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EXPERIMENTAL AND SIMULATED ANALYSIS OF THREE AXIS DUMPING TRAILER

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Abstract: Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in unloading the materials from the trailer. The trailer will unload the material in only one single direction. It is difficult to unload the materials in small compact streets and small roads. In our project these are rectified to unload the trailer in all three sides very easily. Now the project has mainly concentrated on this difficulty, and hence a suitable arrangement has been designed. Suchthat the vehicles can be unloaded from the trailer in three axes without application of any impact force. By pressing the Direction control valve activated. The compressed air is goes to the pneumatic cylinder through valve. The ram of the pneumatic cylinder acts as a lifting the trailer cabin. The automobile engine drive is coupled to the compressor engine, so that it stores the compressed air when the vehicle running. This compressed air is used to activate the pneumatic cylinder, when the valve is activated. Keywords: pneumatic cylinder, several automobile garages, methods, automobile engine drive, vehicle running

Keywords: Pneumatics, reciprocating compressor, valves, pistons.

1. INTRODUCTION

Automation can be achieved through computers, hydraulics, hydraulics, robotics, etc., of these sources, hydraulics form an attractive medium. Automation plays an important role in automobile. Nowadays almost all the automobile vehicle is being atomized in order to product the human being. The automobile vehicle is being atomized for the following reasons:

- To achieve high safety
- To reduce man power
- To increase the efficiency of the vehicle
- To reduce the work load
- To reduce the fatigue of workers
- To high responsibility
- Less Maintenance cost

The pneuma is the greek word which is having a meaning of breather wind. The pneumatics is the one of the branch of science that deals with the study of movement of air and its characterization. But pneumatics is generally understand that the application of air in the manufacturing sector and shipping industry as a working medium for controlling and driving of the machinery and the equipment. In the earlier days pneumatics system is used for performing the basic mechanical tasks in the ships but in the recent times, pneumatics plays a vital role in the development of automation technology. For operating the Pneumatic system compressed air is used as a working medium. Sufficient quantity of compressed air with required pressure should be made available depending on the need of the pneumatic system. There are various types of compressors are available in the world out of which reciprocating compressor is the one which is suited for all kinds of application. Depending on the need from small portable reciprocating compressor to very large reciprocating compressor is available. The compressor will load the air bottle with required size.

2. Pneumatic Three Axis Modern Trailer

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

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through the tube, and then pushes the pneumatic cylinder, so that the Lifting is applied at the time of Valve in "ON" position (i.e.-Emergency time). The 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. 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.

2.1 PRODUCTION OF COMPRESSED AIR :

Pneumatic systems operate on a supply of compressed air, which must be made available. In sufficient quantity and at a pressure to suit the capacity of the system. When pneumatic system is being adopted for the first time, however it wills indeed the necessary to deal with the question of compressed air supply. The key part of any facility for supply of compressed air is by means using reciprocating compressor. A compressor is a machine that takes in air, gas at a certain pressure and delivered the air at a high pressure.

Compressor capacity is the actual quantity of air compressed and delivered and the volume expressed is that of the air at intake conditions namely at atmosphere pressure and normal ambient temperature. Clean condition of the suction air is one of the factors, which decides the life of a compressor. Warm and moist suction air will result in increased precipitation of condense from the compressed air. Compressor may be classified in two general types:

2.2 RECIPROCATING COMPRESSORS:

Built for either stationary (or) portable service the reciprocating compressor is by far the most common type. Reciprocating compressors lap be had is sizes from the smallest capacities to deliver more than 500 m^3/min. In single stage compressor, the air pressure may be of 6 bar machines discharge of pressure is up to 15 bars. Discharge pressure in the range of 250 bars can be obtained with high pressure reciprocating compressors that of three & four stages. Single stage and 1200 stage models are particularly suitable for pneumatic applications , with preference going to the two stage design as soon as the discharge pressure exceeds 6 bar , because it in capable of matching the performance of single stage machine at lower costs per driving powers in the range.

2.3 AIR COMPRESSOR:

Directional control valves:

Directional control valve on the receipt of some external signal, which might be mechanical, electrical or a fluid pressure pilot signal, charges the direction of or stops, or starts the flow of fluid in some part of the pneumatic/hydraulic circuit.

