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“A REVIEW ON HYDRAULIC SCISSORS LIFT DESIGN”

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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 to go to the underside of the vehicle, to lift the body to required height, and many various applications such as 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.

KEYWORD: Aerial Work Platform, Mechanical, Jack, Material Handling, Von Misses Stress, Scissor Lift.

I. INTRODUCTION

The most common device used for lifting in industries is the hydraulic scissor lift table. Scissor lift table may seem like complicated equipment, but in actuality hydraulic lift tables are really very simple in design. Hydraulic scissor lift tables are comprised of five major components:

- **Platform**
It is the top of the lift table where lifted product is carry. It can be supplied in a variety of sizes.
- **Base**
It 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**
The scissors lifts are actuated by one, two, or three single acting hydraulic cylinders. Hydraulic cylinders allow the lift table to lift and lower
- **Motor or Power Source**
The hydraulic scissor lifts are powered by either an electric or air motor. They provide power to the hydraulic pump which actuates the scissor lift table.



Fig.1

II. APPLICATIONS OF HYDRAULIC SCISSOR LIFT

A scissor lift table has many useful applications. The scissor lift table has a variety of parts, but the platform is specifically designed to help lift heavier objects. The industrial lift is mostly used in retail industries and warehouses, although manufacturing engineers are always redesigning.



Fig.2

III. LITERATURE SURVEY

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 is on design and analysis of a hydraulic scissor lift. Conventionally a scissor lift or jack is used for lifting a automobile for maintenance, to gain access to go to the lower of the automobile, or to lift the body to appreciable height, and many other applications also lifts can be used for various applications like maintenance and many material handling operations. In this case scissor lift was needed to be designed a portable and work without consuming any electric power so they decided to use a hydraulic hand pump to supply power to the cylinder also such design can bring the lift

more compact and 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 traditional method of using rope, ladder lift getting person to a height bear 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 or broke down in case of ladders hence hydraulic scissors lift is designed to overcome all these problems. Also the equipment should be compact, cost effective and economical. They designed the scissor lift whose lifting height achieved by scissor mechanism is of 1 m from bottom level. Buckling and bending failure analysis of scissor is also shows in this paper. With constant development of science and technology, more and more new technologies are used to lifting device design. The aim of this project is making equipment multifunctional, easy to use and operate, cost effective and portable so that it will be used easily at home and may be used in hospitals, hotels and other common places with various application. 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 used in chain conveyors. Such a system is used in numerous industries for loading or unloading of materials or to move items between places. The major components of this system are- an electrical hydraulic convertor, a sequence conveyor and a pallet system. A PLC system is used for mechanical control of the pallet. This paper aims at designing a low cost and feasible hydraulic actuated lift mechanism. This paper also compares the hydraulic propulsions with pneumatic and servo actuations. This paper concluded that hydraulic systems had more load carrying capacity and better vibration reductions on account of the back pressure developed in the system. Another important observation was reduction in spring action which nullifies the overthrowing in case of non-uniform load. This makes the hydraulic system safer than the pneumatic or servo controlled system.

[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 operated hydraulically. Beam lifting device having two frames one horizontal and another vertical. Finite element analysis of the frames is done on ANSYS software considering the requirement of the textile industries. 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 information of stresses & deformation of the structure in order to modify the same if needed.

[5] Design & Analysis of Hydraulic Scissor Lift” M. Kiran Kumar¹, J. Chandrasheker, Mahipal Manda , D.Vijay Kumar⁴ . This paper is especially focused on force working on the hydraulic scissor lift once it's extended and contracted thus, the analysis of the scissor lift includes Total deformation load, Equivalent stress, was done in Ansys and every one accountable parameters were analyzed so as to ascertain the compatibility of the design value. The calculated values of aluminum and mild steel are compared for best results.

[6] Design, Analysis and Development of Hydraulic Scissor Lift, Prof. Sangram S. Bhosale, Suraj B. Dhanawade. The paper describes the design as well as analysis of hydraulic scissor lift. The problem of material handling for storage industry, goods were in cartoons which are likely to be perished if not loaded to cold room in stipulated time. The aim of this paper is design, analysis and to fabricate a hydraulic scissor lift which lifts maximum 2000kg load with minimum time. Lifting height achieved by scissor mechanism is of 2 m from bottom level. This paper is for design, analysis and to fabricate a hydraulic scissor lift which operates efficiently and consistently and it should be compact and cost effective. Deformation analysis, beam 188 reaction forces, equivalent stress analysis of scissor were done by ANSYS design software and buckling and bending failure analysis were also done.

[7] Optimisation in Design of Mechanical Scissor Lift, Deepak Rote, Kaustubh Kolhe, Vinit mangaonkar, Vinay shinde, , This paper describes the design as well as analysis of a mechanical scissor lift which works on the principle of

screw jack. Conventionally, a scissor lift or jack is used in many automobile industries for many applications and also for many material handling operations. The scissor lift can be of mechanical, pneumatic or hydraulic type. This type is separated according to the lifting mechanism used in construction of lift. The lift is selected such that calculation regarding the allowable maximum deflection must not be exceeded. To analyze, solid modeling and computer simulations were involved using CAE software. Several linear static FEA analyses have done to get accurate results. Also these results can be verified by using manual calculations simultaneously. The result shows that the designed component of scissor lift is still in the acceptable range. With such a design of a scissor lift, the complexities in the design can be reduced. With this design process, the manufacturing time of a scissor lift can be reduced. Such a design can be widely used in automobile industries and for production in other industries.

[8] Design and analysis of an aerial scissor lift, Jaydeep M. Bhatt, Milan J. Pandaya. This paper describes the design furthermore as analysis of a simple aerial scissor lift. Aerial scissor lifts are often used for varied functions like maintenance and plenty of material handling operations in varied industries. It are often of mechanical, pneumatic or hydraulic type. the design described within the paper is developed keeping in mind that the lift are often operated by mechanical means that in order that the general value of the scissor lift reduced. Additionally such design will build the lift additional compact and far appropriate for medium scale work. Finally the analysis is additionally carried out so as to check the compatibility of the design values. With such a design of an aerial scissor lift, the complexities within the design are often reduced. additionally with such design parameters, the producing time of an aerial scissor lift are often reduced. Therefore such design are often used for production in industries. The analysis on ANSYS has additionally show that the design is safe underneath accepted parameters. Additionally more modifications are often optimizing the design and more analysis also can be carried out by finding alternative necessary parameters relating to aerial scissor lifts.

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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