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Hydraulic Scissor Lift

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Abstract

This project work titled "FABRICATION OF HYDRUALIC SCISSOR LIFT" has been conceived having studied the difficulty in lifting the any type of material lick machines, vehicle etc.Our survey in the regard in several automobile garages, machines, revealed the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning. Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed. Such that the vehicle can be lifted from the floor land without application of any impact force.The fabrication part of it has been considered with almost case for its simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages.

Keywords: Hydraulic Scissor Lift, Fabrication, Automobile Garages, Reconditioning, Impact Force, Simplicity, Economy

Introduction

Any machine part cannot be moved to a desired position with application of less amount of external force. For placing a component in required location, the motion of component follows commonly horizontal or vertical direction. Many machines such as aerial lift, boom lifts, scissor lift, man lift, tele handler, towable lift are used to move machinery and manpower in different directions based on the requirement. A scissor lift is a portable, easily extended and compressed, safe operating machine used for transportation of medium sized components to its expected position. A scissor lift is machine which moves in vertical direction using criss-cross 'X' pattern scissor arms. The required elevation of the lift is achieved based on the number of criss-cross 'X' pattern scissor arms attached. The scissor lift mechanism is based on linked arms in a criss-cross 'X' pattern which can be folded and extended in exact direction similar to a pantograph. The upward motion is achieved by the application of pressure to the outside of the lowest set of supports, elongating the crossing pattern, and propelling the work platform vertically upwards. The platform may also have an extending 'bridge' to allow closer access to the work area.This device the hydraulic scissor lift has been developed to later the needs of industries, who are normally man powered with very minimum of skilled labours.In most of the garages the vehicles and machines are lifted by using screw jack or manually. This needs high man power and skilled labours.A scissor lift is type of platform that can move only vertically. With Today's development of science and technology, more and more new technologies were applied to material handling. This project aim was material handling and providing comfort to the operator. Scissor lift was easy to use/operate and it will be used conveniently at industries and other common places.

Need For Hydraulics

Hydraulic System:

In the development of the submarine from pre-war classes, many changes and improvements have occurred. One of the outstanding differences is the large variety of submarine devices which are now operated by hydraulic power. In early classes, there was no hydraulic system, and power requirements were met by means of air or electricity. Along with constantly improving submarine design has gone a constant extension and diversification of the use of hydraulic power.

Comparative Advantages of Hydraulic Power

Hydraulic systems possess numerous advantages over other systems of power operation. They are light in weight; they are simple and extremely reliable, requiring a minimum of attention and maintenance. Hydraulic controls are sensitive, and afford precise controllability. Because of the low inertia of moving parts, they start and stop in complete obedience to the desires of the operator, and their operation is positive. Hydraulic systems are self-lubricated; consequently there is little wear or corrosion. Their operation is not apt to be interrupted by salt spray or water. Finally, hydraulic units are relatively quiet in operation, an important consideration when detection by the enemy must be prevented.

Methodology

Deflection in scissors lifts can be defined as the change in elevation of all parts to the original size of entire assembly i.e from the floor to the top of platform deck, whenever loads are applied to or removed from the lift. Each component within the scissors lift has the potential to store or release energy when loaded and unloaded. Deflection takes place in all parts of scissor lift i.e Scissors Legs, Platform Structure, Base Frame, Pinned Joints. To reduce stresses and deflection in scissor lift the load should transfer equally between the two scissors arm pair. Base frames should be attached to the surface on which they are mounted.

Components and Description

The main components of the hydraulic scissor lift are

- Hydraulic Cylinder
- Ram
- Oil Tank
- Plunger Pump
- O-Ring
- Release valve lever
- Handle
- Plat form
- Hook
- Wheels
- Frame stand

Hydraulic Cylinder:

It is already briefly explained the above chapter.

RAM:

The ram is the lifting parts of this project. It is fixed to the L-angle flat form.

Oil Tank:

The oil tank is provided in the hydraulic jack inside. The hydraulic system requires the oil to work the system. So we have to provide the oil tank.

Hydraulic fluids

Almost any free-flowing liquid is suitable as a hydraulic fluid, as long as it will not chemically injure the hydraulic equipment. For example, an acid, although free-flowing, would obviously be unsuitable because it would corrode the metallic parts of the system. Water, except for its universal availability, suffers from a number of serious defects as a possible hydraulic fluid. One such defect is that it freezes at a relatively high temperature, and, in freezing, expands with tremendous force, destroying pipes and other equipment. Also, it rusts steel parts; and it is rather heavy, creating considerable amount of inertia in a system of any size.

Plunger Pump:

This is known as the input component of this project i.e. from the power is transmitted to the right of the cylinder, the oil is draw from the reservoir through pumping the handle provide at the right side of the pump plunger. The pump is welded on the right side of the cylinder. The length of stroke of the pump handle is depends upon the length of the plunger used. For this a flexible pivoting arrangement is provided behind the pump. The material used for pump block is mild steel.

