

## REVIEW ON INDUSTRIAL SCISSOR LIFT

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**Abstract:** This paper evaluated the design and analysis of industrial Scissor Lift. It gives the brief description of its types, working, system requirements and design methodologies. This paper explains the need of designing jack to satisfy system requirement by selecting proper drive system according to application.

**Keywords:** Hydraulic jack, Scissor lift, Design, FEA, FBD, Safety.

### I. INTRODUCTION

Scissor lift is a material handling equipment used in industry for variety of applications. It is driven by mechanical, hydraulic and pneumatic power. For heavy duty application hydraulic drive is preferred to achieve desired result. Some of material handling equipment used in industries are scissor lifts, scissor jack and hoisting machinery. These equipment are used according to system requirement for a particular process in industry. Scissor lift is used as a lifting platform for heavy load application. It consists of system of levers and hydraulic cylinders on which the metal is able to move in the vertical plane. The movement is achieved by crisscross links, folding support called scissor mechanism. It is widely used to lift building objects, maintenance and construction, stacking process etc. Some of the applications of hydraulic jack are pallet handling, vehicle loading and work positioning, automatic production lines, distribution lines and so on.

Design & Analysis of the Hydraulic lift that should withstand maximum load without failure in working condition. Carrying capacity, height of close table, height to be raised, stroke, table encumbrance Lifting time, weight, working pressure, power, assembly rate are some prime design considerations to design a scissor lift to satisfy system requirements. Scissor lifts are mainly classified on the basis of energy used as mechanical lifts, hydraulic lifts and pneumatic lifts. It is also classified on the basis of mounting condition as permanent and portable lifts. Scissor lifting platform is example of permanent lift and scissor jack, hoisting machinery are examples of portable lifts.

### II. LITERATURE REVIEW

Scissor lift is multifunctional, efficient and economical material handling system widely used in industry. The research paper has provided design methodology of scissor lift. Material selection is the main consideration in designing any component as it determines the strength and fatigue life of the system. Comparison of various materials and their ANSYS results are given. Modeling is carried out using various 3D software like CREO, Solid works and CATIA. Analysis is carried out using software ANSYS.

[1] "Design of hydraulic scissors lifting platform", Georgy Olenin.

This paper described the design and analysis of scissor lifting platform for both highest and lowest position. Also the working principle of scissor lift and types are discussed. Along with design the faults occurring during operation of scissor lift and their methods of elimination are provided in order to improve the productivity. Design calculations are carried out by using concept of free body diagram and standard formulae's. Various cases of cylinder mountings are given which depends on angle of inclination of cylinder and the transferred force by cylinder on scissor arms. The analysis is carried out with the help of shear force diagram and bending moment diagram.

[2] "Design & Analysis of Hydraulic Scissor Lift" M. Kiran Kumar.

This paper is mainly focused on force acting on the hydraulic scissor lift when it is raised and lowered. Material selection plays a key role in designing a machine and also impact on several factors such as durability, reliability, strength, resistance which finally give rise to increase the life of scissor lift. Modeling is carried out using SolidWorks software and analysis of system is completed using ANSYS. The analysis of the scissor lift includes total deformation load, Principle stress, Von-mises stress and fatigue life. The computational values of two varieties of materials such as aluminum and mild steel are collated for best results.

[3] "Design, Manufacturing & Analysis of Hydraulic Scissor Lift", Gaffar G Momin.

This Paper has given the design as well as analysis of a hydraulic scissor lift. The design developed keeping in mind that the lift can be operated by mechanical means by using pantograph so that the overall cost of the scissor lift is minimized. Hydraulic hand pump is used to power the cylinder. Also such design is able to make the lift more compact and much suitable for medium scale work. Finally the analysis of the scissor lift was completed in ANSYS and all responsible parameters were analyzed to check the compatibility of the design values.

### III. WORK METHODOLOGY

In above literature study, design methodologies of scissor lift using different drive systems are discussed. The analysis is carried out to meet the functional requirements for a particular system. The scissor lift can also be used to provide hydraulic drive to conventional mechanical fixture for cylinder assembly in industry. It is designed to solve center matching problem caused by two conventional fixtures used for cylinder assembly. With the help of scissor lift required raised height of cylinder is achieved in order to complete the

assembly process in least time and efforts by labors is minimized. The proposed design of scissor lift is provided as below-

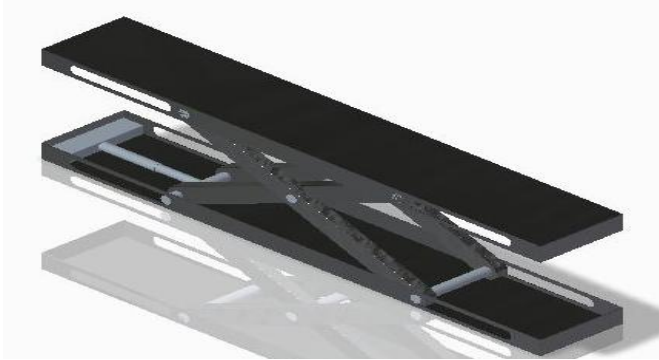


Fig : Scissor lift Catia model

#### IV. CONCLUSION

This paper has provided the design methodologies of scissor lift. Also industrial need and the application of scissor lift are discussed. Various 3D software are used for modelling .The analysis is carried out using ANSYS software. Comparison of various material and their results are given which leads to proper material selection to meet the system requirements.

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