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"REVIEW ON DESIGN AND ANALYSIS HYDRAULIC SCISSORS LIFT"

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ABSTRACT

The following researcher describes the design as well as analysis of a simple aerial scissor lift. Conventionally a scissor lift or jack is used for lifting a vehicle to change a tire, to gain access t o go to the underside of the vehicle, to lift the body to appreciable height, and many other applications Also such lifts can be used for various purposes like maintenance and many material handling operations. It can be of mechanical, pneumatic or hydraulic type. The design described in the paper is developed keeping in mind that the lift can be operated by mechanical means so that the overall cost of the scissor lift is reduced. Also such design can make the lift more compact and much suitable for medium scale work. Finally the analysis is also carried out in order to check the compatibility of the design values.

Key Words: ***A****erial Work Platform, Mechanical, Jack , Material Handling , Von Misses Stress, Scissor Lift.*

I. INTRODUCTION

The most common industrial lift is the hydraulic scissor lift table. This may seem like complicated piece of equipment, but in actuality hydraulic lift tables are really very simple in design. Hydraulic scissor lift tables are comprised of five major components:

- **Platform**
  This is the top of the lift table where lifted product sits. It can be supplied in a variety of sizes.

- **Base**
  This is the bottom of the structure that rests on the floor. It contains the track the scissor legs travel.

- **Scissor legs**
  These are the vertical members that allow the platform to change elevation.

- **Hydraulic cylinder**

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The most common industrial scissors lifts are actuated by one, two, or three single acting hydraulic cylinders. These allow the lift table to lift and lower.

- **Motor or Power Source**
  Most hydraulic scissor lifts are powered by either an electric or air motor. These provide power to the hydraulic pump which actuates the lift table.

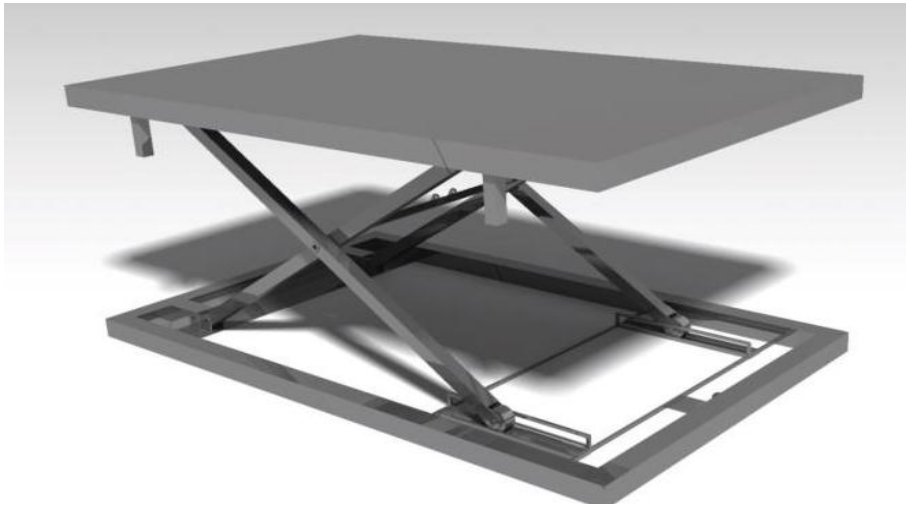

Fig.1

II. APPLICATIONS OF HYDRAULIC SCISSOR LIFT

A scissor life table has many useful purposes. The applications of a scissor lift table include a variety of things, but the platform is ultimately designed to help lift and raise heavier objects. The industrial lift is most often seen in behind the scenes of retail establishments and warehouses, although manufacturing engineers are always redesigning.

Fig 2

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III. LITERATURE SURVEY

3.1 REVIEW OF RELATED LITERATURE

Mans quest for improvement has never been satisfied. The drive towards better and greater scientific and technological outcome has made the world dynamic. Before now, several scientist and engineers have done a lot of work as regards the scissors lift in general. A review of some of that work gives the design and construction of a hydraulic scissors lift a platform.

[1] "Design, Manufacturing & Analysis of Hydraulic Scissor Lift", Gaffar G Momin, et al This Paper describes the design as well as analysis of a hydraulic scissor lift. Conventionally a scissor lift or jack is used for lifting a vehicle to change a tire, to gain access to go to the underside of the vehicle, to lift the body to appreciable height, and many other applications Also such lifts can be used for various purposes like maintenance and many material handling operations. In our case our lift was needed to be designed a portable and also work without consuming any electric power so we decided to to use a hydraulic hand pump to power the cylinder Also such design can make the lift more compact and much suitable for medium scale work. Finally the analysis of the scissor lift was done in ansys and all responsible parameters were analyzed in order to check the compatibility of the design values.

