STUDY BASED ON HYDRAULIC JACK

Prof.Ravi S. Gupta[1], Juned Pathan[2], Shaikh Imran[3], Khan Waliullah[4], Shaikh Ashfaq[5]

[1]Prof.Dept.of Civil Engineering, Rizvi College of Engineering, Mumbai Maharashtra, India
[2]Dept.of Civil Engineering, Rizvi College of Engineering, Mumbai Maharashtra, India
[3]Dept.of Civil Engineering, Rizvi College of Engineering, Mumbai Maharashtra, India
[4]Dept.of Civil Engineering, Rizvi College of Engineering, Mumbai Maharashtra, India
[5]Dept.of Civil Engineering, Rizvi College of Engineering, Mumbai Maharashtra, India

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ABSTRACT :- Now a days hydraulic jack are very common to lift heavy loads in construction industry. In this project we are study about different types of hydraulic jack used in day to day life, Application of hydraulic jack, Future scope of project etc. Hydraulic jack are used in construction industry as well as in garage to lift the cars. Most of time hydraulic jack used to reduced the work load.

I :- INTRODUCTION

Hydraulic jack is a device which is used to lift any type of heavy loads by applying a force by a hydraulic cylinder. A hydraulic jack uses a liquid fluid to push the object. Working of hydraulic jack are based on Pascal's Principle. If there are two cylinders connected with each other and when force applying to the smaller cylinder will result in the same amount of pressure in the larger cylinder. However, the larger cylinder has more area, the resulting force will be greater.

Hydraulic jack lift the loads by using the force created by the pressure in the cylinder chamber. Hydraulic jack are typically used for shop work, garage rather than as an emergency jack to be carried with the vehicles.

II. OBJECTIVES OF THE PROJECT :-

1) To reduce the work load

2) To increase the life of a tyre

3) To reduce the wear of the tyre

4) To reduce the transportation cost

5) It is helpful to lift cars and vehicles

III. DEFINITION OF HYDRAULIC JACK :-

A hydraulic jack is a device used to lift heavy load by applying low force. Now a days hydraulic jack are very common to use in our day to day life. Hydraulic jack is lighter in weight and easy to use. The device pushes fluid liquid against a piston pressure which is built in the jack's container. The jack is based on Pascal's law that the pressure of a liquid in a container is the same at all points.

IV. AIM & FUTURE SCOOPE :-

The present study is aimed at analysis and working of hydraulic jack.We are currently working on small hydraulic jack model but in future it can be used for heavy duty vehicles by making changes and also we are trying to make a hydraulic jack for heavy construction work.

1) To used in heavy construction work to reduced the work load.

2) Hydraulic pump can directly be connected to engine output instead of devising a motor.

V. HYDRAULICS BASICS :

PRESSURE :-

Pressure is force exerted against a specific area (force per unit area) expressed in psi (pounds per square inch), Bar or Pascal. Pressure can cause an resistance to compression, of a fluid that is being squeezed. A fluid is in any condition liquid or gas vapor. An instance of stress is the air that fills an car tyre. As a tyre is inflated, extra air is squeezed into it than it may hold. Pressure is described because the bodily pressure implemented on an item. The pressure implemented is perpendicular to the floor of gadgets according to unit place. The fundamental components for stress is F/A (Force according to unit place). Unit of stress is Pascals (Pa).

$$P = F/A$$

Pressure is defined as the physical force applied on an object. The force applied is perpendicular to the surface of objects per unit area.The basic formula for pressure is F/A (Force per unit area). Unit of pressure is Pascals (Pa).

FORCE :-

The force is an external agent which produces or tends to produce change in the state of rest, motion, shape or size of an object and is expressed in Newton. It is a vector quantity. The Newton is the SI unit for pressure An instance of pressure is to elevate a frame, to displace a frame from one region to the different, to forestall a shifting frame etc. The courting of pressure, stress, and place is as follows: F=P.A Where, F = pressure P = Pressure in psi A = Are V. and area is as follows:

$$F = P.A$$

F=P.A

Where,

F = force P = Pressure in psi

A = Are

V. PASCAL'S LAW :

Blaise Pascal formulated the basic law of hydraulics in the mid 17th century. Blaise Pascal discovered that pressure exerted on a fluid acts equally in all directions. His law states that pressure change at any point in a confined incompressible fluid is transmitted throughout the fluid such that the same change occurs everywhere.

According to this law, "In a closed liquid the pressure applied at any part is equally transmitted in all directions and in the same amount".