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3. DESIGN & DRAWING

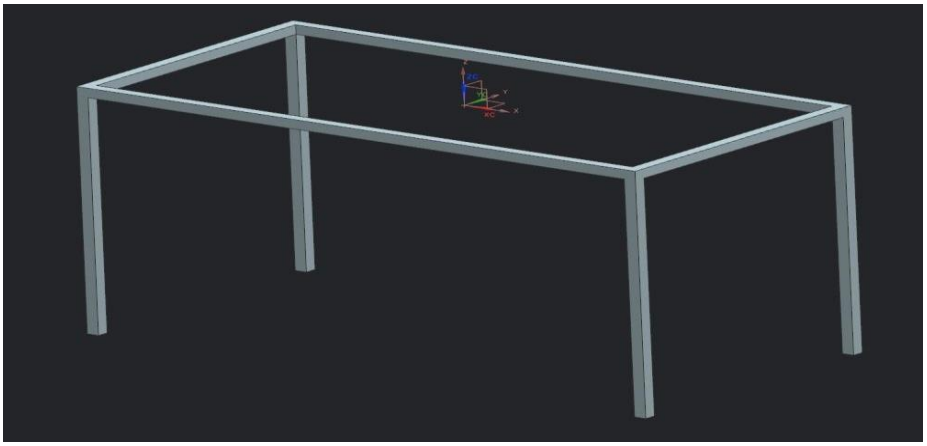

Fig. Frame

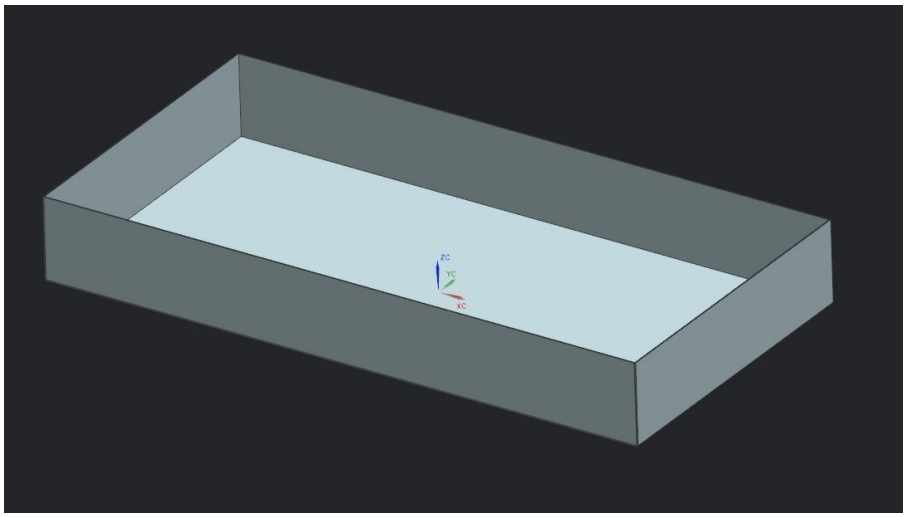

Fig. Tray

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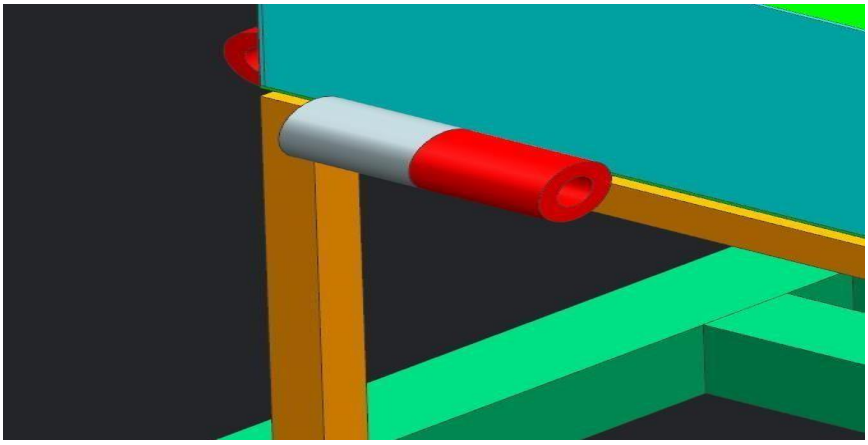