[2] "Design, Analysis and Development of Multiutility home equipment using Scissor Lift Mechanism", Divyesh Prafulla Ubale, et al. The conventional method of using rope, ladder lift getting person to a height encounter a lot of limitation (time and energy consumption, comfort ability, amount of load that can be carried etc.) also there may be a risk of falling down in case of ladders hence hydraulic scissors lift is designed to overcome all these difficulties. Also the equipment should be compact and cost effective. Lifting height achieved by scissor mechanism is of 1 m from bottom level. Buckling and bending failure analysis of scissor is also done in this paper. With ceaseless development of science and technology, more and more new technologies are applied to lifting appliance design. This project aims at making equipment multifunctional, easy to use/operate, cost effective and portable so that it will be used conveniently at home and may be used in hospitals, hotels and other common places. A scissor lift mechanism is a device used to extend or retract a platform by hydraulic means. The Extension or displacement motion is achieved by the application of force by hydraulic cylinder to one or more supports. This force results in an elongation of the cross pattern. Retraction through hydraulic cylinder is also achieved when lowering of platform is desired.

[3] "Design and Analysis of Hydraulic Pallet System in Chain Conveyor", Setu Dabhi, et al, This paper describes the design and analysis of hydraulic pallet system in a chain conveyor used in automobile industries for loading and unloading of materials .The system, consisting of a hydraulic power pack, a chain conveyor, a pallet system is automatically controlled with the help of PLC. Our aim is to design a feasible and a cost effective mechanism to lift the given load using hydraulic actuation and listing merits of hydraulic actuations over pneumatic and servo actuation. The design module pallet along with mechanism used for balancing is design in CAD software CATIA and analyzed for variable loading in ANSYS. Comparing the three systems, we find pneumatic system rather advantageous over the other two. Merits of pneumatic system are listed below: Simplicity in design, Cost effective, Safety and reliability In spite of the above advantages, it was found that hydraulic system could handle more load as compared to the previous, and the back pressure so developed in hydraulic actuation could efficiently be handled as compared to pneumatic during movement of the pallet ,so as maintaining stability and reducing the amount of vibrations. Considering the involvement of the third system , where actuation of the pallet is via servo motors is out of question ,as its highly costly, requires frequent maintenance, and its load bearing capacity is also low as compared to others. The main advantage of using hydraulic system in our application over pneumatic other than the load bearing capacity is the fluid in hydraulic system is basically incompressible, hence it leads to minimum springing action. So even if the load on the pallet is non uniform, the actuators will balance the pallet in such a way so as to minimize the chances of over throwing the load. This sort of safety measure is difficult to achieve using pneumatic actuation, and even in case of uniform loading the vibration encountered is much more.

[4] "Finite Element analysis of Frame of Hydraulically Operated Beam Lifting Machine" S. B. Naik, et al A special type of beam lifting device is designed for textile industries. The machine is hydraulically operated and is having two frames one horizontal and another vertical. Finite element analysis of the frames is done by ANSYS software considering the need of the textile industries, a special purpose machine has been designed to lift the beams in textile industries. The finite element analysis of the frame of this machine is done to get the idea of the stresses & deformation of the structure in order to modify the same if needed.

[5] Design and analysis of an aerial scissor Lift, M. Abhinay, P.Sampath Rao
Aerial scissor lifts are generally used for temporary, flexible access purposes such as maintenance and construction work or by fire-fighters for emergency access, etc which distinguishes them from permanent equipment such as elevators. They are designed to lift limited weights usually less a ton, although some have a higher safe working load (SWL).

[6] Design & Analysis of Hydraulic Scissor Lift" M. Kiran Kumar1, J. Chandrasheker, Mahipal Manda , D.Vijay Kumar4 . This paper is mainly focused on force acting on the hydraulic scissor lift when it is extended and contracted Hence, the analysis of the scissor lift includes Total deformation load, Equivalent stress, was done in Ansys and all responsible parameters were analyzed in order to check the compatibility of the design value. The computational values of two different materials such as aluminum and mild steel are compared for best results.

IV. CONCLUSION

Static analysis is helpful for understanding and improving the operating performance of the hydraulic scissor lift static and dynamic analysis have very important significance for the life of the specific parts. Specific process will be no longer introduced. This concept of static is followed by number of researches for their application. This review provides the background of hydraulic scissor lift to carried out further research work in same era.

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