

# FABRICATION OF HYDRAULIC FLOOR CRANE

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**Abstract:** A hydraulic floor crane is a mechanical lifting device used to lift and move heavy loads in workshops, garages, and industrial environments. The primary objective of this project is to design and fabricate a portable and efficient crane utilising a hydraulic jack system. The crane works on the principle of Pascal's law, where pressure applied to a confined fluid is transmitted equally in all directions, allowing heavy loads to be lifted with minimal effort. The fabricated crane consists of major components such as a base frame, vertical support column, boom arm, hydraulic jack, wheels, and lifting hook.

**Keywords:** Hydraulic System, Hydraulic Floor Crane, Pascal's Law, Material Handling, Hydraulic Jack, Lifting Mechanism, Fabrication, Mechanical Design.

## 1. INTRODUCTION

A hydraulic floor crane is a lifting device used in workshops, garages, and industries to lift heavy loads such as engines, machines, and equipment. It works using a hydraulic jack system, which multiplies force to lift heavy objects with less manual effort. The fabrication of a hydraulic floor crane involves designing and assembling components such as the base frame, boom, hydraulic jack, wheels, and lifting hook to create a portable and efficient lifting machine.

### 1.1 PROBLEM STATEMENT

In many workshops, garages, and small industries, lifting and moving heavy components such as engines, machinery parts, and equipment is a difficult and time-consuming task. Manual lifting methods require more human effort and may cause worker fatigue, injuries, and accidents.

### 1.2 OBJECTIVES

The main objective of this project is to design and fabricate a hydraulic floor crane that can safely lift and move heavy loads in workshops and industries. Another objective is to create a portable and cost-effective lifting device using a hydraulic system based on Pascal's law.

## II. COMPONENTS AND DESCRIPTION

### Frame

The base frame is the main supporting structure of the hydraulic floor crane. It is usually made of strong mild steel to provide stability and strength. The base supports all other components of the crane and helps distribute the load evenly. It also holds the wheels that allow the crane to move easily on the floor.



Figure 1. frame

### Hydraulic jack

The hydraulic jack is the main lifting mechanism of the crane. It works on the principle of Pascal's Law. When force is applied to the jack handle, hydraulic pressure is created inside the fluid, which moves the piston and lifts the boom arm along with the load.



Figure 2. Hydraulic jack

### Hook

The hook is an important component of the hydraulic floor crane used to hold and lift the load safely. It is attached to the end of the boom arm with the help of a chain or shackle. The hook is usually made of high-strength forged steel to withstand heavy loads without bending or breaking.



**Figure 3.** Hook

### Boom (or) arm

The boom is the main lifting arm of the hydraulic floor crane used to raise and support the load. It is usually made of strong steel or mild steel to handle heavy weights without bending. One end of the boom is connected to the vertical support column, while the other end carries the hook and chain used to hold the load.



**Figure 5.** Boom (or) arm

### Chain

The chain is an important component used to connect the load to the hook in a hydraulic floor crane. It is typically made of high-strength alloy steel to safely support heavy loads. The chain helps secure the load to the crane and allows for slight flexibility during lifting.



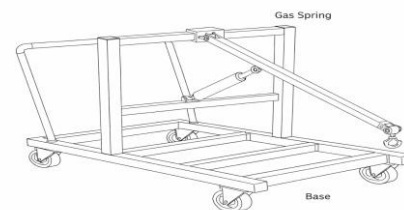
**Figure 4.** chain

### Nut & Bolt

The nut and bolt are important fastening components used in the fabrication of a hydraulic floor crane. They are used to join and secure different parts of the crane, such as the base frame, boom arm, support column, and other structural components. Proper tightening of nuts and bolts ensures the stability, safety, and durability of the hydraulic floor crane structure.



**Figure 5.** Nut & Bolt



**Figure 7.** CAD model

### WORKING PRINCIPLE

The hydraulic floor crane works based on Pascal's Law, which states that pressure applied to a confined fluid is transmitted equally in all directions. When the operator pumps the handle of the hydraulic jack, pressure is created in the hydraulic fluid inside the cylinder. This pressure moves the piston upward, which pushes the boom arm of the crane.

### III. ADVANTAGES

The hydraulic floor crane offers several advantages in lifting and handling heavy loads. It requires less manual effort because the hydraulic system multiplies the applied force, making lifting easier. The crane is portable and easy

to move due to the wheels attached to the base frame. It provides safe and stable lifting of heavy components such as engines and machinery parts.

#### IV. APPLICATIONS

Hydraulic floor cranes are used in automobile workshops to remove and install vehicle engines. They help in lifting and positioning heavy machine parts during industrial maintenance. These cranes are used for material handling in factories and workshops. They assist in assembling and disassembling heavy equipment in manufacturing units.

#### FUTURE SCOPE

Hydraulic floor cranes can be improved with electric or battery-powered hydraulic systems for easier lifting. Future designs may include lightweight high-strength materials to increase portability and durability. The integration of smart sensors and load indicators can enhance safety and prevent overloading. Foldable and compact designs can make cranes easier to store and transport. Hydraulic floor cranes may be integrated with automation and robotic systems in modern industries.

#### CONCLUSION

The fabrication of a hydraulic floor crane offers an efficient and economical solution for lifting and handling heavy loads in workshops and industrial settings. It operates on the hydraulic principle, which enables the lifting of heavy objects with less manual effort. The crane is portable, easy to operate, and reliable for various maintenance and assembly tasks. Proper design, quality materials, and safe operation ensure high performance and durability.

#### REFERENCES

1. Michael G. Kay, "Material Handling Equipment," 2012. Okolie Paul Chukwulozie et al., "Steel Work Design and Analysis of a Mobile Floor Crane," *British Journal of Applied Science & Technology*, 2016.
2. J. O. Oyejide et al., "Design and Fabrication of Single-Acting Hydraulic Crane," *IOSR Journal of Mechanical and Civil Engineering*, 2018.

#### BIOGRAPHIES



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