O-Ring:

The “O” rings are fitted into the grooves of plunger pump to maintain perfect seal between the plunger and the outer wall. They are mostly made up of neoprene rubber.

Release Valve Lever:

It is made up of mild steel. This is used to release the hydraulic pressure, so that the ram downwards to its original position.

Handle:

This is also made upof mild steel. This handle is used to lifting the ram from downwards position to upward position. This handle is used to pull the plunger pump.

Flat Form:

It is made upof mild steel. This one end is fixed to the bed of hydraulic scissor lift lift with the help of bearing and bearing cap. Another end of this flat form is fixed to the J-type Hook. The hydraulic jack ram is pushing these plat form, so that it is fixed above the hydraulic jack.

Hook:

Hook is used to lifting the materials. This is look like the letter "J", so it is called J-Type Hook.

Wheels:

There are four wheels are fitted two in front and other two in back side of the hydraulic scissor lift lifting machine. This arrangement is used to move the hydraulic scissor lift lift machine from one place to another place easily.

Frame Stand:

It is made up of mild steel. This is the base of the hydraulic scissor lift lift machine.

Principle of Working

Principle

Pascal's Law:

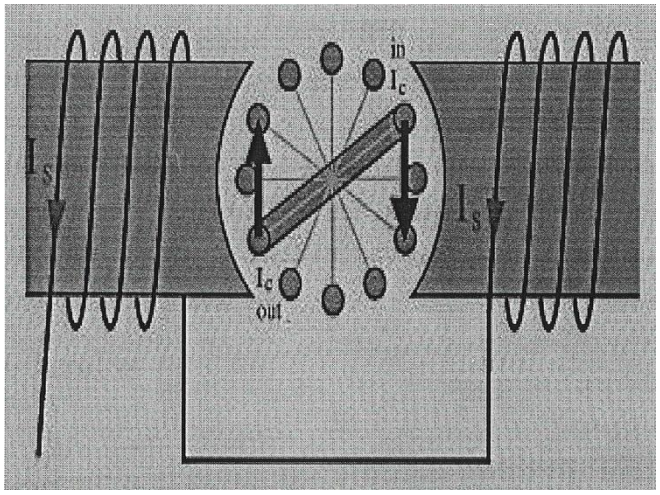
"It states that the intensity of pressure at any point in a fluid at rest is the same in all direction"

Working Principle:

Hydraulic jack consists of piston, piston rod, screw rod and hydraulic oil. The hydraulic jack reciprocating handle is move upward and downward continuously, so that the compressed oil goes to the hydraulic jack piston. The end of the piston rod the top plate is fixed. The compressed oil pushes the hydraulic jack piston forward. The L-Link plate is joint the top plate and flat form. The hydraulic jack is lifting the flat form totally.

Operation Instructions of Hydraulic Jack:

- Before operating the jacks first insert the notched end of the handle into the release valve, turn the operating handle clock wise until release valve is closed. Do not oner tighten the valve.
- Insert operating handle into the socket and the ram is steadily raised by the load is thus raised; the ram will stop rising when the required height is reached.
- Lower the ram by turning the release valve. Counter-clockwise with the notched end slacken it slowly when a load is applied or accidents would occur.
- Before operating, estimate the weight of the load. Do not overload the jack beyond its rated load.
- Select point of action according to the gravitational centre place the jack on the hardness ground If necessary, place a hard plank under the jacks so as to avoid tottering or falling during operation.
- When more than one jack are used at the same time it is important to operate the different jacks at an equal speed with equal load. Otherwise, there is danger of falling of the entire fixture.
- For best results use specifically blended jack oil. If such oil is not readily obtainable, the equivalent international oil specification is SAE 10.
- Violent Shocks must be avoided during the operation.
- Do not overload, Do not adjust the release value



A large percentage of AC motors are induction motors. This implies that there is no current supplied to the rotating coils (rotor windings). These coils are closed loops which have large currents induced in them. Three-phase currents flowing in the stator windings leads establish a rotating magnetic field in the air gap. This magnetic field continuously pulsates across the air gap and into the rotor. This is a single phase representation of windings and current flow

Results and Discussions

Advantages

- It requires simple maintenance cares
- The moving parts of this system are cooled by the oil itself used. Thus this project does not require any cooling arrangements.
- The loaded light machine or material can be easily.
- Checking and cleaning are easy, because of the main parts are screwed.
- Handling is easy

Disadvantages

- Size of the machine is high when compared to ordinary screw jack

Applications

- It is very much useful in auto-garage. This trolley hydraulic scissor lift lift is used for lifting the vehicles.
- Small scale industries

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 “HYDRAULIC SCISSOR LIFT” 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 "HYDRAULIC SCISSOR LIFT " which helps to know how to achieve low cost material loading/unloading methods. 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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