC VIEW FRONT VIEW

3. Spur Gear:

Material = C45(steel)

Teeth = 70

Outside diameter = 15cm

4. Pinion:

Material = steel (C45)Teeth = 25

Outside diameter = 15cm =150mm

5. Battery:

Voltage = 12volt

6. DC MOTOR:

- Speed : 400rpm
- Voltage : 12v
- Power : 0.035kw

DESIGN CALCULATION:

Force = 600 * (π/4) * ((0.32)²-(0.14)²)

= 600 * 0.0650

Force = 390N

=390/9.81

= 39.01kg (g=9.81)

1. Calculation of Gear:

Diameter of the pinion (d) = 6cm Diameter of spur gear (D) = 12cmSpeed of the pinion (n) = 400rpm
Power (P) =0.035KW

CONCLUSION:

A Prototype which exhibits the expected results is developed the analysis of working with help of pneumatics system. Pneumatics cylinder lifts the trailer easily it carried out without a much effort. spur gear arrangement are used for rotating a trailer.

This mechanism is not only applicable in dumping trucks but also for various manufacturing industries. Thus, we have developed three axis pneumatic modern trailer which helps to know how to achieve a low cost automation. The working of this system is simple process.

Then, in future modified a system would be developed according to the applications.

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