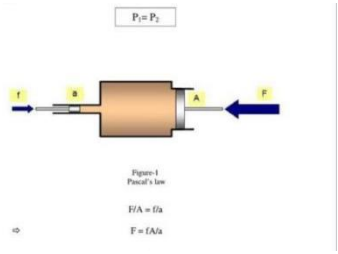

Fig.no:1Pascal Law

VI. WORKING OF HYDRAULIC JACK :

A hydraulic jack work on a liquid fluid. The liquid is incompressible, this is pressured right into a cylinder through a pump plunger. Oil is used given that it's far self lubricating and stable. When the plunger pulls lower back. It attracts oil out of the reservoir via a suction take a look at valve into the pump chamber. When the plunger forwards. It pushes the oil via a discharge take a look at valve into the cylinder. The suction valve ball is withinside the chamber and opens with every draw of the plunger. The discharge valve ball is out of doors the chamber and opens while the oil is driven into the cylinder. At this factor the suction ball withinside the chamber is pressured close and oil stress builds with inside the cylinder.

VII. TYPES OF HYDRAULIC JACK :-

(1) TROLLEY HYDRAULIC JACK :-

The hydraulic trolley jack are consider to be very safe. Trolley jack are very common and expensive but if well cased it can lost very long period. Trolley jack are quicker and easier to use it is simply a case of inserting the handle and pumping it until this cradle reaches the jacking point. To lower it back down, take the handle out and twist the little lever anti clockwise, taking care to do so steadily to lower the car slowly.

Fig.no:1 Trolley Hydraulic Jack

(2) BOTTLE HYDRAULIC JACK :-

Bottle jack are suitable for personal use. Bottle jack have loin shaped lift surface. In a bottle jack the position of piston is vertical and directly supports a bearing pad that contacts the object being lifted. With a single action piston the lift is somewhat less than twice the collapsed height of the jack, making it suitable only for vehicles with a relatively high clearance.

Fig.no:2 Bottle Jack

For lifting structures such as houses the hydraulic interconnection of multiple vertical jacks through valves enables the even distribution of forces while enabling close control of the lift.

VIII. APPLICATIONS OH HYDRAULIC JACK :-

Following are some applications of Hydraulic jack.

- Lifting a car or any other vehicle for changing its tires
- To lift heavy loads in industries
- Cranes are fitted with Hydraulic jacks to lift load
- They are used in lifting platforms
- They are used in material handling equipment
- They are used in earth moving equipment

IX. ADVANTAGES OF HYDRAULIC JACK :-

Following are some advantages of hydraulic jack.

- It occupies less space
- It is highly effective with heavy loads
- It lifts loads with the minimum of effort
- It is easier to use
- It is a bit lighter than screw jacks

X. DISADVANTAGES OF HYDRAULIC JACK :-

- It is susceptible to failure if the oil seals are worn out, this can cause serious problems
- It has relatively slow speed
- Hydraulic oil can emit unpleasant odor when become too warm due to overuse
- It can overheat fairly quick
- Hydraulic oil leak can cause soil and water pollution.

DESIGN METHODOLOGY :

Design and methodology of hydraulic jack involved the step as mentioned below :-

First the market review was identified by local surveying. Making the design of the prototype model of machine then the design was evaluated specification of the components of machine (hydraulic jack) were noted down. Observation and calculation were made and then major components of machine were assembled. Fabrication of in built hydraulic car jack was carried out later on testing and trials run where carried out

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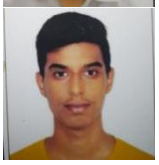
CONCLUSIONS:

The main aim of this project is to implementation of hydraulic jack to heavy vehicles, due to these heavy loads an vehicles the life of tyre will be reduced. Whenever the vehicles is in static condition the vehicle exerts point load on tyre,due to this load wear of tyre take place. Now,at this time present hydraulic jack increases the life of tyre and also it help in reduction of transportation cost. It also help in changing of tyres od vehicle or lifting heaving loads in factory as when required.

BIOGRAPHIES :-

Pathan Juned, Student of Rizvi College of Engineering, Mumbai, Maharashtra, India.



Shaikh Imran, Student of Rizvi College of Engineering, Mumbai, Maharashtra, India.

Khan Waliullah, Student of Rizvi College of Engineering, Mumbai, Maharashtra, India.

Shaikh Ashfaq, Student of Rizvi College of Engineering, Mumbai, Maharashtra, India.

Prof.Ravi.S.Gupta, Assistant Professor Rizvi College of Engineering, Mumbai, Maharashtra, India.