Fig. Hings

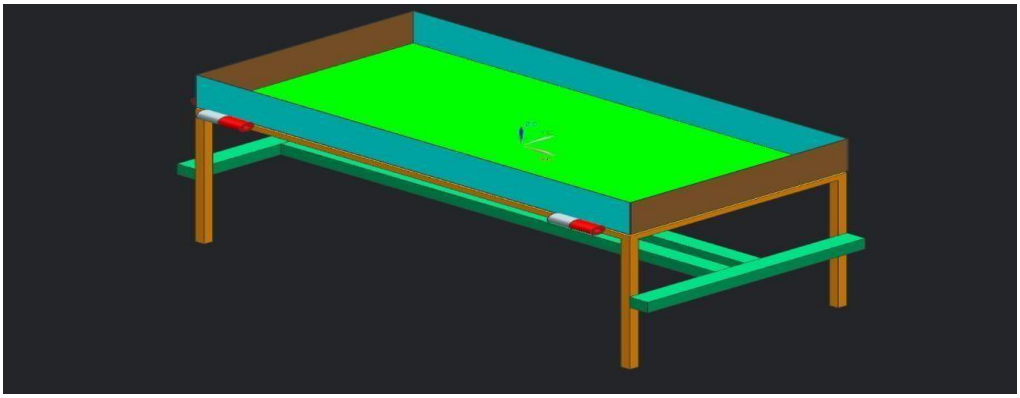

Fig. Top View of Trolley

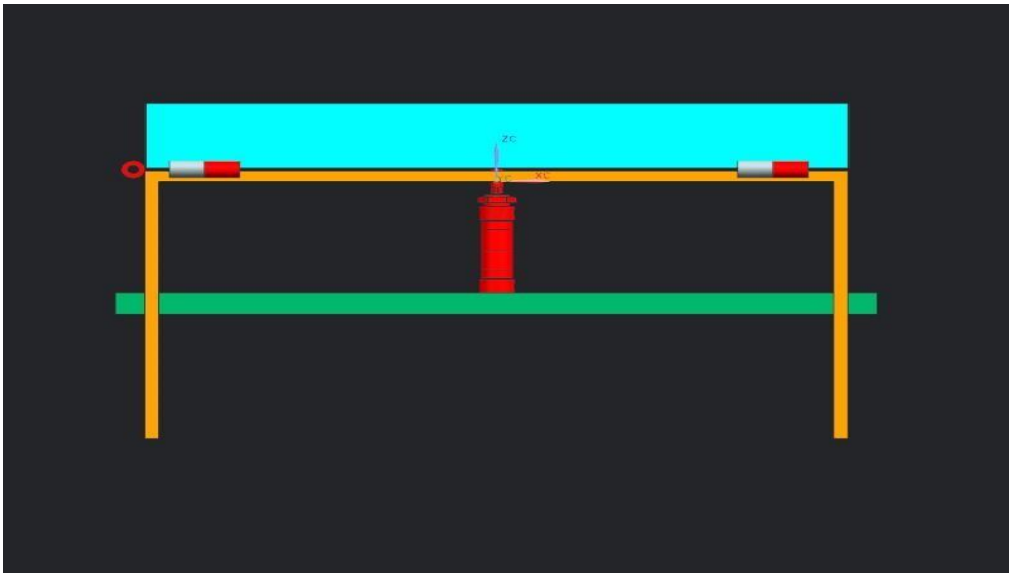

Fig. Front View of Trolley

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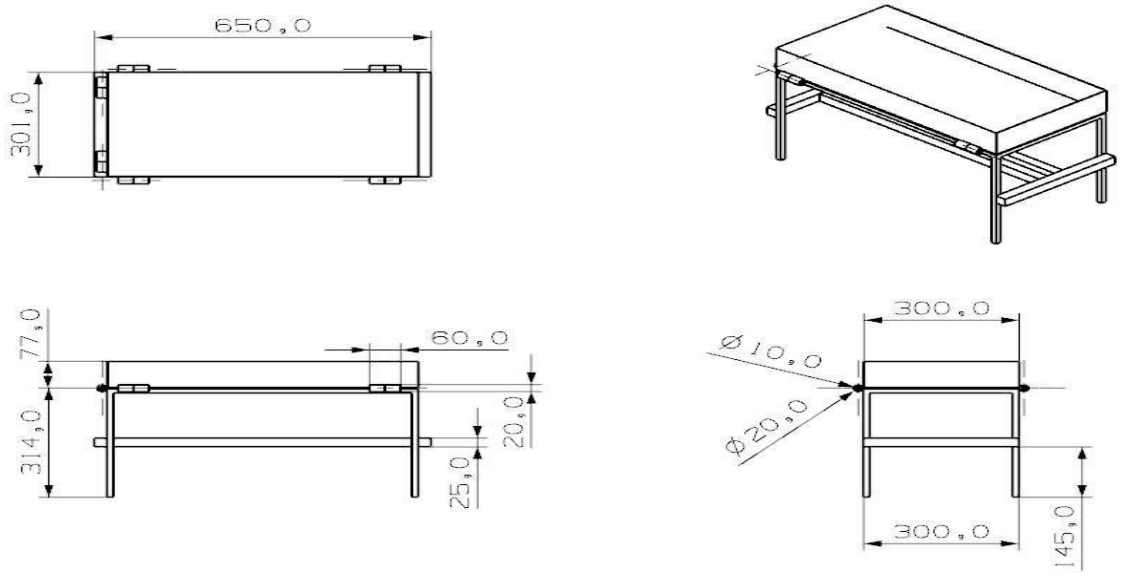

Fig. Drafted Dimesions of Model

4. WORKING PRINCIPLE

1. Since pneumatic circuit plays a vital role in this device, it is very necessary to explain the working of this circuit.
2. Initially starting with air compresses, its function is to compress air from a low inlet pressure (usually atmospheric) to a higher pressure level. This is an accomplished by reducing the volume of the air. Air compressors are generally positive displacement units and are either of the reciprocating piston type or the rotary screw or rotary vane types. The air compressor used here is a typically small sized, two-stage compressor unit. It also consists of a compressed air tank, electric rotor and pulley drive, pressure controls and instruments for quick hook up and use. The compressor is driver by a 1 HP motor and designed to operate in 10 – 100 PSI range. If the pressure exceeds the designed pressure of the receiver a release value provided releases the excesses air and thus stays a head of any hazards to take place.
3. Then having a pressure regulator where the desired pressure to the operated is set. Here a variable pressure regulator is adopted. Through a variety of direction control value are available, a hand operated spool value with detent is applied.
4. The spool value used here is 5 ports, 3 positions. There are two exhaust ports, two outlet ports and one inlet port. In two extreme positions only the directions can be changed while the Centro ore is a neutral position and no physical changes are incurred.
5. The 2 outlet ports are connected to an actuator (Cylinder). The pneumatic activates is a double acting, single rod cylinder. The cylinder output is coupled to further purpose. The piston end has an air horning effect to prevent sudden thrust at extreme ends.

PRINCIPLES OF WORKING:

1) The compressed air from the compressor reaches the direction control valve. The direction control valve changes the direction of flow according to the valve position handle.
2) The compressed air pass through the direction control valve and it is admitted into the front end of the cylinder block. The air pushes the piston for the lifting stroke. At the end of the lifting stroke air from the valve reaches the rear end of the cylinder block. The pressure remains the same but the area is less due to the presence of piston rod. This exerts greater pressure on the piston, pushing it at a faster rate thus enabling faster return stroke.
3) The stroke length of the piston can be changed by making suitable adjustment in the hand liver valve operating position.

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5. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The "THREE AXIS PNEUMATIC MODERN TIPPER" is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed a "THREE AXIS PNEUMATIC MODERN TIPPER" which helps to know how to achieve low cost automation. The operating procedure of this system is very simple, so any person can operate. By using more techniques, they can be modified and developed according to the applications.

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